

Climate Adaptation Santiago

Climate adaption strategies for a sustainable water management in the metropolitan region of Santiago de Chile

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The CAS project

1. Organization

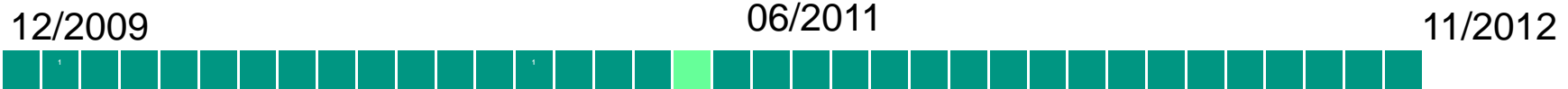


Partner in South America	Universidad de Chile Pontificia Universidad Católica de Chile United Nations Economic Commission for Latin America and the Caribbean (ECLAC)
Partner in the Helmholtz Association, Germany	UFZ (Helmholtz Centre for environmental research) Coordination ITAS/KIT (Institute for Technology Assessment and System Analysis)
Cooperating Chilean institutions	Environmental ministry GORE (regional government of Santiago)

2. Financing

funded by the International Climate Initiative of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)

3. Duration



Aims

The main objective of the project is to develop climate change adaptation measures for the Metropolitan Region of Santiago de Chile in the most highly affected sectors:

- Water (ITAS)
- Energy (ITAS)
- Land use (UFZ)



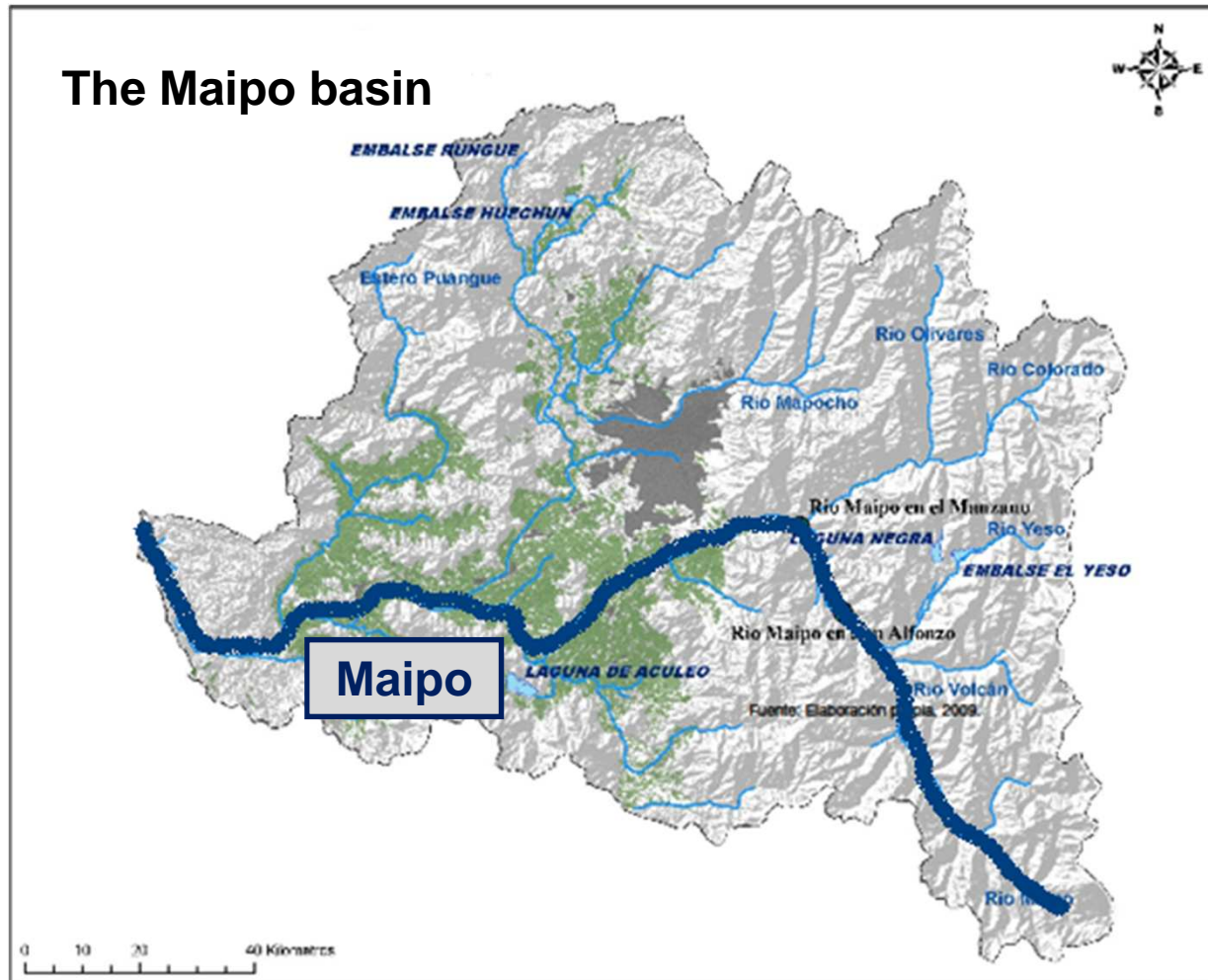
Practical realization



Implementation in a regional climate adaptation strategy for the metropolitan region of Santiago de Chile

The Metropolitan Region of Santiago de Chile (MR)

The Maipo basin



Source: S. Vicuña 2010

- Industrial, agricultural and financial centre of Chile with 6 Mio. inhabitants (40 % of national total)
- The river Maipo is the main drinking water resource

Water management policy - the water codex

- Chile is the leading example of free market water policies
- The 1981 water code declares water as “national property for public use“
- Water rights are separated from land rights, and can be freely transferred, sold and bought
- The 1981 water code specified rights for
 - surface and groundwater and
 - consumptive and non-consumptive uses
- The national water authority grants new water rights
- It is not allowed to take back water rights without infringing a constitutional guarantee

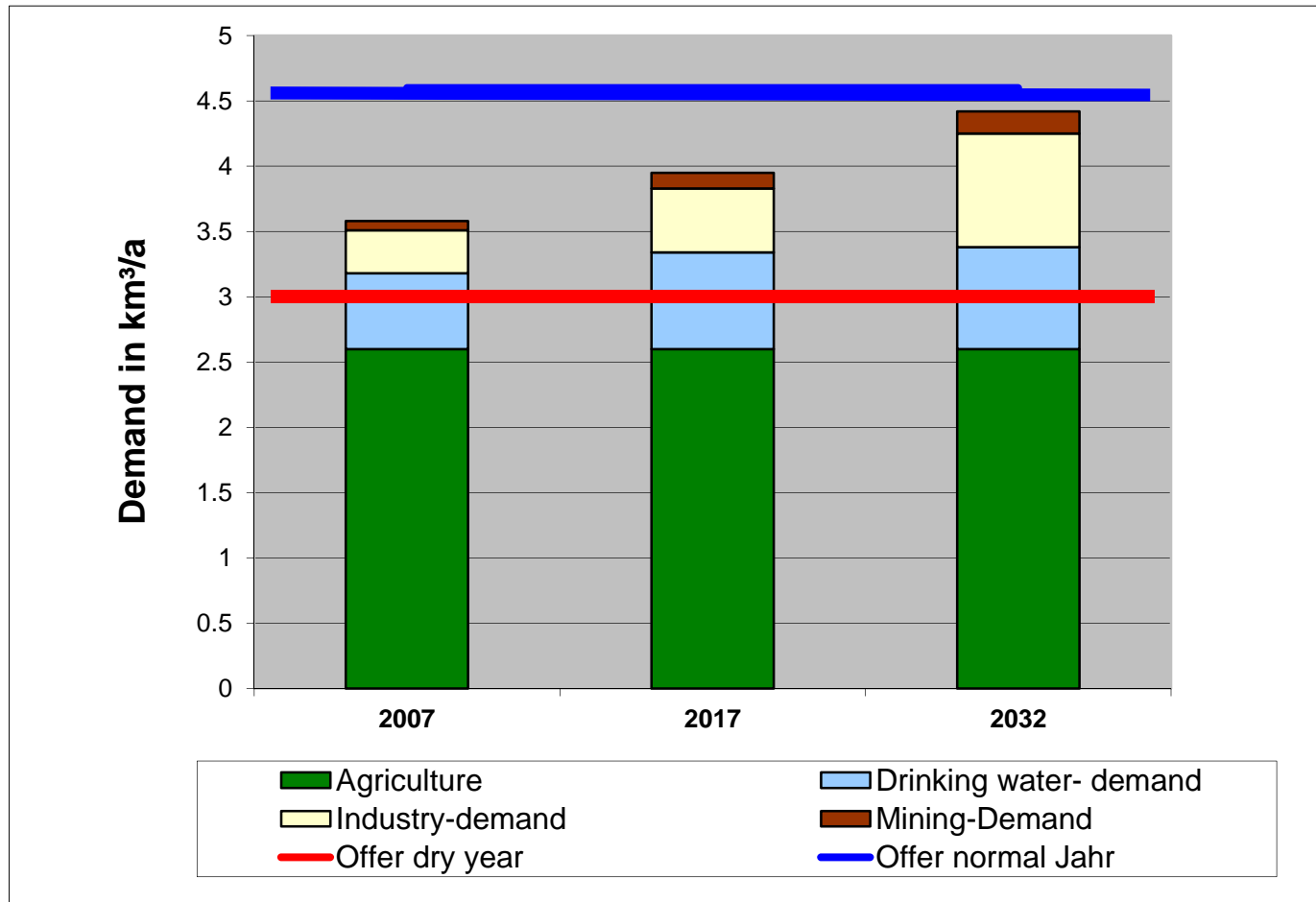
Regulatory concept of the water and sanitation sector

- Privatization of the Chilean water and sanitation sector was undertaken from 1998 to 2005: most far reaching reform in Latin America - transferring ownership of assets to the private sector
- For obtaining a concession from the regulatory agency, a company needs sufficient water rights, to meet the demand of the concession area



- According to the „*Chilean Norm Nch777/1*“, the water rights are related to the run-off, which has to guarantee to 90% of the time the given rights
- Actually the water companies dispose sufficient water rights to secure drinking water supply in water scare years

Water balance in the MR

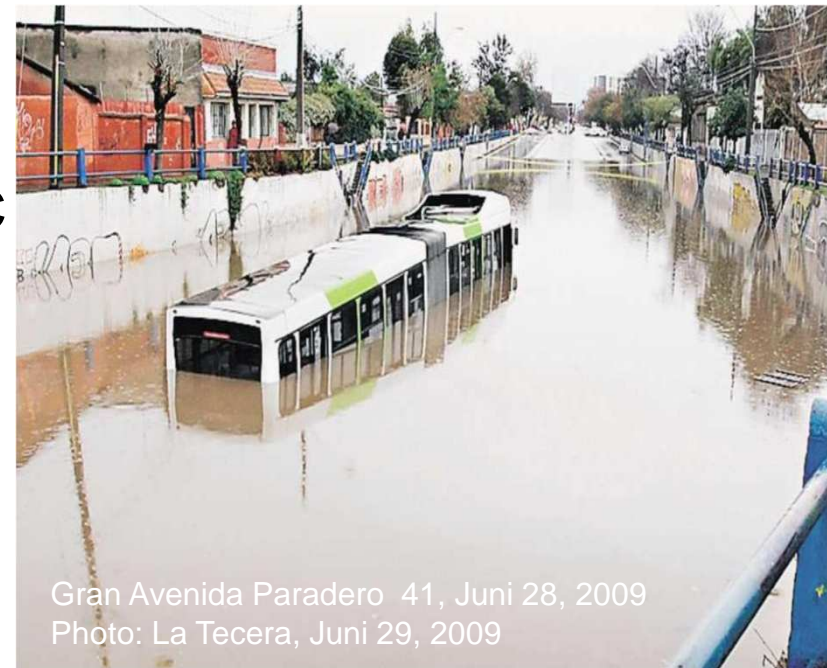


- Yearly per capita offer at the RM: 584 m³ → According to Falkenmark chronic water scarcity
- Growing water demand caused by growing economy and population

Future conditions: Impact of climate change

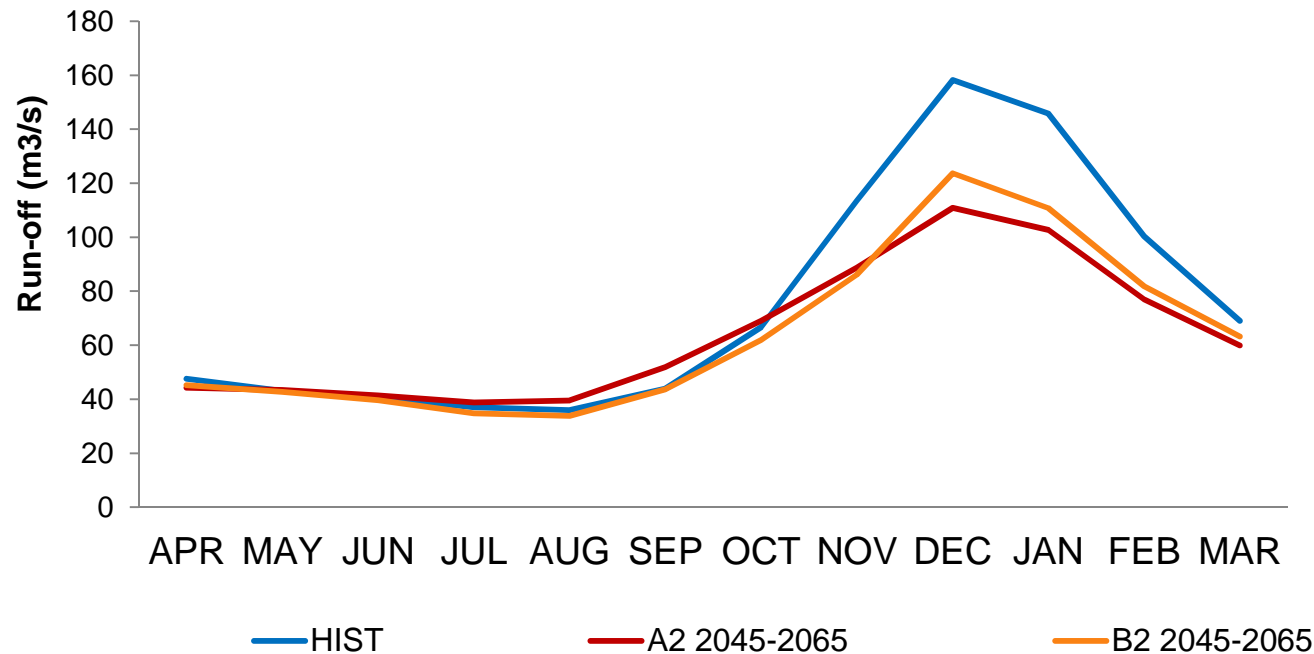
For future scenarios A2 and B1 a downscaling methodology was used:

- rising temperature about 2°C
- 30% increase in the number of days with maximum temperatures above 30°C
- significant decrease in days with temperatures below 0°C
- higher elevations of the zero isotherm line about 200 - 400m
- lower precipitation rates about 10 -30%
- increasing storm run-off caused by extreme events



Future conditions: Impact of climate change

Measuring point: Maipo at San Alfonso



The impact of climate change will worsen the scenario in the future:

➔ decrease in run-off up to 40%

Future challenges - options for reaction

- Growing imbalance in relation water offer/water demand
- Amount of water rights from water and sanitation companies will no longer be sufficient to secure the drinking-water supply in water scarcity scenarios

Options:		Result
Buy new water rights	considering the future decrease of water availability, higher prices on the markets are expected (costs around 1-2 Mio. US\$ depending the scenario)	<ul style="list-style-type: none"> • Conflicts with agricultural sector • Higher water tariffs
Change in infrastructure	Replace of water storage by ice and snow by dams = higher investments	<ul style="list-style-type: none"> • Higher water tariffs
Decrease demand of water	decrease UFW-rates (today $\geq 30\%$, losses of 212 Mio m ³ /a drinking-water), higher investments in infrastructure	<ul style="list-style-type: none"> • Higher water tariffs

Weak points in legal framework

- No regulation of conflicts between competing water user interests
- Weak regulating capacity of DGA due to lack of data
- Weak controlling capacity of DGA regarding water withdrawal
- No sufficient incentives for O&M-investments for leak management
- Lack of environmental consciousness, like appropriate standards for minimum river flows



- The water codex does not give a flexible response to a reduced water offer
- Water authorities are comparatively weak to drinking-water providers

Conclusion: Governance Deficits → Sustainability deficits

- A sustainable water management needs an improved institutional and legal framework to adapt to climate change effects



Photos: H. Lehn