

Community Involvement in the Fog-water Collection System for Chungungo, Chile

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Abstract: The coastal fishing community of Chungungo, Chile (29° 27' S and 72° 18' W) obtains its drinking water from a Fog-water Collection System (FCS), which was implemented in 1992. The FCS has brought significant changes to the life of the community since it started its operation. In 1995 the International Development Research Centre-Canada (IDRC) donated the system to the village. In August 1999, the FCS was not working properly. The main causes were related to the lack of community involvement, fishing community dynamics and the lack of economic sustainability.

1. INTRODUCTION

The coastal fishing community of Chungungo, Chile (29° 27' S and 72° 18' W) has 408 inhabitants. They obtain drinking water from a Fog-water Collection System (FCS), which was implemented in 1992. This system has four components: a) 94 fog collectors located between 748-800 meters above sea level in the adjacent highlands; b) settling tanks and 6.2 km of pipelines that run downslope; c) a treatment plant with 100 m³ and 60 m³ reservoirs; and 4) a water distribution network of 1.9 km in the village.

The FCS has brought significant changes in the community life since it started its operation. This system replaced the tanker transport system that used to bring 10 m³ of water once a week to Chungungo, an average supply of 11 m³ of water per day (Schemenauer and Cereceda 1994). People shifted from having a fixed supply of water to deciding when and how much water to consume. Water consumption increased from 14.2 l pers⁻¹ d⁻¹ in 1988 (Suit, 1992) to 27 l pers⁻¹ d⁻¹ in 1993 (Cereceda and Schemenauer 1993). Two storage tanks that receive water from the treatment plant replaced the rusty metal tanks used in each home to store water. This water achieves Chilean and World Health Organization quality standards (Schemenauer and Cereceda 1992). People started growing gardens and orchards at their homes. The FCS technology has been promoted worldwide through more than 300 articles and at least 20 documentaries. This gave Chungungo a new tourist potential. Better living conditions due to the new characteristics of the

water resource. The subsequent arrival of electricity to Chungungo resulted in population growth and the settlement of a tourist community called "Canada village". Finally, the Chungungo Water Committee (CWC) was established. It is a local organization which includes the whole community as partners. Five elected and *ad-honorem* members of the community formed the board of the CWC and another receives a salary for that duty. This local organization is currently responsible for the management of all the components of the FCS but the treatment plant.

National and international organizations enabled the establishment of the FCS, and the demonstration that "fog is a viable hydrologic resource for the community of Chungungo" (Cereceda and Schemenauer 1996). In parallel with the FCS development, some projects focusing on the diversification of the uses of drinking water have been carried out. These projects are the establishment of forest plots, a fish manufacturing plant and an agricultural orchard. The projects involved training the community and included the basic elements to initiate the development of these activities. Each one of these specific projects demonstrated the feasibility to develop the proposed activities and had the potential to improve the community's economic conditions. However, the reality has proven to be different. The community has failed to adequately resolve problems arising after the departure of the project leaders.

The FCS was managed during its first four years by: the Chilean Forestry Service (CONAF), which maintained the fog collectors; the Sanitary Services Company of Coquimbo S.A. (ESSCO), which stored, distributed and controlled the water quality; and the Chungungo Water Committee (CWC), which treated the water, distributed it to the homes and collected a payment for the water (Cereceda & Schemenauer, 1993). In 1995 the International Development Research Centre-Canada (IDRC) finished its participation in the project and donated the system to the village. IDRC's departure left CONAF with a shortage of financial resources and led to the end of research in vegetation and fog relationships. Therefore, CONAF had to transfer the maintenance of the fog collectors to the CWC. Since then, the committee assumed the entire management of the FCS together with ESSCO.

In August 1999, the FCS was not working properly. The delivery of water was once a week through the water distribution network and the community was complaining about the water quality. Damage was observed in the mesh of two doubled fog collectors and fifteen of them were not clean, affecting the efficiency of fog-water collection. To face this situation, the Director of the CWC asked for volunteers to maintain the fog-collectors; nobody from the community volunteered. The CWC had to pay the community members to maintain the fog-collectors.

This paper attempts to explain, from a community perspective, the main causes of the low community involvement in the Chungungo Fog-water Collection System. It also attempts to propose criteria to be considered when implementing future Fog-water Collection Systems in others communities.

2. METHOD

The method consisted of a survey within the Chungungo community during part of July and August 1999 and interviews with the Chungungo Water Committee (CWC) board.

The families being surveyed were randomly selected and represented 63% of the inhabitants of Chungungo. It was a personal interview taken with one adult woman and one adult man with high decision-making responsibilities in each family. The survey was designed considering previous surveys done in Chungungo (Suit 1989; Borojevic 1998). Through 50 Since the donation of the FCS, the additional burden

open and structured questions and priority lists this survey addressed several issues about demography, the socio-economic situation, local natural resource knowledge, perception of water issues, management of water, and community involvement. Once completed, the questionnaires were gathered and answers for each question and priority list were tabulated and analyzed.

The CWC board was interviewed to have a better understanding of FCS operation. The issues to address were the economic sustainability of the FCS, the maintenance of the FCS and the community involvement.

3. RESULTS AND DISCUSSION

3.1. Community Involvement in the Chungungo Water Committee (CWC)

The Chungungo Water Committee (CWC) has been organizing several public meetings asking for voluntary work from the community members. There has been a low attendance at these meetings and also there has been no offer of voluntary work. The interviewed villagers that felt invited to participate to the FCS since its implementation were 52% male and 2% female. For those who participated in FCS, they were asked for paid work related to fog-collectors construction and pipeline installation. It seems that there is no compulsory reason to participate in voluntary work within the community. In addition, 67% of the community perceives that the Chungungo Water Committee (CWC) is working properly. Criticism focused on the job done by the committee elected members, as if they were solely responsible for the local organization; there were no comments on the community's role as committee participants. The IDRC's donation of the FCS is not known for 52% of the community members. The village is located 7 kilometres from the fog-collectors (horizontal distance) and vertically at 800 meters from them; thus, they have no connection with the fog resource environment, resulting in poor knowledge of fog behaviour. All these factors are reflected in a low overall involvement with the FCS, resulting in low community participation.

3.2. Economic Sustainability of the Chungungo Water Committee (CWC)

for the CWC of maintaining the fog-collectors, created

an economically non-viable situation. Lack of community involvement created the need to hire villagers at the CWC. The fog-collector maintenance implies a cost of USD \$727/month including salary, daily transport, food and cleaning devices. The CWC 1999 monthly average expenses and incomes are USD \$830 and USD \$847, respectively indicating a profit of USD \$17. Considering that the expenses do not include the cost of fog-collector maintenance it will be necessary for 42 months to save that money at the committee. This is the reason why the last fog-collector maintenance done in May 1999 was financed by a governmental organization not related to FCS. Fog-collectors should be maintained at least twice a year.

3.3 Dynamic of the Fishing Community

Fishing activities give work to 62% of the community. Adding other activities, like algae extraction, 80% of Chungungo's male population depend on the sea to earn a living. That results in an impossibility to schedule work, even though they have an average of 3.2 days a week of labour. Also, the community is aware of a crisis on the ocean's resources: 92% perceived a decreased availability, 64% perceived a decrease in size, 59% perceived species extinction and 91% perceived a vulnerability of current extracted resources.

The incomes of the fishing community are received on a daily basis. This dynamic collides with a monthly expense in drinking water. Traditionally, the community has been living day by day with a short-term view, due to their close connection and dependence to nature.

4. CONCLUSIONS AND RECOMENDATIONS

The community of Chungungo does not feel part of the Chungungo Water Committee as the agency responsible for and owner of the FCS. This results in a low community involvement and thus in an inappropriate maintenance of the Fog-collectors, thus affecting the efficiency of the FCS.

The FCS is not economically sustainable on a village basis. The maintenance of the fog-collectors implies funds that need to be provide at the municipal or higher level of government.

The dynamics of the fishing community does not

match with the funding required by the FCS. Their daily-oriented expenses do not fit with the monthly expenses required by the FCS. Also, given the community dependence on sea conditions, they can't commit to a fixed work schedule with FCS.

Considering the current conditions at Chungungo we recommend to:

- Reorganize the FCS to function on a fishermen community-oriented dynamic.
- Elaborate, with a strong community involvement, a project towards improving their monetary income that at the same time can provide financing for FCS operation and maintenance.
- Urge the Municipality to take part in the maintenance and funding of the FCS. The sustainability of this project could be ensured by this stage.

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6. REFERENCES

Cereceda, P.; Schemenauer, R. 1993: *Revista Geografica de Chile Terra Australis*: " La Percepcion de los Consumidores de Agua Potable de Nieblas Costeras de Chungungo, Chile" Vol. 38.

Cereceda, P.; Schemenauer, R. 1996: *Clima y Agua: La gestion de los recursos climaticos*: "La niebla: recurso para el desarrollo sustentable de zonas con deficit hidrológico", pp. 25-26.

Schemenauer, R.; Cereceda P. 1992: *Journal of Applied Meteorology*: " The Quality of Fog Water Collected for Domestic and Agricultural Use in Chile", Vol. 31, no.3, pp. 275-290.

Schemenauer, R.; Cereceda P. 1994: *Natural Resource Forum*: "Fog Collection's Role in Water Planning for Developing Countries", Vol.18, No. 2, pp. 91-100.

Suit, M. 1989: *Estudio de agua potable rural en las localidades de Chungungo y Caleta Hornos*.