

TWO YEARS OF FOG MEASUREMENTS AT THE SITE “FALDA VERDE”, NORTH OF CHAÑARAL (CHILE)

Dr. Horacio Larrain, Universidad Arturo Prat and IECTA, Iquique; Flavia Velásquez, Equipo de Estudios de Ecosistemas de Niebla, Iquique; R. Pinto, Equipo de Estudio de Ecosistemas de Niebla, Iquique; P. Lázaro, Gobierno Regional, Iquique; P. Cereceda, Pontificia Universidad Católica de Chile; P. Osses, Pontificia Universidad Católica de Chile, R. S. Schemenauer, Atmospheric Environmental Service, Canada.

Abstract: The Fog Collection Data registered at a Standard Fog Collector installed at 600 m elevation, at “Falda Verde”, North of the Chilean harbour Chañaral, from November 1998 to November 2000, by a local fishermen’s association, are presented here, analysed, and compared with the data obtained, exactly in the same period of time, at other Chilean fog-stations: El Tofo, Alto Patache, Tillandsias and Talinay. A mean of 1.46 liters/m²/day was here obtained after two year measurements.

1. INTRODUCTION

The initiative of installing an SFC at this site, was undertaken by a local fishermen’s association wishing to diversify their depressed economic income, traditionally based on off-shore fishing, and willing to complement it with new agricultural trials at the piedmont, near the sea. Knowing what has been recently done in terms of fog water collection elsewhere in Chile (Chungungo), they asked for help from the “Equipo de Estudios de Ecosistemas de

Niebla”, at Iquique, to study the feasibility of water collection, at the site. After our first visit and following our suggestions, a small Project was launched, supported by local municipality funds. The fog collecting measurements were made by trained local fishermen and registered in visits programmed every two weeks over two years. These measurements certainly afford us new information concerning the behaviour of fog on the arid North Chilean Coast, and at a much lower altitude than studied before.

The geographical area

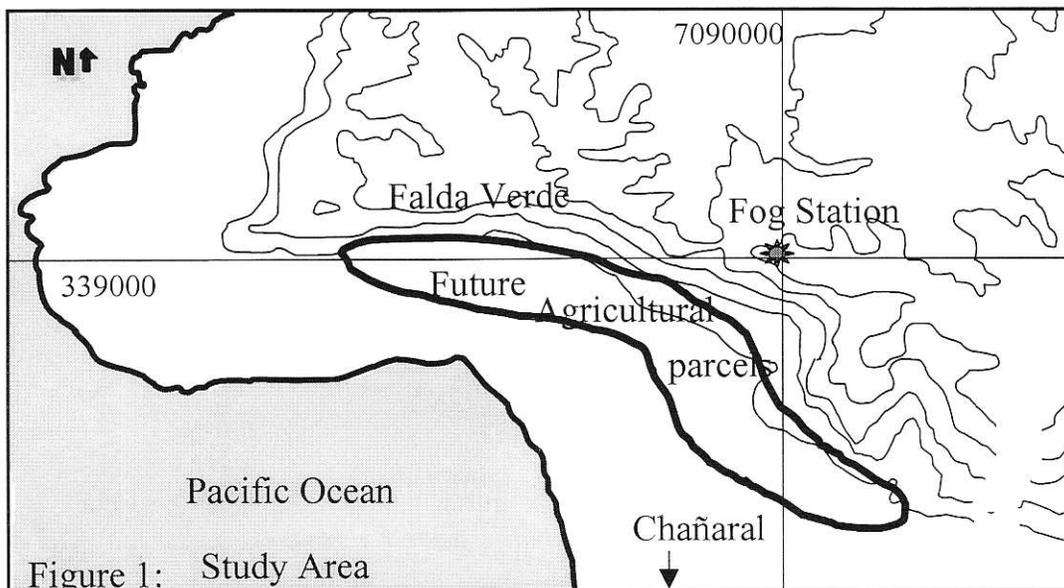


Fig.1 shows our area of study, about 800 km South from the Alto Patache Fog Oasis. "Falda Verde" lies at 600 m, on the top of a small coastal range, leaning from NW- to SE, a few kilometers north of Chañaral, (26° 17' N and 70° 36' W). No higher elevations could be found in the vicinity of their future agricultural parcels, at the foot of the chain, and near the sea. The Bay of Chañaral makes a huge half circle, opened to the sea, so that our area "Falda Verde" receives directly from the south the predominant Trade Winds, which normally come in this area from 180°-185° Az. This constant wind direction throughout the year corresponds pretty well with the one we have always registered at Alto Patache, lying further North (20° 49' S), and appears to be caused by local relief, which modifies the dominant SW Winds, into South Winds. The "Falda Verde" small chain, lies at the northern margin of Salado River, one of the few intermittent desert rivers, which crosses the territory of the III Region, north of Copiapó, reaching the sea from time to time.

2. MATERIALS AND METHODS

Local fishermen installed a Fog Collector of their own design (1,5 square meter mesh), mounted on wooden poles, using a fishing net type of mesh, and scarcely 1 m above the soil surface. Our Group came to the place in March 1999, installing two meters apart from the fishermen's collection device, a standard SFC (1 m² mesh, double layer, 55% coverage, 2m above the soil surface). By so doing, it was possible to compare the production results of both devices from the beginning of the measurements (November 1998). In both instruments, water was collected in a 100 liter plastic container, surrounded by big stones, to avoid damage produced by foxes, trying to have access to water. Measurements were made every two weeks, by trained persons. Both instruments, (lying close one another) were measured at the same time by means of a graduated cylinder.

Objectives

The goal of this presentation is to take maximum profit from these bi-weekly measurements made by local fishermen, and, at the same time, offer measurements of fog water collection in local fog, at a place never studied before, lying somewhat between two already known catching Stations: Alto Patache (20°49' S), and El Tofo (29° 17' S). These registers, obtained at a very low altitude (600m.), are interesting to compare with those obtained at much higher altitudes: El Tofo 900 m. and Alto Patache 860 m. high.

3. RESULTS AND COMMENTS

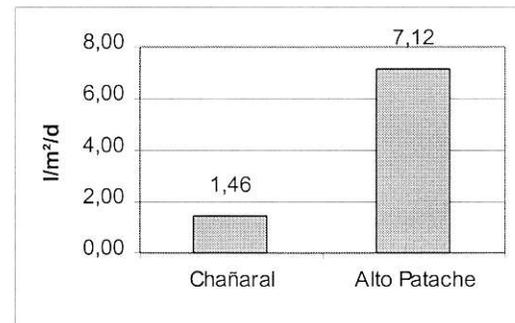


Figure 2: Two years Comparative daily average Fog-catching at Chañaral and Alto Patache

This Figure shows the average daily water collection, at two coastal Fog Stations: Chañaral and Alto Patache. The amounts collected correspond exactly to the same collection period, namely, from November 1998 to November 2000. Total average collection at Alto Patache, in three years (July 1997- December 2000), goes up to 8.4 l/m²/day. The two fog stations lie at different altitudes: at 860 m (Alto Patache), and 600m (Falda Verde, Chañaral). The collection average obtained at Chañaral seems very modest, being the lowest among stations located close to the sea (3-5 km from sea shore). Altitude, therefore, seems to be the most important parameter to be considered.

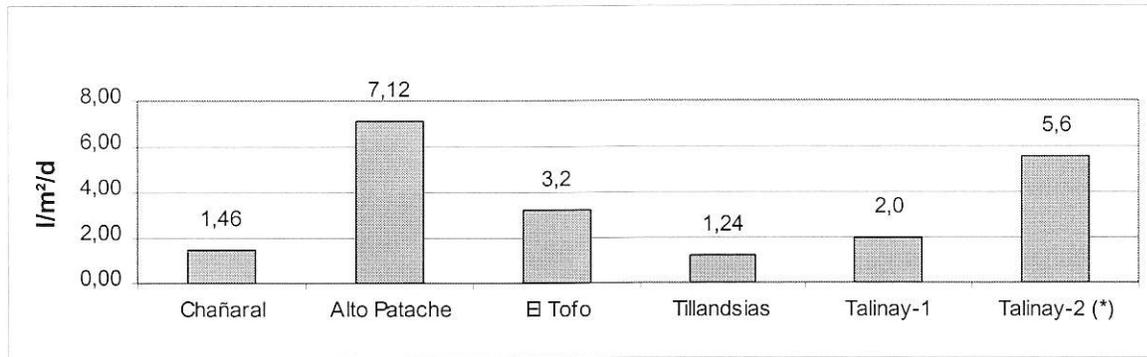


Figura 3: Comparative daily average fog collection at six Chilean Stations

The Figure 3 presents fog water collection averages, obtained at six different fog stations in Northern Chile throughout different time periods. El Tofo (9 years: 1987-1995); Chañaral (2 years, 1998-2000); Tillandsias (Cerro Guatalaya: 3 ½ years, 1997-2001); Talinay-1 (2 years, 1994-1995); and Talinay-2 (six months, March to September 1999). In the last two cases, the area is the same, but the exact location of instruments is different. As it becomes evident, Alto

Patache shows, by far, the best collection values obtained. Tillandsias (Cerro Guatalaya), lies at 1050m, but 15 km away from the sea shore. The longer the distance from the sea, the worse in terms of water collection. Among the coastal stations shown in Fig.3, there is no correlation visible, neither in latitude nor in longitude. According to these very preliminary data, the best stations lie between 800 m and 900m. high.

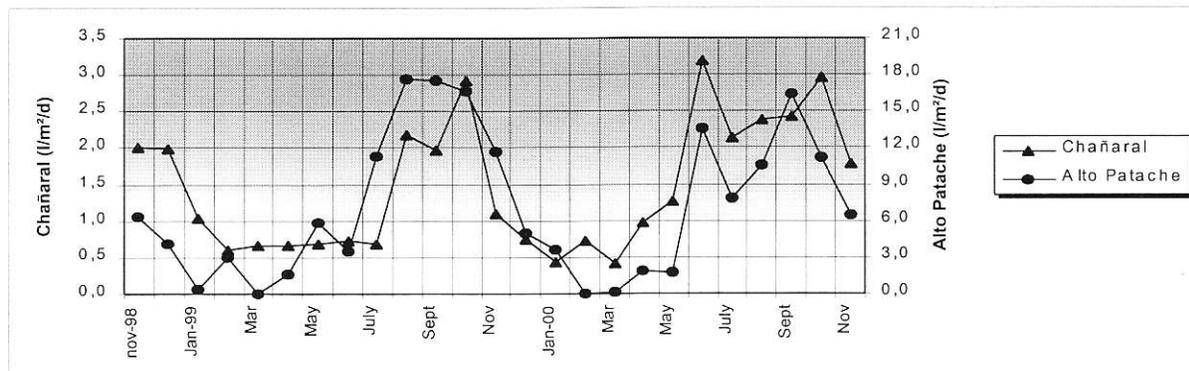


Figure 4: Two years comparative fog collection at Chañaral and Alto Patache (monthly behaviour)

This Figure 4 shows the surprisingly correlated curve obtained after exactly two years of fog water collection, at both Stations (Chañaral and Alto Patache). The trend observed is almost identical; the water amounts collected, of course, are quite different. In order to get valid conclusions concerning trends, we would need to compare several coastal stations, controlled during exactly the same period of time. This is not the case still in Northern Chile,

where measurements have been collected in different years or months. When examining this Figure, we are surprised by the fact that in June 2000 the graph shows, in the two stations, a high correspondance, with exactly the same peak. We have no explanation as to the causes involved. In both cases, moreover, the best collection period falls between June or July and November, being in year 1999 much more stable.

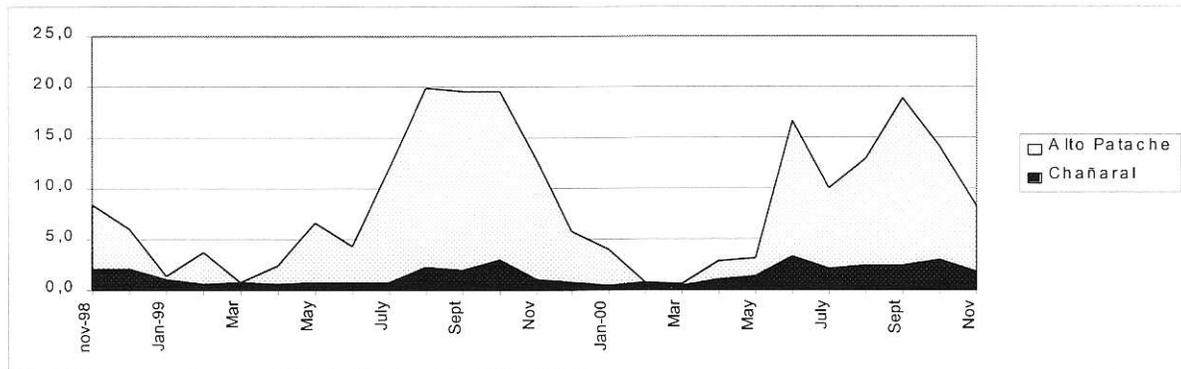


Figure 5: Comparative Fog Water Collection Values between Chañaral and Alto Patache

This Figure shows the proportional collection values, obtained at the two compared stations, using an area graph. This kind of graph has the advantage of showing the water volumes obtained at Alto Patache, against the clearly weaker results at Falda Verde, Chañaral.

4. CONCLUSIONS

- 4.1 There is a very strong resemblance in the graphic curve presenting water production at both places: Chañaral and Alto Patache, during the two years 1998-1999. Nobody before us has been able to demonstrate this strong similarity in final results, due to non existing comparative records, at different Chilean coastal stations, in the same time period.
- 4.2 Even if the Chañaral results seem very modest in comparison with other Chilean stations, the average amount of 1.46 l/m²/d obtained, would permit, by means of appropriate storage systems, to irrigate small agricultural plots, as the fishermen propose to do.
- 4.3 These modest results, in terms of water collection, are certainly not due to the presence of a week type of fog at Chañaral, but rather to the low altitudes where catching can be practiced (600m).
- 4.4 With the establishment of this new fog collection station, a new link in the chain of Chilean coastal measurements appears, giving birth to future analysis of fog behaviour along the Pacific Coast of South America.

Acknowledgements

Our special recognition to the members of the Fishermen's Association of Chañaral, especially to Mr. Hugo Olguín (President), Mr. Hugo Streeter and the different persons in charge of the bi-weekly measurements at "Falda Verde". Without their continuous effort, in climbing the hills to reach the SFCs and measure them every fourteen days, nothing would have been done. Thanks to them, we can now include Chañaral as another important station for fog studies in Chile. To the professional members of Servicio-País, who believed in the fishermen's dreams and had confidence in our assistance and help. To the Municipality of Chañaral, who attended us in our visits to the place. Finally To the I.E.C.T.A., secretary Mrs. Silvia Alquinta who dedicated much time in assembling our materials.

5. REFERENCES

- Cereceda, P., Schemenauer, R. y Velásquez, Flavia, 1997, Variación temporal de la niebla en El Tofo-Chungungo, Región de Coquimbo, Chile, *Revista Geográfica Norte Grande*, N°24, 191-193, Santiago.
- Larrain, H. 1997-2001, Notebook on Alto Patache measurements (private Field Diary) ;
- Velásquez, Flavia, 1995, Captación de agua de niebla en el Tofo, IV Región, Chile. Pontificia Universidad Católica, Memoria de Título de Geógrafo y Licenciado en Geografía, Santiago, 131 p. y Anexos