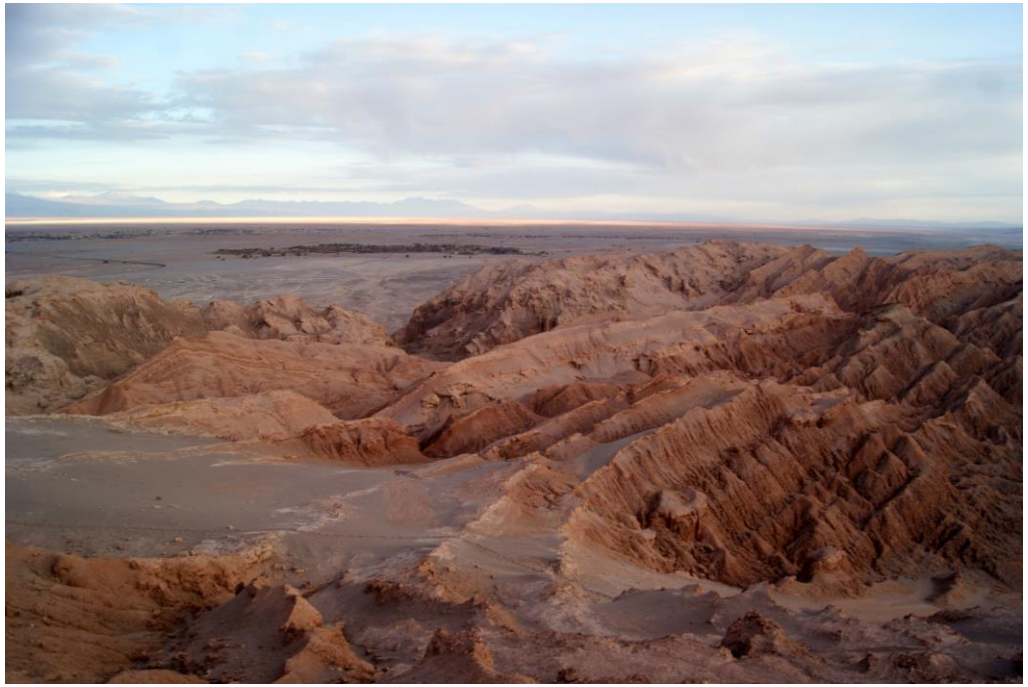
Study on fog harvest (2013-2017) in the Agricultural Community Peña Blanca- Chile

UN ALTO EN EL DESIERTO

UNIVERSITAS ATHESINA STUDIORUM

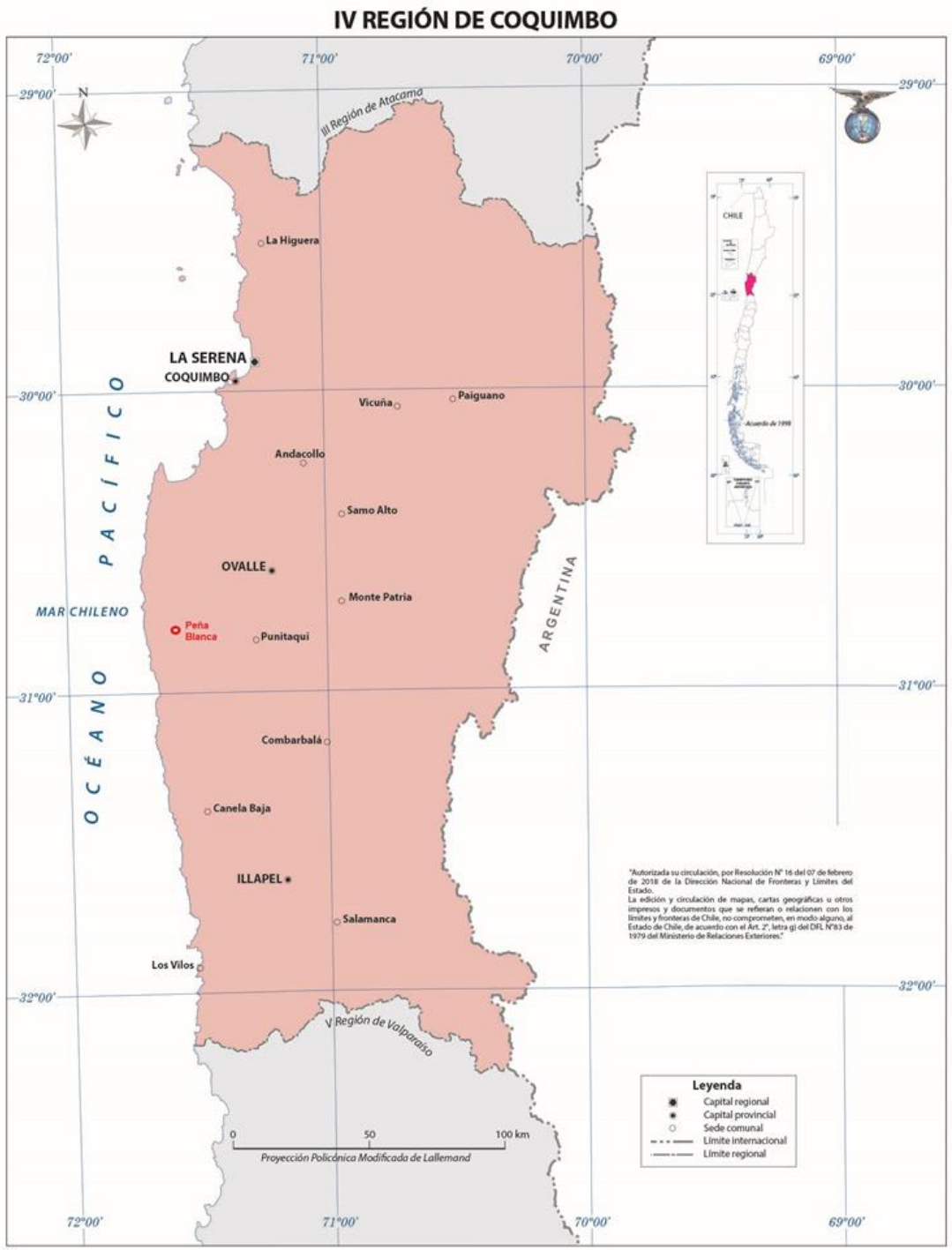


Atacama Desert

OVALLE

Región de Coquimbo (IV)

UN ALTO EN EL DESIERTO



Coquimbo Region (IV)

Total area 4’061’627 ha

- Urban and industrial area 39’360 ha
- Agricultural land 161’959 ha
- Soil without vegetation 758’229 [ha]

The region is semi-arid, with monthly rainfall of about 35-50 [mm] during the austral winter (June - July - August).

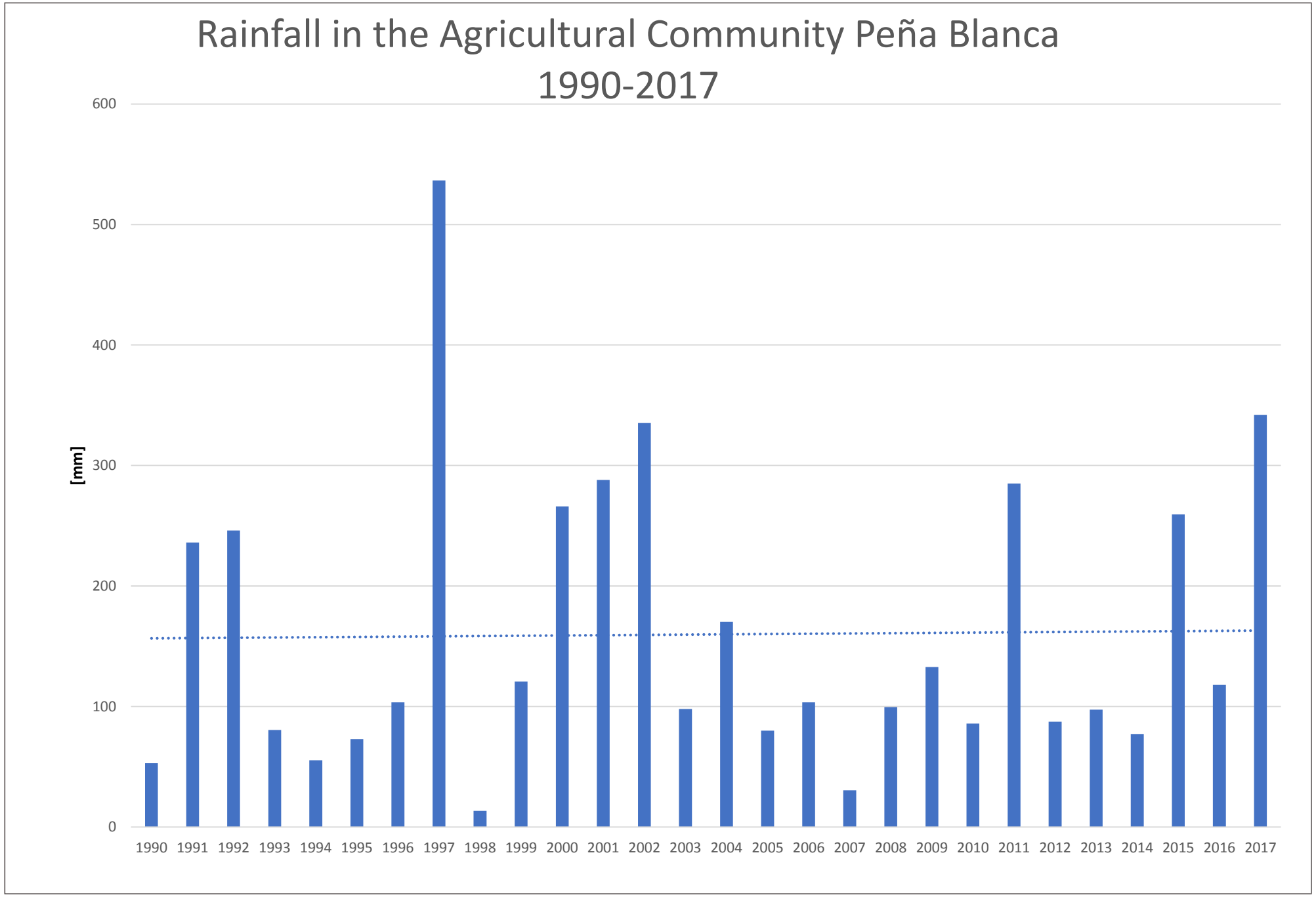
Water issues

- Privatisation of water
- Lack of regulations on the protection of water resources
- Main water reserves: rainwater basins, subject to decreased precipitation and evaporation

The project:
Atrapaniebla Comuneros

Peña Blanca

- Agricultural Community of the Ovalle commune
- 70 *comuneros*, 85 land tenure rights
- High soil degradation due to extensive wheat cultivation
- Low rainfall


Rainfall in the Agricultural Community Peña Blanca
1990-2017
[mm]
600
500
400
300
200
100
0
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017

Camanchaca

The climate on the west coast of South America is mainly regulated by the Pacific Anticyclone. This results in low rainfall in the Chilean coastal zone.

The Anticyclone produces winds from the south and southwest that penetrate towards the continent. Those winds, crossing extensive oceanic spaces, load of humidity and when they get in contact with the cold ocean (current of Humboldt) this humidity condenses giving origin to abundant stratiformes clouds, which are located between 600 and 1200 m of altitude.

Reserva Cerro Grande

- 100 hectares within the Peña Blanca Agricultural Community
- Created in 2006 by the community with the support of *Fundación Un Alto en el Desierto* to regenerate the native vegetation of the area.
- The place has the adequate geographical characteristics to catch the fog

Suitable fog-catching conditions

- Presence of a mountain or hill (in spanish cerro) near the coast
- Presence of a cold current in the Ocean (e.g. Humboldt current)
- Summit height between 600 and 1000 m.a.s.l. to intercept the cloudy layer
- Exposure to moderately strong winds, e.g. no obstacles between the hill and the Ocean
- Presence of a depression in the interior area to encourage the formation of low pressure systems, which increase the ocean breeze
- Suitable topographic conformation that facilitate wind and fog flowing, i.e. presence of saddles (in spanish portezuelo)

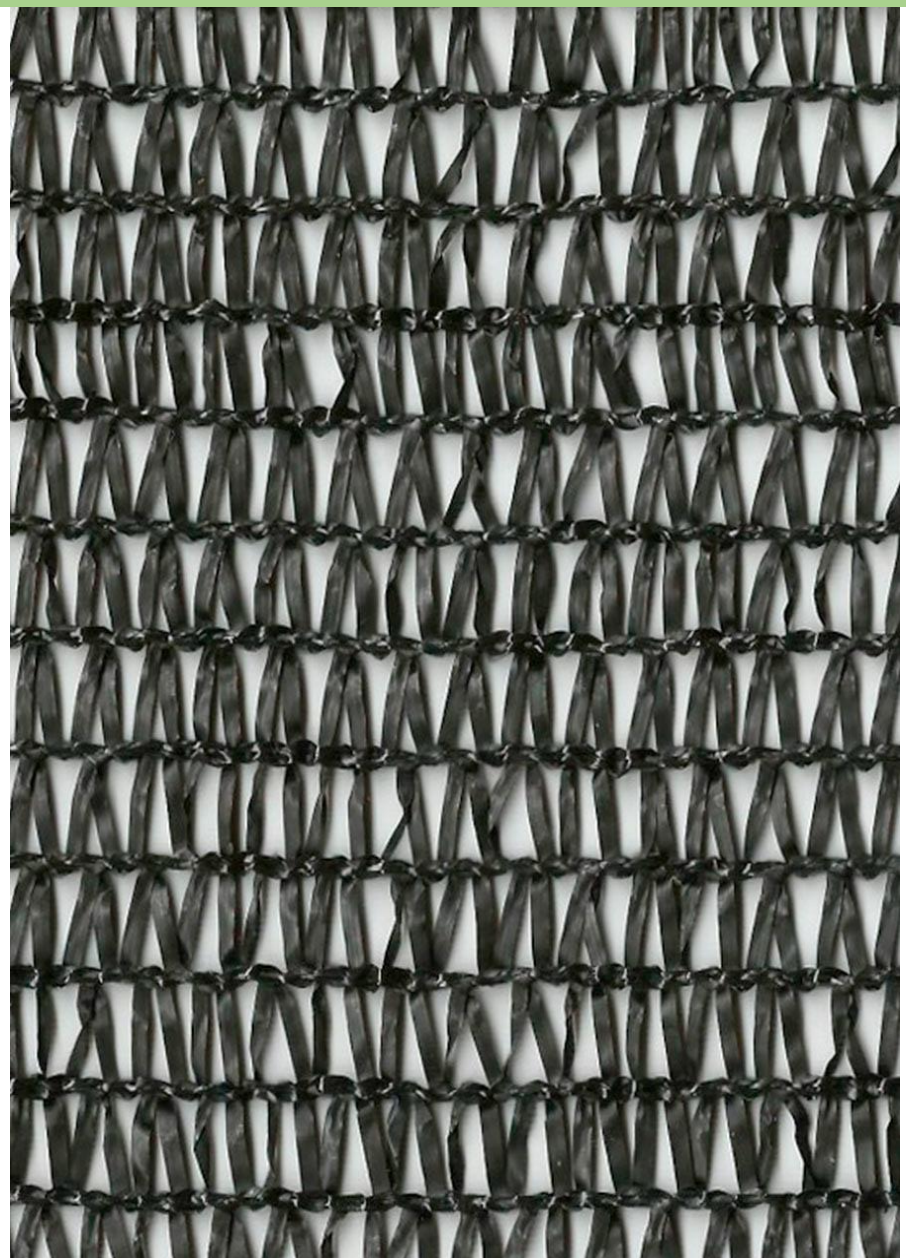
ATRAPANIEBLA

In 2006, "Fog Catcher" meshes were installed in the Cerro Grande Eco-Reserve.

Technical Characteristics

Material: double layer of polypropylene mesh with a shade coefficient of 35% (RASCHEL 35%)
The meshes are 3x3 m wide and are placed on panels 1[m] from the ground.

There are currently 2 harvesting sectors:
Sector "Portezuelo" at 620 m.a.s.l.
Sector "Antenna" at 650 m.a.s.l.



Destino del agua de niebla

- Regeneration of the native vegetation of Cerro Grande to stop the advance of the desert (12 meshes 3 x 3 m, Portezuelo sector).

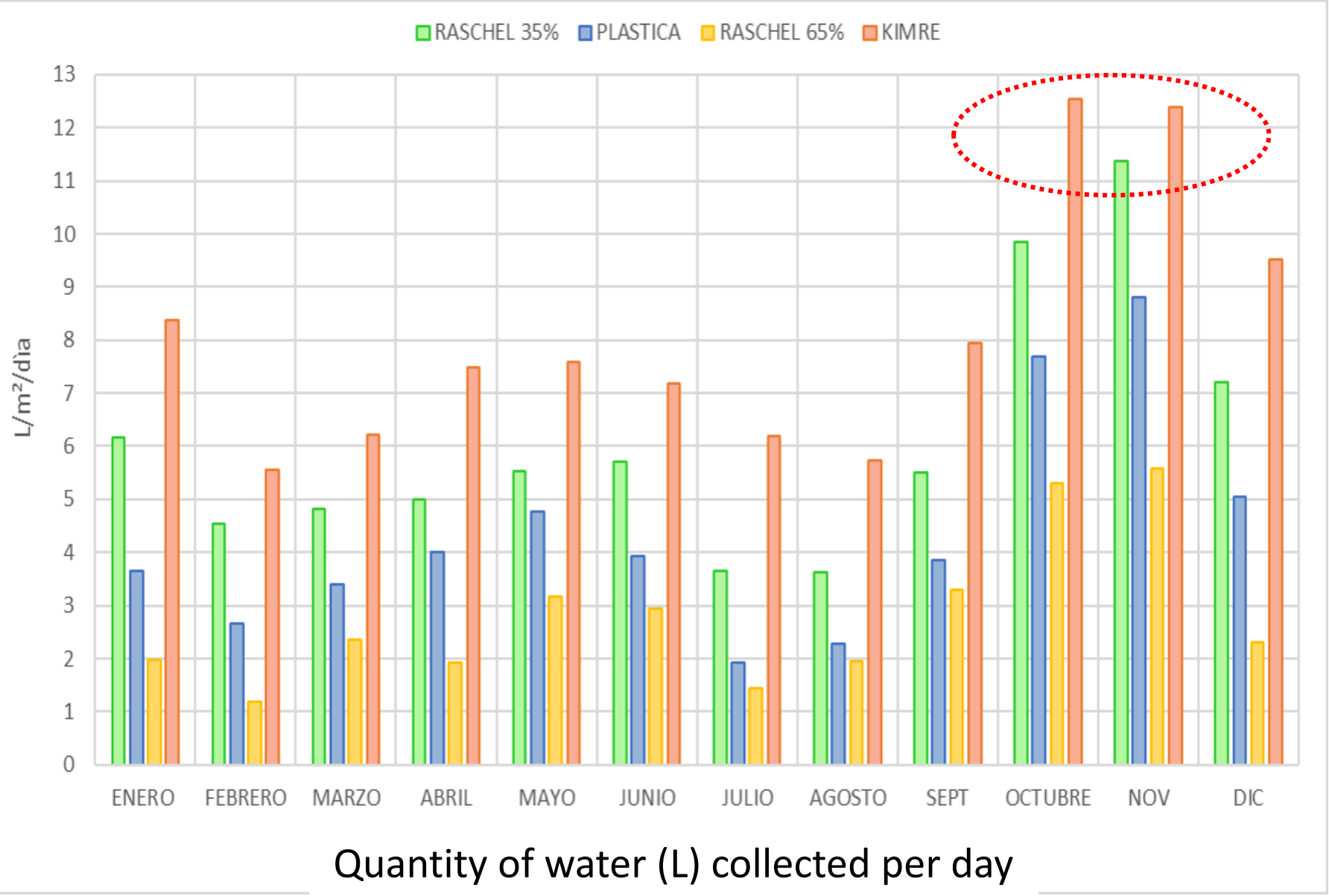
- Support to the community pastoral activity of Comunidad Agricola Peña Blanca and to be a water supply resource for the population in periods of extreme drought (12 meshes 3 x 3 m, Antenna sector).

- Promote the creation of local trade through the direct and indirect use of the project (4 panels of 15 square meters in the Portezuelo sector are dedicated to the production of "Atrapaniebla“ beer).

Standard Fog Collectors (SFCs)

- At the end of 2012, 4 SFCs 1x1[m] were placed in the Portezuelo sector to study the fog harvest potential of the reserve.
- The SFCs are oriented to the main wind direction (facing the ocean, southwest direction).
- Each SFC has a mesh of different materials to investigate different catchment capacities. Materials: RASCHEL 35% and 65% shade coefficient, Plastic, and a 3D mesh "KIMRE" manufactured by the MIT Institute.
- Each SFC is equipped with a 210 litre tank to measure the water collected.

Data analysis 2013-2017

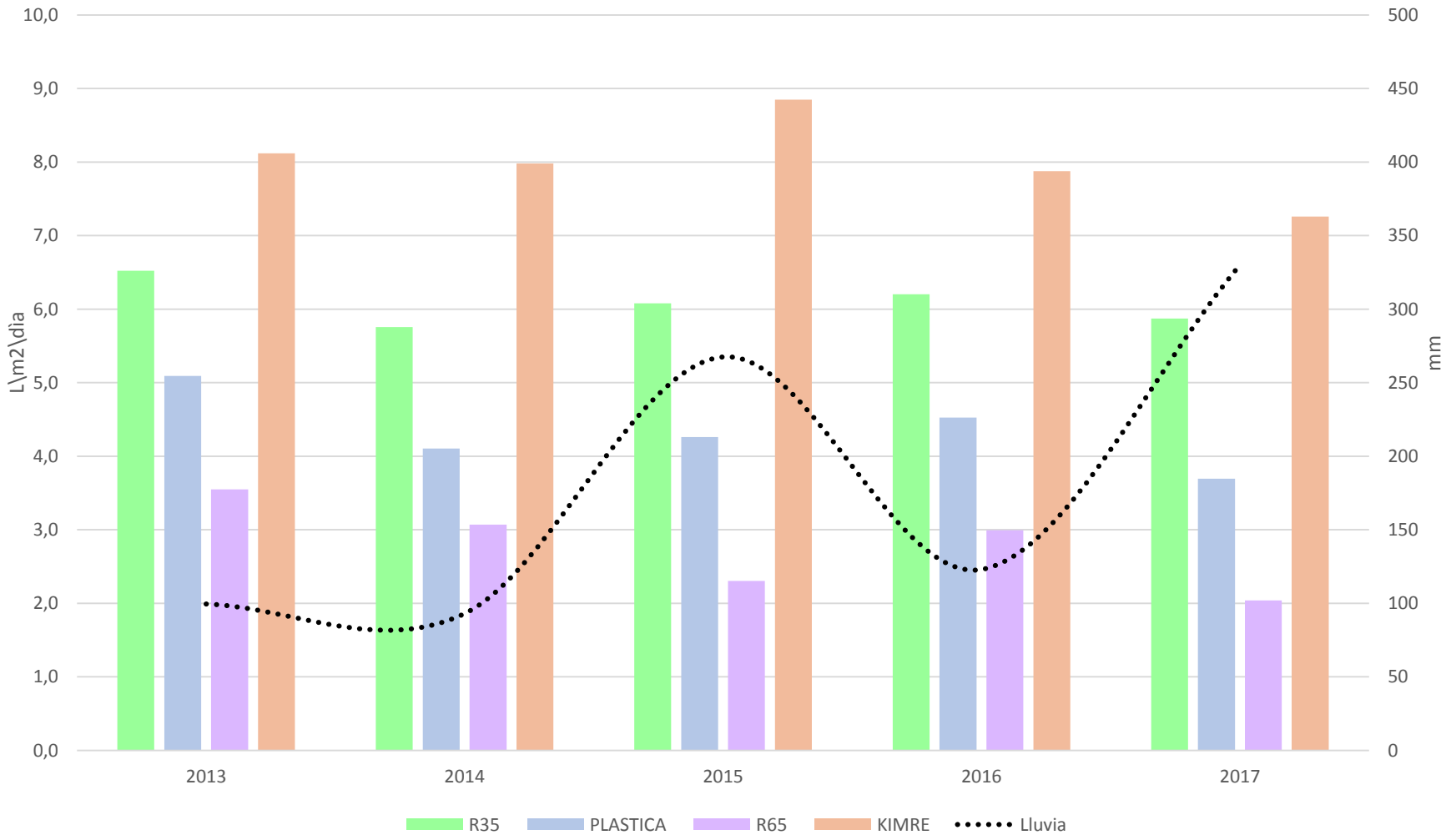


Quantity of water (L) collected per day per square metre of mesh

- The most productive months are October, November, December (austral spring and early summer).
- The fog collection is lowest in June, July and August (austral winter), when it normally rains.
- The most effective materials for fog harvesting are: Kimre (pink) and Raschel 35% (green).

años	Raschel 35	Plastica	Raschel 65	Kimre
2013	6,5	5,1	3,5	8,1
2014	5,8	4,1	3,1	8,0
2015	6,1	4,3	2,3	8,8
2016	6,2	4,5	3,0	7,9
2017	5,9	3,7	2,0	7,3

→ L/m2/d

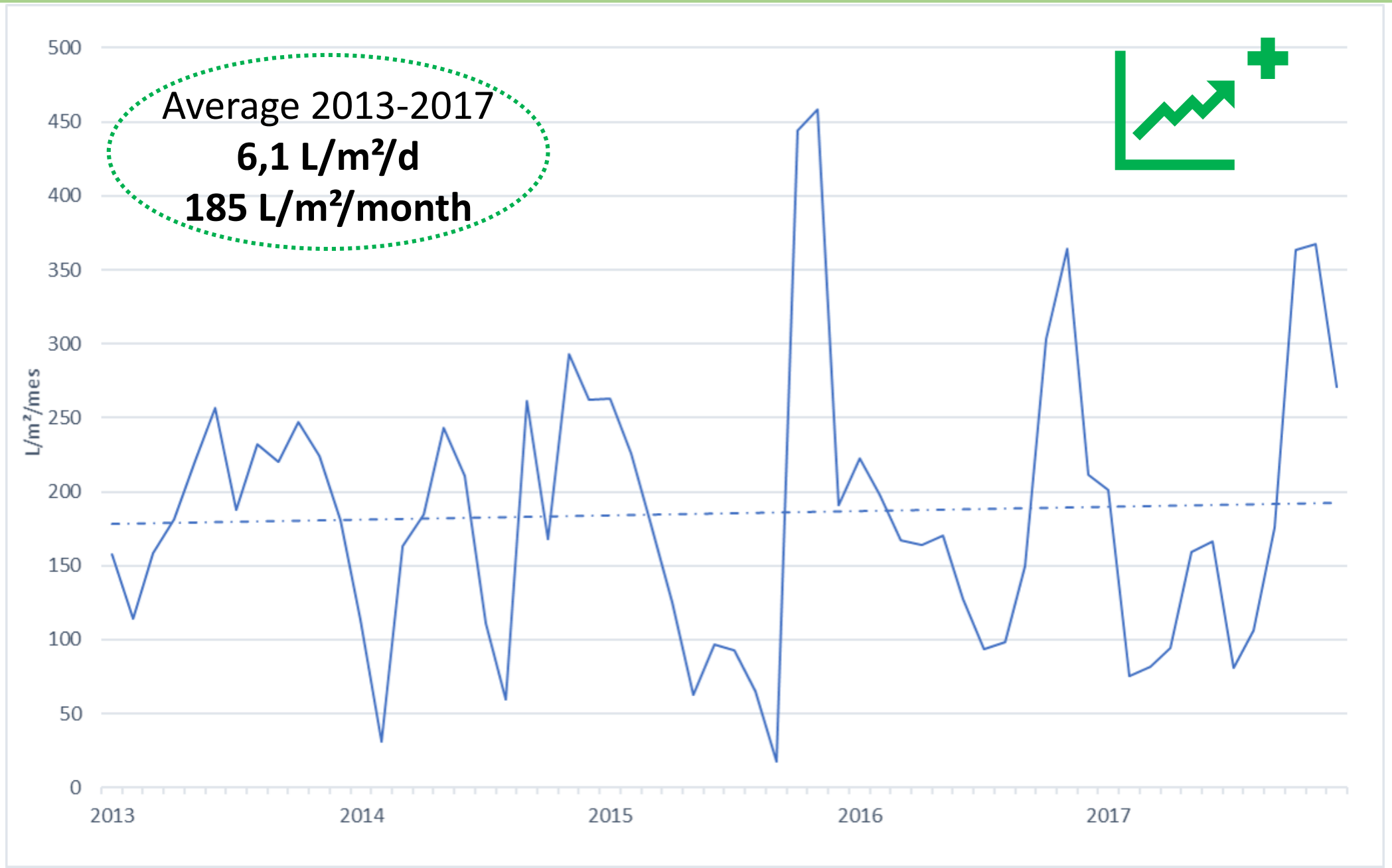


Fog harvesting and precipitation

NO correlation between the two

Fog harvesting (green) and rainfall events (blue) trends in the years 2013-2017

Fog collection trends in 2013-2017, Cerro Grande



Comments for future developments

- It is essential to bear in mind that the fog water resource is not and never will be a constant resource but the study has shown a certain regularity in its behaviour, which translates into a desirable characteristic for any planning of activities.

- Fog water collection provides ecosystem services as well (i.e. restoring vegetation and land), thus increasing the climatic resilience of the context in which is used.

- Fog water collection is an environmentally friendly intervention that does not rely on energy consumption; i.e. fog water harvesting is a green technology

what happens with just 35 mm of rain..

The surface area of the fog collectors for the community is currently 108 m^2:
referring to the daily average of 9.7 $L/m^2/d$ of the most productive months, there is a water production of 1048 litres per day in spring - that's when it doesn't rain!


Mucha gente pequeña
en lugares pequeños
haciendo cosas pequeñas
Puede cambiar el mundo
Eduardo Galeano
UN ALTO EN
EL DESIERTO