

**Report on the Fog-Collecting Project in Chungungo:  
Assessment of the Feasibility of Assuring its Sustainability**

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**1. The Task**

The consultant's task was to evaluate for IDRC whether it makes sense to encourage the sustainability of the fog-collecting project by facilitating the coordination of the actors involved: the community, the Municipality, related state institutions and eventually other agencies. She also had to see if the Chilean government or some agency were preparing to finance a new phase of the project.

Therefore, the consultant had several meetings in Santiago, and made a one-day field visit to La Serena and La Higuera and a two-day field visit to Chungungo. The list of people that the consultant talked to, their responsibilities and addresses are annexed to this report, and they will be mentioned as sources when relevant. The IDRC provided a set of useful and interesting background documents. Regarding the task entrusted, the report of Professor J. Nef stands out. This report is "an assessment of the state of the fog-collecting project in Chungungo", the result of an evaluation made in May-June 2001, with the purpose of assessing the situation of the project to "develop hypotheses about the reasons for the lack of maintenance to the fog-catching infrastructure". The following report will build upon Mr. Nef's information, which was again gathered and confirmed to a great extent during the interviews, and will therefore not repeat the project's history and other background information provided in the report mentioned above. The consultant will only refer to the facts that are relevant to understand the fog-collector's project as it now stands and to offer different alternatives for the future.

Though this may be self-evident, it is important for the consultant to state that **the arguments and points of view expressed in the following report are an interpretation of the reality** as seen and understood by her. The consultant will try to present facts that underlie her interpretation. **The consultant wishes to express her utmost respect for all the persons involved in the Camanchaca Project of Chungungo** and for the underlying reasons that made them do things as they have done them, since she knows it is easy to interpret and explain what could have been done otherwise after the fact.

The report will address the following issues:

- The fog-collectors today
- What has been achieved by the project
- What has failed
- Explain achievements and failures to learn from them
- Alternatives for the future of the fog-collectors

**2. The Fog-Collectors Today**

The fog touches El Tofo mountain and passes over it. Above its wide slopes, it goes through many greyish-black trunks that stand like totems, always parallel to each other and in pairs, alone in these big lonely expansions, looking down to Chungungo and the sea. Only nine of the 94 meshes, that once extended all over this large area, are still hanging, dirty and full of lichens, blowing loosely in the wind. Broken or loose cables hang down, but most cables and meshes have been dismantled for other uses. A

few remaining drainpipes lie on the floor; those still in place under the fog-collectors are full of leaves and dirt. None of the collectors is connected to the water tanks and no water from the Camanchaca<sup>1</sup> flows down to Chungungo. The operator's house, once an attractive guesthouse to live in, has been totally dismantled. Goatherds and miners of the surrounding area have furtively taken away nearly everything they could use, leaving just a few unsheltered walls. They have left behind a wooden ladder, built to dismantle the roof to take away the rest when they need it.

At the coast below El Tofo, the village of Chungungo, which was once receiving water from the fog, now lives only from the water that the truck from the Municipality brings in twice a week.

### 3. What has been achieved by the Project?

Despite the situation described above, the project can be interpreted as successful in many ways:

3.1. **It has been definitely proven** to the Chungungo population, to the Chilean community and the international community in general, **that water can be obtained from fog**. Today, unlike twenty years ago, that is part of the general knowledge and understanding of Chilean citizens, of children at school and of state institutions. The village of Chungungo lived primarily from Camanchaca water from 1992 to 1997 and even the Mayor of La Higuera --the Municipality to which the little town of Chungungo belongs-- acknowledges publicly in front of the community that the fog-collectors provided drinking water, and at a very low cost. Mrs. Mirtha Melendez, Head of the Coquimbo Region Water Works Directorate (DOH, the Ministry of Public Works Agency that replaced ESSCO, a private water company, as the office responsible for providing drinking water to rural areas throughout the region) and Mr. Jorge Valenzuela, Chief of the Rural Drinking Water Unit of this same institution, referred to the possibility of using fog-collectors to provide drinking water for small rural villages in their region.

3.2. **It has been widely shown that fog-water** can be gathered for agricultural use, for reforestation, and that it **can also provide drinking water**, which was the emphasis and innovation of the Chungungo project. Fog-collectors are successfully being used nowadays in several places along the Chilean coast for reforestation and agricultural use. Mr. Waldo Canto, head of CONAF in the Coquimbo Region, and Mrs. Pilar Cereceda, Professor of Geography at the Catholic University, Santiago --who were also important participants in the Chungungo project-- can show several other existing successful experiences in different regions of Chile.

3.3. **Water collection** from Camanchaca has become **part of Chungungo's identity**, as the Mayor of La Higuera and different community members have stated. They say that Chungungo had never been as known and as visited by so many different people as it has since the fog-collectors were functioning, and still, even now and then, people from all over the world come to visit them.

3.4. The Mayor of La Higuera, members of his Planning Department, and a representative from the Project "Más Región", financed by the European Community, expressed their **intention to build up the fog-collecting installations for tourism, reforestation and agricultural purposes**, and they are even toying with the idea of having a place where people can come to learn how the fog-collecting system works.

3.5. The Chungungo **water pipe system**, installed by the project, **is still working** and has been expanded. The project has **changed the way the people of Chungungo receive their water**. Prior to the project, they got it from big barrels they kept in their houses; nowadays they get it **from the tap**, regardless of the origin of the water. Also, the Chungungo Rural Drinking Water Committee, initially established in 1991 as part of the project, is still working and managing the drinking water system.

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<sup>1</sup> Camanchaca is the name the Chileans give to the fog that is generated along the coast in the northern part of the country

3.6. Directly or more indirectly related to the water initiative, Chungungo experienced changes that meant an **improvement in its quality of life**. It managed to get electricity and a telephone --which are still working-- and it is trying to attract tourism as a way to secure an income. Furthermore, Chungungo's population grew from around 250 inhabitants in 1990 to around 450 inhabitants in winter and about 1000 inhabitants in the summer time<sup>2</sup>.

3.7. In the village of Chungungo and all over northern Chile, school children are used to **learning about "getting water from the Camanchaca" in their regular education program**, as part of the courses taught to develop their roots, preserve their identity and learn about natural sciences. Some people from the Chungungo community --like Mr. Patricio Piñones for instance, a former operator of the water committee-- have been actively involved with the Ministry of Education in disseminating the Chungungo experience to make this happen.

3.8. Within the Chungungo community and the Municipality of La Higuera, there is a **good impression of the Canadian government** and the support it provided. One of the ways in which this is manifested is that the new part of the village installed by summer holiday-makers --who are supposedly privileged in comparison to the Chungungans-- was named "Villa Canada" by the neighbours' association.

There surely are many other achievements that can be attributed to the project: students work, information for the university, job creation, personal development for the people involved, experiences and sharing encouraged by IDRC in different continents, and many other examples.

#### **4. What has Failed?**

Besides these achievements, it is also interesting to see what went wrong, and what can be learned from the experience for the future.

4.1. Definitely, **Chungungo is not receiving its drinking water**, nor water for any other purposes, **from the fog**. Actually, the water comes from the water trucks as it did before the project. The amount of water the people in Chungungo receive, especially in the summer, is as little and precarious as before.

4.2. The **fog collecting installations are broken**, not working, disconnected (see picture No. 1). The community, the Mayor and the regional authorities **regard water from the fog as an unreliable, irregular and insufficient source for providing drinking water** for Chungungo. The Mayor is fighting hard to get financing from the regional government for one of two alternatives studied for providing water: a 32 km long pipe from El Trapiche, or a plant to desalinate groundwater.

4.3. Other projects for Chungungo related to Canadian cooperation, like a plant to process fish or a vegetable garden have disappeared and are not even mentioned by the community.

4.4. The **institution technically responsible for providing rural drinking water in the region** --the DOH attached to the Ministry of Public Works-- **has no know-how on fog-collecting technology**. The head of the office, Mrs. Mirtha Melendez, said she knew that the project exists only because she is curious. The person in charge of the Rural Drinking Water Unit, Mr. Jorge Valenzuela, has given the regional government negative evaluations about the fog-collecting technology as an alternative for Chungungo, although he has no information about, for instance, how to build the fog-collectors, how to

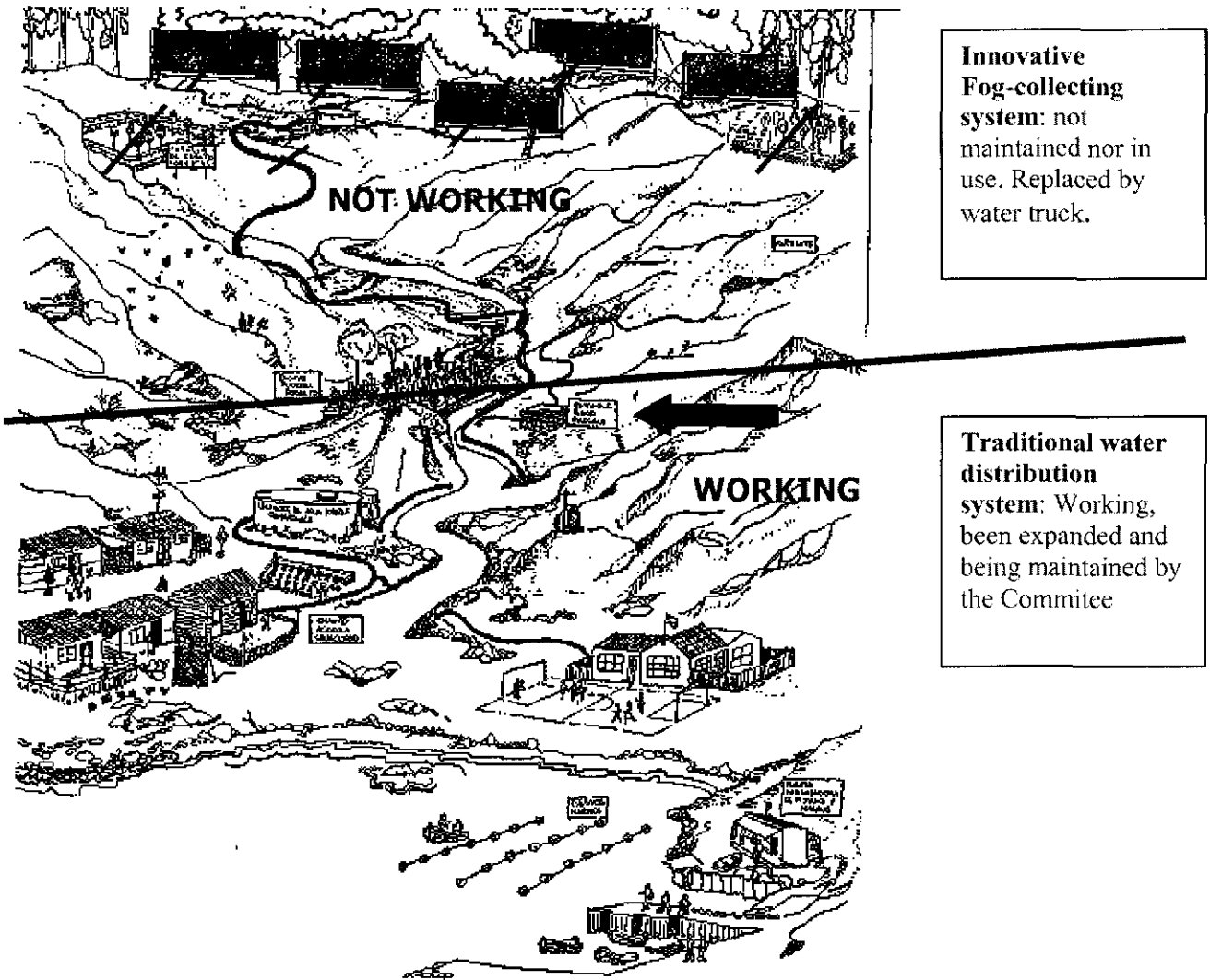
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<sup>2</sup> The figures on the inhabitants of Chungungo are estimates provided by the Head of the Planning Department of La Higuera and some community members, given that precise numbers are not available. The 2002 Census will probably provide more accurate information.

maintain them, how much water can be collected per square meter or what the costs of the fog-collectors are. The DOH is technically assisting the Mayor of La Higuera in the choice of two other alternatives for providing water for Chungungo.

4.5. The **Chungungo Rural Drinking Water Committee**, responsible for the distribution, maintenance and administration of drinking water, including charging for this service, **seems to be very weak**. It does not have any participation or initiative to participate in decisions about the future water-providing alternative that will determine the costs and the responsibilities of the Committee in the coming years and the community members do not trust it. The position of President of the Committee is regarded as a conflicting and difficult task. During the consultant's visit, the Chief of the La Higuera Planning Department, the SECPLAC Mr. Américo Flores and his colleague Cornelio Vargas, went for the first time to Chungungo to have a meeting with the Committee and to explain to them the two alternatives they are evaluating to provide water. Even though both alternatives will demand a much greater effort in technical maintenance and will elevate water costs for the community, the Committee members did not ask much and left the meeting before the visitors, leaving them alone with the consultant in the Water Committee's office. On the other hand, the visitors explicitly did not give the President of the Committee any written information about the projects and said "they would chose the best alternative".

**Picture 1: What is Working and what is not Working in the Chungungo Drinking Water System  
2002**



Source of the picture: INFORME TECNICO FINAL COASTAL FOG APPLICATION – CHILE, August 1993, C.Masson and others. Notes in red by the consultant.

## 5. Explaining Achievements and Failures to Learn from them

The consultant agrees with Prof. Nef (2001) and other interlocutors in a basic explanation for the actual state of the fog-collecting project: the reason for failure is not due to technical reasons, but managerial ones and to a lack of ownership by the community and the institutions responsible for providing drinking water.

### 5.1. The project was not made by the community, but for the community

Originally conceived as a reforestation project that discovered the nearby village's lack of water, the community was the recipient of a solution provided by well-meaning people without the community

itself having to do much in exchange for this advantage. The community became accustomed to receiving, once more in its history – and not for the last time, without having strongly asked or fought for the tap-water nor having made any commitment to maintain or pay for the benefit.

### 5.2. The Consumers' Habits were at odds with the Project's Assumptions

Many of the original ways of using water of the people in Chungungo are not necessarily related to regularly receiving and paying for drinking water.

**Low consumption:** Though they very much appreciate having tap water, they have grown up with a very economical approach to the use of water and most of them continue that way. They still store water in big barrels to make sure they have some available. The use of water the well-meaning urban project promoters are accustomed to and assumed for the Chungungo community was not that way; these more urban behaviours are only fulfilled by the outside holiday-makers in the summer.

**Unwillingness to pay:** The price of water in Chungungo has risen in the last few years, while most of the population stayed poor and jobless. As consumers, the people of Chungungo also believe that the price they pay for water is extremely high, even though the Municipality subsidizes 50% of the price for most of them. They are not willing to pay more, which is a strong reason for their low consumption.

Therefore, the Chungungo community in general uses water in a relatively low ratio (an average of 5-6 m<sup>3</sup> per family a month, which decreases in the winter<sup>3</sup>) though they could have water permanently except for the summer season. Therefore, the Water Committee claims lack of financial means for paying an additional operator to maintain the fog-collectors and for any improvement that goes beyond repairing the traditional water pipes and keeping the legally established water quality by chlorination. The former (and single) operator --who is the person with the most experience on fog-collecting technology-- was dismissed because the committee preferred to hire another operator at a lower salary. Mrs. Valentina Herrera, a social worker from the DOH, stated that people don't pay their water bills regularly, and that there is a high rate of default on payments.

### 5.3. Inappropriate and Changing Institutional Grounding of the Project: Appropriation and Transmission of Know-how

The national institutions that promoted and executed the project –i.e. CONAF and the Catholic University at Santiago-- were not responsible for providing water to Chungungo. At both institutions, driven mainly by the enthusiasm and initiative of certain specific individuals, the fog-collecting work still persists and the experience has been reproduced in other projects. Thanks to them, the fog-collecting techniques have been disseminated and improved. But none of these committed persons work in the institutions responsible for providing drinking water to Chungungo. Though significant efforts were made to train and involve the institutions responsible for providing drinking water, the acceptance of the fog-collecting techniques was not sufficiently grounded at a higher institutional level, and the technical know-how transmitted to the frequently changing operators/workers of that time was not managed by those institutions in a sustainable and permanent way, and perhaps was not handed over foreseeing the possible lack of commitment and institutional changes. The situation was aggravated by the fact that the technical responsibility for providing rural drinking water changed between three institutions in a not very programmed and transparent manner. It started in 1996 with ESSCO, at a time when the water company was being privatized<sup>4</sup>, and changed in a sudden and uncoordinated way to the Planning Department of the Ministry of Public Works in 1997 (who subcontracted ESSCO for technical assistance), and two years later to that Ministry's Public Works Departments (DOH). At the DOH, they still believe that the fog collectors are CONAF's responsibility.

<sup>3</sup> Source: Chungungo Drinking Water Committee

<sup>4</sup> According to Pablo Osses, ESSCO always rejected the fog-collecting technology for being different to their usual way of doing things.

The only institution that has been permanent is the Municipality of La Higuera, which even has the same Mayor from 1994 to date. However, for some reason it has never felt that it is in charge of the fog-collectors. In fact, the Mayor openly resents the importance and public prestige that the other institutions --especially CONAF-- received thanks to the project to the detriment of the recognition that the Mayor himself would have liked to obtain. In fact, today the Mayor is the main driving force seeking to provide a permanent water solution for Chungungo.

#### 5.4. National Financing of Fog-Collectors without Problem Solving and Technical Improvement

It would be untrue to say that Chilean institutions have not cared about the fog-collecting project. Significant efforts have been made to keep the system working. The fog-collectors have been destroyed three times by strong storms and they been replaced with national funds because of the interest created by the project.

**Table No. 1: Renovation of Fog-Collectors**

Year	Fog-Collectors Provided(*)	Comments
1992	40	Project
1996	+ 50 = 90	Project
August 1997	- 80	Destroyed by a storm
Nov. 1998	+ 94	Funds originally destined to increase the number of fog-collectors to 120 were used to replace the ones destroyed. Funds partly provided by CONAF, partly by the Regional Government.
1999	- 50 + 10	Lack of maintenance, theft of meshes and cables, only some were repaired
2000	- 50	Destroyed by a storm
2001	+ 30	Budget obtained by Municipality. Only 20 connected to water pipes because of lack of materials
2001 - 2002	- 21 = 9	Mainly storms, but also lack of maintenance, theft of meshes and cables. The 9 fog collectors left are in very bad state and not connected to the pipes

Source: Verbal information provided by Mr. Patricio Piñones, Mr. Waldo Cerda and Mr. Efrain Alegría

(\*) Approximate numbers

These approximate figures show that, after the handover of the project by the Canadian Cooperation in 1996, Chilean institutions replaced about 134 fog-collectors. On the other hand, one can see that:

- the fog collectors were replaced without trying to learn from former errors: the same building techniques were used without considering the probability of future storms
- though lack of maintenance, lack of vigilance and lack of reaction when storms came up (letting down the meshes) were the origin of the deterioration of the collectors, none of the restoration-projects considered solving these problems
- the projects did not consider leaving materials like meshes, pipes or cables for repairs, which accelerated deterioration.

The explanation provided by the Municipality of La Higuera, the DOH and the regional government for the failure of the fog-collecting project is that the technology was not able to bear the storms, that it is not stable and not strong enough. They are unable to see that, during the four years that the collectors

were handled by a CONAF operator, Mr. Juan Ossandon, the system worked without any serious damage, and that it works well in other places. The fog-collecting technology is simple and can easily be improved if the person in charge is committed and creatively participating in its implementation and monitoring. Looking at the project history from that viewpoint, the lack of effective institutional grounding can be one of the explanations for the problems that arose.

#### 5.5. Weak Technical Assistance and Follow up

The technical assistance provided originally by three technicians from ESSCO, who were specialists in the water pipe system and water quality, but who had also been trained by the project in handling the fog-collectors, was not enough to supply a daily operator who should have maintained the system up in El Tofo mountain. Nevertheless, according to the Water Committee, that technical assistance method was better than the one they receive nowadays after the abrupt transfer of this function to the DOH nearly two years ago. This institution has one team, consisting of an accountant, a technician and a social worker, for the many Rural Drinking Water Committees of the Province. Evidently, the intensity of the technical and administrative assistance has diminished and is even less satisfactory than before.

#### 5.6. Bad Community Experiences in Terms of the Regularity and the Reliability of the Water-Providing Capability of the Fog-Collectors

The fog-collectors were never presented by the project specialists as the only means of getting water: they always guessed that around 25% of the water would have to be complemented by the municipality's truck, specially in the winter season and according to climate changes. After the strong storm of August 1997, that caused destruction throughout the region, the community did not have water from the fog-collectors until the fog-collectors were re-built in November 1998. During that time, deficient coordination with the Municipality and also the fact that there was only one truck to provide water to several villages all over the vast territory of La Higuera<sup>5</sup>, caused severe water scarcity in Chungungo. This was attributed by the community to the deficiency of the fog-collecting technology. When the lack of maintenance and other storms caused progressive damage and several interruptions in the fog-collectors' water supply, the community reacted like a hurt child, confirming their judgment about the new technology. Nowadays the community prefers a "permanent" water supply system, as they call it, and they have set all their hopes on the Mayor's attempts to secure a more traditional project. There is no initiative in the Chungungo community to rebuild the fog-collectors for the drinking water supply: they do not believe in it any more.

#### 5.7. Weak Community Organizations vs. High Legal Responsibility

According to Chilean legislation, for Communities that have less than 150 inhabitants, the organization responsible for managing water, charging and collecting, maintaining the pipelines and -in the special case of Chungungo- the fog-collectors and supervising its quality is the Rural Drinking Water Committee. This Committee is elected by the community, and has a President and three members; one of them is a Treasurer and another is the Secretary. The Chungungo Committee contracts an operator and an administrative person for the work. The DOH is mainly a planning and controlling institution, not an operational organization. It evaluates and supervises water reservoirs and watering systems and monitors the water firms. Its responsibility is also to assist and orient the rural drinking water committees, help them to determine the prices or fix problems with the consumers, control the administration of monetary resources, and assure that the water, whatever the source, is available for the Committee to distribute. The Municipality --in this case-- provides the water<sup>6</sup> and is fighting for a definitive solution because it should supply the basic needs of the population. The money for these works should come from the regional government, because it exceeds the municipality's financial capacity. From these three actors, the committee has the most direct involvement and responsibility towards the community. The maintenance and reparation of the fog-collectors, which could have been

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<sup>5</sup> Nowadays the truck is used only for Chungungo: other places have solved their water problem by different means.

<sup>6</sup> The municipality does not charge for the water and its transport. The cost of the water given to the consumers only reflects the cost of administration incurred by the Water Committee.



interpreted as a responsibility to preserve the source of water, and therefore a responsibility of the Municipality or DOH, fell into the domain of the drinking water committee. Unfortunately the committee is --as mentioned above-- a weak organization. In these years, it has not been able to solve the contradiction between being communitarian and therefore having the right to ask the Chungungo community to help physically to repair and build the water system, and having to charge for the water. As many other Water Committees in the past, it is in a process of transition to becoming a little service enterprise. The project lived with the paradox that the institution legally responsible for the most complex part of the water supply was the weakest of the institutions involved<sup>7</sup>.

#### 5.8. "Chungungo Culture" and "Personal Attitudes"

Several interlocutors as well as Mr. Nef mentioned that Chungungo's population had cultural characteristics that were a hindrance for active commitment. In its origin, Chungungo was a village totally dependent on the El Tofo mine which, like most of the mines in the first half of the 20th. Century, was a hierarchical, classist and authoritarian organization that provided water and electricity at no cost to the disempowered village. To a great extent, today the community of Chungungo is formed by fishermen and small independent miners (called *pirquineros*), and these activities in general create individualistic personalities who are not accustomed to regular daily work but to having strokes of luck. It was surprising how badly the people of Chungungo talked about their own community in relationship to commitment, their ability to fight for their interests, and solidarity. When referring to other villagers, they expressed *distrust, resentment and rancour*; when the Mayor visited the village to talk with the community, only about 30 people came to the meeting and none of them talked to him, they mostly asked for favours.

On the other hand, like in every project, personal problems arose that made collaboration and coordination more difficult. For instance, the Ministry of Public Works' Planning Department asked CONAF to prepare the technical bases to hire it to build more fog-collectors. After handing them in, CONAF discovered by chance that the Planning Department was inviting building firms to do this job using CONAF's document. The Municipality of La Higuera has a dispute with CONAF about establishing a tourist resort in a national park. For two years, the president of the Chungungo Water Committee was also its operator and therefore the only person contracted by the Committee, which originated all kinds of distrust among the villagers. Several anecdotes like this have interfered with the project's work.

#### 5.9. Limitations of the Fog-Collecting Technology

Three kinds of technical limitations in the fog-water supply system can be identified:

First, the limitations that were already known from the beginning: the fog cannot be the only source of water and has to be complemented by the trucks.

Second, the kind of technical problems that arose during its operation, like the lack of a flexible capacity to respond to the strong wind, the insufficient capacity of the upper water tank to collect the abundant fog-water in the summer, and the difficulty to save water more than a few days without proper treatment and installations. As stated in point 5.4, in the consultant's opinions, these are not problems that a committed Chilean organization could not solve.

Third, the increase in the amount of water needed. Though the people of Chungungo are still accustomed to using little water, the official standards the Chilean state has to provide for, according to the DOH, is 100 litres a day per person in rural areas. This standard is applicable only to permanent

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<sup>7</sup> This difficulty appears also in other Water Committees, for instance at Los Choros, which now is responsible for the reverse osmosis plant recently installed in that community

inhabitants, as it means the state is going to subsidize the building of the water facilities. Though this has not yet been fulfilled in Chungungo, the standard is growing, as the DOH in the Region of Coquimbo has started a Program of Rural Sanitation and Sewage, which will demand 20% more water per person. In the summer time, due to tourism and to the return of Chungungo emigrants, the number of inhabitants increases to more than double. The lack of water is one of the main limitations for the further growth of tourism. Even more, there is a private investment project that has already been agreed upon, to build two abalone growing and processing plants at the seaside in Chungungo which, according to the Mayor, shall create 250 additional jobs in the village. The new business also needs water, as shall the new inhabitants that the industry will attract.

The fog-collecting project in Chungungo was planned for 150 to 250 inhabitants. The water made Chungungo more attractive, it nearly doubled its permanent population. In the following table we can see the projection of water consumption:

**Table No. 2: Water consumption and standards**

Case	Population	Average use of water/ month in Chungungo	Official drinking water standards/ month (DOH)	Official drinking and sanitation water standards/month (DOH)
Use per capita/month	1	0,6 m3	3 m3	3,6 m3
Permanent population in 2002	450	270 m3	1350 m3	1620 m3
Population in Summer time	1000	600 m3	3000 m3	3600 m3
Projection with new business and tourism <sup>8</sup>	1550	930 m3	4650 m3	5580 m3

**Table 3: Water production by Fog-Collectors**

Number of Fog-collectors	50	100	150	200
Production/ month (m3) <sup>9</sup>	240	480	720	960
m3/person/month (base 450 inhabitants)	0,53	1,07	1,60	2,13
m3/person/month (base 1000 inhabitants)	0,24	0,48	0,72	0,96
m3/person/month (base 1550 inhabitants)	0,15	0,31	0,46	0,62

Source: Pablo Osses and Pilar Cereceda

As we can see, though fog-collecting technology is technically working, when it comes to population growth, there is a need to multiply the fog-collectors, which impacts on the landscape and has its limits depending on the space available<sup>10</sup>. Pilar Cereceda and Pablo Osses from the Geographic Institute, Catholic University in Santiago, estimate that with 500 fog-collectors the Chungungans would get an average 2,7 m3 per capita a month – with average oscillations from 1,1m3 in May to 4,4m3 in December<sup>11</sup>. This average is more than what Chungungans have nowadays, but less than the official standards of 3 m3 per capita a month. As Robert Schemenauer, Executive Director of Fog Quest:sustainable water supplies, commented on a former version of this report, fog-collectors “are preferably associated with a smaller population but not because of a limitation in supply for domestic

<sup>8</sup> Conservative hypothesis: 200 jobs of the new factories would be absorbed by people from Chungungo, only 50 new families. 500 more tourists a year

<sup>9</sup> Hypothesis : 1 m2 gathers 4 litres a day; fog-collectors of 40 m2

<sup>10</sup> According to Pilar Cereceda, El Tofo stands up to 500 fog-collectors, according to Robert Schemenauer, between 500 to 1000.

<sup>11</sup> Numbers calculated according to measurements made from 1987 to 1995 (Cereceda et.al. 1997).

water usage, but rather because as a community grows there is a greater municipal demand for water per capita. This is largely related to the change in water usage associated with business and municipal interests.”

It is in this respect that the Mayor of La Higuera felt the fog-water to be an obstacle for Chungungo's growth: as there was water, though it was not enough for it to grow, the village's situation was not desperate and it was more difficult for him to obtain financing for a so called “permanent” water solution. Also, the Mayor probably never knew that the number of fog-collectors could be increased up to that amount, at least neither he nor anyone else in Chungungo ever commented about that possibility to the consultant.

## **6. Alternatives for the Future of the Fog-Collectors**

In that context, what are the alternatives for the fog-collectors at Chungungo?

The Consultant checked with Mr. Germán Quintana, Executive Director for Chile and Ecuador at the IDB, Washington, and with the Chilean Vice-Ministry for Regional Development (*Subsecretaría de Desarrollo Regional*), responsible for regional investment, that there was no project to reconstruct the fog-collectors to provide drinking water for Chungungo.

During the days that the consultant was in Chungungo, the Mayor of La Higuera was fighting for the financing of a water project for the village. He had rejected all other investment from the regional investment fund (FNDR) for his municipality for the sake of this, and a few weeks later received a conditional approval. The Municipality, together with DOH, have to prove which of the alternatives evaluated are the best solution: the 32 km water pipe from El Trapiche or the reverse osmosis plant similar to the one in Los Choros. Both of the alternatives have several technical problems and will significantly increase the cost of maintenance and therefore the cost of water supplied to end-consumers at Chungungo. Both have a negative cost-benefit evaluation according to the Chilean public investment evaluation system, and will be possible only if the costs (between US\$ 700,000 and US\$500,000 (1US\$ = 700 Chilean pesos) are reduced significantly at the expense of quality, which will again increase maintenance costs. According to the Mayor, if the investment should definitely be approved, this would happen in November 2002. The system itself would be started in 2003 with US\$125,000 and finished in late 2004. For the Chungungans, this would mean living at least two more years with water from the trucks. In any case, the cost of water would rise.

The Mayor expressed his interest for restoring part of the fog-collectors to attract tourists and for reforestation or green belt areas. He states that they are part of Chungungo's identity. The project “Mas Región”, financed by the European Community, is finishing its first part in 2002 and will possibly be extended. In that case, it might finance and organize this partial replacement of the collectors, as Mr. Osvaldo Miranda from Mas Región and Mr. Cornelio Vargas from SECPLAC said. They were interested in technical and financial information about the fog-collectors to formulate the project.

On the other hand, Mrs. Mirtha Melendez and Mr. Jorge Valenzuela from DOH expressed their wish to know more about the fog-collecting technology. The DOH's slogan is “Diversificándonos por el manejo del agua por una región con futuro” (Diversifying water-management for a region with a future), and both said they think this innovative system might be the solution for remote little rural communities in the Province of Limache. However, Mr. Valenzuela said, this would be only possible if the community is convinced they would never get a different solution and really take care of the system. Mrs. Melendez, as Head of the office, mentioned the need to let one of her expert engineers become thoroughly informed of the technology involved, if she decides to go further in that direction.

CONAF and the state rural assistance organization, INDAP, have had a positive experience in using Camanchaca in reforesting and at the same time in providing drinking water to a herd of goats at the Comunidad Agrícola Lorenzo Araya, in Ovalle. This project was financed by a normal subsidy for reforestation from the Chilean state at no cost to the beneficiary – thus a new door opens for this technology.

As for Chungungo, there is still the doubt if the Regional Investment Fund will in the end approve the new water project. The consultant, with the help of Mrs. Pilar Cereceda and Mr. Pablo Osses from the Catholic University in Santiago, will send the Municipality of La Higuera and DOH more information about the cost of reconstructing and **maintaining** the fog-collectors in Chungungo. Though it is a very remote possibility, if there is no other alternative to have water and both institutions today in charge of providing it feel they have the know-how and they can handle it, they could start the adventure once more of collecting fog from the clouds for Chungungo.

Santiago de Chile, September 28<sup>th</sup> 2002

**ANNEX**  
**People Contacted for this Report:**

<b>Interlocutors</b>	<b>Organization and/or Role</b>	<b>Phone number</b>
Gustavo Paulsen	Executive Secretary of the Chilean Association of Municipalities	56-2- 3355421
Eugenia Muchnik	Fundación Chile	56- 2- 2400300
Jorge Caro	Head of the Division for Politics, SUBDERE	Contacted by Gustavo Paulsen
Julio Ruiz	Head of the Regional Division, SUBDERE	Contacted by Gustavo Paulsen
Germán Quintana	Executive Director for Chile and Ecuador at the IDB, Washington	1202-6231015
Mirtha Melendez	Head of the Coquimbo Region Water Works Directorate (DOH, the Ministry of Public Works)	56- 51- 221150
Jorge Valenzuela	Chief of the Rural Drinking Water Unit, DOH	56- 51- 221934
Valentina Herrera	Social Worker responsible for Chungungo, DOH	56- 51- 221934
Waldo Canto	Regional Director of CONAF, Region of Coquimbo	51- 224306
Efrain Alegría	Mayor of La Higuera, to which Chungungo is adscribed to	51- 213088/ 51-229349
Americo Flores	Head of the Planning Department (SECPLAC) of La Higuera	51- 213088/ 51-229349
Cornelio Vargas	Professional of the Planning Department (SECPLAC) of La Higuera	51- 213088/ 51-229349
Osvaldo Miranda	Representative in La Higuera and Chungungo of the Project Mas Región, financed by the European Community	55- 51- 321960
Erika Ahumada	Administrative Secretary of the Rural Drinking Water Committee of Chungungo	56- 51- 772104
Elena Ahumada	President of the Rural Drinking Water Committee of Chungungo	56- 51- 772104
Alberto Arancibia	Actual operator of the Rural Drinking Water Committee of Chungungo	56- 51- 772104
Patricio Piñones	Former President and operator of the Rural Drinking Water Committee of Chungungo	56- 51- 772104
Daisy Sasmaya	Former President of the Neighbours' Association	56- 51- 772104
Pilar Cereceda	Professor of Geography, Catholic University, Santiago. Member of the implementation team of the fog-collecting project	56- 2- 3544716
Pablo Osses	Professor of the Catholic University, Santiago. Member of the implementation team of the fog-collecting project	Contacted by Pilar Cereceda