

Safeguarding the water reserves of Baja California

Water management is a growing issue in Baja California in Mexico. On the background of an analysis of the water supply issues and the legal and policy framework in Mexico and Baja California, drawing particularly on Maneadero as a pilot case, partners in the EU H2020 project SUBSOL – **bringing coastal SUBsurface water SOLutions to the market have developed a set of recommendations to safeguard the future supply of freshwater.**

RECOMMENDATIONS

- The local authorities in Baja California are aware of the urgency of the issue, but not of all the alternatives available to address them. They will benefit from being presented to available solutions and their pros and cons.
- Subsurface Water Solutions are capable of addressing all water management issues of Baja California, they are low-cost and low-tech and they fit the local institutional capacity.
- As regulation for aquifer recharge with reclaimed water is very strict, implementation of SWS systems requires careful treatment of reclaimed water, continuous documentation and monitoring of the water quality and eventually close dialogue with authorities about the room of maneuver within existing regulation.
- In order to ensure an efficient and legitimate process with local support and cooperation, and a solution that is adjusted to local needs and resources, dialogue with all stakeholders and authorities prior to decision making and implementation is core.



BACKGROUND

Water resources management is a major challenge in Baja California. Improved water supply has become an important priority on the national as well as on the regional agenda. Due to excessive groundwater extraction and drought, the water table has dropped 1.6 metres in the past 10 years. Further, salinization of groundwater along the coast has caused wells to close. As a result, many areas of Baja California do not have sufficient water supply to support economic development. In Maneadero the primary water source is groundwater, 75% of which is used for agriculture. 1000 ha of agricultural land has till now been taken out of production. Salinization of the groundwater is also a concern for environmental NGOs who fear the effect on the rich coastal wildlife in Baja California.

Regional authorities are aware of the problem, and a number of initial steps have been taken to address it. A few reservoirs have been constructed to store reclaimed water from a wastewater treatment plant in Ensenada, and some of the treated wastewater is reused for irrigation of non-edible crops (flowers, animal feed crops etc.). But as water reservoirs take up valuable space, which is preferably used for production purposes, this solution has only brought 100 ha back into production. Furthermore, a desalination plant using Reverse Osmosis to serve domestic purposes will open in Ensenada by 2017, and more plants are in the pipeline. However, Reverse Osmosis is very costly and hence not affordable by smaller farmers, and it tends to provoke further intrusion of seawater in the groundwater.

SUBSURFACE WATER SOLUTIONS

Subsurface Water Solutions (SWS) offer a series of solutions to freshwater resources problems in coastal areas by means of advanced groundwater management (pumping, infiltrating, controlling) which enables protection, enlargement and sustainable utilization of fresh water resources. Combinations of wells extracting brackish water and infiltration (ponds) or injection (wells) of fresh water are used to control the position of the interface between fresh and brackish water, thereby creating a barrier against further saltwater intrusion and securing the freshwater wells inwards. Moreover, it enables storage of large volumes of run-off or recycled water in the underground in order to ensure a stable water supply year-round, irrespective of seasons and shifting levels of exploitation, e.g. from agriculture and tourism.

SWS systems address all of the main water issues of Baja California. Moreover, while SWS systems work by stimulating natural infiltration to secure clean irrigation water, and as they require little energy to run compared to for example desalination technologies, they provide environmentally sustainable and low-cost alternatives for water management. Furthermore, as SWS systems are low-tech, they can be adapted to shifting economic frameworks and environmental requirements. Taken together, SWS systems are highly compatible with the institutional and economic capacity in Baja California.

¹ See for example the National Development Plan 2013-2018 (Gobierno Federal [2013] Plan nacional de desarrollo 2013-2018. Gobierno Federal) and the Water Agenda 2030 (CONAGUA. [National Water Commission] [2011] Agenda del Agua 2030. CONAGUA).

² Requisitos para la recarga artificial de acuíferos con agua residual tratada Norma Oficial Mexicana NOM-014-CONAGUA-2003. Diario Oficial de la Federación. 3 Junio 2008. [Mexican Official Norm – Requirements for aquifer artificial recharge with reclaimed water]

³ Gobierno del Estado Baja California [2014] Plan Estatal de Desarrollo. Gobierno del Estado Baja California

⁴ NOM-014-CONAGUA-2003 (see above).

⁵ NOM-014-CONAGUA-2003 (see above). Diario Oficial de la Federación. 3 Junio 2008. [Mexican Official Norm – Requirements for aquifer artificial recharge with reclaimed water.

PERSPECTIVES FOR THE UPTAKE OF SWS SYSTEMS

Water issues have gained increasing priority in the Mexican national plans over the last decade¹, and wastewater reuse is promoted in a set of official guidelines². On the regional level, water sustainability and aquifer recharge is given high priority in diverse sections of the Baja California State Development Plan 2014-2019³.

There are, however, some obstacles that require attention:

- The legal frameworks⁴ allowing use of treated wastewater for irrigation and aquifer recharge are very strict. Recharge is only allowed for treated water fulfilling the physico-chemical characteristics of drinking water quality⁵.
- Farmers who produce high value crops for exportation, mainly to the USA, are reluctant to use treated wastewater for irrigation as they are concerned about the possible presence of pathogens in reclaimed water and about the acceptance of crops which have been irrigated with treated wastewater.
- The desalination technique reverse osmosis is currently given strategic focus in the water resource plans in Baja California. Institutions interviewed by the SUBSOL team were open for presentations about SWS systems, yet not fully aware of the potential of such technologies in terms of lower costs and better sustainability in comparison to desalination techniques.
- There may be a potential conflict between authorities and users about the distribution of costs of improved water supply. Conflicts have already arisen in the past regarding fees and investment costs required for the connection of farmland to the pipe system from Ensenada for reuse of treated wastewater.

On this background, the recommendations for exploring and implementing SWS solutions in Baja California involve four main issues:

Adaptation to legislation on reclaimed water

The strict regulation on water quality before recharging it in the underground does not take into account of the efficient natural treatment process which the water undergoes when passing through the aquifer. A close dialogue with local authorities is needed about the possibility of SWS proj-

ects within the regulative framework. A pilot project would be helpful to demonstrate that (1) ambient water quality of the aquifer does not deteriorate when infiltrating treated wastewater, and (2) the aquifer provides sufficient natural treatment capacity to comply with the required standards for irrigation water use.

Communication, documentation and monitoring

An aquifer recharge pilot will have to go hand in hand with careful communication and monitoring. Potential users (and also important food safety regulation institutions, such as SENASICA in the case of Mexico and the FDA in the case of USA) need to be well informed on the actual process and potential of SWS. This includes the water quality obtained, the suitability of the water for irrigation, the potential of SWS systems to reduce the current pressure on groundwater, and the tangible economic benefits, such as cost savings compared to other solutions like Reverse Osmosis.

Continuous monitoring, documentation and communication of the water quality may be important in order to build trust among users, key customers of agricultural products and authorities. This will require some level of capacity building of the research and scientific monitoring resources in Maneadero.

Informing decision makers on available solutions

While regional and local decision makers alike are aware of the urgent need to find solutions for future water supply in Baja California, it is important to make sure that they are aware of the available alternatives and their pros and cons in order to make choices that fit the local needs and economic and institutional framework.

Proper process

In order to ensure an efficient and legitimate process with local support and cooperation, and in order to ensure that the solution and particular details of implementation address the actual local needs, resources and institutional framework, it is core to have a proper process prior to decision making and implementation. That is, ensure that all stakeholders and decision makers are properly informed about the alternatives and their pros and cons, that their concerns are addressed with proper information, and that they are involved in a debate about solutions. Participatory Technology Assessment (pTA) is an efficient methodology to align water solutions with local needs and capacities and obtain the required dialogue.

The SUBSOL project

SUBSOL targets a market breakthrough of SWS as robust answers to freshwater resources challenges in coastal areas, by demonstration, market replication, standardization and commercialization. SUBSOL will share experiences and outcomes with stakeholder groups through an online platform which will be linked to existing networks.

The SUBSOL consortium combines knowledge providers, technology SMEs, consultants, and end-users from across Europe. Our ambition is to introduce a new way of thinking in terms of water resources management, promoting the sustainable development of coastal areas worldwide.

Credits and disclaimer

This policy brief was produced by the Danish Board of Technology (DK) on the basis of the research and analysis by adelphi (GE) and ARCADIS (NL). The work involves meetings and interviews with key informants, a desk study and a stakeholder workshop in Maneadero.

The SUBSOL project is funded by the European Union's Horizon 2020 research and innovation programme. The views expressed in this brief do in no way reflect official opinion of the European Union.

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