Fez, Morocco

About the IWA Action Agenda for Basin-Connected Cities

The IWA Action Agenda for Basin-Connected Cities builds on the Principles for Water Wise Cities, with a focus on how cities can be active water stewards in their wider water basins. This includes the Drivers for Action such as extreme events, declining water quality, and water availability; followed by the Pathways to Action through assessment, planning and implementation; and the Foundations for Action from developing a vision to building capacity to improving governance.
To learn more visit - http://www.iwa-network.org/press/the-action-agenda-forbasin-connected-cities/

About the Basin Stories

The basin stories are documenting some of the best practices and approaches that demonstrate how stakeholders, especially those in urban areas (e.g., city government, water and wastewater utilities, industries) are taking part or contributing to sustainable management of water resources. Greater basin-level collaboration from catchment to consumer is essential for sustainable water management in the face of growing demand on water resources and global change. The stories aim to inspire urban stakeholders to be aware and respond to what is happening in their watershed.

The city of Fez: Technical and Institutional strengthening for a sustainable management of water resources

Contributed by Laila Misane, Sebou Hydraulic Basin Agency

Summary

The imperial city of Fez, listed as a UNESCO World Heritage Site since 1981, currently has a population of 1,200,000 inhabitants. Located in the center of the Sebou basin, it covers an area of 100 km^2. Water supply security, industrial pollution and flood risks are the main challenges facing the city. These issues are mainly addressed, in a concerted and participatory approach, by the integrated water resources development master plan of the Sebou basin (PDAIRE).

Numerous projects mainly focused on the protection and preservation of water resources are being carried out thanks to a common and shared vision adopted by all stakeholders at different scales and the pooling of human and material resources. The goal of this approach is to adopt an inclusive and lasting water management strategy to promote sustainable development.

Source: https://www.independent.co.uk/

Problem:

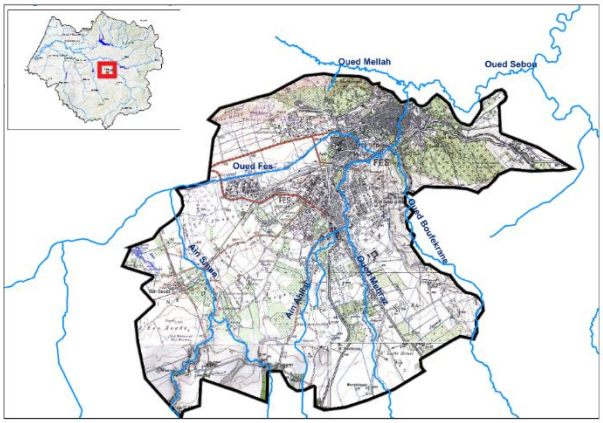
Sebou river pollution
Securing drinking water supply
Floods risks

Solution:

Technical and Institutional reinforcement for sustainable water management
Participatory approach

Geographic information

Country: Morocco
City area and population: Fez, around 100 km^2; 1.200.000 inhabitants
Basin area: Sebou Basin – 40 000 km^2



Problem

The City of Fez was founded on the banks of the Oued Fez at the confluence of several rivers. The city has experienced excessively violent floods in the past that have caused significant damage, and is further threatened by the effects of climate change. Measures and arrangements for the protection of the population and their property have been set up in partnership between the stakeholders concerned (Ministry of the Interior, Ministry of Public Works, Regions, Local Authorities, Basin Agency, etc.). These measures have benefited from financial support of the FLCN (Fund for Fighting Against Natural Disasters) managed by the Ministry of the Interior.

The city has a large water supply network managed by the *Régie de distribution d'eau et d'électricité de Fès* (RADEEF). The city's drinking water supply rate is 100% and is primarily from the Saiss aquifer.

However, the overexploitation of this aquifer, which is already in deficit, is impacting security of drinking water supply in Fez. Therefore, alternative solutions must be put in place using surface water from the Sebou River, although industrial pollution from local industries is an ongoing problem.

In addition to the water supply network, RADEEF manages an urban wastewater collection network, with a connection rate of about 90%. Since 2014, an activated sludge treatment plant is treating the wastewater. The purification efficiency of this wastewater treatment plant (WWTP) varies depending on level of industrial activity. The treatment of accumulated sludge is through belt filters, and a biogas system has also been set up to provide the energy needed for the WWTP facilities.

Industries such as tanneries, copper workshops and oil mills do not have treatment or pre-treatment systems meaning that there are fluctuating pollutant loads, and serious pollutants such as heavy metals entering the environment. The industrial pollution has seriously inhibited the functioning and efficiency of the WWTP as there is little treatment prior to discharge. This has led to pollution of the Sebou River which impacts water use downstream including:

- Degradation of irrigation water quality along the river
- Water releases from upstream dams to dilute pollution
- Degradation of flora and fauna

What are the Drivers for Action?

For more information on the Drivers for Action visit the Action Agenda for Basin-Connected Cities

Extreme Events
☒Public health risk
☒ Damage to infrastructure
☐ Economic activities and supply chain disruption

Declining water quality
☒ High Operating costs
☒ Loss of credibility and trust
☒ Environmental, cultural and health impacts

Water Availability
☒ Water supply disruption
☐ Constraints to growth
☒ Declining quality of life

Solution

Vision The sustainable management of water resources through technical and institutional reinforcement	**Governance** - A cooperative approach with all parties to pool efforts -Development of a master IWRM plan in collaboration with all parties	**Knowledge and abilities** - Build the knowledge and technical capability of all the parties within the city - Enable exchange of both knowledge and skills to be able to adopt the best practices
Planning Tools		**Implementing Tools**

- Master Plan for the Integrated Management of Water Resources in the Sebou Basin (PDAIRE) -Master plan for flood protection of Fez -Fez industrial pollution control program		- Financial contribution from the State enabled the achievement of many projects -Incentives through grants and financial aids of the State.

Action areas

The Master Plan for the Integrated Management of Water Resources in the Sebou Basin (PDAIRE) focuses on the sustainable management of water resources in the Sebou basin including the issues of water security, flooding and pollution issues within the city and the wider catchment. A specific plan for the city of Fez has also been included in the PDAIRE. The plan was developed with a participatory and concerted approach with all concerned stakeholders and has initiated projects to protect and preserve water resources while supporting the city's socio-economic development of the city.

Securing of drinking water supply of Fez
Drinking water supply is mainly provided by groundwater from the Saiss aquifer. However, the deficit of this aquifer, which will likely be amplified by climate change, has an impact on the security of drinking water supply in Fez. Thus, the use of surface water has become necessary to ensure the supply of drinking water in the long term, to reduce the pressure on groundwater and to ensure sustainable management of the Saiss aquifer. A first phase consisting of partially supplying the city with drinking water from the Sebou River has been implemented. The second phase, currently underway, consists of connecting the city to the first Idriss dam, which is located about 60 km from the city. These water supply infrastructures will ensure the supply of drinking water until 2050.

The RADEEF is also making numerous efforts to improve the output of the drinking water distribution networks, especially in the old Medina. Leakage or non-revenue water across has decreased from 40% in many parts of the city to about 20% currently and is expected to be less than 10% in the future.

Industrial pollution control

To ensure the proper functioning of the WWTP, an industrial pollution control programme was established by the partners concerned including the Hydraulic Basin Agency/Sebou, RADEEF, Fez Municipality and the Department in charge of the Environment] . The involvement of industry was essential for the success of this programme in recognising the impact of urban industry on the wider catchment. Numerous meetings and awareness workshops have been organized for the benefit of industries.

This industrial pollution control program has focused on the most polluting industrial units, namely: a large soft drink company, a yeast factory, a brewery and a textile unit, in addition to tanneries, coppersmiths and olive oil mills.

Tanneries: These are a historical activity within the Medina of Fez. However, leather working generates a lot of chromium. The chromium effluents are collected and transported by tanker to the dechromatation station. This station recovers 90% of the toxic chromium rejected by the tanneries, which is reused by the tanners.

Copperware: Following a support program for the copperware workshops in the Medina of Fez, simple facilities and tools to reduce metal losses have been put in place in these units in order to reduce pollution at the source. These are essentially "soaking baths" that allow the reuse of water and reduce discharge rich in heavy metals.

Four other units are equipped with high-tech autonomous treatment systems, or pre-treatment systems. These systems reduce and homogenize the pollutant load into the city's sewage network. .

This program has been carried out through agreements between all stakeholders, with financial contributions from government departments and industries.

Oil mills: Discharge from the oil mills located inside the city negatively impacts the operation of the WWTP. As a result, RADEEF stops the operation of the WWTP during the olive oil production season and discharges the untreated wastewater into the Sebou River which increases the impact of wastewater pollution of the river.

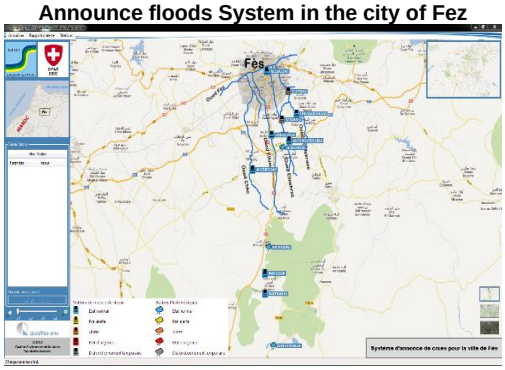
To address this problem, many actions have been taken to reduce the levels of pollution through a cooperative approach including all relevant departments and stakeholders. These actions consist of 1) organizing awareness meetings with the owners of oil mills to propose technical solutions to the problem; and 2) providing information on how the owners can benefit from financial aid be implementing pollution control mechanisms. Thanks to these meetings, some oil mills have been brought up to environmental standards, although there are still some that need to take action.

Flood risk

Several measures have been implemented within the framework of a program for protection against flood risks, in partnership between all the stakeholders concerned (Ministry of the Interior, Ministry of Equipment, Municipality, Basin Agency, etc.). These measures have received financial support from the FLCN (*Fonds de lutte contre les catastrophes naturelles)* which is managed by the Ministry of Interior.

In addition to structural measures, flood warning and prevention systems are needed for flood risk management. A telemetry system was implemented in 2012 to predict and announce floods in the city of Fez. This system provides alerts to parts of the city exposed to the danger of floods.

Announce floods System in the city of Fez



Water planning processes at the basin scale have been undertaken with a participatory approach actively involving all stakeholders who identify challenges and develop an action plan. The monitoring committee of this was set up by the Wali (Prefect) of Fez.

Pathways for Action

For more information on the Pathways for Action visit the Action Agenda for Basin-Connected Cities

Assessment

☒ Investment in data and information systems
☐Linking traditional water management with science
☒ Invest in values to motivate decision making in the sector of water

Planning

☒ Risk-based approach to planning

☐ Water allocation mechanisms
☒ Stakeholder participation in planning and management
☒ Aligning urban development with basin management

Implementing
☐ Integration of natural infrastructure
☒ Economic and financing mechanisms
☐ Building partnerships from catchment to springs
☐ Digital technologies

Lessons learned

To address all water-related challenges, it is necessary to:

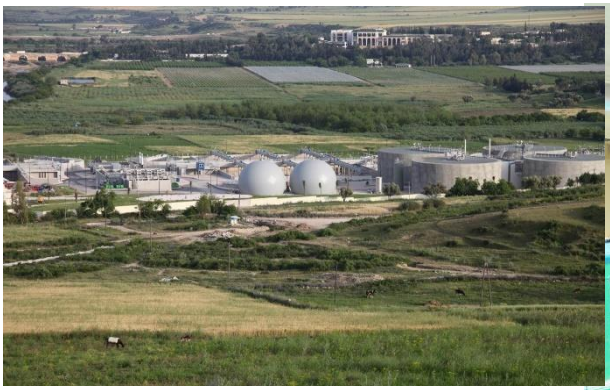
- **Adopt a cooperative and sustainable approach**. The involvement and collaboration of all stakeholders at all levels of governance, both in the city and in the basin, is essential to achieve the desired results. The involvement of industries in pollution control programs is crucial, through awareness raising, exchange and sharing of information on the technologies to be adopted, and financial support provided by the State.
- **Extend sustainable management to the whole basin and not only to the city**. The city depends on its basin for the supply of water resources for the present and the future and for the management of water-related risks.
- **Deploying new technologies for flood warning and prevention** as a necessary measure for better flood management and for the protection of lives and property.
- **Ensure financial contribution of government departments** to encourage stakeholders to join the efforts.

Next steps

To address the problem of oil mill discharges, the clean-up process began in 2004 with feasibility and evaluation studies and. This project was then developed by the International Office for Water and local stakeholders. The project description, including technical, legal and financial aspects, was presented to donors at COP23, in 2017.

A pilot project for the treatment and recovery of waste produced by olive oil mills was set up in cooperation with the Japan International Cooperation Agency (JICA). The project tested Japanese technology for the treatment and recovery of by-products from olive oil mills. This was an "Oil Temperature Decompression Dryer" technology which separates, from oil, solid matter and water. Positive results were observed, and the technology has been integrated into the ongoing phase of the clean-up process. The proposed long term solution is to relocate all olive oil mills to outside the city and provide a specific area to manage and treat discharge from the oil mills prior to release to the environment. Secondly, a financial partnership agreement including all stakeholders and oil mill owners must be developed and signed for the project to be implemented, which includes the commitments of all stakeholders.

As a leader in integrated water resources management, the Sebou Basin Agency (ABH Sebou) intends to continue its effort to mobilize all stakeholders across the water sector to develop and adopt a common strategy based on sustainable and inclusive water resources management.



Fez WWTP

Pilot project for recovery of waste from oil mills of Fez

Resources
http://www.radeef.ma/

Régie Autonome intercommunale de Distribution d'Eau et d'Electricité de la wilaya de Fès

The Fes Autonomous Board of Drinking Water and Power Supply (RADEEF) is a public establishment of an industrial and commercial nature, with legal personality and financial autonomy, placed under the supervision of the Ministry of the Interior.

RADEEF was created by a decision of the municipal council of the city of Fez on April 30 and August 29, 1969 by virtue of Dahir n° 1.59.315 of June 23, 1960 relating to the communal organization, and this after the expiry of the concession contract with the Compagnie Fassie d'Electricité (CFE) for the distribution of electrical energy.

Currently, RADEEF ensures the distribution of water and electricity as well as the management of the liquid sewerage network within the city of Fez and the commune of Ain Chkef. It is also responsible for the distribution of drinking water in the urban communes of Sefrou and Bhalil as well as in the following rural communes: Bir Tam-Tam, Ras Tabouda, Sidi Harazem, Ain Timgnai, Ouled Tayeb, Douar Ait Taleb and Douar Ait El Kadi.