SWITCH

Zaragoza, Spain

Reducing water demand and establishing a water saving culture in the City of Zaragoza

Faced with severe water shortages, an expanding population and deteriorating water infrastructure, the city of Zaragoza has responded by embarking on an ambitious water conservation programme with the aim of establishing a 'water saving culture' among businesses, industry and the local population. By mobilising key stakeholders and residents, the city has succeeded in significantly reducing its water consumption despite continued population growth and an expanding economy.

Population: 701,090 (2010)

Land area: 1,062 km²

Following a prolonged drought in the early 1990s, water management in Zaragoza was exposed as being inadequate to satisfy the needs of the developing economy and the future demands of a growing population. In response, the municipality redefined its approach to water supply, shifting from a policy of continued exploitation of limited resources to one where priority was instead given to demand reduction solutions.

Coordinated by the newly established Zaragoza Water Commission, the city's efforts included a comprehensive stakeholder engagement programme, rehabilitation of distribution infrastructure and a reform of the billing system in what became a city-wide effort to achieve ambitious water saving targets. Fifteen years later the city has succeeded in reducing its overall consumption by almost 30% and is now known throughout the world as a leader in the field of water conservation.

The importance of water demand management

As cities continue to expand, the growing demand for water increases the strain on local supply sources. The traditional response is to increase water availability by developing new surface and groundwater abstractions, constructing or expanding storage reservoirs and transferring bulk supplies from regions where water is less scarce. Increasingly, however, this approach is being questioned as natural limitations, environmental concerns and the impacts of climate change reduce the availability of existing resources and prevent the development of new ones to match the demand of growing populations.

Rather than increasing supply to meet demand, an alternative way of addressing water scarcity is to manage consumption. Reducing leaks from distribution pipelines, dissuading wasteful use and promoting water-saving fittings and appliances are all ways in which cities can sustain growth and reduce their vulnerability to climate change without negatively impacting on environmental resources and social needs.

This case study was produced for the SWITCH project (2006-2011), which aimed to achieve more sustainable urban water management in the "City of the Future". A consortium of 33 partner organisations from 15 countries worked on innovative scientific, technological and socio-economic solutions with the aim of encouraging widespread uptake around the world.
www.switchurbanwater.eu

The case study is part of the SWITCH Training Kit, which can be found at www.switchtraining.eu

Zaragoza in context

Zaragoza is the fifth largest city in Spain and the capital of the semi-autonomous region of Aragon. The city was founded in Roman times and has remained the cultural and economic centre of the region ever since, benefiting from its strategic location on the banks of the River Ebro, which flows from west to east across the dry plains that cover much of the region. Since the 1970s the economy and population has grown rapidly and the city is today home to over 700,000 inhabitants. This growth is predicted to continue and the population is anticipated to reach one million shortly after 2020.

Zaragoza (Image courtesy of SWITCH. © SWITCH Project)

With a semi-arid climate and average rainfall of less than 400mm per year, Zaragoza is heavily reliant on the Ebro for its water supplies. Due to the river's varying seasonal flows and poor water quality in the vicinity of the city, more reliable water supply options have been developed higher up in the catchment where a series of storage dams provide water to the city through the 80km long Canal Imperial of Aragon.

More recently, additional water is being sourced from the Yesa reservoir in the Pyrenees which increases security of supplies and, due to the good quality of the source, reduces the cost of treating water to potable quality. Drinking water treatment for the entire city is carried out at the Casablanca treatment works and this drinking water is distributed through a gravity fed network of pipes.

The responsibility for water management in the city is held by a range of local government departments. Although there is no specific water utilities agency, the infrastructure department is in charge of providing the water and sewerage services. As with much of the Iberian Peninsula, Zaragoza suffered from a prolonged drought in the early 1990s resulting in water use restrictions for the city's residents.

Reducing water consumption in the City of Zaragoza

In the mid-1990s, against the backdrop of water shortages, use restrictions and national debate concerning the transfer of water supplies between catchments, the municipality of Zaragoza recognised that managing water demand rather than solely increasing supplies was the most sustainable way to secure satisfactory water services for the rapidly growing population. As a result, a municipal Water Commission was established by the city council to oversee the implementation of a range of ambitious long-term water saving initiatives. These included the multi-stakeholder Zaragoza Water Saving City programme, a complete reform of the water billing system and investments to reduce high rates of unaccounted-for water from the city's distribution network.

The Zaragoza Water Saving City programme

Through four phases of implementation, the Zaragoza Water Saving City programme has been highly successful in achieving its aim of establishing a 'water saving culture' in the city. Targeting a wide range of stakeholders, the programme objective was to significantly reduce water consumption through the elimination of wasteful water use and the uptake of water saving technology. The programme was initiated in 1996 by the Zaragoza-based environmental NGO Fundación Ecología y Desarrollo (FED) with support from the municipality of Zaragoza.

Aimed at professionals in the water sector, large-scale consumers, educational institutions, political decision makers and the general public as a whole, the programme was implemented through the following phases:

- Phase 1: 'Small steps, big solutions' – A widespread awareness-raising campaign to reduce water consumption within homes, public buildings and commercial activity through behavioural change and water saving technology.
- Phase 2: '50 good practices' – The implementation of 50 examples of water efficient technologies and practices in parks, gardens, public buildings and industry to demonstrate performance, overcome resistance and encourage uptake on a wider scale throughout the city.
- Phase 3: 'School for efficient water use' – The dissemination of pocket guides among the city's major water consuming sectors describing the good water saving practices identified in Phase 2 of the programme.
- Phase 4: '100,000 commitments' – The invitation of citizens and businesses to make online public commitments to save water with the aim of recording 100,000 such commitments in time for the International Expo "Water and Sustainable Development" which opened in Zaragoza in June 2008.

Image courtesy of SWITCH. © SWITCH Project

The considerable savings in commercial and domestic water consumption were achieved primarily through a change in water use behaviour among businesses and citizens as well as, to a lesser extent, the uptake of water efficient technology.

Tariff reforms

As part of the overall efforts to reduce water consumption in the city, the Zaragoza City Council carried out a comprehensive review of the water tariff structure to make it more equitable and demand-responsive. Rather than covering the true cost of water services, tariffs in the city prior to the reforms were set based partly on political criteria and provided very little incentive for the consumer to save water.

Reform of the tariff structure was carried out with the aim of achieving:

- full cost recovery through revenues, including the direct costs of service provision as well as indirect costs within the water cycle more generally;
- equitable charging, ensuring that the cost of water is related to the benefits it delivers to the user;
- affordable access to basic water services for all, including the availability of subsidies for vulnerable households; and
- an incentive for the consumer to use water efficiently.

In addition to the financial disincentives to waste water brought about by the tariff, economic incentives in the form of water bill discounts were also introduced to reward households that were able to reduce their annual water consumption by 10% or more.

Leakage control

Due to high levels of unaccounted-for water in the distribution system, the municipality also targeted leakages from the city's dilapidated water supply pipelines. Considerable investments were made in controlling water losses, including rehabilitation of the pipeline network, pressure management controls and much needed maintenance to leaking storage tanks in the basements of apartment buildings.

The Actur area of the city is currently being used as a pilot site to test active leakage control measures and pressure management techniques with the aim of establishing optimal leakage performance targets for the city as a whole.

Results

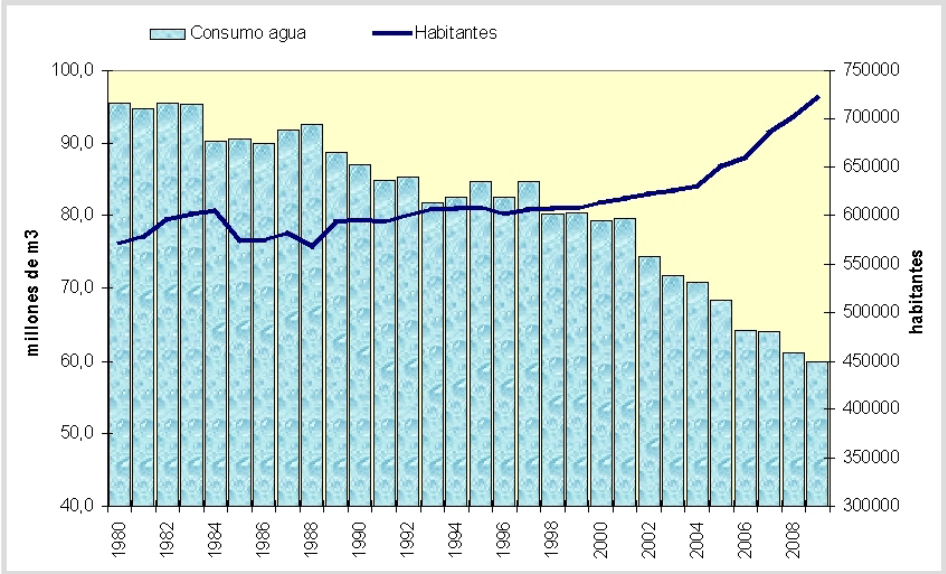
Despite a 12% increase in population, the water conservation measures employed by Zaragoza achieved a decrease in total water consumption of 27% between 1997 and 2008 (from 84.8 million m^3 to 61.5 million m3 per year). This far exceeded the goal the city had set themselves of reducing consumption to 65 million m^3 per year by 2010.

The bulk of the achievement was due to the change in water use behaviour by the citizens of Zaragoza, largely brought about through the widespread awareness-raising programmes and promotional activities carried out within the four stages of the Water Saving City programme. In fact, as early as the first phase of the programme, the percentage of citizens aware of potential water saving measures had already risen from 40% before the programme began to 72% once it had been completed, demonstrating how successfully the city's messages were able to reach the local population.

Other initiatives such as the control of leakage from the water supply distribution network also played a part. By 2008 recorded pipe bursts within the system were less than half those reported in 1997 and losses from the system as a whole were reduced by over 40%, meaning that almost 20 million m^3 of water were saved each year.

Although less influential in reducing consumption, the reform measures for water tariffs in the city have had a large economic impact on water services. Whereas in 1997 income from water consumers covered around 70% of the cost of supply and wastewater disposal, the equivalent figure in 2006 was closer to 90%; well on the way to achieving the goal of full cost recovery. This has allowed much-needed investment to be in made water services infrastructure, particularly wastewater treatment.

In response to these achievements, new goals have been set that aim to reduce per capita consumption of potable water in the city to 90 litres per person per day (from 131 litres per person per day in 2006) and overall consumption to 58 million m3 per year by 2015.



Water savings and population growth in Zaragoza from 1980 to 2009 (Source: Zaragoza Ayuntamiento)

Lessons learned

The case of Zaragoza demonstrates in particular how the successful mobilisation of a city's citizens has the scope to achieve considerable water savings. Through the active promotion of a 'water saving culture' in the city, Zaragoza was able to convince its residents of the value of water, the consequences of using it wastefully and, perhaps most importantly, that reducing consumption delivers social and economic benefits – both for individuals and for the collective – without impacting upon quality of life.

The main lessons to come out of the Zaragoza experience include:

- The promotion of good practice water use can significantly reduce urban water consumption.
- If the reasons and benefits are well understood, local businesses, industry and the general public are willing to adopt more water efficient practices.
- When combined, changes in water use behaviour, water efficient technologies and reduced wastage from the distribution network can contribute enough savings to replace the need for more costly supply-side infrastructure, and can also contribute to reducing vulnerability to future droughts.

The Zaragoza Water Commission

Water in Zaragoza is managed through a range of local government departments. However, prompted by the municipal strategic plan's prioritisation of water conservation, the city council established a Water Commission hosted by the city's Local Agenda 21 office to coordinate water-related activity in the city. As well as relevant local government departments, the 29 members of the Water Commission include academic institutions, civil society groups, business interests, professional associations and the River Ebro Basin Organisation. With access to such a large range of stakeholders, the Water Commission has been able to interact closely with user groups and involve them in the efforts to conserve water in the city.

The achievement of these results was due to the comprehensive and innovative approach taken by Zaragoza when revising their water management policy in response to the looming water crisis faced by their city. The success of this approach appears to have largely depended on the implementation of the following actions:

- **The establishment of a central coordination unit** – Rather than being a collection of fragmented, individual initiatives, the setting up of the Zaragoza Water Commission allowed the effective coordination of consultation, implementation and evaluation of different activities, with the aim of achieving a common goal.
- **Working directly with stakeholder representatives** – The goal of reducing water use by all types of consumers required the cooperation of a wide range of stakeholders. Working closely with stakeholder representatives allowed the identification of realistic and acceptable water conservation measures and took advantage of existing channels of communication to reach out to members of the different target groups.
- **Encouraging public participation** – Domestic water consumption was identified as a key area where significant water savings could be made. Providing citizens with the information, means and incentives to actively commit themselves to saving water raised awareness about the benefits of contributing to the overall conservation goals of the city.

- **Targeting specific sectors** – Instead of promoting generic water saving messages, awareness-raising activities targeted specific user groups with information that was directly relevant for their business or lifestyle. The production of dissemination guides for different consumer types also allowed the explicit benefits and incentives of reduced water use to be clearly outlined and promoted.
- **Leading by example** – High-use groups and the general public were likely to ignore awareness-raising campaigns if they felt that the authorities responsible for water were not equally committed to improving their own performance. By providing an efficient and reliable water and wastewater service, businesses and residents were more inclined to contribute themselves.
- **Gaining political commitment** – Key stakeholder consultation and public participation to reduce water consumption in Zaragoza was specifically mentioned in the municipal strategic plan, with the implementation of many activities taking place through Local Agenda 21 commissions. A supportive city council allowed policy commitments to be made, increased the availability of funding and provided the means to generate public pride in the city's achievement through events such as Expo '08.

It is also worth recognising that the initial trigger for the Zaragoza experience came from the political fallout from water shortages on a national scale in the early 1990s. This exposure to vulnerability and the public anger that resulted from water restrictions was a wake-up call to the city and justified the initial need to take action. The extent to which the city would have been committed to reducing water consumption without this natural intervention is unknown. Either way, the manner in which the city now manages its water has not only provided considerable economic, social and environmental benefits for the local population but has also significantly increased the city's resilience to future episodes of drought in the region.

Replication

The initiatives that achieved the high levels of water saving in Zaragoza are on the whole applicable in most cities throughout the world. Although the dry climate and lack of water supply options in Zaragoza was certainly the driving force behind the strong commitment to demand management, the economic and environmental benefits of reducing water consumption through cutting out wasteful use, investing in water efficient technology, fixing leaking pipes and pricing water at its true value are certainly not restricted to cities where water is scarce.

Zaragoza (Image courtesy of SWITCH. © SWITCH Project)

Despite including considerable wastage, the per capita consumption figures for the city prior to the push to reduce water were not excessively high when compared to other European cities. This goes to show that the magnitude of savings achieved are likely to be possible elsewhere and could even be bettered in cities where the starting point is higher.

The multi-stakeholder approach and encouragement of citizens' participation is an area in particular which could be used as a model for cities hoping to launch similar water saving initiatives. Rather than the regular public consultation process commonly adopted for large scale public programmes, Zaragoza actively engaged with different users in the city through their professional associations and neighbourhood representatives.

This method of stakeholder involvement increased the likelihood of the message being well received by the intended audience rather than with the scepticism so often associated with radical policy interventions. Such an approach is not unique to Zaragoza and can easily be replicated elsewhere to encourage water conservation or other urban sustainability initiatives.

2008 International Expo "Water and Sustainable Development"

From 14 June to 14 September 2008 Zaragoza hosted the International Exposition on the theme 'Water and sustainable development'. Attracting visitors from across the globe, Expo '08 presented the city with the opportunity to showcase itself as a 'World Water Capital City'. The local population was encouraged to use the event to further justify the city's water efficient reputation through the '100,000 Zaragoza commitments' initiative, the aim of which was to collect and present at the Expo '08 public and business pledges to use water more efficiently.

www.expozaragoza2008.es

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