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Fog collectors and collection techniques

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The earth sciences taught that due to the occurrence of water in three phases: gas, liquid and solid, solar energy keeps the hydrological cycle going, shaping the earth surface while regulating the climate and thus allowing smart technologies to interfere in the natural process by rerouting water and employing its yield for natural and human environments' subsistence.

This is the case of traditional fog collectors implemented by several researchers along the Atacama Desert since late '50s such as vertical tensile mesh or macro-diamonds structures. Nevertheless, these basic prototypes require to be upgraded, mainly through new shapes, fabrics and frameworks' types by following the principles of lightness, transformability, portability and polyvalence. The vertical canvas of conventional fog collectors contain too much stressed at each joints and as result it became vulnerable.

Our study constitutes a research by design of two fog-trap devices along the Atacama Desert. Different climatic factors influence the efficiency of fog harvesting. In order to increase yield of collected fog water, we need to establish suitable placements that contain high rates of fog's accumulation. As important as the location is also the building reliability of these collectors that will be installed. Their frames and skins have to be adjustable to the wind direction and resistant against strong winds and rust. Its fabric need to be more hydrophobic, elastic and with light colours to ease dripping/drainage and avoid ultra-violet deterioration. In addition, meshes should be well-tensed and frames well-embraced too.

In doing so we have conceived two fog collectors: DropNet© (Höhler) and FogHive© (Suau). These designs explore climatic design parameters combined with the agile structural principles of Tensegrity and Geodesic widely developed by Bucky Fuller and Frei Otto. The research methods mainly consisted of literature review; fieldwork; comparative analysis of existing fog collection's techniques and climatic design simulations.

DropNet© is a lightweight fog collector kit -a standing-alone web- resistant against very strong winds. It is constructed with an elastic mesh according to the required tension. Apart from this, it is ease to be transported, assemble and relocated due to its tent-like construction. As a flexible construction it can be installed on flatten or uneven grounds.

FogHive© is a modular space-frame, fully wrapped with a light waxy mesh, that can collect water fog and also performs like a shading/cooling device and a soil humidifier for greenery and potential inhabitation. Its body consists of a deployable polygonal structure with an adjustable polyvalent membrane which performs as water repellent skin (facing prevailing winds) and shading device facing Equator. In addition, a domestic wind turbine is installed within the structural frame to provide autonomous electrification.

Both models have great applicability to provide drinking water in remote place and also irrigating water to repair or re-establish flora. Water collector, filtering (purification) and irrigation network are designed with appropriate materials and techniques.