



Lodz, Poland

River restoration as a catalyst for sustainable urban development

Lodz, formerly a textile production centre, continues to feel the environmental, economic and social impacts of industrialisation and subsequent manufacturing decline. It is focusing its urban regeneration efforts in part on river restoration, with the Sokolowka River acting as a test case. Restoration has involved the building of reservoirs, the invention of a stormwater biofiltration system and the development of a wider development plan for the river valley. The pilot project has been a success, and cooperation through the city's Learning Alliance (which was established during the SWITCH project) has succeeded in changing mindsets, so that upscaling to the rest of the city's rivers is planned.



Population: 742,000 (2009)

Land area: 293 km²

The Polish city of Lodz's rivers bore in many ways the brunt of the city's 19th century industrialisation, becoming mixed stormwater drains and sewer conveyance channels. Aquatic ecosystems were negatively affected by these changes. Moreover, the changes made to the city's rivers has also had adverse effects on the health of its inhabitants: since rainwater is removed from the city as quickly as possible, it cannot saturate soils – thereby leading to dust and pollution – and can also not contribute to reducing air temperatures in the city. Finally, the operational efficiency of wastewater treatment in the city is decreased because of the dilution of influents.

Restoring the city's rivers is seen as a way to address all of these challenges and regenerate the city in a multi-dimensional way. Lodz is applying the principles of ecohydrology and Integrated Urban Water Management and has started with the restoration of the Sokolowka River as part of its work with the SWITCH project. The intention is to apply the lessons learned from this pilot initiative to the restoration of the rest of the city's rivers.

An integrated approach using ecohydrology

Commonly, the urban water cycle is approached from a fragmented perspective, with water supply, stormwater and wastewater managed in an unconnected way. Integrated Urban Water Management recognises both the links between water and other urban sectors as well as the links within the water cycle itself. Decision making that connects the dots between the different parts of the urban water cycle allows for more sustainable management of water and reduces unintended impacts as well as missed opportunities.

Ecohydrology looks at the connection between the water cycle and ecosystems and the multiple benefits which can be drawn from this interaction. Rivers in their natural state provide many services, and restoring altered rivers is one of the ways in which cities can take advantage of ecohydrology.

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

Lodz in context

Lodz, whose name in Polish means ‘boat’, is a city whose history has been shaped by water. Eighteen waterways are present in the city, and this proximity to water enabled it to become a major manufacturing centre – the “Polish Manchester” – in the 19th century. The town’s textile manufacturing was first hit by the economic depression of the 1930s and then by World War II, when the town’s Jewish population – which formed an integral part of the textile industry – was virtually eliminated after the German occupation. The final blow for the city’s industrial sector was the liberalisation of Eastern European markets in the 1990s; the town’s population has significantly decreased since that time.



Textile factory in Lodz (© iStockphoto.com/bodo23)

Many severe environmental problems have resulted from the industrial history of the city: loss of forests and green spaces, soil contamination, degradation of rivers and streams and poor water quality. Other issues are linked to more recent transformations, such as the political and economic instability stemming from the collapse of the textile industry and the end of the Soviet Union, urban sprawl, marginalisation of some city districts and communities and inadequacy of environmental and water management systems to current demands. Overall, the city’s historical heritage and environment have suffered, as has the quality of life of the city’s inhabitants.

In an effort to reverse these trends, the city is implementing an urban development programme centred on water and river restoration in particular. This restoration, which includes the development of green spaces alongside the rivers, will contribute to the health and quality of life of the city’s inhabitants, but also reduce flooding risk, improve urban ecosystem health, and eventually also spur sustainable development and adaptation to climate change.

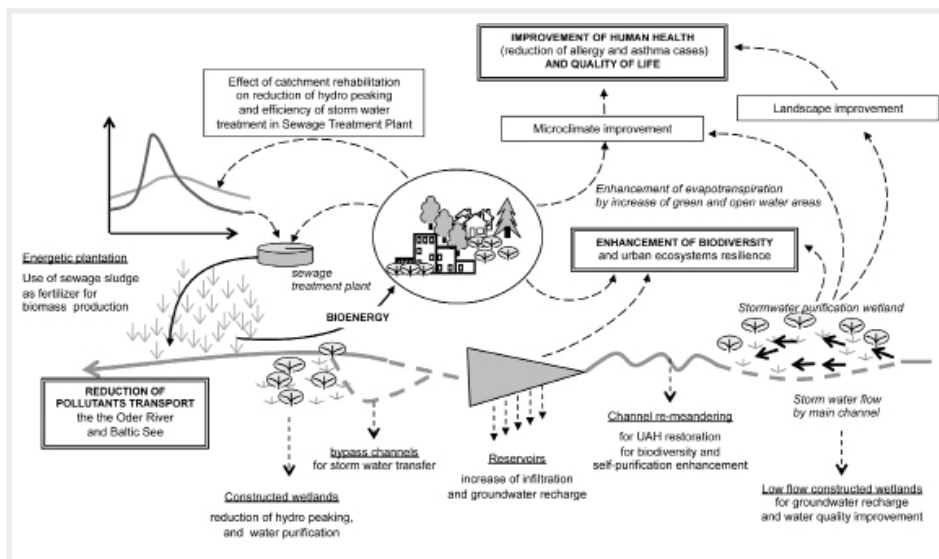
River restoration in Lodz

Lodz hopes to draw from the experience of restoring the Sokolowka River in order to inform the restoration of the other rivers in the city. The city will elaborate recommendations linked to river restoration and prepare a general plan for river management for the city.

Water resources in Lodz

Lodz’s industrial past and urbanisation have created some very serious water management challenges for the city. Indeed, most of the city’s urban streams were channelised and converted to a mixed stormwater drainage and sewage conveyance system. This, combined with dense urban development, increased the speed of water outflow and lessened the capacity of the land to absorb water. As a result, Lodz has become subject to frequent flooding. Also, the city wastewater treatment facility’s efficiency is reduced due to periodic stormwater influx.

The lack of green spaces and open waterways in the city, combined with the health problems created by the low infiltration rates (causing high dust and pollution levels, an urban heat island and low humidity levels), have affected the quality of life of Lodz’s inhabitants. Last but not least, the habitats of aquatic ecosystems within these rivers have been diminished, and the rivers ecologically degraded. These challenges explain the importance of river restoration for Lodz, in terms of creating multi-dimensional benefits within its management of water, as illustrated in the diagram on the opposite page.

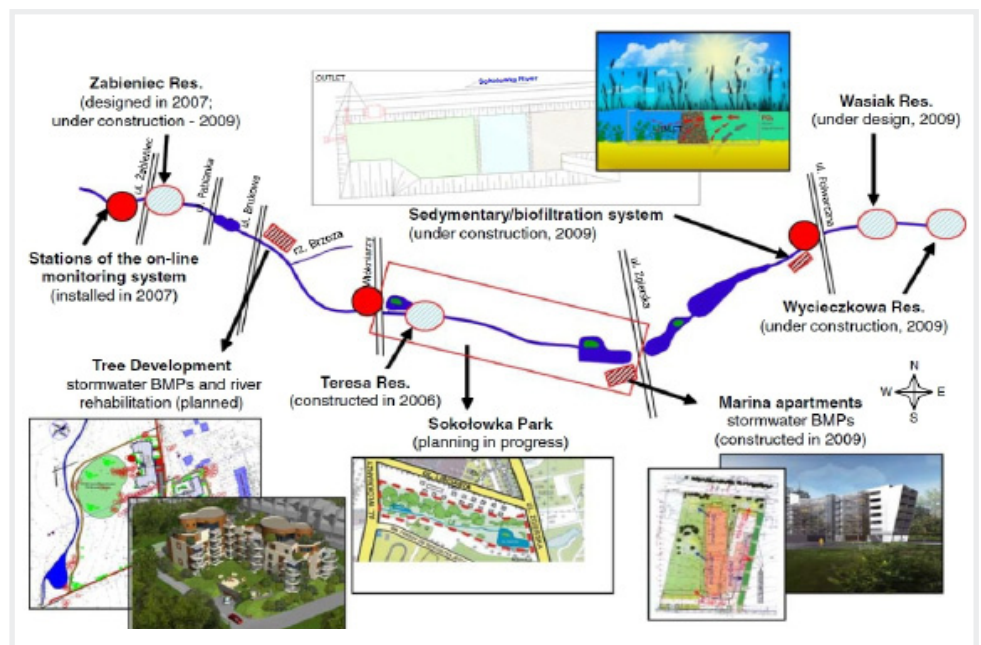


Possible multidimensional benefits for the urban environment and society (Image courtesy of SWITCH. ©SWITCH Project)

Restoration of the Sokolowka River

River restoration work on the Sokolowka River has focused on several different areas:

- Hydrological monitoring and landscape surveying: A key first step for any project is to acquire accurate baseline data upon which to base plans. Lodz developed a water budget for the river as well as mathematical models for stormwater management, using results from online monitoring systems. As a result of this research, the project partners were able to design a stormwater biofiltration system which prevents the influx of pollutants into the river during high flows.
- Reservoir construction and chemical analysis: Lodz's study of ecohydrological relationships led it to design and build three stormwater reservoirs with increased pollution absorption capacity thanks to adjusted biotic structures and hydrodynamic adjustment. Given the project's attempt to deliver multiple benefits, it was necessary to undertake chemical analysis of bottom sediments and water samples in order to be able to carry out preventative measures and reach water quality high enough for recreation purposes. For example, toxic cyanobacteria blooms can sometimes occur in reservoirs if preventative measures are not put in place.
- Rehabilitation and development plans: More generally, the project partners have instigated a wider plan for the rehabilitation of the river valley, using among other things a landscape survey, and have planned the development of the Sokolowka River Park (see figure opposite).



Activities carried out in the Sokolowka River valley (Source: Wagner & Zalewski, 2009)

Lessons learned

The Sokolowka River pilot project has provided Lodz with valuable lessons for use in its roll-out of restoration to the city's other rivers.

- Linking water and the environment to wider urban development: In an excellent illustration of the wider links between the water cycle and other aspects of urban development, Lodz took a broader view instead of just focusing on water management. The creation of the Blue-Green Network framework, where the development of a network of rivers and green areas will be used as a basis for spatial planning and economic development, has linked water management to the wider city development process. The demonstration projects implemented by Lodz have played an important role in creating visibility, interest and cooperation, and as such have been vital in the scaling-up strategy of the project.
- The central role of the Learning Alliance: Stakeholder involvement through the Learning Alliance has driven the success of the initiative, and has created links strong enough to last beyond the lifetime of the initiative and to sustain the upscaling of research results. Because research foci remained flexible and responsive to stakeholder needs, stakeholders participating in the initiative were able to really take advantage of their involvement. It also became clear that the success of a Learning Alliance cannot just be based on occasional meetings, but rather that it relies upon strong facilitation, frequent communication, and the commitment of stakeholders from all levels to regular and open involvement.
- Champions as drivers of change: A big part of the success of the Learning Alliance has been linked to the strong commitment of champions within the Alliance. Individuals, in particular a professor from the university, have been instrumental in the process. Having promoted river restoration since the 1990s, their persistent effort was needed to bring other stakeholders on board. These champions have also credited the Learning Alliance format for enabling the effective sharing of information and providing an avenue for catalyzing change.
- Cooperation with developers: The work of the Lodz Learning Alliance on river restoration has been shared with stakeholders, motivating some developers to consider innovations linked to stormwater management in their development projects. One developer had already applied stormwater collection and treatment on-site, as a way to prevent overburdening of the sewer system. The second developer incorporated ecohydrology considerations into the design of another project. Proposals included reservoir construction for purification and sediment retention and the use of green roofs, but also a walking path near the river and more natural landscaping in order to improve quality of life for residents. Unfortunately, the failure to obtain permits has delayed the practical application of these design principles.



River restoration in Lodz and the Blue-Green Network (© Barbara Anton / SWITCH Project / Barbara Anton)

- Thinking beyond the city level is important: This rehabilitation focused on the city level. However, cities are not self-contained entities, but instead are influenced by wider-level policies and laws, so that links with these regional and national authorities are needed to ensure success.
- Challenges linked to capacity and financing: The pilot river restoration activities implemented on the Sokolowka River have been a success, and have convinced the Lodz Infrastructure Company of the value of replicating these across the city's other rivers. However, the main challenges to rolling out this replication are the lack of capacity in terms of the availability of technical and scientific specialists, but also the lack of finances. The company has highlighted the difficulty in attracting investment, including from developers, and the vital role played by EU funding.



Lodz means 'boat' (© Barbara Anton)

Replication

The highly engineered and polluted status of Lodz's rivers makes their restoration to a more natural state quite challenging. Lodz was able to make significant improvements to the flow rates, pollution status and ecosystem value of the Sokolowka River, thus demonstrating the technical feasibility of river restoration. However, the technologies and management options implemented on the Sokolowka River were chosen because of their adequacy in responding to the specific conditions in place at the time, namely the unique stormwater flow patterns as well as the exact pollution loads in the water and sediments. Therefore, although the general principles of river restoration are replicable in all settings, the specific means with which this is achieved vary depending on the conditions in and around the targeted river.

One of the biggest factors behind the success of the initiative has been the strong commitment from the city's Learning Alliance. The lessons learned by Lodz regarding the involvement of stakeholders can be very useful for other cities, particularly for those trying to combine urban water management with that of other city sectors.

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