

Water of camanchacas and sustainable Building in the Atacama Desert: Project for the degree School of Architecture North Catholic University Antofagasta, Chile

José Guerra Ramirez¹ and Christian Games Diaz²

¹Departamento de Arquitectura, Universidad Católica del Norte, Antofagasta, Chile

ABSTRACT: The present document gives account of the results of the environmental formation of the students of the school of architecture of the North Catholic University. The project for degree "Institute of Botanical Investigations for the national reserve Morro Moreno" approaches the theme of the sustainability of the building through utilization of the hydric resource (camanchacas) and the incorporation of the device "to catch fogs" in the conformation of the architectonic space. In this manner the project establishes clearly relations of environmental and landscape integration and proposes architectonic elements of environmental control, energetic efficiency of the facilities in the pickup and water consumption, selection of environmentally correct materials for an architecture assumed properly for its desert condition

Keywords: Hydric resource, Camanchacas, sustainable architecture, Comfort, Energetic efficiency

1. INTRODUCTION

The present article is an example of the preoccupation by the environmental formation of the student of the School of Architecture of the North Catholic University. The development of a responsible attitude for the environment is a characteristic of identity of these professionals, aiming to establish relations of respect and integration with the surroundings as a criterion to construct a maintainable architecture

The project for degree "Institute of Botanical Investigations for the national reserve Morro Moreno"; approaches the theme of the use and utilization of the renewable resources in the architecture of desert zones and especially sensible theme is the possibility to utilize the hydric

potential of clouds or camanchacas of the coast.

It is a past part to evaluate the Mejillones Peninsula as Environmental Patrimony that counts on a notable landscape image and a singular ecosystem of great diversity characteristic of the coastal desert.



Figure 1: Morro Moreno and evolution of the camanchacas

Spatially the hillock raises a characteristic vertical zonación: A high “humid” zone directly influenced by the camanchacas, and another low “dry” zone, affected by the cloud, but conditioned to its coast, it has enabled to arise settlement of fishermen and the construction of equipment designated to the productive, touristic and scientific development..

3 PROJECT PROPOSAL

3.1 Constructive-structural System

The macro diamond cath-fog patent 611115 has been selected, since its constructive structural system offers aspects of modulation, non-deformable geometry, tridimensionality capable of coalescence, looseness, good behavior to the traction, resistance to the wind and transport appropriate to the architectural conception.

3.2 Spatial-environmental system

1. In increasing the height of the collector surface, better yields of pickup are obtained, by this a model Catches fogs integrated to the structure of the cover was thought [Espinoza 1983]

2. In filtrating the cloudy mass, the yields of pickup, could be notably increased with traps [Zuleta, 1981]

3. By means of tridimensionality, the resistance of the collector structure could be improved against strong winds and would generate a major surface of pickup device associated with that filtrated of the cloud. [Espinoza 1983]

4. Through the inclination of the panel collector the efficacy of the yields, based on the coalescence law could be improved, allowing to stimulate the union of droplets to form a major drop [Espinoza 1981]

5. In increasing the surface superior of pickup of the system major yields would be

obtained by major amount of surface, assimilating themselves to the foliage of the trees.

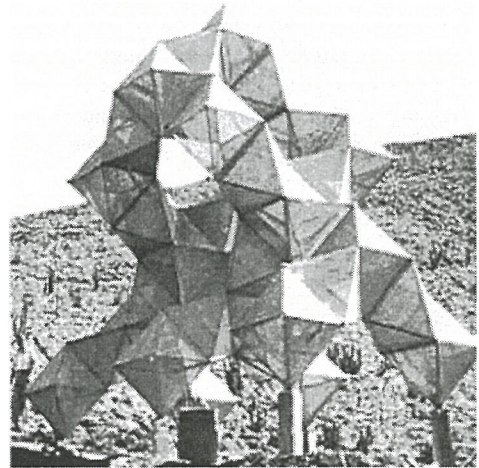


Figure 3: Macrodiamante catch-fogs is based on a regular octahedron, conformed by bars of a zinc and copper which gives alloy excellent results against the corrosion

3.3 Sistema programático-formal

El proyecto se emplaza en el lugar teniendo en cuenta los siguientes factores:

- La dirección del viento y la Camanchaca, disponiendo a la fachada principal de abanico ante la nube.
- La trayectoria solar, que orienta la posición de dormitorios y oficinas.
- La topografía, para fraccionar sectores húmedos y secos.

3.3 Programmatic-formal system

The project appoints the place, taking the following factors into account:

- The wind direction and the camanchacas, arranging the main facade of fan against the cloud.
- The solar trajectory that orients the position of dormitories and offices.

- The topography, to divide humid and dry sectors.

3.4 System formal configuration

The project is proposed in three levels or horizons, as seen in the camanchacas, generating ambits related to vertical circulations between octahedrons.

Level 1: Designated to the investigation, it set up working place at day. As area of investigators, and at night acting as camanchacas collector.

Level 2 appointed the public, space of association with the visitor, terrace suitable for receiver, that you give excellent views, is a place of halt under the shade.

Level 3 appointed the residence for the scientists. Low-ground part is set up to reconstitute the natural terrace and this also enables to condition the interior sectors through thermal mass, providing great thermal comfort.

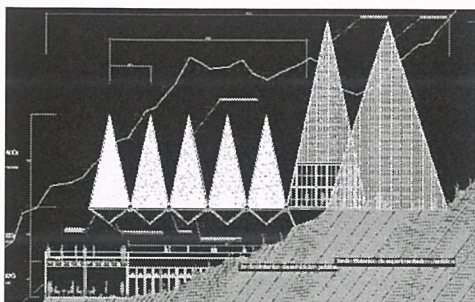


Figure 4: Longitudinal section

4. CRITERIA OF MAINTENANCE

- Flora Protection

Inventory of flora and fauna of the place

- Saving of water

The recollection and reutilization of the water is set up in whole the project through the cover conformed by 14 octahedrons

- Accessibility

Construction of a way for vehicles

- Energetic efficiency

Integration of systems that generate solar, photovoltaic energy

- Durability/low-cost maintenance

Incorporation of materials of high durability, and therefore, require a minimum maintenance. Modular constructive, flexible and demountable system with low residues.

- Surroundings

Integration of the building with its adjoining surroundings, conforming to an oasis of low impact

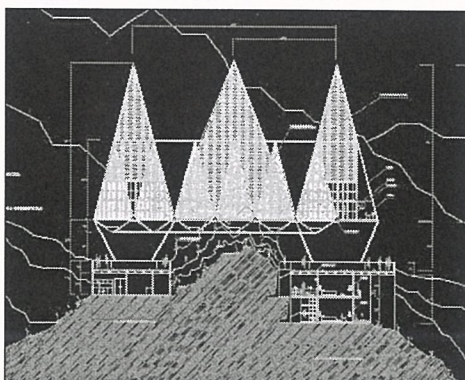


Figure 5: Transversal section.

CONCLUSIONS

The Camanchaca is a climatic phenomenon of an enormous potential, for the development of the cities of the desert coast of the north Chile.

The Mejillones Península should be declared Environmental Patrimony, due to its landscape value and geographic singularity.

The norm should demand that the new buildings in arid zones include integrated solar and photovoltaic systems integrated to the surrounding as dynamic surfaces of energy capturing.

Due to the high costs paid for the electricity and water in the north zone, an incentive policy, that allows to develop the solar potential of the Antofagasta region, is necessary as much for the pickup and transformation of solar energy into electric energy as for the desalinization of the seawater.

REFERENCES

- [1]AA:VV. 1990. Atlas del Universo y de Chile Regionalizado.
- [2]Ramírez, Jorge 1982 Potencial Hídrico de las nubes rasantes en el desierto costero chileno. Revista Terra Australis, N°26.
- [3]Gutiérrez, E. Morales, J. 1999 Arquitectura y Norte Grande, Sistemas energéticos pasivos 1999. Antofagasta, Chile.
- [4]Espinosa, C 1983. Camanchacas, un posible recurso de agua dulce para estimular los asentamientos humanos, en el inhóspito territorio aledaño al litoral del desierto de Atacama. Departamento de Ciencias Físicas U. Católica del Norte, Antofagasta, Chile.
- [5] Espinosa, C 1967. Consideraciones económicas y fundamentos del proyecto Camanchacas", Revista Scientia, N° 133.
- [6]Espinosa, C 1981. Acumulación de energía solar en el desierto de Atacama, por medio de destilación natural (Camanchacas) Departamento de Ciencias Físicas U. Católica del Norte, Antofagasta, Chile.
- [7]Espinosa, C 1981. Artefactos de geometría macro- diamante, para coleccionar agua de camanchacas en la cordillera de la costa del desierto de Atacama. Departamento de Ciencias Físicas U. Católica del Norte, Antofagasta, Chile.
- [8]Zuleta, R. 1981 Modelos bidimensionales captadores de destilación natural. Departamento de Ciencias Físicas Universidad Católica del Norte, Antofagasta, Chile.
- [9]Zuleta, R. Tapia, O 1981 Veinte años de camanchacas y dos del proyecto Mejillones. Departamento de Ciencias Físicas Universidad Católica del Norte, Antofagasta, Chile.
- [10]AAVV.Informe de las Naciones Unidas sobre el desarrollo de los recursos hídricos en el mundo. Agua para todos, agua para la vida. UNESCO.
- [11]Baeza y Otros. 1972 Marco geográfico de las camanchacas Tesis de grado Carrera de Geografía U. del Norte, Antofagasta, Chile.
- [12]Cereceda, P. Larrain, H. 1972 Camanchaca: Recurso hídrico postergado. Instituto de Geografía Pontificia Universidad Católica de Chile.