



**Millennium Ecosystem Assessment:**  
**HUMAN WELL-BEING  
 AND SUSTAINABLE  
 MANAGEMENT OF  
 SAN PEDRO DE  
 ATACAMA**



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The Millennium Ecosystem Assessment  
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**The Millennium Ecosystem Assessment**

The Millennium Ecosystem Assessment (MA) is a unique partnership involving public and private institutions, scientists, and concerned citizens that seeks over a five-year period (2001-2005) to assess the capacity of ecosystems to support human well-being and life on earth. By doing so, the MA expects to increase dramatically the understanding, information, and tools available to guide decisions that may affect or be affected by the earth's ecosystems.

While challenges such as food production, clean water, fisheries, and biodiversity conservation have traditionally been approached issue by issue, the MA examines the entire range of benefits humans obtain from ecosystems and provides information that will allow us to better understand the trade-offs that often exist when making decisions concerning ecosystem services.



**Human well-being and sustainable management of San Pedro de Atacama**

The San Pedro de Atacama assessment in the Atacama Desert, in northern Chile, is one of approximately 30 sub-global assessments conducted across the globe that are linked to the MA. The project, which started in 2002, aimed to assess the services provided by the ecosystem and its impacts on people's lives. The assessment focuses at local level (municipality), analyzing the condition of ecosystem services in

the basing, elaborating scenarios for the coming 20 years, and suggesting alternative and complementary management responses.





## Organization

The San Pedro de Atacama assessment is led by RIDES (Research and Resources for Sustainable Development), a Chilean independent research centre focusing on generating public and private policy directed towards sustainable development. Additionally, in order to ensure that the results of the assessment are as directly relevant to all local stakeholders as possible, an advisory committee was set up. The committee has become a unique multi-stakeholder forum, the only one in which public and private parties sit together to discuss important development issues for the area.

## The area

The geographical area corresponds to the Salar de Atacama basin, which for users and in political and administrative terms is practically the same as the Municipality of San Pedro de Atacama.

The Salar de Atacama (2,918 km<sup>2</sup>) is an endoreic hydrologic basin covering 17,040 km<sup>2</sup> with an altitudinal interval of 3,700 m; the lowest part of the depression is about 2,300 m above sea level.

Most of the inhabitants of the area are Atacameños, an ethnic group that has managed to survive for centuries in this inhospitable terrain, facing constant socio-political changes that have challenged its cohesion and continuity.



The main characteristic of the area, and hence of this subglobal assessment, is the high degree of social complexity (legitimate demands from the indigenous peoples, high concentration of government development initiatives, large-scale mining, emergent tourism industry, astronomical projects of global relevance) in a unique yet hostile environment due to the extreme shortage of water resources. There are ongoing conflicts between users of the ecosystem –particularly the Atacameños, tourism operators and mining companies– firstly over water availability and ownership, and secondly over equality of access to the emerging economic opportunities. Generating dialogue and trust between users and with the research team has been a constant challenge throughout the assessment.



## Ecosystems and human well being

People depend on the earth's living systems for both life and livelihood. The benefits that human beings extract from nature are the foundation of all economies, the basis of major industries, sources of knowledge, and central to many cultures. Forests, rivers, wetlands, lakes, and oceans provide the food we eat, the water we drink, and a wide array of other products, as well as cultural benefits, and spiritual values. Thus, we must ensure that human impact on ecosystems will not affect the capacity of ecosystems to deliver services.

## Ecosystem services in the San Pedro de Atacama Assessment

The MA defines ecosystem services as the benefits people obtain from ecosystems. These benefits can be goods such as food or water, functions such as carbon sequestration or other benefits such as cultural, and recreational values.

The ecosystem services that determine human well-being in San Pedro de Atacama and make up this assessment are: water resources, mining resources, agricultural resources, tourism resources, astronomical resources and biodiversity. This selection was made in the initial stages by means of diverse interviews with key information sources and discussion with the advisory committee.

Main user	Ecosystem services
Indigenous people, Atacameños	<ul style="list-style-type: none"> <li>• Water (drinking, subsistence agriculture and livestock)</li> <li>• Animal feeding places (particularly for sheeps and llamas)</li> <li>• Access to the ecosystem and sustainable management of it in order to keep using it to foster their culture (rituals, ceremonies, etc.)</li> <li>• Traditional tree fruits, herbs and medicinal plants</li> </ul>
Mining companies	<ul style="list-style-type: none"> <li>• Non-metallic minerals such as, potash, lithium and boric acid (mine sites at the Salar de Atacama)</li> <li>• Water for mining processes at the Salar (non-metallic minerals) and outside the Salar (copper)</li> </ul>
Tourism operators	<ul style="list-style-type: none"> <li>• Pristine and aesthetically valuable tourism spots</li> <li>• Archaeologically valuable assets</li> <li>• Water for drinking</li> </ul>
Public agencies and	<ul style="list-style-type: none"> <li>• The forestry agency, in charge of the administration of national regional authorities parks, needs to keep the unique characteristics and conservation status of the ecosystems in the area (there is one national protected area, with seven different sites, in the project area)</li> <li>• The Indigenous People's Agency counts on water and land availability in order to implement its development projects</li> </ul>
Astronomical Observatories	<ul style="list-style-type: none"> <li>• Clear skies (no chemical-physical or light pollution)</li> </ul>
Regional Universities	<ul style="list-style-type: none"> <li>• Valuable archaeological assets in order to pursue research endeavours.</li> </ul>

## Conditions and trends

Conditions and trends have been defined as the salient characteristics presented by ecosystem goods and services as well as human well-being in the past. Trends, in particular, are the expression of a tendency in the main characteristics of ecosystem goods and services and human well-being.

For each ecosystem service considered in the study, conditions and trends have been explored through an analysis of main changes in the sector in the last twenty years. Below are examples in the case of tourism and water resources.

### Tourism has become a main economic activity in the area:

- In high season, tourists more than double the local population; over 60% are foreigners (mostly Europeans).
- Three kinds of tourism assets are clearly identified: ecological capital (desert and high Andean plateau landscape), ethnic capital (**Atacameño culture**) and scientific capital (archaeological and astronomical research).

### Water is the limiting factor for any economic, productive and even social activity:

- The basin's surface water resources have been used by the local inhabitants for agriculture for hundreds years. This irrigation along with domestic water supply were the only uses of water until the 1980s, when both brackish water and brines started to be pumped by mining companies, who strongly increased their fresh water demand in the 1990s. During this same decade tourism services also increased demand, but to a much lesser extent than mining.
- Whereas water rights currently amount to over 6 m<sup>3</sup>/s, water recharge to the basin is estimated at 5 m<sup>3</sup>/s, and there are further requested water rights for over 3 m<sup>3</sup>/s.

## Scenarios and responses

The responses of the project will seek to inform public and private user decision-making on how to achieve more sustainable decisions with enhanced human well-being. In order to identify recommendations for the ecosystem and for human well-being, the project team, jointly with the advisory committee, has developed different scenarios or examples of what could occur under different situations. The scenarios have been adapted from those developed by the Global Assessment.

### Scenarios for San Pedro de Atacama

- Scenario 1: Economic growth and development:** Strong economic development with governance oriented to formulate and implement decentralized policies
- Scenario 2: Business as usual:** Economic development with governance oriented to formulate and implement centralized policies
- Scenario 3: Facing the adversity:** Economic depression in the country and in the Municipality. However, governance is defined by policies formulated and implemented at the local level.

## Selected responses

- Implementation of regulatory strategies for the tourist sector as well as strategies to promote special interest tourism.
- Redefinition of participatory mechanisms in areas such as the ADI (Indigenous Development Area) and public investment.
- Enhanced opportunities for participation to improve integration between companies in the area and local challenges (companies with local identity).
- Revitalization of Atacameño culture: ancestral medicine and multicultural education, amongst others.
- Implementation of new community-based conflict resolution methodologies.

## Products and results

- Final project report (Spanish)
- Summary for decision makers (in English and Spanish)
- CD including all the presentations and reports produced by the project team
- Geographic Information System on the base line information (ecosystem services and human well-being indicators)
- Video of two activities with community elders on their traditions about the environment
- Donation of two solar tanks for water heating

## Project funding

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