

## Fog as a water resource for the improvement of subsistence agriculture of lomas of Atiquipa

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**Abstract:** Lomas of Atiquipa is located in the peruvian coast, Province of Caraveli, north of Arequipa, between 74°18'55" to 74°24'49" LW and 15°42'42" to 15°50'00"LS. Due to its extension and floristic composition is considered a well conservated lomas ecosystem in Peru and north of Chile. It is the only place where is found the last forest of *Caesalpinea spinosa* "tara" and *Myrcianthes ferreyrae* "arrayán" which function as natural fog catchers of water fog. This ecosystem is inhabited just for one community integrated by agricultures and cattlemen that depends on fog water catching by trees, the same that is stored in the soil by vegetation and then taken by rural population from springs, and so conducted until the crops areas and the town. Nowadays, the community produce in four irrigation times per year around 70 ha of soil each productive plot that produce olivo trees, sweet potatos, corn, pupkims and other productos, as agriculture of subsistence. In 1999, the IRECA-UNSA built with the sponsored of British Embassy and the European Union, 20 fog catchers covering 960 m<sup>2</sup> of area. These produce 19 l/m<sup>2</sup>/day mean with a total of 6 935 m<sup>3</sup>/year. The increment of approximately 20% in the water quantity has means the irrigation increasement and the time disminution in frecuency of watered which makes expect a significant increment of crops production .

### INTRODUCTION

The coastal lomas are vegetational formations by the fog of the rails of the coastal ridge. The trees and shrubs use their leaves to capture fog, this is the principal way they get water for functioning of all the vegetation. The lomas formations have high percentage of endemic trees, shrubs and herbs.

The coastal lomas have always been an important natural resource human kind. The pre-hispanic human groups have used them since 6 000 years ago by conserving and managing their pastures, by consuming the animal protein produced by the wild fauna that lived there, by practicing agriculture based on water produced by fog in the wood and by using wood as fuel.

The flora of these lomas has contributed to with a germoplasm reserve of cultures as important as potatoes (*Solanum tuberosum*), tomatoes (*Lycopersicum* spp.), chile (*Capsicum* spp.), pumpkin (*Cucurbita* spp.), sweet potatoes (*Ipomoea batatas*) and achira (*Canna edulis*).

As a consequence of the introduction of european practices of agriculture and breeding cattle, the wood was cut to set systems of extensive breeding of goats, sheeps and cows wich have cause overgrazing, reduction of the vegetable coverage that captures fog therefore the cultivated area and breeding cattle have been reduced and so have been the ingresses of the members of the rural community, this way the continuity of this important ecosystem.

### SOCIOECONOMIC DIAGNOSTIC OF THE COMMUNITY ATIQUIPA:

Table 1. Population in the district of Atiquipa (1993)

Groups of age	Total population			Urban population			Rural population		
	Total	H	M	Total	H	M	Total	H	M
Children (0 - 15 years)	264	127	137	34	17	17	230	110	76
Youngs (15 - 30 years)	95	52	43	22	12	10	73	40	33
Adults (30 - 60 years)	180	86	74	39	22	17	121	64	57
Old man (< a 60 years)	40	24	16	12	8	4	28	16	12
TOTAL	559	289	270	107	59	48	452	230	222

According to the table 1, more than two thirds is rural population that deicates to agricultural activities, likewise children and young are the most part of the population.

Tabla 2. Agricultural production in Atiquipa

Products	Ha	I	TM/Ha
Alfalfa	10	17,5	34,8
Olive	30	52,7	0,07
Corn	10	17,5	2,6
Fruits	7	12,3	

They also product daily consumed cultures for the self-consume such as potatoes, sweet potatoes, lettuce, carrots, pumpkin, cauliflower and so far.

Talking about cattle breeding th emembers of community possess 60 heads od cattle, 5 sheep, 5 pigs, 175 goats and 96 hens aproximately.

**WATER VOLUME USED FOR AGRICULTURAL ACTIVITIES:**

The rural community uses an irrigation basin wich has a storage capacity of 200 m<sup>3</sup>, the daily stored are 86,30 m<sup>3</sup>, that make a total of 31 535 m<sup>3</sup> per year. This water volume is used to irrigate aproximately 50 Ha of fields, mainly olive, fruits and other daily consumed daily.

**SYSTEM OF CAPTURE AND CONDUCTION OF WATER IN THE COMMUNITY OF ATIQUIPA:**

A line of 20 fogcatchers (2 single and 9 double), has been constructed at Lloque hill, between 960 and 900 m.a.s.l. in the Lomas of Atiquipa. Each fogcatcher has 48 m<sup>2</sup>, and they make a total fog capture area of 960 m<sup>2</sup>. The fogcatcher are made from Raschel net of 35% polypropilene. The net is extenden vertically and held by 2 posts and a system of wires, they are set perpendiculary to thje wind that bring fog . Each fogcatcher has a paddle in its base that allows to conduct the captured water. These paddles are connected to a system of underground pipes set as a branch. All the fogcatchers are connected to 2 main pipes that end in a basin, built wear the fogcatchers at 890 m.a.s.l. with capacity of the 65 m<sup>3</sup>. From the base of the basin theris a pipe that arrives water. A pipe of two inches takes water since 880 m.a.s.l., until an opened whirlpool located at 550 m.a.s.l. A part of the water that arrives to

this whirlpool comes from village by a system of open cement canal.

**CAPTURE OF FOG WATER**

The measurement of fog capture were taken by using estándar for collector of 1m<sup>2</sup> (Schemenauer and Cereceda, 1994), made with 35% Rascehl net, since August 1996 till March 1997. The results are presented in Table 3.

Table 3. Capture of fog water

Month	Volume (dm <sup>3</sup> )
August 1996	48.8
September	34.6
October	25.5
November	19.5
December	8.1
January 1997	4.0
February	3.1
March	10.6

According to the results, the daily average was 19,28 dm<sup>3</sup>/m<sup>2</sup>/day, it's necessary to point out that the months evaluation embrace 2 seasons, one represented by fogs (winter and sppring) and other represented by absence of fog (durig summer). The lowest volume of capture occurs in February.

The increment of approximately 20% in the water quantity has means the irrigation increasement and the time disminution in frecueny of watered which makes expect a significant increment of crops production

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