

# The benefits of natural areas on urban areas by recognizing the ecosystem services: a strategy to link the protection of natural areas to urban settings

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# Content of presentation

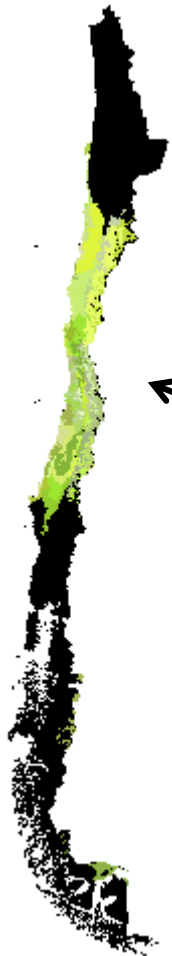
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- Geographical and Ecological Context
- The 'Parque Mahuida' Environmental Plan
- Reflections about Governance

# **GEOGRAPHICAL AND ECOLOGICAL CONTEXT**

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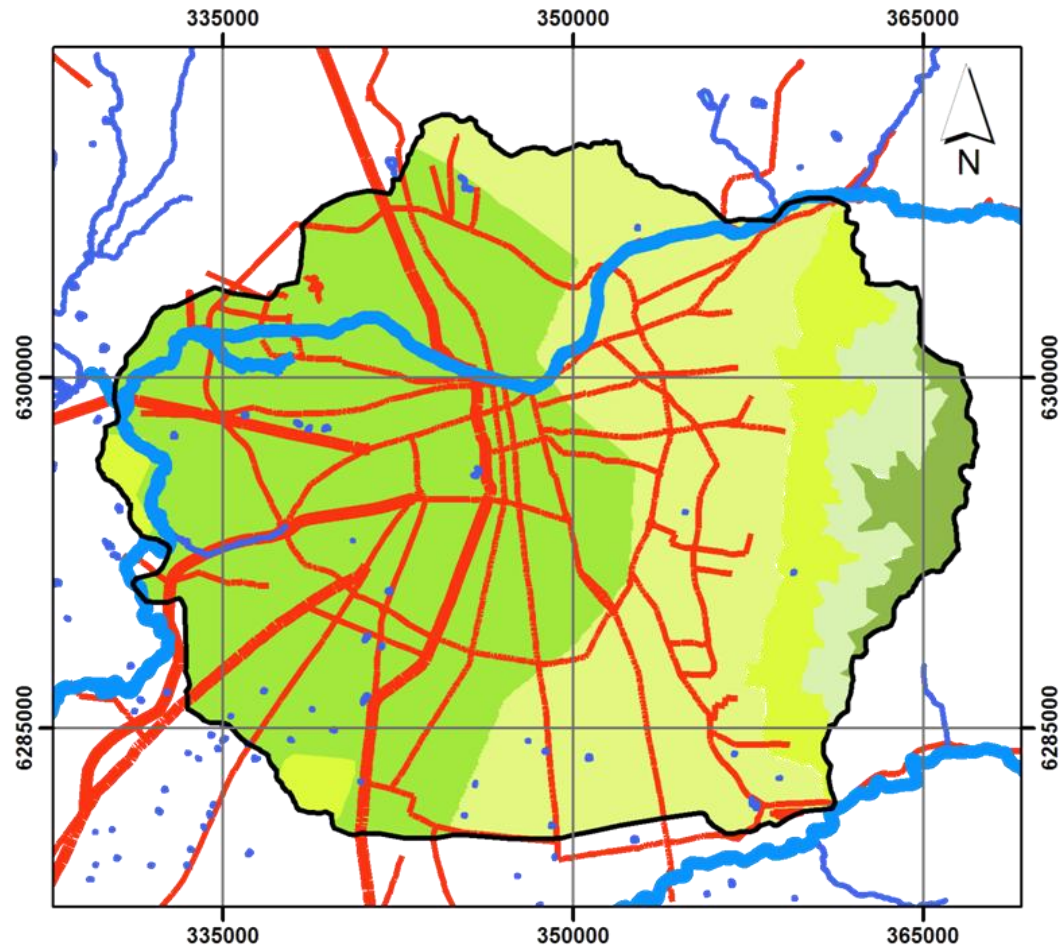
# Mediterranean ecosystems



<http://www.researchlearningcenter.com/>



# Santiago's watershed

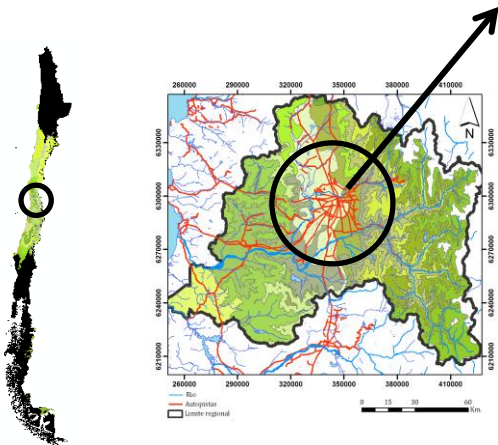


## Leyenda

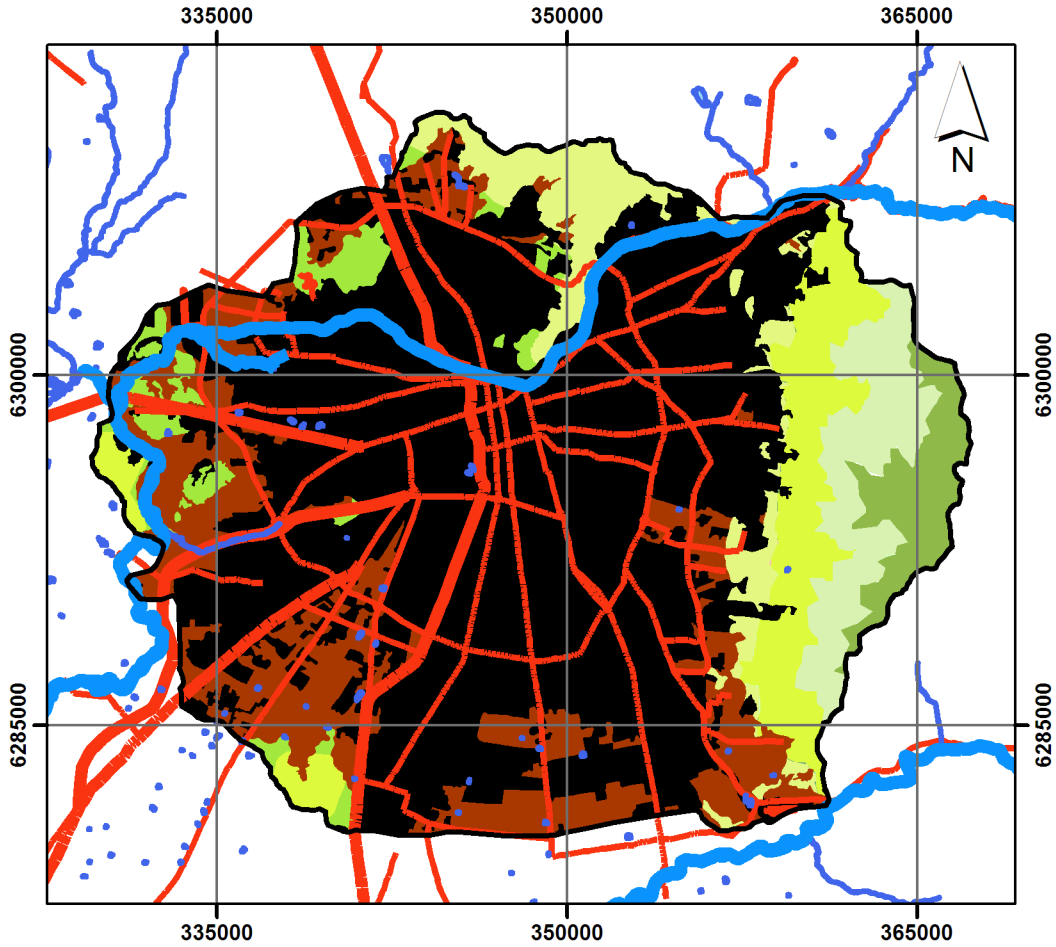
- Rio
- Autopistas
- Cuenca Santiago

## Pisos vegetacionales

- Bosque esclerófilo mediterráneo andino de *Kageneckia angustifolia* y *Guindilia trinervis*
- Bosque esclerófilo mediterráneo andino de *Quillaja saponaria* y *Lithrea caustica*
- Matorral bajo mediterráneo andino de *Chuquiraga oppositifolia* y *Nardophyllum lanatum*
- Bosque espinoso de mediterráneo andino *Acacia caven* y *Baccharis paniculata*
- Bosque espinoso mediterráneo interior de *Acacia caven* y *Prosopis chilensis*



# Santiago's watershed with urbanization and agriculture

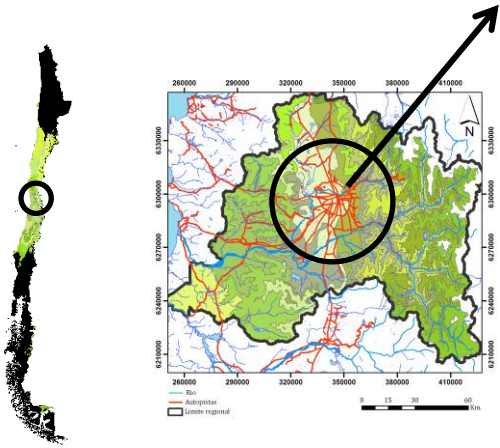


**Legenda**

- Rio
- Autopistas
- Cuenca Santiago
- Zona urbana
- Terrenos de Uso Agricola

**Pisos vegetacionales**

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**Cururo** (*Spalacopus cyanus*) by Agustín Iriarte



**Evergreen sclerophyllous shrubs in "Cerros de Chena" by Juan Muñoz**



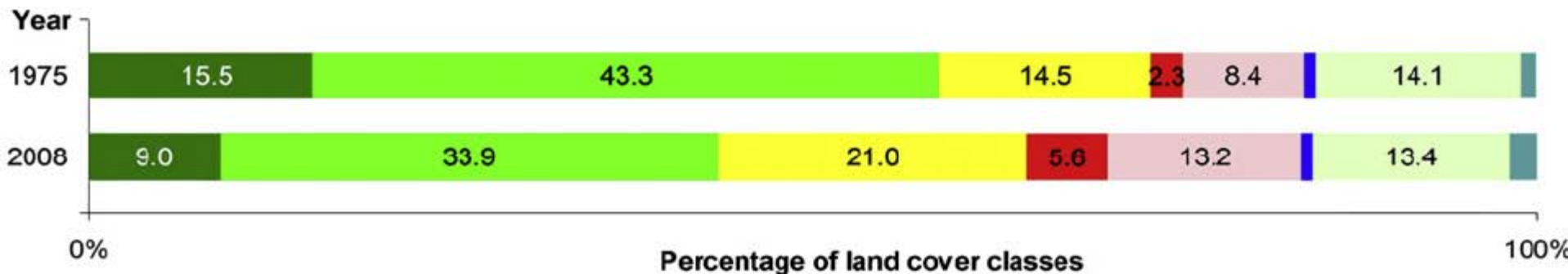
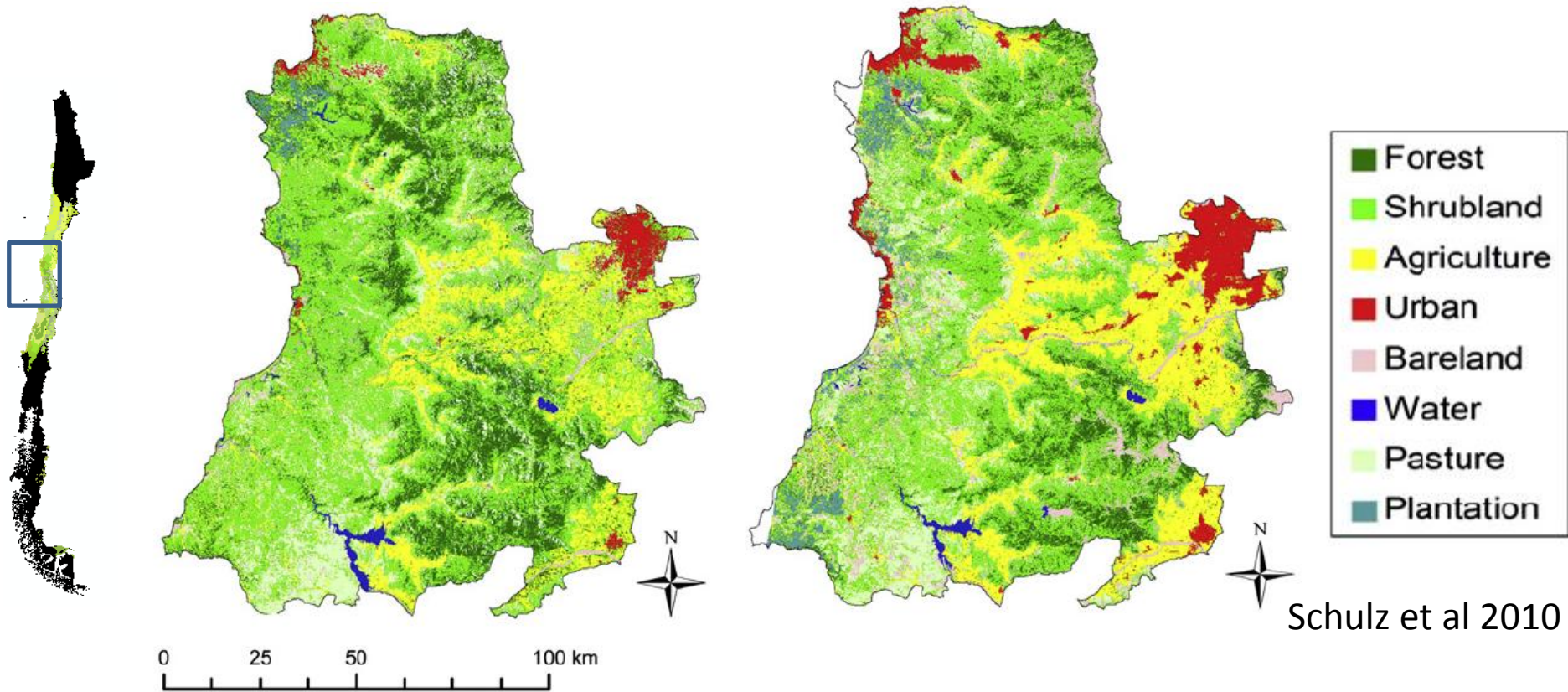


**Evergreen sclerophyllous forest** near to Ancoa by Darío Moreira

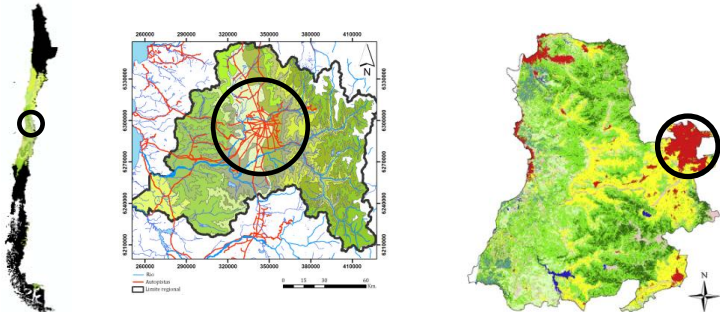
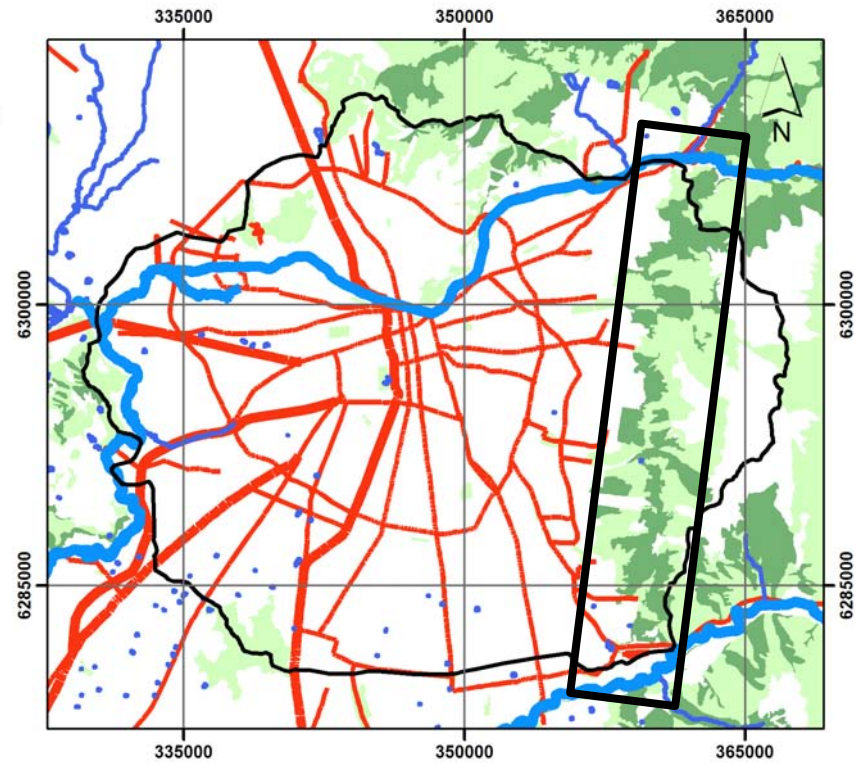
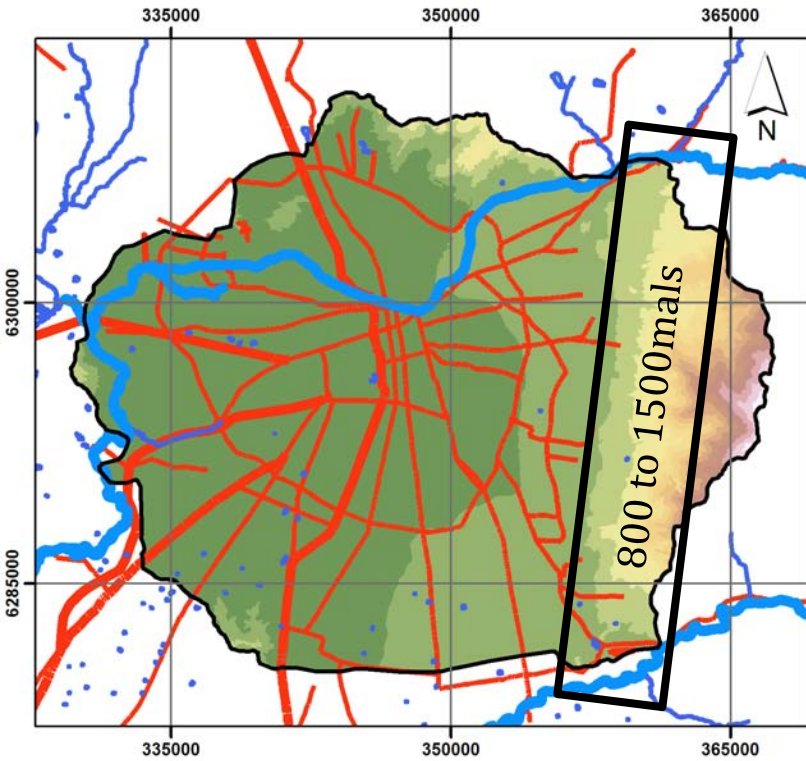


**Urbanization in Santiago de Chile** by Darío Moreira

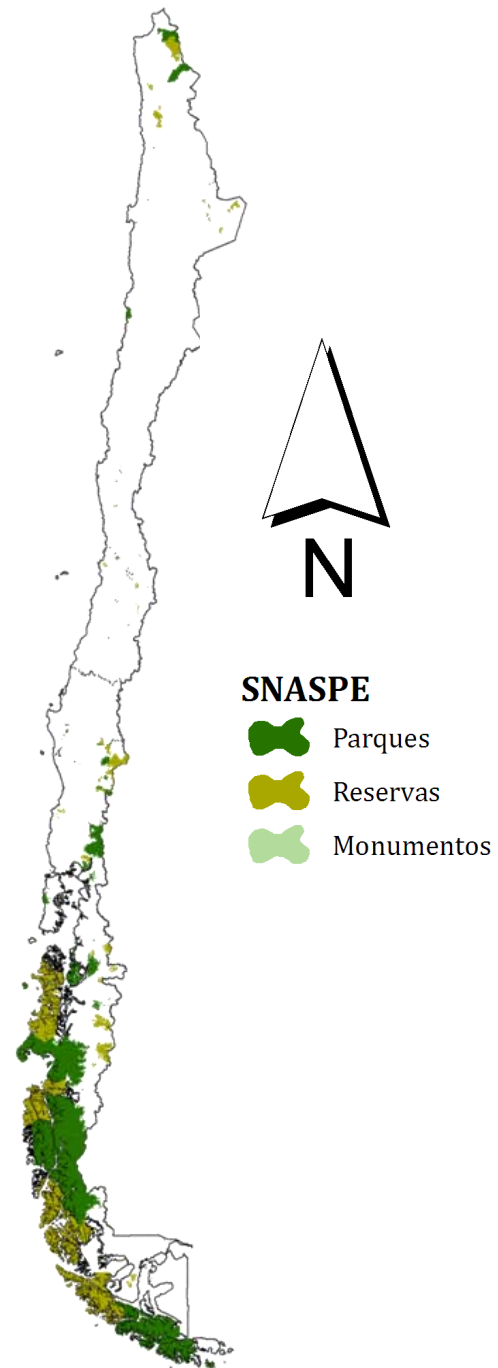
# 1975 – 2008 land cover change



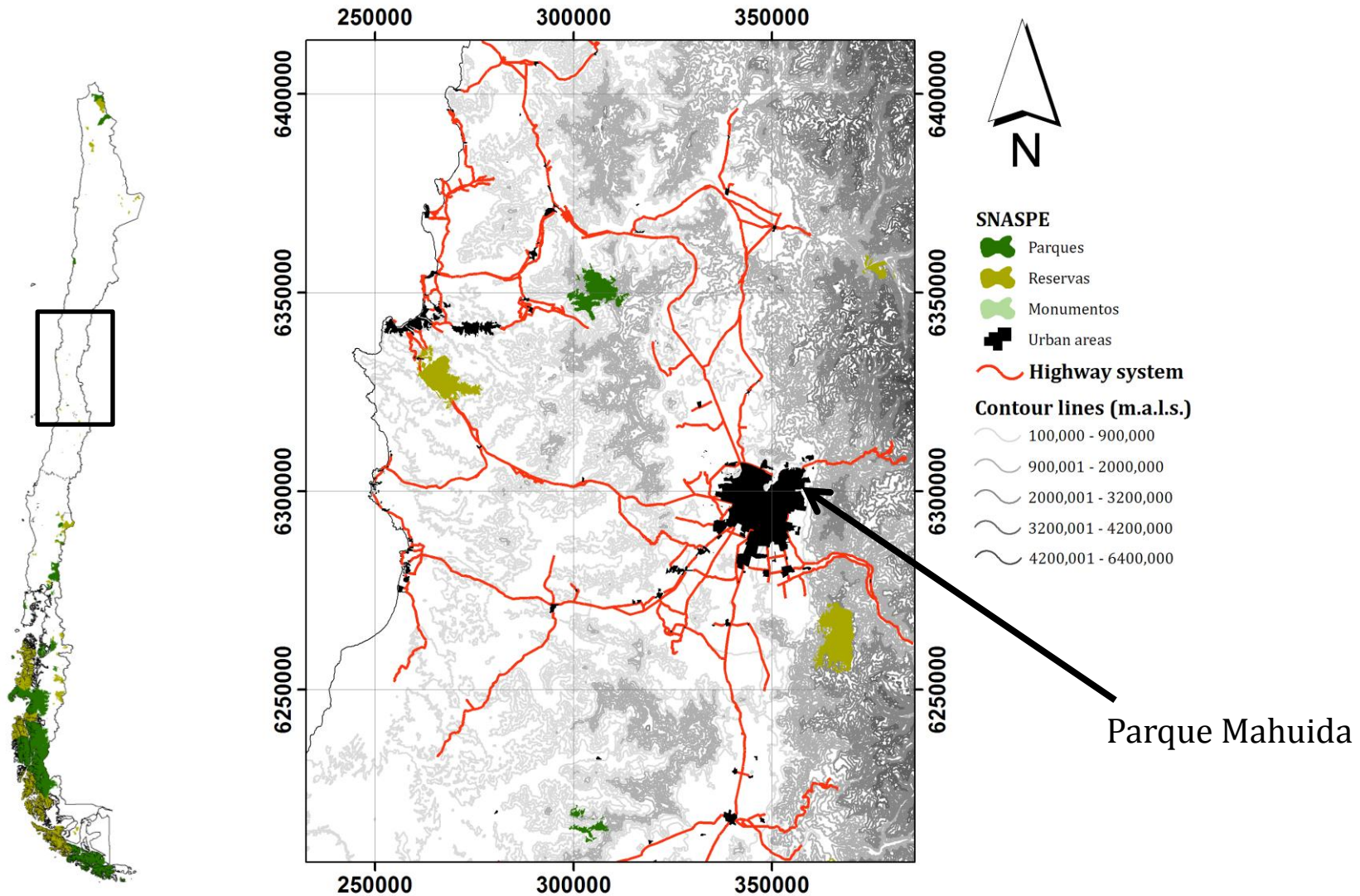
# Andean piedmont



# Chilean official system to protect ecosystems



# Ecosystems officially protected in Central Chile



**TO PROTECT THE CHILEAN MEDITERRANEAN  
ECOSYSTEM, OTHER KIND OF PROTECTED  
NATURAL AREAS ARE NEEDED (PRIVATE, PUBLIC-  
PRIVATE) .**

# Parque Mahuida

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- Opened in 2000
- Administrated by a foundation:
  - the Major
  - 2 council member
  - 3 inhabitant
  - 3 businessman that offer services in the park
- Around 120 ha





**Evergreen sclerophyllous forest by Darío Moreira**

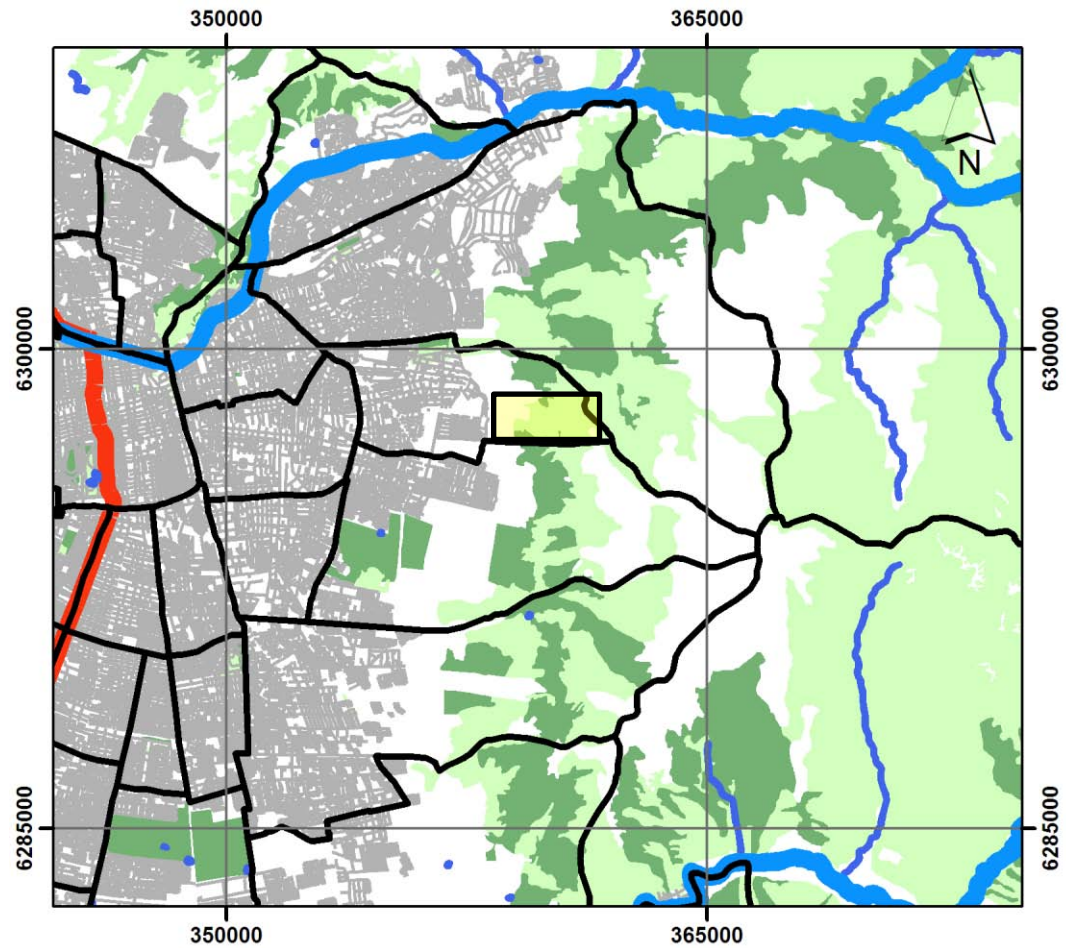
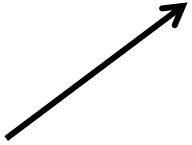
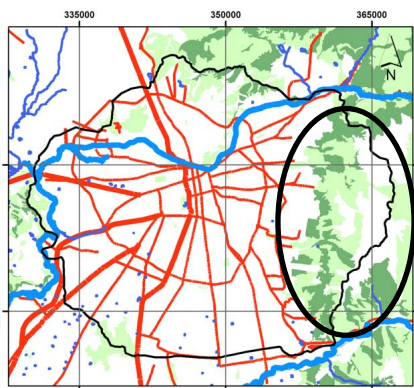


**Ravine with Evergreen sclerophyllous shrub by Darío Moreira**



**Open Evergreen sclerophyllous shrub** by Darío Moreira

# Districts and closeness at city

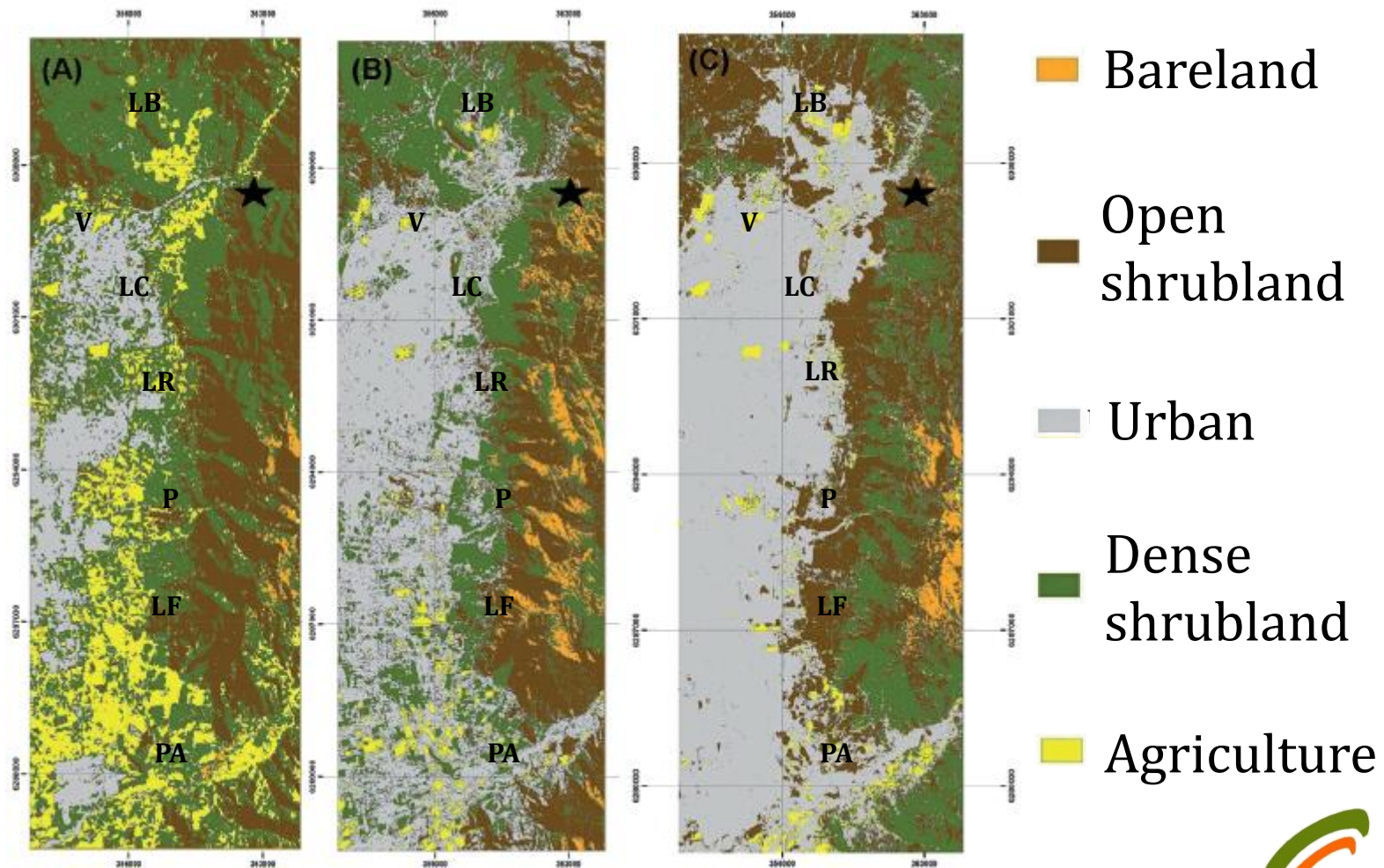


## Leyenda

- |              |                 |                                       |
|--------------|-----------------|---------------------------------------|
| Rio          | Cuenca Santiago | Areas verdes urbanas                  |
| Autopistas   | Limite comunal  | Vegetación de alto valor ambiental    |
| Trama urbana |                 | Vegetación de mediano valor ambiental |



# Land cover change in the Andean piedemont





The park generates ecosystem services for the inhabitants living nearby

Parque Mahuida

Escala 1:10.000

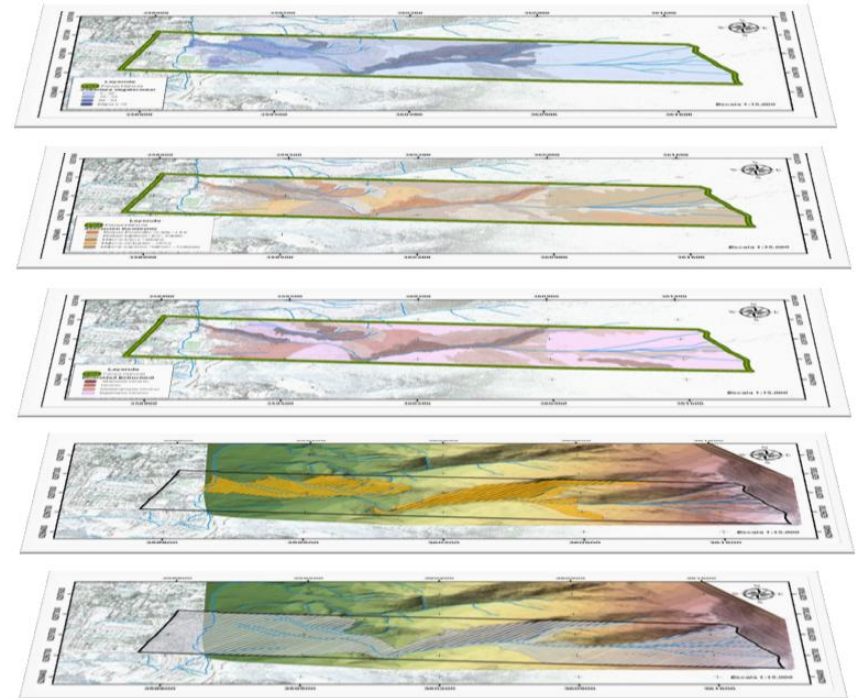
# **THE ENVIRONMENTAL PLANNING**

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# Parque Mahuida Planning

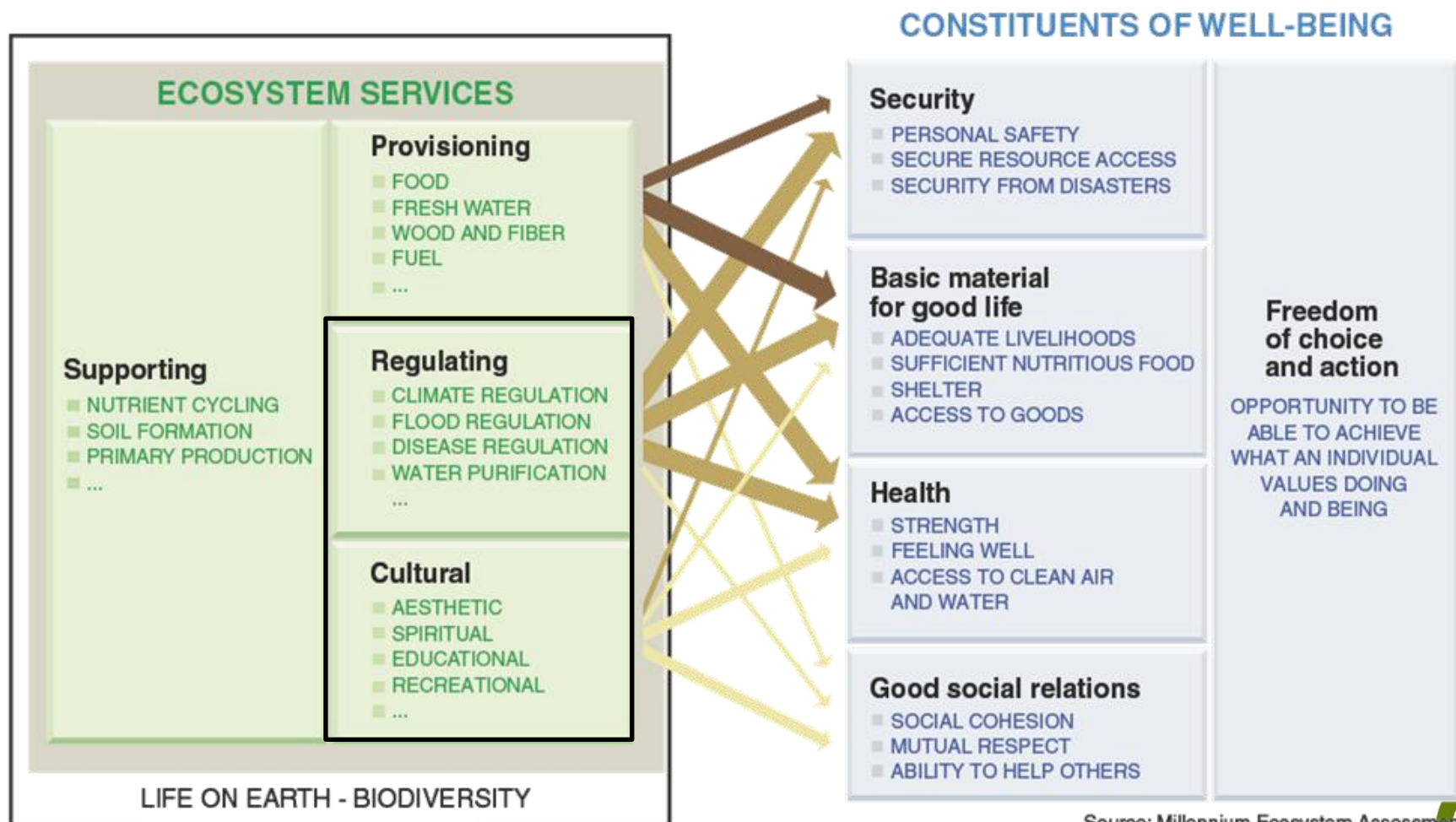
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- Traditional criteria:
  - Areas of high biodiversity value
  - Direct use areas (services and infrastructure)
- Ecosystem services production areas





# Millenium Ecosystem Assessment classification: ecosystem services



Source: Millennium Ecosystem Assessment



# Cultural (ecosystem) services

- Use and enjoy the nature
- Neighbors (into the district) can access easily
- It is also possible to access coming from remote districts.



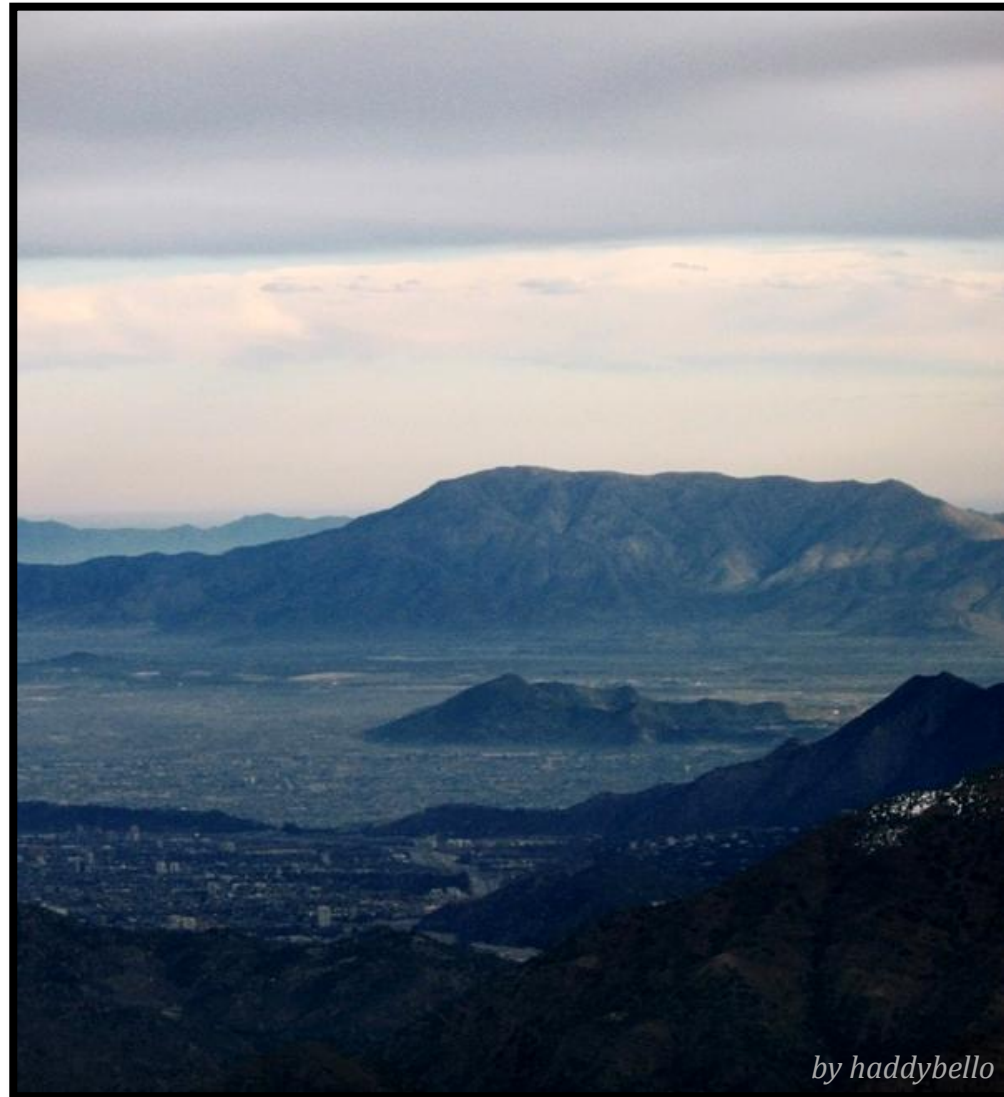
# Regulating (ecosystem) services

- Some of them have expression **at local scale** and other at global scale
- Directly perceptible
- Quantifiable
- The inhabitants cannot decide if they will use them.

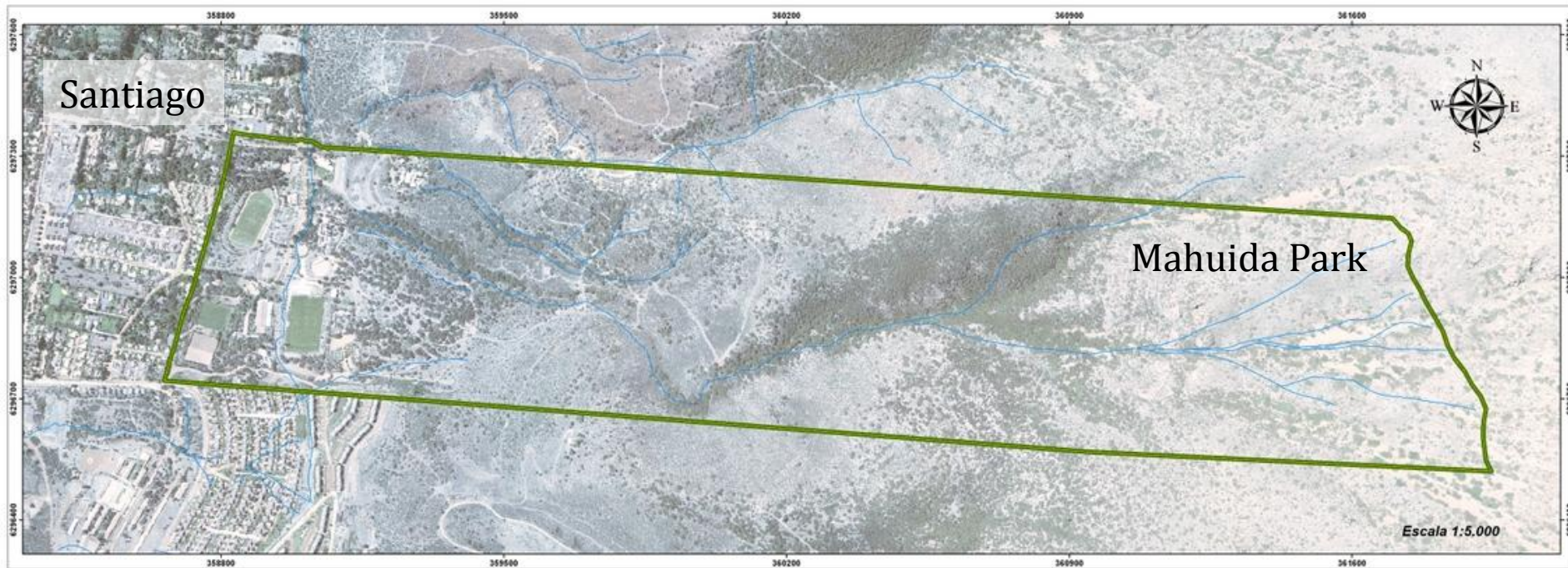


# Regulating (ecosystem) services

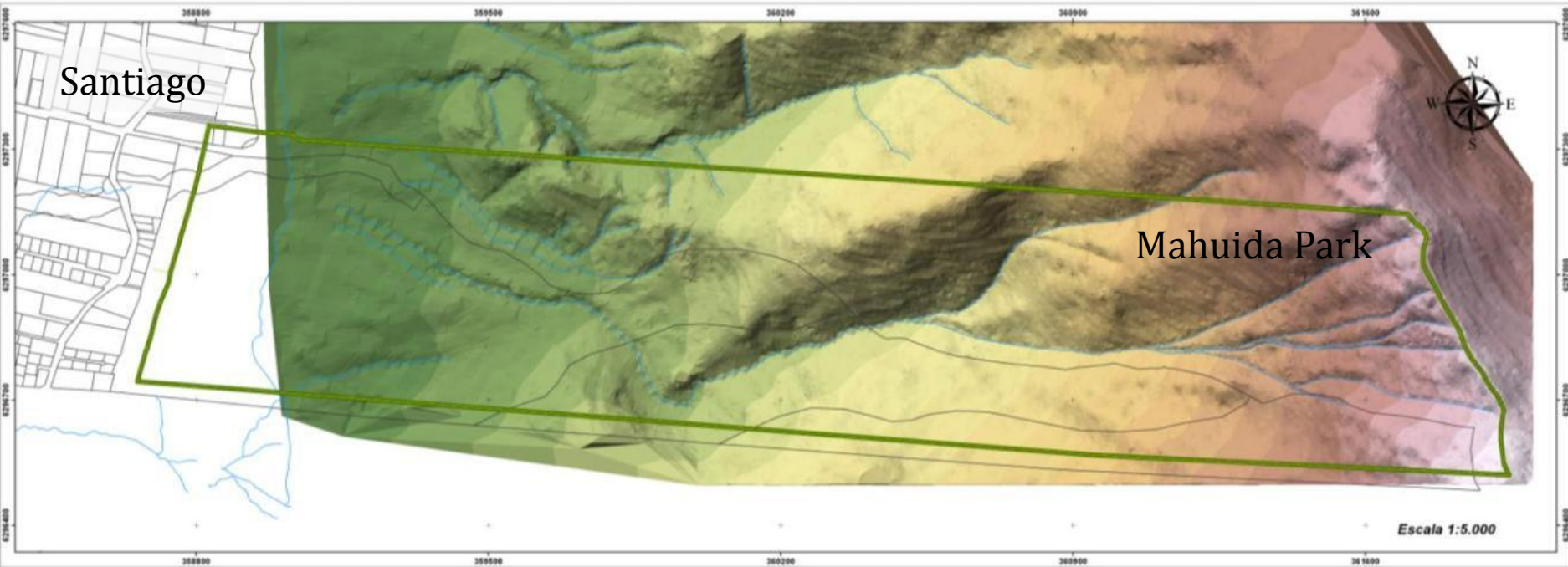
- The urban areas that obtain benefits are:
  - spatially demarcated (delimitable)
  - in function of its closeness to natural areas and the urban settings
  - consumed outside the parks



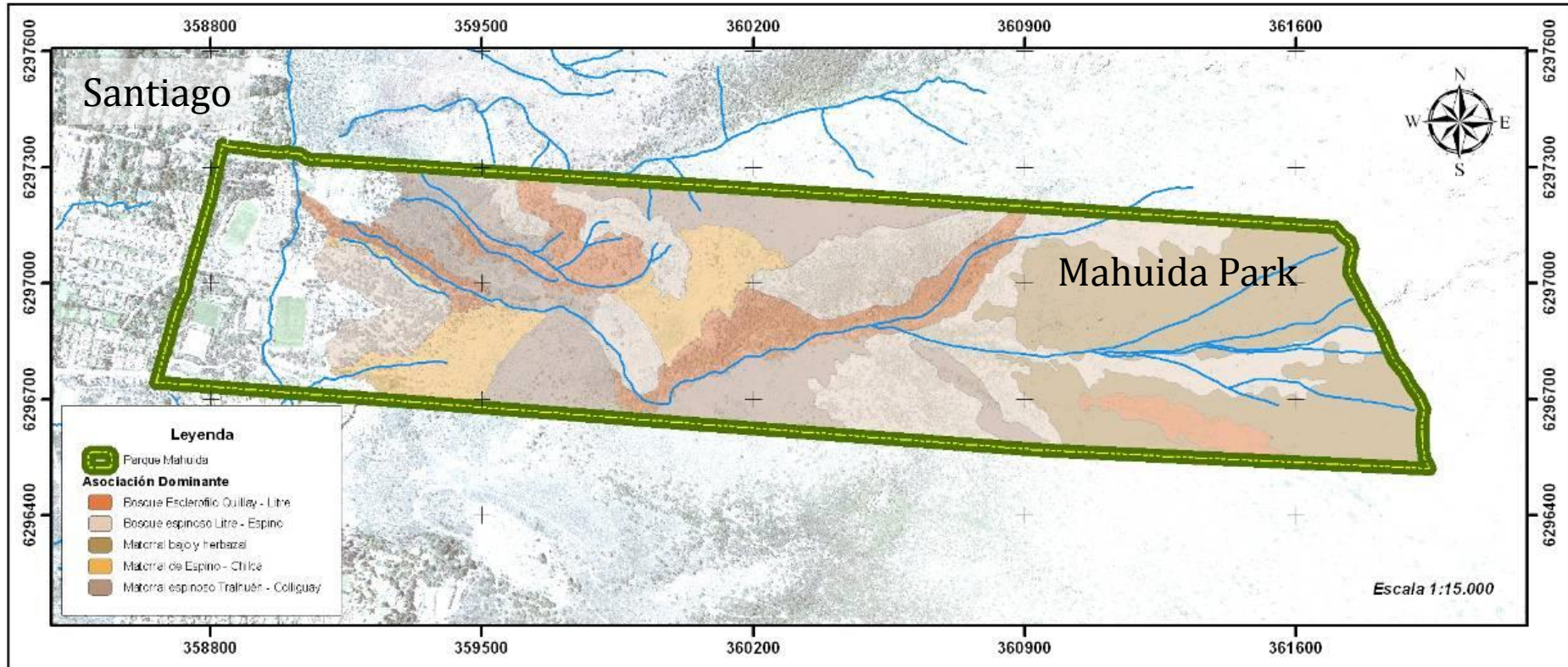
# Biophysical park structure



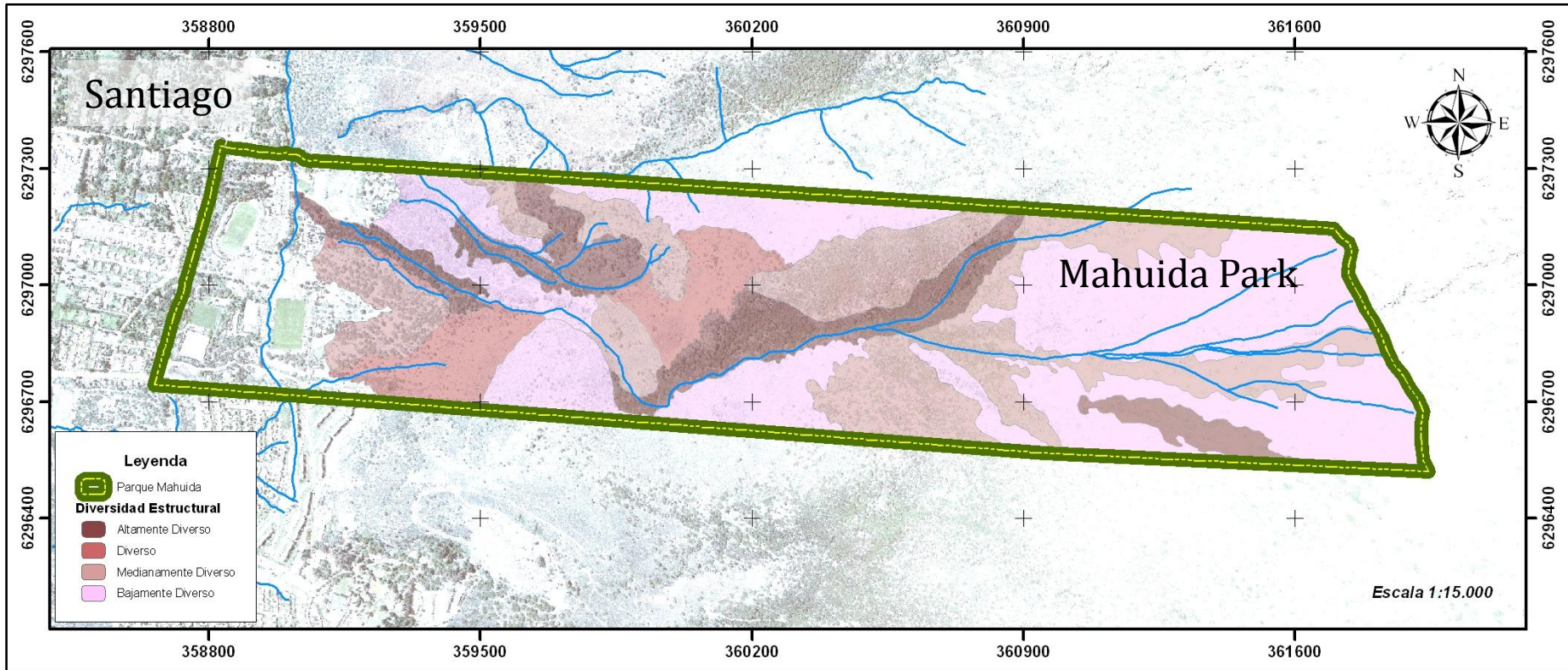
# Digital Elevation Model



# Dominant Species Association

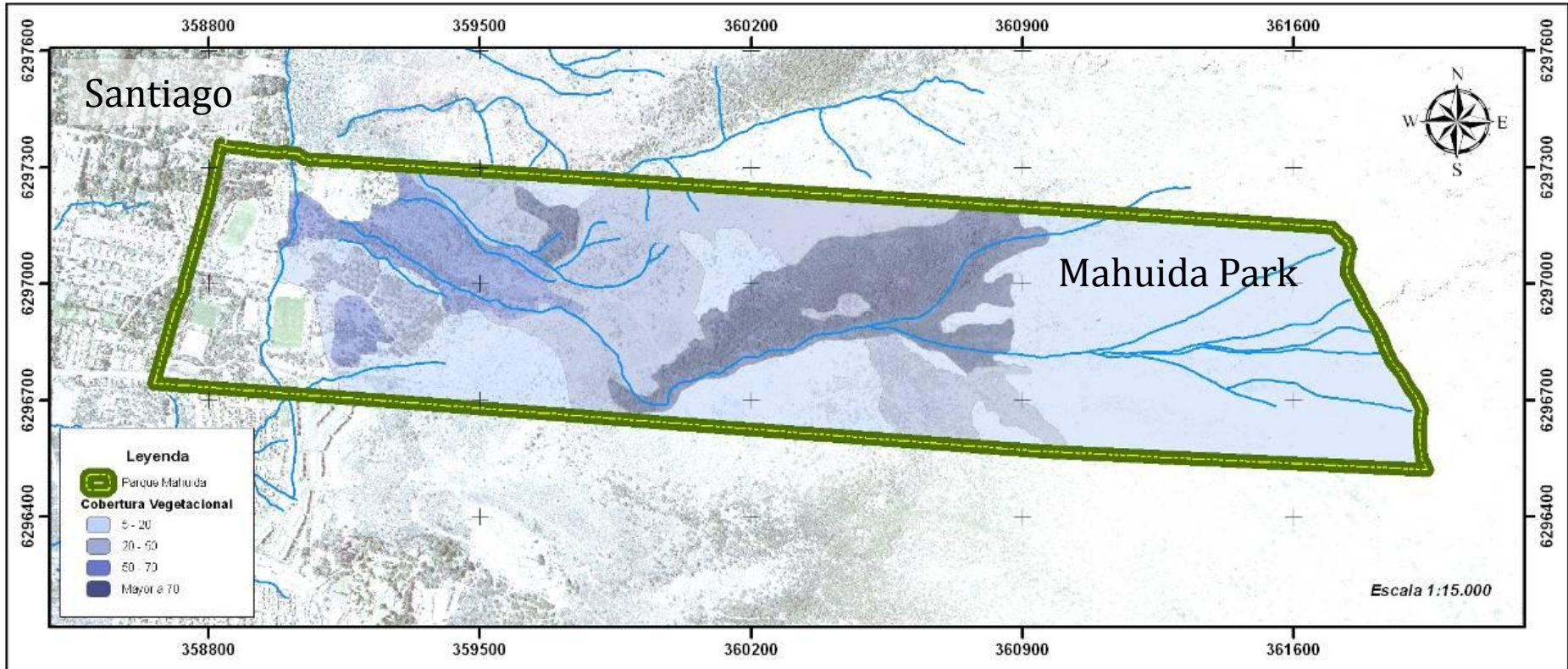


# Structural Strata Diversity





# Vegetation Land Cover

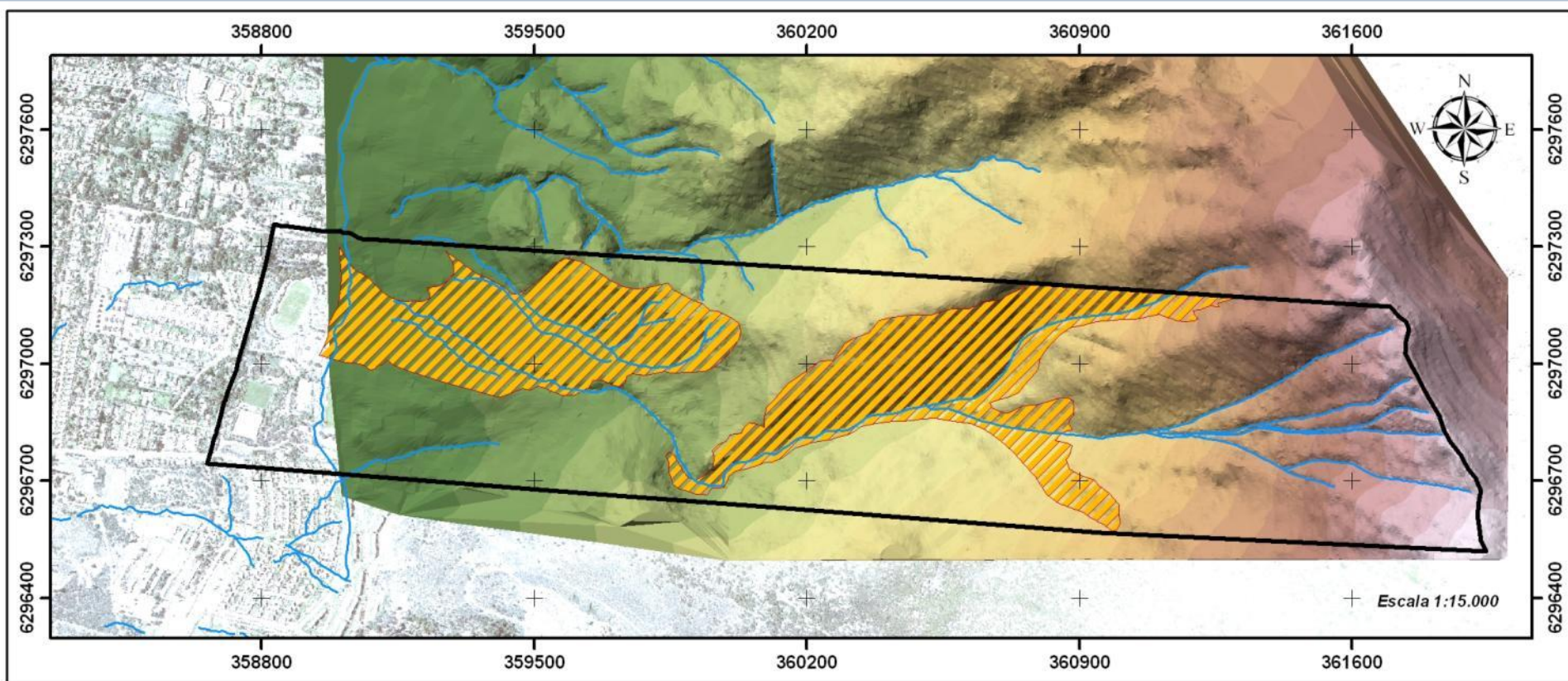




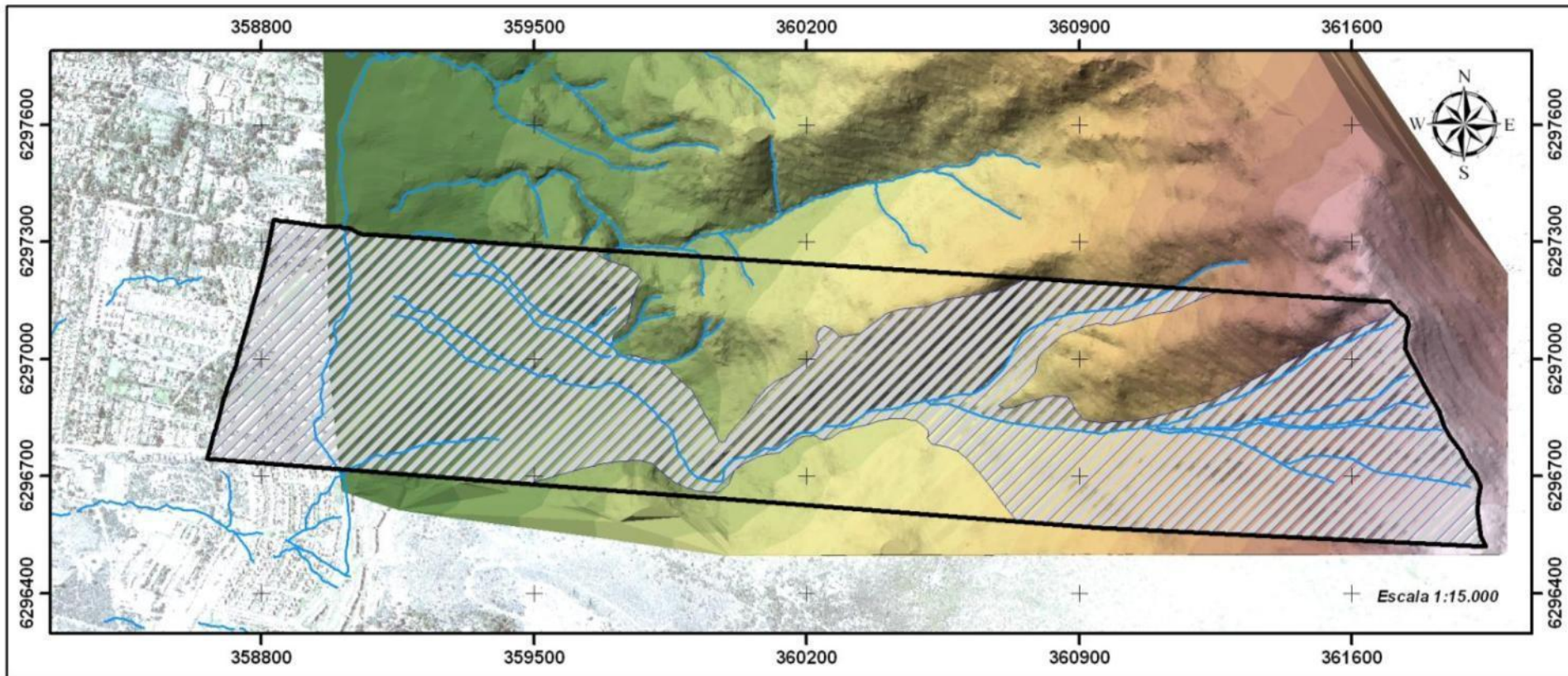
To choose which areas to preserve, we prioritized those areas that produce:

- 1- water regulation
- 2- air quality maintenance and
- 3- local climate regulation.

# Areas to conserve the production of water regulation ecosystem services

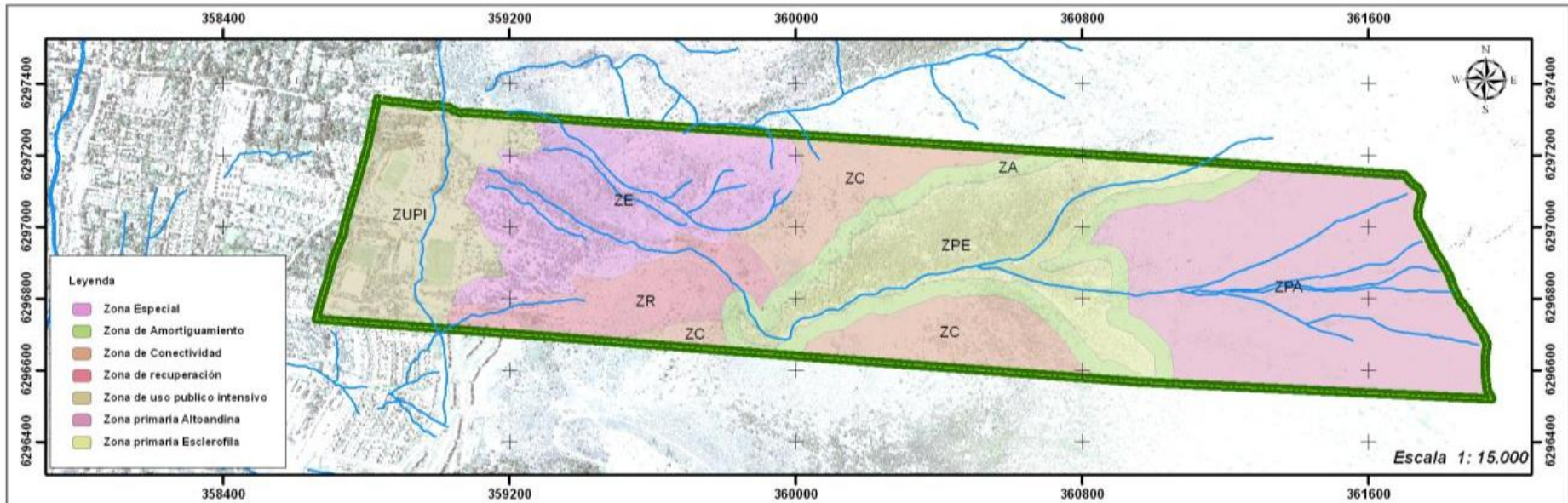


# Areas to conserve the production of air quality maintenance and local climate regulation ecosystem services

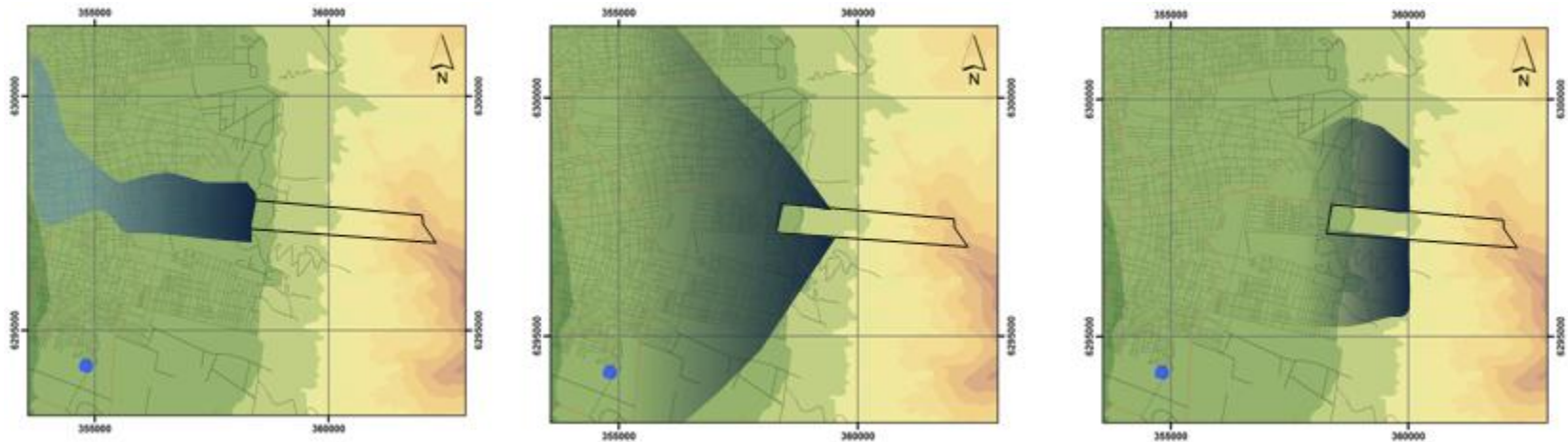


Park's vegetation land cover: mean 30.8%  
20.3 t/y C - 1.2 t/y of PM - 0.3 t/y O<sub>3</sub>





**THE ECOSYSTEM SERVICES PRODUCTION AREAS WERE INCLUDING AMONG THE ZONING CRITERIA.**



**WHAT URBAN AREAS ARE BEING  
FAVoured WITH THESE ECOSYSTEM  
SERVICES**





**HOW MANY INHABITANTS ARE BEING  
FAVOURERD WITH THESE SERVICES**



# Ecosystem services from park to city are conditioned by:

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1. maximum production of ecosystem service by the park
2. physical variables that facilitate or constrain the flows inside the park
3. urban settings that could facilitate or constrain the flow outside the park
4. additional features of the urban area



# **GOVERNANCE**

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PRIVATE  
AGENCIES

LANDOWNERS

ESTATE  
AGENCIES

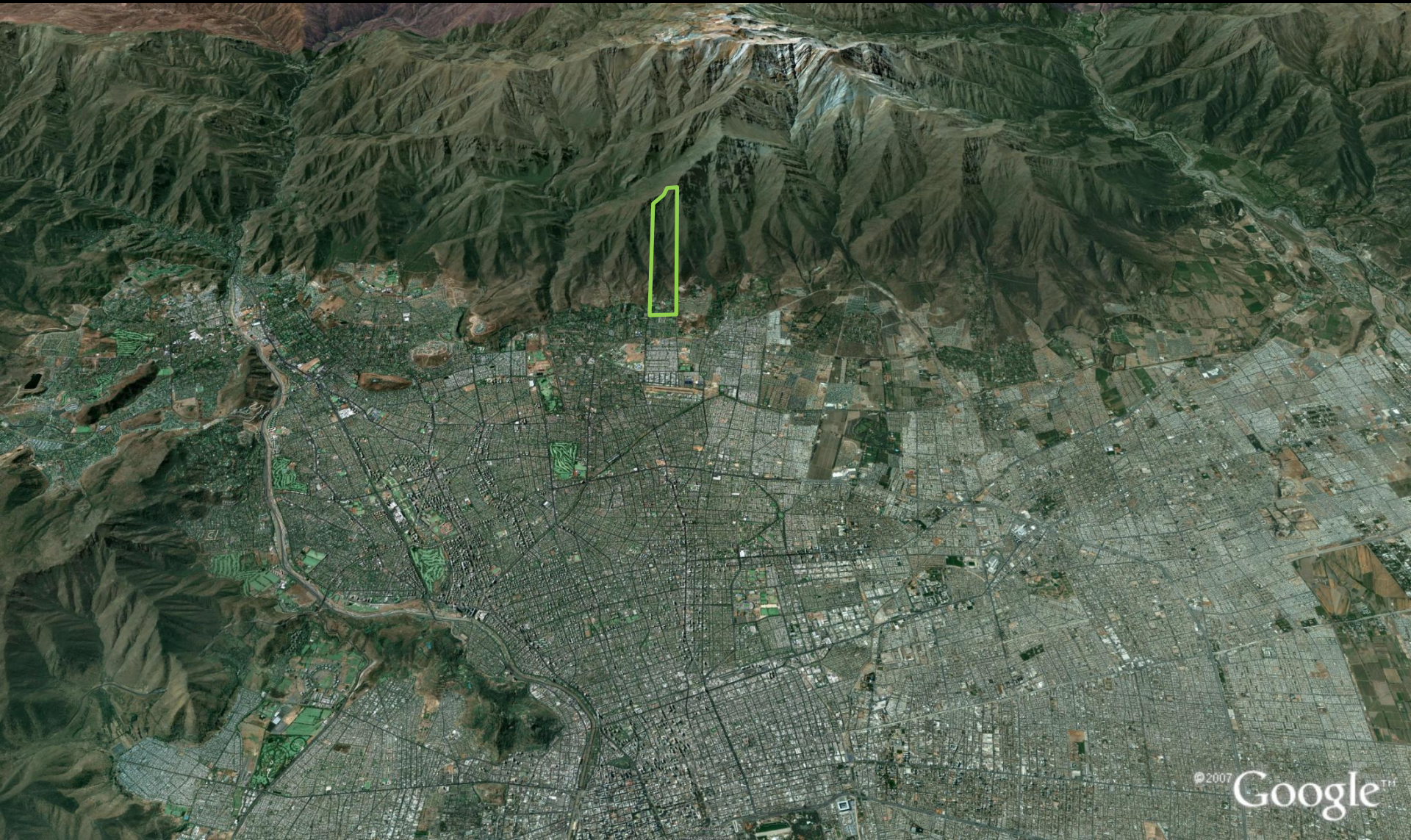
LOCAL  
GOVERNMENT  
INSTITUTIONS

INTERNATIONAL  
ORGANIZATIONS

**WHO SHOULD PLAN AND MANAGE  
THE AREAS THAT PRODUCE GLOBAL  
AND LOCAL ECOSYSTEM SERVICES**



# Parque Mahuida



### **Aguas de Ramón Park**

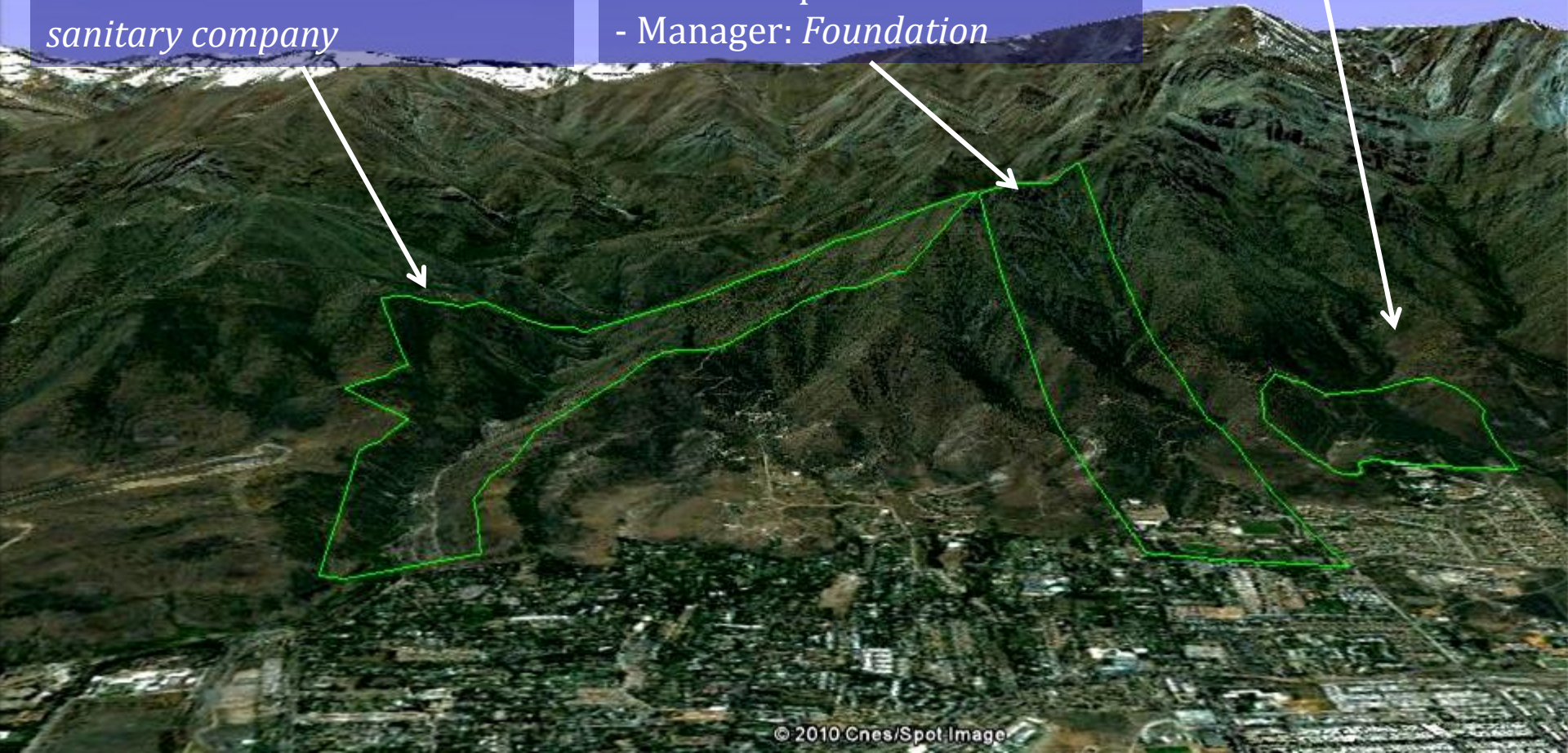
- Area: 3.624\* ha (200ha at piedmont)
- Ownership: *National agency (CORFO)*
- Manager: *Districts association and Private sanitary company*

### **Mahuida Park**

- Area: 112 ha
- Ownership: *District*
- Manager: *Foundation*

### **Cantalao Park**

- Area: 40 ha
- Ownership: *Army*
- Manager: *Environmental NGO*



## Aguas de Ramón Park

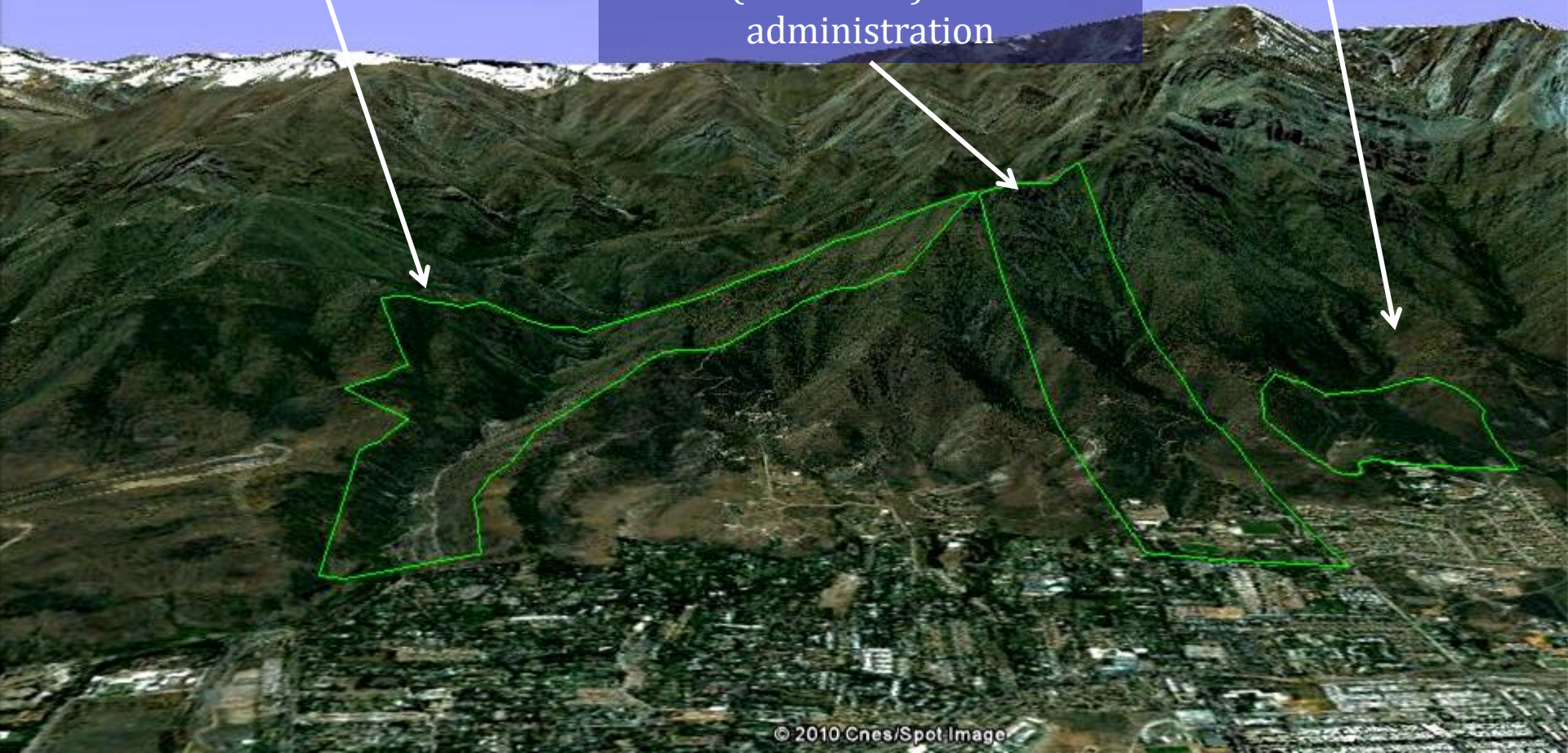
Public (National and Local Government) and Private administration

## Cantalao Park

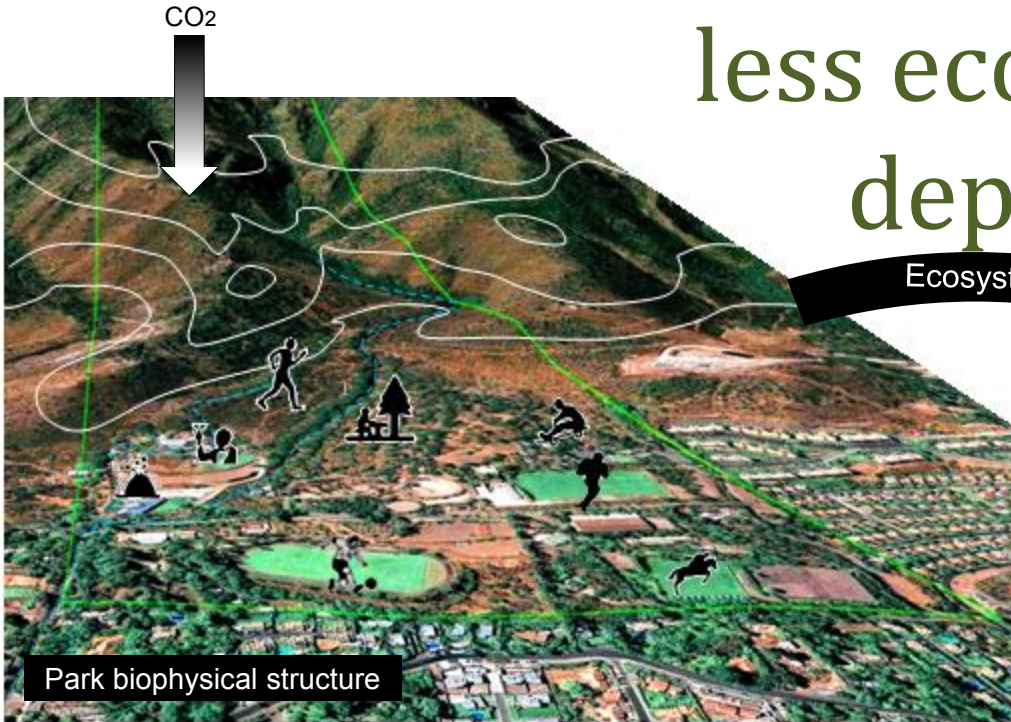
Public (National Army) and Private (National NGO) administration

## Mahuida Park

Public (Local Gov.) and Private administration



The rich population are less ecosystem-services-dependent than poor population



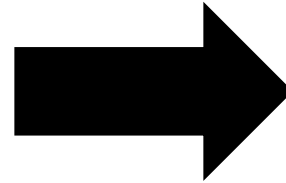
Ecosystem Services Beneficiaries



# If you could...

identify the beneficiaries  
by the ecosystem  
services of a park,

you could know who  
should maintain it.



know how change the  
the ecosystem services  
production capacity,

you could know who  
will be the affected.

# 2 proposals for periurban parks:

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- to quantify ecosystem services production and the areas and inhabitants benefited
- the implementation, management and/or financing of periurban public parks must be shared between public and private institutions,

(according to the socio-economic population status)



**POSITIVE EFFECTS ON THE BIODIVERSITY  
CONSERVATION, REPRESENTING AN ALTERNATIVE  
WAY TO PROTECT NATURAL AREAS NEAR CITIES.**



**THIS NEW APPROACH IS BASED IN THE  
INHABITANTS' DAILY WELL-BEING WHO  
ARE LIVING CLOSE TO THESE AREAS.**





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