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Sustainable Water Management in the City of the Future

Integrated Project
Global Change and Ecosystems

Deliverable D1.1.6 Report on the City Strategies

Towards integrated water management in the City of Łódź - Current status and strategic options for the future.

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SWITCH Deliverable Briefing Note Template

SWITCH Document

Towards integrated water management in the City of Łódź - Current status and strategic options for the future.

Audience

This document is of interest to managers of municipal departments and utilities of Lodz concerned with water and other related city aspects (environment, city planning, transportation, architecture, and others), as well as the top managers of the city.

Purpose

This Draft Strategic Document is the first attempt towards integrating efforts of representatives of various sectors related to water and environment in Lodz towards integrated, research based water management as opposed to fragmented approach. It draws the map for the city based on the vision “Lodz 2038: Lodz Uses Water Wisely”.

Background

One of the objectives of SWITCH in Lodz was to apply innovation in science for elaborating more sustainable, long-term methods and tools for integrated urban water management using ecohydrology, and integrating all the stakeholders in the demand-based research process. Establishment of the Lodz Learning Alliance and co-operation within this platform created for the first time in the history of Lodz the opportunity for in-depth and direct interactions for exchanging ideas, plans and interests among the stakeholders. Five-year research in provided new information, technologies and solutions towards the city water issues. In the process, the vision of the Lodz water resources (“Lodz 2038: Lodz Uses Water Wisely”), scenarios and strategic options for the vision accomplishment was elaborated by the Learning Alliance. The presented document has been elaborated by the Lodz Learning alliance members and is to complement other city documents and guidelines regarding water and natural resources documents. It includes the Lodz vision, scenarios, strategic options, description of the current state including SWOT analyses and major strategic options with implementation mechanisms for:

- water and sewage infrastructure,
- management of water and natural resources,
- strategic planning for the city, and
- public participation.

Potential Impact

The document should lead to more widespread and efficient co-operation between the city stakeholders and co-ordinated action towards accomplishment of the Lodz vision for integrated urban water management resource.

Note on status document

This document is a final deliverable for the SWITCH project, but is still 'draft' in the sense that it requires approval by the city authorities of Lodz.

Towards integrated water management in the City of Łódź

Current status and strategic options for the future

STRATEGIC DOCUMENT

Executive summary

The objective of the Strategic Document was to contribute to the application of an integrated water management in Łódź as opposed to fragmented approach, by means of looking at more sustainable, long-term methods and tools, integrating all the stakeholders in the process. The document with aspirations to complement other city documents and guidelines regarding water and natural resources documents, includes vision (Łódź uses Water wisely: 2038), scenarios, strategic options, description of the current state, SWOT analyses and major strategic options with implementation mechanisms for:

- WATER AND SEWAGE INFRASTRUCTURE,
- MANAGEMENT OF WATER AND NATURAL RESOURCES,
- STRATEGIC PLANNING FOR THE CITY, and
- PUBLIC PARTICIPATION,

as desired and agreed by stakeholders participating in a series of workshops leading to work in specialized groups responsible for the above areas. The document has been based on the inputs and expertise of the following stakeholders' (Łódź Learning Alliance key members), adding value to the process of integration of the water sector in the city:

- Waterworks and Sewage Company (ZWiK), Lodz,
- Department of Municipal Management of the City of Łódź Office,
- Department of Environment and Agriculture of the City of Łódź Office,
- Department of Strategic Planning of the City of Łódź Office, City Architect's Office,
- University of Łódź
- European Regional Centre for Ecohydrology under the auspices of UNESCO

This is a draft document, which is at this stage under further consultation with the Learning Alliance and final elaboration.



Towards integrated water management in the City of Łódź

Current status and strategic options for the future

DRAFT STRATEGIC DOCUMENT

Representatives of Łódź Learning Alliance:

Waterworks and Sewage Company (ZWiK), Lodz,

Department of Municipal Management of the City of Łódź Office,

Department of Environment and Agriculture of the City of Łódź Office,

Department of Strategic Planning of the City of Łódź Office, City Architect's Office,

University of Łódź

European Regional Centre for Ecohydrology under the auspices of UNESCO

Facilitated by:

Dr Iwona Wagner (University of Łódź),

Monika Dziegielewska-Geitz (University of Łódź),

SWITCH/University of Łódź, Poland

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I LODZ

1 ABOUT THE CITY

Description of the city and its water resources

The City of Lodz has a population of 800 thousands inhabitants (agglomeration of 1 million inhabitants) and is located in central Poland on a steep between uplands and lowlands, and the area raises from 180 m above sea level in its western part to 235 m in the East, on the first order watershed between the Vistula and Oder Rivers System (the two major basins in Poland). The city area is divided into 18 catchments drained by small urban streams (average flow < 1 m³ s⁻¹). During the industrial revolution in the early 30s of the 19th century the streams were channelized and turned underground, becoming a part of the stormwater system of the city. Lodz is equipped with a mixed drainage system – combined in the centre - old part of the city - and separated in the new, outskirts sections – in general, about 80% of the population has access to the sewer system.

Some rivers sections (basically those located on the outskirts of the city) have been relatively less degraded, and flow through with the semi-natural open river corridors. Strengthening of channels, highly impermeable surfaces in the city and relatively high slope of stream channels (5-7 ‰) result with high surface runoff and discharge into the streams. Degradation of freshwater habitats reduces their capacity for water retention and self-purification resulting with low water and ecological quality.

Demographic projections for the city of Lodz predict possible decrease from 768,9 thousand in the year 2005 down to 605,1 thousands in 2030, which may have further effect on water resources management. Recent activities undertaken by the city authorities (restructuring of motorways, airport, encouragement of new investors) may reverse this trend.

Main water pressures and issues

Urban water management in the city of Lodz is challenged by its specific hydrological situation determined by its location, dynamic industrial development in 19th century and recent decrease in the population:

- location of the City on the first order watershed between the Vistula and Oder Rivers System requires **inter-basin transfer of water** from the water intakes at the Vistula catchment (Pilica River) to the disposal at the Oder catchment (Ner River);
- the city location and streams chanalization together with compacted and highly impermeable historical development of the city **reduced water retentiveness** in the landscape and capacity of streams. This particularly evidences during storm events, through increased the flow peaks in the streams and sewage treatment systems;
- **rivers degradation** reduced also their capacity for selfpurification, deteriorating the quality of water, ecological stability of the ecosystems and thus the quality of life in the city;
- treated sewage from the City are disposed into a small river (the Ner River) of natural flow about 0,3 m³/s, with the sewage outflow of 2,5 m³/s and **exceeds the capacity of the sewage treatment system for stormwater purification**;
- The Ner river floodplain have been severely **contaminated with heavy metals and organic compounds**. During last years, due to decrease of water consumption in the city, the average river flow and ground water level at floodplain decreased, resulting with mineralisation of cumulated organic matter in aerobic condition and in leaching heavy metals from the soil.
- **Sewage sludge utilization**: the Group Wate Water Treatment Plant (GWWTTP) produces 70 000 ton of sewage sludge, which causes additional economic and ecological issue;

SWITCH in Łódź

The collapse of textile industry and change of the city character from industrial to the centre for education, science and development of new technologies changes the expectations of the society, also regarding the city landscape and the quality of life. Additionally, decreased water use in the last 20 years, forcing the necessity of changing the approach to water management in the city. There is an increasing need to change the perception of the role of the water in the city. Extending the technical

systems for urban water management with ecological solutions may not only improve the quality of the environment but also lower costs of management and raise economic benefits for the society. There is a need for elaborating a comprehensive scientific background and implementation plan to address this issue, which will require cooperation of scientists, officials, local NGOs, and society. The major activities undertaken within the SWITCH project have addressed:

1. Elaboration and demonstration of strategy for restoration of municipal rivers, stormwater management, increasing water retentiveness and improvement of quality of life (Sokolowka River);

The project validated implementation of ecohydrology approach as one of the essential components of urban water management, based on three fundamental canons. It:

- i) uses synergies between catchment water cycle and dynamic of its biotic component,
- ii) harmonizes existing and planned hydrotechnical solutions with ecological biotechnologies, and
- iii) integrates complementary synergistic measures at all scales.

The concept of the restoration project has addressed the following issues:

- reduction of the stormwater sewage flow peaks by series of ponds and reservoirs, creation and restoration of river floodplain and wetlands;
- increase of water retentiveness in the city landscape (mitigation of extreme flows, increase of groundwater level, support of city vegetation) by application of phytotechnology;
- increase of the quality of water, ecological stability of freshwater resources and increasing their carrying capacity by instream ecohydrological regulation;
- increase of quality of life and aesthetic values in the catchment by restoration of the river corridor, ecotone zones and landscape;
- increase of human health by incorporating the measures into development plan of the city, based on relationships between the effect of green-lands and water on frequency of allergies and asthma cases;

2. Elaboration and demonstration of strategy for sewage water management, environmental quality and positive socio-economic feedbacks (Ner River):

Traditional sewage treatment plants often do not possess sufficient efficiency and face high costs of construction and exploitation which has to be carried by local communities. Extending the sewage treatment by constructing willow plantations and wetlands results in more efficient reduction of pollutant loads and sludge utilization problems and generate additional benefits. Implementing willow plantations reduces problem of sewage sludge utilization and may contribute to water quality improvement (constructed wetlands). Additionally, it provides alternative sources of energy (bioenergy) and thus revenue for local economy while reducing outflows of capital for fossil fuel use. The production of bioenergy can result with quicker return of the invested capital through a short rotation time of the plantation and high planting density. The preliminary calculations shows that wood chips from short rotation forestry (SRF) of the area to be established in the project, can cover the energy needs for municipal buildings in the City of Lodz and eliminate problem of sewage sludge utilizing. Reduction of heavy metals in the sludge is necessary to increase efficiency.

Based on ecohydrological approach, the restoration strategy is integrating measures at all scales and contribute to generating positive economic feedback:

- catchment scale – increase of stormwater retention at the city by increase of water infiltration, constructed wetland and restoration of rivers (related to the activity 1);
- floodplain scale – fitoextraction of heavy metals using willows for both water and floodplain quality improvement and production of biomass (bioenergy), including restoration of floodplain with native plant communities;
- local scale – application of sewage sludge for fertilization remote bioenergetic plantations (enhancement of production of biomass and bioenergy and economical utilization of sewage sludge);

The SWITCH project has introduced a new collaborations and communication paradigm in an form of a multi-stakeholder platform called Learning Alliance, horizontally involving all the city actors having stakes in the water and natural resources management in the city as well as regional and national stakeholders important for the SWITCH in Łódź process. The Learning Alliance's key role was the elaboration of the Vision for Łódź 2038 as well as in the development of the scenarios and strategic options for the city quoted further in the document.

2 ABOUT THE DRAFT STRATEGIC DOCUMENT FOR INTEGRATED WATER MANAGEMENT IN ŁÓDŹ

The objective of the Strategic Document was to contribute to the application of an integrated water management in Łódź as opposed to fragmented approach, by means of looking at more sustainable, long-term methods and tools, integrating all the stakeholders in the process. The document with aspirations to complement other city documents and guidelines regarding water and natural resources documents, includes vision (Łódź uses Water wisely: 2038), scenarios, strategic options, description of the current state, SWOT analyses and major strategic options with implementation mechanisms for:

- WATER AND SEWAGE INFRASTRUCTURE,
- MANAGEMENT OF WATER AND NATURAL RESOURCES,
- STRATEGIC PLANNING FOR THE CITY, and
- PUBLIC PARTICIPATION,

as desired and agreed by stakeholders participating in a series of workshops leading to work in specialized groups responsible for the above areas. The document has therefore been based on the stakeholders' inputs and expertise adding value to the process towards sector integration. ANNEX 1 includes guidelines developed in Łódź in the course of the SWITCH project regarding sustainable rainwater management, which were used as recommendations to the city spatial development plan, ANNEX 2 includes guidelines, which were used as recommendations to the city spatial development plan regarding the concept of the Blue-Green Network developed in the course of the SWITCH project in Łódź.

This document has been elaborated by four working groups on the above mentioned topics, which were formed by Łódź Learning Alliance key stakeholder, namely:

- Waterworks and Sewage Company (ZWiK), Lodz,
- Department of Municipal Management of the City of Łódź Office,
- Department of Environment and Agriculture of the City of Łódź Office,
- Department of Strategic Planning of the City of Łódź Office, City Architect's Office,
- University of Łódź
- European Regional Centre for Ecohydrology under the auspices of UNESCO

This is a draft document, which is at this stage under consultation with the whole Learning Alliance.

II METHODOLOGY

1 DEVELOPMENT OF THE VISION and SCENARIO-BUILDING

The common vision for Łódź 2038 in the context of urban water management was elaborated in a workshop held in January 2008 objectives of the visioning workshop by a group of approx. 50 participants representing diverse stakeholders - the Learning Alliance. The participants were first familiarized with existing scenarios concerning certain aspects of urban management, to identify the risk factors affecting the scenarios, and to create strategies that would minimize those factors and maximizing the favourable ones. A list of the greatest present and anticipated challenges for Lodz in the field of water and sewage management, and the development of the city with special attention to the aspects of water management and natural environment was created. Then the most important aspects if the vision were chosen in the following phases:

Phase 1: Participants divided into four groups demonstrated their suggestions of the most important aspects of their own visions of Lodz concerning three areas connected with water management:

- 1) Resources
- 2) Infrastructure
- 3) Access and demand

Phase 2: Based on their earlier work, the groups suggested three most important elements of the vision.

Phase 3: A representative of each of the four groups presented three most important elements of the vision, briefly explaining their significance and the reasons for which they were chosen.

Phase 4: Twelve most important elements of the vision put forward by all groups were summed up, which enabled the elaboration of common elements of the vision as well as the ultimate shape of the vision for the city.

The next stage of the process was for the workshop participants to get acquainted with the scenarios for Lodz concerning demographics, climate, the environmental aspects particularly linked to human health, and the scenarios concerning water management and spatial planning.

Then identification of the internal and external factors influencing the vision and their classification according to the criteria of importance and predictability took place by means of the following method:

The participants were divided into four groups. In the first part the participants conducted a discussion and identified the factors, which may potentially influence the process of achieving the vision. In the second part, having identified the factors mentioned above, the groups moved on to choosing two most important and least predictable of them.

In the final phase of the task the members of all groups elaborated on the list of most important and least predictable factors, which were:

- The politics of authorities regarding:
 - Funds
 - Demography
 - Rate of economic growth
 - Cooperation within the urban structures
- The good will of decision makers
- Climate and weather in the context of changes

- Law regulations

In the process of naming the most important and least predictable factors affecting the realization of the vision “Lodz 2038”, it was proposed to take into account the aspect of their being short- and long-term. From the methodological point of view, it proved to be a challenge to enumerate the factors and to avoid their evaluation.

As a result it was decided that the two most important and least predictable factors that may affect the realization of the vision “Lodz 2038” were:

- **the existing law**
- **economic growth**

Four narrative scenarios based on the above factors were elaborated then commented upon or modified depending on the knowledge available to the participants in three groups.

2 DEVELOPMENT OF STRATEGIC OPTIONS

Proposed strategies enabling the realization of the vision’s elements were developed by the workshop participants in group work in January 2008. The proposed elements that should be included in a strategy developed to realize the vision of Lodz 2038 were:

1. Integrated and efficient system of water management in the city of Lodz and its surroundings

- Eliminating communication barriers and tightening the collaboration between institutions responsible for respective elements of the water system in Lodz (rivers, sewage network, water supply, underground waters, environmental protection and the control of the environmental quality) and other institutions which indirectly affect the quality of water resources (spatial planning, architecture) and standard of living in the city;
- Centralizing decisions and responsibility for all undertaken activities combined with elaborating relevant legal procedures and ways of working of the coordinating individuals;
- Lobbying in favor of legislative rationalizations;
- Creating a centralized commonly accessible database regarding urban water resources;
- Creating a centralized decision system based on the common database and model systems of decision support (DSS);
- Social consultations, special offers, inclusion of the marginalized groups;
- Spatial development plan 100% of the Lodz area;

2. Dependable infrastructure that meets the requirements of a safe city and the needs of all inhabitants, as well as provides good ecological condition.

- Integration of entities responsible for undertaken activities, e.g. in such projects as SWITCH;
- Implementation and elaboration of the latest technology and solutions (BAT) in the infrastructural development of the city;
- BMP (Best Management Practices) – utilizing the best available technology and solutions combining technological and ecological methods – greater system efficiency at lower investment costs and improved life quality;
- Stormwater management
 - Dividing sewage system from stormwater
 - Development of stormwater infrastructure the city in 100% (including local systems and BMP – Best available solutions in the field of sanitation and stormwater management;

- Achieving maximal infiltration surface of the basin (appropriate notifications in the management of spatial planning);
- Stormwater management (Green roofs, re-use of stormwater);
- Creating green belts along the streets;
- Creating a system of monitoring for stormwater;
- Pollution control:
 - Monitoring system – establishing, expanding, rationalizing;
 - Identifying illegal sources of pollution;
 - Tightening of the control and the law system;
- New investments in the city:
 - Introducing a criterion of the choice of bid offers and investments with regard to the degree to which they meet ecological and environmental regulations as well as economical conditions;
 - Promoting the vision among investors and establishing the necessity for the design offices to take the vision into account;
 - Strict protection of the areas of river valleys and their exclusion from building permits;

3. Green areas along open river valleys (river valleys, flood plains) serving a recreational purpose – „Green lungs” for Lodz

- Including appropriate notifications in the plan of spatial management (protection of valleys) and local regulations, buying of grounds by the city to provide social access to river valleys;
- Creating a recreational infrastructure (e.g. bicycle lanes, parks, picnic spots) along river valleys;
- Renaturalization of the rivers (where possible);
- Inclusion of the investors and developers into the process of renaturalization and creating a friendly landscape, both in terms of responsibility for undertaken activities and their financing;
- Good ecological condition of waters in the city
- Spatial planning:
 - channeling and integration of activities;
 - limiting the spatial expansion;
 - Clear distinction between areas planned for modern intensive urbanization from the areas for light constructions and protected areas, serving as ecological corridors and “green lungs” of the city;
- Investments connected with the water sector:
 - Concluding sewage investments and waste water treatment plant;
 - Introducing new technology of decentralized sewage purification
- Renaturalization
- Landscape solutions for restitution of a hydrological cycle, stormwater management and preventing floods:
 - Increasing the water retention in basin (maximizing infiltration of the basin, landscape management);
 - Water re-use and harvesting;
 - Control of stormwater outflows;
 - Separating devices connected with biofilters and ecosystem biotechnologies for stormwater outflows
- Revision of activities harmful to the environment and the inhabitants’ health:
 - Identifying dangers;
 - Eliminating illegal outflows of sewage into rivers and stormwater canals;

- Constant monitoring;
 - Control of the private water ponds, where economic activity is conducted;
 - Pro-ecological activities:
 - Increasing help e.g. WFOSiGW (Voivodship Fund for Environmental Protection and Water Management) in promoting investments using pro-ecological solutions;
 - Good standards of vehicle transportation and inclusion of roads managers in common activities;
 - Limiting the emission of gases;
 - Engaging institutions such as ZDiT (Executive Board for Roads and Transport) in cleaning and maintaining cleanliness;
- 4. Lodz as a leading centre of implementation, education and innovation In the scale of Poland**
- Promoting Lodz as a city with an ecological image – attracting dynamic entities, investors, educated and creative individuals;
 - Practical use of the Lodz educational institutions’ scientific experience as well as new technologies developed in Lodz;
 - Integration of the scientific community with investors, managing and executive institutions (e.g. using Learning Alliance technology);
 - Creating a demonstrative ecological housing estate utilizing the latest ecological technology and water management;
 - Creating a simulation program showing the environment condition, life quality and economic benefits for the city stemming from the implementation of the vision;
- 5. High ecological awareness among the society**
- Promoting (information, advertisement, media events) modern ecological image of the city basing on the latest technology;
 - Creating demonstration sites presenting the latest technological and ecological solutions in practice, promoting these solutions and its implementation in other parts of the city (e.g. modern ecological housing estate, renaturalization of rivers, valleys redevelopment; BMP in stormwater management.
 - Intensifying ecological activities on the level of functioning of the municipal units, such as – housing councils;
 - Education – creating programs for schools, educational paths (in and around the city of Lodz), ecological villages (practical education of children and teenagers using the parts of the city developed in accordance to the vision);
- 6. Common access to information and data**
- Creating an integrated database concerning water resources, environmental aspects and spatial development, with an access for professional groups and the society at large;
 - Creating an information database GIS In a single system for all entities of the city, which these entities would use as a basis to develop their own systems in accordance to their specific needs and aims;
 - Creating an interactive map of the city showing all planned/current activities towards realizing the vision, their progress and results achieved;
 - Cooperation of institutions / organizational units such as the Center for Crisis Management
- 7. Investors and authorities alike respect ecological conditions of soils and water use**
- Creating a detailed analysis of environmental conditions and local spatial development plan combined with granting the status of protected areas for places significant from the viewpoint of ecological safety of inhabitants or environmental conditions.
 - Adjusting building construction law regulations to ecological requirements of the terrain;

- Legal execution of pro-ecological activities and giving priorities to those investments which act in accordance with ecological safety requirements;
- Creating a system of consulting and promoting elaborated visions / methods;
- Creating a system of control over approving investments and official's decisions;
- De minimis programs for the investors acting in accordance with the rules of ecology;

8. Lodz makes a smart use of its water resources

- Promotion, advertisement, information and raising the ecological awareness of inhabitants and investors;
- Utilizing ecosystem biotechnology and modern solutions distinguishing Lodz among other cities
- Modern stormwater management: using technology for the re-use of stormwater;
- Promoting modern solutions in sanitary systems: compost toilets, separation of sewage (grey and black water);
- Utilization of geothermal waters;
- Implementing alternative sources of energy;
- Balneology based on groundwater;

III THE VISION FOR CITY'S INTEGRATED WATER MANAGEMENT 2038

VISION: Lodz 2038 „Lodz Uses Its Water Wisely”

The city's resources management is based on an efficient and integrated system ensuring access to information for all. Investors and authorities respect ecological properties of land and waters. Infrastructure serves the functions and requirements of an environmentally secure city, is reliable, meets the needs of all the city's population and assures good status of aquatic ecosystems. Green areas - river valleys along open corridors – provide space for recreation and are the 'green lungs' of Lodz. The application of ecological biotechnologies and the population's common and in-depth ecological awareness contributes to exceptional quality of life. Our city is a leading centre for innovation, education and implementation in Poland.

IV SCENARIOS

Scenario 1

The economy remains stagnant owing to a series of worldwide economic recessions and poor performance of the Polish economy owing to political instability, a shortage of labour, and poor infrastructure. Incomes/output remain similar to 2008 (GDP of Euro 4,800 at current prices) and the country is one of the poorest within a highly unequal Europe. There are low tax revenues and little external funding (richer countries with the EC have stopped supporting major investments in the Centre and East) for investment in improving infrastructure.

Institutions dealing with water management at a city level remain highly fragmented with different agencies dealing with various issues and poor coordination between agencies and departments, partly as a result of politisation of local government. Nobody is looking and planning to improve overall performance of the water management systems, but only at their individual areas of responsibility. As a consequence, the city's water governance systems have been slow to adapt and respond to the challenges posed by climate change (increasing frequency of droughts and floods) and the rising costs and absolute shortages of fossil fuels. Despite the efforts of individuals and localized success stories, the state of the city's urban environment has deteriorated. WASH service levels have are unacceptable in many areas of the city.

Scenario II

The economy remains stagnant owing to a series of worldwide economic recessions and poor performance of the Polish economy owing to political instability, a shortage of labour, and poor infrastructure. Incomes/output remain similar to 2008 (GDP of Euro 4,800 at current prices) and the country is one of the poorest within a highly unequal Europe. There are low tax revenues and little external funds (richer countries with the EC have stopped support major investments in the Centre and East) to invest in improving infrastructure.

Despite the above, strong leadership and professionalism within the various organizations dealing with aspects of water management in the city (and its catchment areas) leads to improved sharing of information and coordination. An integrated plan is developed (largely based on the water framework directive) and implemented to use water wisely and improve the environment. However, shortage of tax revenues has limited the scope for the major investments needed for the city's authorities to adapt and respond effectively to the challenges posed by climate change and the increasing costs and absolute shortages of fossil fuels. Lack of investment funding has meant that the city's emphasis has been on promoting and encouraging action by community-based groups. Whilst this local action has been successful, it has not been able to impact on all the challenges facing the city. Inequities exist in WASH service levels and the urban environment is much better in richer areas of the city.

Scenario III

The Polish economy develops steadily to become the largest in eastern and central Europe and average in terms of performance across the whole of the EC, closing the gap with western European countries (with a GDP equivalent to the EU average: Euro 22,860 at current prices). Many young people who migrated to the UK, Ireland and other EC countries in the first decade of the century return to the city owing to the better wages and prospects. This results in a sharp recovery in the population, a rise in investment and a reverse "brain drain". Much higher tax revenues can be invested in infrastructure improvements, and people are also able to pay much higher fees for services.

The institutions dealing with water management at a city level remain highly fragmented with different agencies dealing with various issues and poor coordination between agencies and departments, partly as a result of politisation of local government. Nobody is looking and planning to improve overall performance of the water management systems, but only at their individual areas of responsibility. Investment needed to address the increasing challenges of climate change and the rising cost and absolute shortages of fossil fuel is poorly targeted. In fact, much of it has been wasted! Individuals and urban “landcare” groups have achieved a lot as a result of the strong support and involvement of environmentally-minded returnees. As a result of disillusionment in government, these groups have turned a coalition of landcare groups into a strong political voice. However, the ability of local action to address major problems is quite limited. There is a growing gap between the rich and the poor in the city. Landcare groups tend to be more active and successful in the richer areas of the city. Similarly, WASH service levels tend to be much better in the richer areas.

Scenario IV

The Polish economy develops steadily to become the largest in eastern and central Europe and average in terms of performance across the whole of the EC, closing the gap with western European countries (with a GDP equivalent to the EU average: Euro 22,860 at current prices). Many young people who migrated to the UK, Ireland and other EC countries in the first decade of the century return owing to the better wages and prospects available at home, leading to a sharp recovery in the population. Much higher tax revenues can be invested in infrastructure improvements, and people are also able to pay much higher fees for services.

Strong leadership and professionalism within the various organizations dealing with aspects of water management in the city and its catchment leads to improved sharing of information and coordination. An integrated plan is developed (largely based on the water framework directive) and implemented to use water wisely and improve the environment. The city has responded and adapted famously to the challenges posed by climate change and the rising costs and absolute shortages of fossil fuels. environmental plans are well aligned across all the sectors and the city’s environment has never been better for all the city’s inhabitants (and for its flora and fauna). WASH service levels are also outstanding across the whole city. A combination of local action and innovative city governance has resulted in Lodz being a leading proponent in integrated urban water management (IUWM) and a source of IUWM expertise that is in high demand across Europe and worldwide. The city has achieved all aspects of a vision that was formulated by a “turning point” project (SWITCH) in the first decade of the century.

V STRATEGIC OPTIONS RESULTING FROM THE VISION AND THE SCENARIOS

Elements of the Vision	Strategic Options
The city's resources management is based on an efficient and integrated system...	<ul style="list-style-type: none"> - Elimination of communication barriers and closer cooperation between institutions responsible for specific elements of the water system in Łódź (rivers, sewerage system, water supply, ground water, protection and control of environment's quality) and institutions whose measures indirectly impact quality of water resources (spatial planning and architecture) and living standard in the city; - Centralisation of decisions and responsibility for the measures and development of relevant legal and methodological procedures and operating procedures for the Coordination Body and specific partners; - Lobbying concerning legislative improvements (by the community or authorities); - Establishing a central decision making system on the basis of a joint database and a model Decision Support Systems (DSS); - Dissemination of the information on the progress achieved in implementation of the (EU) programmes and obligations and outputs of their implementation, or on the lack of their implementation; - Social consultations, promotion and inclusion of disadvantaged groups; - Management plan that will cover 100% of the Łódź territory;
...ensuring access to information for all.	<ul style="list-style-type: none"> - Development of central, integrated database of water resources and environmental aspect, spatial management, which will be available for general public, including professional groups and community members; - Development of the GIS database in a single system for all the City entities – the base will be the foundation for development of specific systems by these entities to meet their individual needs; - Development of an interactive map of the City, which will present measures planned/implemented with respect to the vision, progress and results achieved; - Initiating a forum for social consultations, information exchange (innovations and investments); - Cooperation of institutions/units of such organisations as the Crisis Management Centre for information sharing;
Infrastructure serves the functions and requirements of an environmentally secure city...	<ul style="list-style-type: none"> - Integration of the entities responsible for measures undertaken, such as the ones implemented in such projects as SWITCH; partnership development; - Application and use of the latest technologies and solutions (BAT) in development of the City infrastructure; - BMP (Best Management Practices) – use of the best available technologies and solutions, combining technological and environmental methods – improved efficiency of the system and lower investment expenditure, and improved living standard;

	<p><u>Rainwater management:</u></p> <ul style="list-style-type: none"> - Separation of sanitary sewerage systems from rainwater sewerage systems; - Providing 100% of the City territory with the sewerage system (including the use of the local systems and BMP – best management practices in the field of sanitation and rainwater management); - Maximum splitting of the catchment area (appropriate provisions in the spatial management plan); - Introduction of charges for rainwater; - BMP in rainwater (such as green roofs, re-use of rainwater, establishing green belts along the streets); - Establishing monitoring of storm water, application of the latest technologies; <p><u>Pollution control:</u></p> <ul style="list-style-type: none"> - Monitoring system – to be established, developed and made more efficient; - Identification of illegal sources of pollution; - Strengthening of control and legal system, and law enforcement; <p><u>New investments in the City:</u></p> <ul style="list-style-type: none"> - Introduction of a criterion of selecting tendering bids and investments in the context of not only meeting economic conditions, but also technological, environmental and environmental safety ones; - Promoting the vision among investors, and introducing a need to consider it by design offices; - Identifying conditions and absolute protection of river valley areas and their complete exclusion from the land planned for development; - Construction of Lutomiersk reservoir as the final stage of sewerage purification from the Main Sewerage Purification Plant - Introducing legislation which will regulate environmental aspects and methods of its enforcement (system of incentives and penalties); - Creating the risk information system; - Cooperation of institutions/units of such organisations as the Crisis Management Centre;
<p>... is reliable....</p>	<ul style="list-style-type: none"> - System of monitoring of infrastructure condition; - Application of available best methods; - Stimulating responsibility and awareness of residents; - Cooperation with a wide range of national and international experts – practitioners – and the use of experience available in Poland and abroad; - Technology and knowledge transfer and cooperation with the scientific sector; - Developing and implementing recommendations of the operating instructions for water reservoirs and other elements of the City ecohydrological system;
<p>... meets the needs of all the city's population...</p>	<ul style="list-style-type: none"> - Raising social awareness in the field of undertaking initiatives, cooperation with the city and impacting shaping the living standard in the City; - Social consultations system; - Providing 100% of the City territory with the sewerage system (including the use of local systems and BMP – best management practices in the field of sanitation and rainwater management); - Providing general public with the access to the river valleys as

	<p>recreational areas, and developing the system of their management to be used by the City;</p> <ul style="list-style-type: none"> - Developing residents' environmental awareness in order to ensure appropriate functioning of the areas accessible to general public; - Purchase of the river valley areas by the City;
<p>... and assures good status of aquatic ecosystems.</p>	<p><u>Review of the activity harmful to the environment and life of the residents:</u></p> <ul style="list-style-type: none"> - Risk identification; - Elimination of illegal disposals of sewerage to rainwater and river sewerage system; - Permanent monitoring; - Control of private water reservoirs in which or in whose vicinity business activity is conducted; - Law enforcement. <p><u>Spatial planning:</u></p> <ul style="list-style-type: none"> - Providing direction to measures and their integration; - Limiting spatial expansion; - Clear separation of the land planned for modern and intensive city development processes, land planned for "light" development and protected areas which constitute ecological corridors and green lungs of the City; <p><u>Investments in water sector:</u></p> <ul style="list-style-type: none"> - Completion of the investments in the sewerage treatment and purification systems (including implementation of new technologies of decentralised sewerage purification, where necessary); - Implementation of new technologies of decentralised sewerage purification; <p><u>Environmentally-friendly measures:</u></p> <ul style="list-style-type: none"> - Increased assistance of such bodies as the Regional Fund for Environmental Protection and Water Management in the field of promotion of these investments that promote environmentally-friendly solutions; - Landscape solutions for restoration of the hydrological cycle, rainwater management and flood control: - Improved retention of water in the catchments (catchment splitting and landscape management); - Water reuse & harvesting; - Control of rainwater disposal; - Separators connected to bio filters and ecosystem biotechnologies used in rainwater disposal; - Rehabilitation; <p><u>Building awareness and responsibility of the residents through such initiatives as educational parks and paths, school education:</u></p> <p><u>Including the Board for Roads and Transport in active cooperation:</u></p> <ul style="list-style-type: none"> - Including BMPs in the road investments in Łódź; - Good standards of car transportation and including road authorities in joint activities; - Reduction of exhaust gases emissions; - Involving such bodies as the Board for Roads and Transport in order to maintain order and cleanliness, etc;

<p>Green areas - river valleys along open corridors – provide space for recreation...</p> <p>....and education.....</p> <p>...and are the ‘green lungs’ of Lodz and attractive conditions for City development.</p>	<ul style="list-style-type: none"> - Introducing relevant provisions in the spatial management plan (protection of valleys) and local legislation, land purchase by the City in order to ensure community access to the river valleys; - Developing recreation-related infrastructure (such as cycling routes, parks, picnic sites) along the river valleys; - River re-naturalisation within these sections where such measures are feasible, small retention promotion, fountains in the City (city centre and residential districts); - Including investors and developers in the re-naturalisation process and design of a friendly landscape, both in the context of responsibilities for measures delivered and their financing; - Social consultation system for spatial management projects (including architectural concepts) - Ensuring continuity of green areas
<p>The application of ecological biotechnologies...</p>	<ul style="list-style-type: none"> - Developing a portal / innovation information centre - Developing solutions adjusted to the Łódź specific conditions in - Developing guidelines and local legislation in the field of new investments (housing, roads and storm water) - Adoption of a draft resolution concerning the above issues, by the City Council and its enforcement;
<p>... and the population’s common and in-depth ecological awareness contributes to exceptional quality of life. Our city is a leading centre for innovation, education and implementation in Poland.</p>	<ul style="list-style-type: none"> - Promotion (information, advertising, media campaigns) modern environment-friendly image of the City based on the latest technologies; - Developing demonstration sites presenting the latest technological and environmental solutions in practice, promotion of these solutions and their replication in other parts of the city (such as modern environment-friendly residential districts; river re-naturalisation; valley management; BMP in the rainwater management); - Intensification of environment-based measures at the operational level of the ancillary entities of the City – councils of the residential districts; - Education – developing curricula for schools, educational paths (in Łódź and its vicinity), ecological villages (practical education for children and youth with an aid of these parts of the City that are managed in accordance with the vision);
<p>Our city is a leading centre for innovation, education and implementation in Poland.</p>	<ul style="list-style-type: none"> - Promotion of Łódź as a city with the environment-friendly image – attracting dynamic entities, investors, educated and creative individuals; - Integration of the scientific circles with the managing authorities and implementing bodies (with an aid of such measures as methodology of the Learning Alliance); - Practical use of scientific experience of the Łódź universities and modern technologies designed in Łódź; - Developing a demonstration environment-friendly residential district, which will use the latest international environmental technologies and technologies in the field of water management; - Developing a simulation programme which will demonstrate the condition of the environment, quality of the living standard and economic benefits to the City resulting from implementation of the vision;

VI DRAFT STRATEGY FOR INTEGRATED URBAN WATER MANAGEMENT IN ŁÓDŹ

1 CURRENT STATE OF WATER RESOURCES

A. WATER AND SEWAGE INFRASTRUCTURE

Water supply for the City of Łódź

The city of Łódź receives water from three main sources:

- From the Łódź Water Supply Company, from deep water wells in Łódź and adjacent areas (output capacity of 70 000 m³/d),
- From the Tomaszów - Łódź Water Supply Company, i.e. from a surface water intake on the Pilica River and from deep water wells in Rokiciny (output capacity of 100 000 m³/d),
- From the Sulejów - Łódź Water Supply Company from deep water wells in Bronisławow (output capacity of 50 000 m³/d).

As of 01.01.2010, the length of the water supply network was as follows:

- Transit water supply network – 187 km
- Water mains – 161 km
- Distribution network -1193 km
- Utility connections – 493 kilometres

Water as a raw material used for production of water intended for human consumption in 90% is composed of ground water and only in 10% of surface water. Since the early 1990s, water consumption in the City of Łódź has been declining due to the collapse of textile industry and smaller water consumption by recipients (possibility of using better installation materials and fittings, individual household water-meters, legislation concerning charges for water supply and modern water-efficient household appliances), and use of individual ground water intakes by industrial facilities. At present Łódź receives approximately 127 000 m³/d on average.

This situation induces numerous negative consequences for the operator of the water supply equipment owned by the ZWiK Sp. z o.o. (Water Supply and Sewage Company), which are presented in a SWOT analysis further in the document. Proposed methods of preventing this state by the year 2030 are listed as strategic options further in this document.

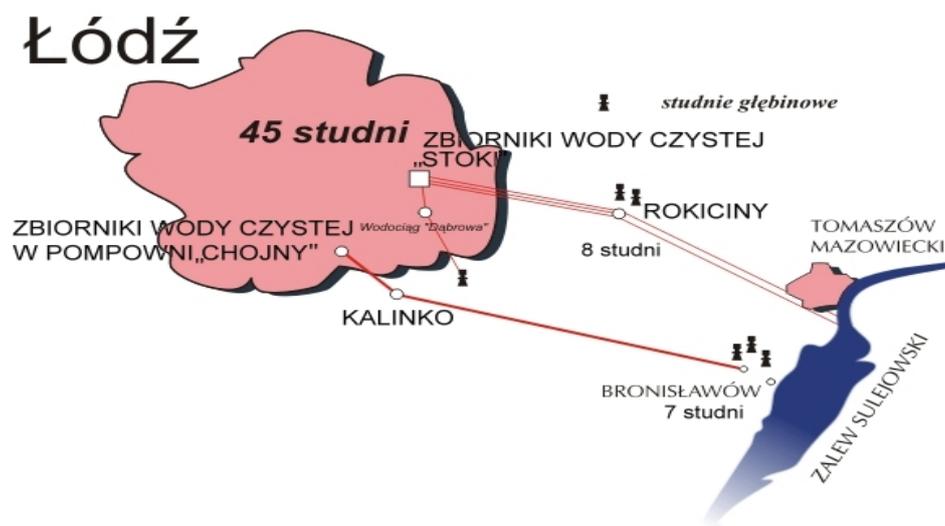


Figure 1 Structure of water supply for the City of Łódź

Sewage infrastructure and rivers

Łódź is situated on the watershed of the Vistula and the Oder. More than 73% of the city's area is situated in the catchment of the Ner River. 18 rivers flow through the city, where 15 operate within the stormwater drainage system. Most of the rivers lost their natural characteristics. Rivers and streams flowing through Łódź have served as sewage canals following its industrial development. EU co-financed projects, which were implemented within the past few years, and the collapse of industry, which took place at the turn of the 1980s and 1990s, contributed to organisation of the water supply and sewage management system in the city.

As of 30th June 2010, the length of the water supply network was as follows:

- Sanitary sewage drainage– 548,4 km
- Combined sewage system – 404,8 km
- Stormwater drainage system - 467,3 km
- Utility connections – 298,4 km.

Quality of water in the streams has been defined as medium. Further measures to improve water quality are necessary and they include: development of the sewage network in order to increase the number of residents benefitting from its service and liquidation of cesspools and illegal sewage disposal. Improved technical infrastructure of the river-beds, its appropriate maintenance, construction of retention reservoirs and implementation of retention of combined sewage system will contribute to enhanced flood protection of the city, improved image of Łódź, and satisfaction of its residents achieved due to the proper river valley management. Construction of retention reservoirs also improves water conditions and ensures adequate ground water level.

At the same time measures intending to inform investors, designers and institutions such as the Board for Roads and Transport about the need of stormwater retention at its source by application of appropriate BMPs in stormwater management in road constructions, lawns – construction of low and appropriately profiled kerbs, unsealing the surface of squares and roads, construction of low-cost high quality underground retention tanks in the inbuilt areas, using stormwater for equipment and installations which do not require application of water intended for human consumption, should be implemented. Adoption by the city authorities of fees for stormwater drainage from hardened surfaces to the sewage system, may provide an economic incentive.

18 rivers of the total length of 110 kilometres are located in the City of Łódź. 11 rivers of the total length of 72,5 kilometres, including the covered streams of the length of 15,6 kilometres, function in the stormwater drainage system and combined sewage system.

B. MANAGEMENT OF WATER AND NATURAL RESOURCES

Water resources and the way they are managed constitute a key factor that impacts economic development. We should aspire to ensure that this impact is effective. It should also be noted that economic development has impacted, and unfortunately affected in particular, quantity and quality of water resources. Efficient and effective water resources management is the only way to bring all economic and natural aspects together, both in the national and city scale. Appropriate water resources management is also a key element of the environmental protection.

Water resources management helps to meet needs of the community, economy, protection of water and environment related to these resources, and in particular it is to:

- Ensure adequate quantity and quality of water for the community,
- Protect water resources from pollution and inappropriate or excessive use,
- Maintain or improve the condition of water ecosystems or ecosystems that depend on water
- Protect from floods and droughts,
- Ensure water for the needs of agriculture and industry,
- Meet the needs in the field of tourism, sport and recreation,
- Create conditions for using water for the purposes related to energy, transport and fishery.

Water resources in Łódź Province and in Łódź

Location of Łódź Province in the transition zone between the Southern Poland's upland zone (approximately 300 metres above sea level) and the Central Poland's lowland zone significantly contributed to the development of a slope towards northern direction, which reaches the Warszawsko-Berlińska Ice-marginal Valley (below 100 metres above sea level). This configuration of the land facilitated development of the river network system, and the Łódzka Upland, including its crown, i.e. the Łódzki Hummock, determined the course of the first order watershed between the catchments of the Vistula and the Oder. The hydrographic network of the Łódź Province is characterised by a large number of small rivers and streams, some of which become dry at certain periods. The relatively smallest ones are found near the edge of the Łódzki Hummock. The unit run-off is generally low, and on average, it approximately reaches 4,8 l/sek/km² in the catchment of the Pilica and the Bzura. The total run-off from the territory of the Łódź Province approximately reaches 80 l/sek/km², where 50% results from underground recharge.

Discharges in the river are characterised by strong variability. Deficit of water for the municipal and economic purposes, agricultural ones in particular, is observed in the Province. This deficit is intensified by poor forest-related retention and liquidation of natural retention reservoirs (wetlands, peatbogs and small ponds). In order to compensate this deficit and improve water supply, 2 large dammed reservoirs (Jeziorsko and Sulejów) have been constructed. They contribute to reducing flood risk. The rivers in the Łódź Province are rather short and they are characterised by small discharge which causes their vulnerability to risks resulting from untreated and partly treated sewage discharged into their water. Nearly all these rivers (large, medium and small) contain strongly polluted water (which usually remains unclassified). Water discharge from the Pilica river-basin to the Warta (Oder) river-basin is a characteristic feature of Lodz Province. It is due to collecting potable water for Łódź from the Pilica and Sulejow Reservoir, and from sewage discharge to the Ner. It indicates a need to organise water management under over-regional system.

The first order watershed crosses Łódź territory latitudinally providing specific hydrological conditions, which result from the natural topography. Streams and small rivers have their sources in the city territory, and then, they flow in a star-shaped configuration outside the city. Due to progressing anthropopressure, they are significantly more vulnerable to negative impacts than the

rivers flowing through open arable land or forests. Łódź water resources are strongly exposed to environmental impacts. Disappearance of biological movements, lowering of the ground water table caused by fast stormwater run-off from the city (the lack of retention), and long-term pollution of water with sewage and waste, are most harmful. Disappearance of natural discharge in Łódź rivers determined directions and options of both their economic use and protection against pollution. The plan of urban water management prescribes the use of surface water in the city for:

- receiving stormwater,
- bathing sites and water sport centres,
- decoration-related purposes, development,
- melioration and fish farming to a minimum extent.

Conservation and sound management of water resources based on results of integrated, innovative science should be the city's priority measure.

b. Green areas and naturally valuable areas

According to its assumptions, the urban natural system covers these areas that on the one hand should ensure sustainable desirable high quality of the natural environment (i.e. guarantee good quality of surface water, stormwater retention, exchange and improvement of air quality, space for recreation and leisure in contact with nature), and practically enable conservation of urban natural assets, including high quality of landscape, on the other. It requires that connectivity (i.e. the spatial contact provided by ecological corridors) with bioactive areas located outside of the city, based on the river valleys in particular (the Ner, Sokołówka, Bzura and Miazga) should be maintained. Thus the system combines the idea of preserving nature's utility values and its biodiversity, which guarantees sustainable and efficient functioning of ecosystems. Key components of Łódź's natural system include:

River valley areas, their bottoms in particular – areas threatened with flood occurrence, inundations and flooding caused by snow-melt and stormwater, which result in formation of local isolated still water pools, municipal forests, including undeveloped open areas in the non-urbanised zone, urban green areas (such as parks and green squares accessible to all residents) owned or managed by various organisational entities of the City, areas adjacent to urban green areas and municipal forests in the non-urbanised zone.

Primarily these areas need to be protected against chaotic development arranged by property owners based on individual decisions concerning conditions of development, and implemented without local spatial development plans and systemic solutions related to environmental protection. Restoration of damaged ecological systems and elements of animated nature is difficult, costly and long-lasting, and in many cases, it is practically impossible for achievement during lifetime of one generation. Rehabilitation of the Sokołówka River, which has taken many years and involved expenditure of millions of zlotys, may be an example. Conservation of components of the urban natural system is also important to appropriate development of water balance in the city scale as it concerns the areas that are of key importance to increasing surface and soil retention of water, stormwater management and self-purification capacity of the environment.

Efficient conservation of most valuable natural areas, i.e. river valleys, urban green areas and open areas that co-establish the city's natural system, is facilitated by local spatial development plans. By the time that they will have been developed, these areas may be protected against degradation only by applying restrictions implemented pursuant to the acts establishing site-based nature conservation in Łódź (they constitute separate provisions concerning nature conservation within the meaning of article 61(1) item 5 of the Act of 27 March 2003 on spatial planning and management). In this context it is worth noting the current unfavourable trend in Łódź spatial development, which is characterised by the lack of development in the areas that have been provided with costly infrastructure paid for by the city and have been reserved for many years for development-related purposes, while open and naturally valuable areas are developed in a scale and dynamics larger and faster than the former. At the same time, the naturally valuable areas are subject to devastation and irreversible loss of natural values. This state has been caused by a low (in comparison to plots designated for development) price

of former arable land, which provides a sufficient stimulus to undertake measures in order to change the current way of developing these areas.

22 forms of nature conservation have been adopted for Łódź so far – 2 nature reserves: ‘Polesie Konstantynowskie’ and ‘Łagiewnicki Forest’ (79,65 hectares in total), Łódź Hills Landscape Park (1676 hectares within the city’s borders), 5 nature-landscape protected complexes: ‘Dry Valley in Moskuly’, ‘the Ner Source Areas’, ‘Ruda Willowa’, ‘Indelta of the Ner and Dobrzyńka’ and ‘the Sokołówka Valley’ (957,99 hectares in total), and 4 ecological sites: ‘Meadows in Modrzew’, ‘Indelta of the Bzura and Łagiewniczanka’, ‘Ponds in Nowosolna’, ‘Meadow in Wiączyn’, ‘Ponds in Mileszki’, ‘Wetlands at Pomorska’, ‘Wiskitno Lake’, ‘the Brzoza Wetlands’, ‘Indelta of the Sokołówka and Brzoza’, ‘Valley of lower Wrząca’, ‘Alder Swamp Forests in Żabieniec’, ‘Majerowskie Field’, ‘Alder Swamp Forests on the Ner’ and ‘Majerowskie Marshland’ (113,84 hectares in total). All these sites are characterised by significant, and in some cases, outstanding natural and landscape values. Ecosystems and types of landscape related to wetland and aquatic habitats situated within the river valleys are the main subject of conservation. The share of conservation sites in relation to the total surface of the city reaches just over 9%. Their borders also include 2 complexes of municipal forests – Łagiewnicki forest (the largest municipal forest with the surface of approximately 1200 hectares) and Ruda-Popioły forest. The total forested surface in Łódź reaches approximately 3100 hectares, where the share of forests owned by the Municipality constitutes 56,3%, by the State Treasury – 7,9%, and by private owners – 35,8%. They are all covered by conservation measures.

The core urban greenery includes parks (37 complexes, including 12 registered as nature monuments) and green squares (50), which occupy the total surface of 597 hectares, Botanical Garden (64,5 hectares), the City Zoo (17 hectares) and 4 leisure and recreation facilities owned by the City Centre of Sport and Recreation in Łódź: ‘Arturówek’ (surface of 8,7 hectares, this facility is located on the edge of Łagiewnicki Forest within the Bzura River’s source area), ‘Jana Ponds’ (surface of 18 hectares, this complex is located within a former manor park), ‘Stefańskiego Ponds’ (a park which houses a pond of the surface of 11,4 hectares established on the Ner; currently it is used as a bathing site – the largest within Łódź administrative borders), ‘Młynek’ (surface of 12,6 hectares, this complex was established in the Olechówka valley in the park surroundings; the currently operating reservoir opens in summer season and is used for water sports).

C. STRATEGIC PLANNING

Łódź seen from strategic planners’ perspective

The City of Łódź is the third largest Polish city and holds the population of 742 400 residents. Within the past 25 years, the city population declined by over 105 000 people. Since 1980s, a negative birth-rate was recorded in Łódź. For the past few years, a deficit of migration has also been observed, which indicates that the declining number of residents is primarily due to the natural deficit. Unemployment rate ranges at the level of 10 %.

The city has a particularly favourable transport-related location in the centre of Poland, on the newly developed crossing of A1 and A2 motorways, which in combination with S8 and S14 fast highways, will create by-pass roads for Łódź. Łódź airport is developed consistently, and the transport network expands systematically.

Łódź holds three functional railway stations (Łódź-Widzew, Łódź-Kaliska and Łódź-Fabryczna) offering a good connection with Warsaw (modernised infrastructure), and connections with the northern and southern parts of the country, which are of lower quality as they are based on outdated rail infrastructure. The city does not offer international connections (railway station in Kutno is the nearest centre that provides international transport service in the region). Łódź is not connected to the Central Railway Main Line. The city is getting ready for reconstruction of Łódź-Fabryczna station, which will enable construction of cross-town railway line running through a tunnel through the city centre. This will allow to lead fast train Warsaw – Łódź – Poznań/Wrocław through the city. Reconstruction of the station is an element of the largest revitalisation project entitled the „New Centre of Łódź”.

Both transport-related attractiveness of the city, availability of qualified staff and office space, which is much cheaper than in Warsaw, attract new investors, which facilitates creation of new jobs. Łódź holds a major economic, administrative and cultural potential, which causes that the city is perceived as one of the best locations to develop business projects. A KPMG report concerning the top locations for BPO centres, which was drafted in 2009, indicated Łódź as a leader in Poland.

Thanks to major urban investments (such as a compost plant, waste sorting plant and wastewater treatment plant) the condition of the natural environment in the city has improved. As a result of implementation of the largest Polish programme of modernisation of the water supply and sewage network, almost all residents in Łódź have access to water supply and sewage system. Łódź residents drink water from deep water intakes, which is not common in most Polish cities.

City financial resources are at a good and stable level. International long-term rating in foreign currency remains at the BBB+ level with a stable perspective (Fitch Ratings and Standard & Poor's). Łódź which used to be the Polish capital of declining textile industry now becomes a centre of business and arts. Such companies as the BSH, Gillete, Foxcon (Dell) and Infosys (Philips) invested in the city. Łódź is a multi-cultural centre of a unique and even post-industrial American-style spatial structure, which is used as a factor for development of tourist functions. The city holds many green areas, forest complexes and inner city greenery. It also has a well-developed educational base, which offers numerous educational facilities and profiles at every level of education, both in public and private schools. Currently 6 public and 21 private university schools operate in Łódź. They train 130 000 students.

Łódź has a diverse cultural offer, which predestined it to apply for the title of the European City of Culture 2016. Numerous cultural institutions, arts galleries, cinemas, theatres and museums operate in Łódź. Cultural events organised in the city are addressed to various audiences, often to niche ones, however there are few visible marketing activities to promote them. Before Atlas Arena started its operations, Łódź held few mass events. Weakness of Łódź culture results from competitive short distance to Warsaw and the lack of stable support from relevant authorities.

D. PUBLIC PARTICIPATION

Public participation in decision-making

a. The SWITCH Łódź Learning Alliance has operated in the city since 2006. It is a horizontal platform of cooperation of stakeholders interested in the water supply and sewage sector, whose capacity should be used to continue development of participatory culture in the process of urban management, and to continue profiling Łódź as a city socially and environmentally responsible. This should be achieved by focusing its development strategy on long-term planning in the field of health and sustainable development AND by benefitting from the capacity generated as the heritage of SWITCH project co-implemented with the City of Łódź and Healthy Cities programme implemented by the City of Łódź in cooperation with the World Health Organisation. Awareness of the significance of the direction adopted for this development, i.e. adopting this direction by the city authorities, is of crucial importance to continuation of this process. It should be adopted in the long-term perspective, and combined with such measures as JESSICA programme, which is currently developed.

b. Cooperation of the Łódź City Office (Municipality) with NGOs
2011 was crucial to shaping the model of the City's cooperation with NGOs. NGOs initiated a dialogue with the Mayor of the City of Łódź and the City Office's Department for Social Issues. The dialogue concerned social consultations and general process of community participation in the decision making in Łódź. Two meetings of a working group composed of the Director of the Department for Social Issues and the Department's representatives and representatives of Łódź NGOs, were held in January 2011. The objective of these meetings included elaboration of a social consultation model that would address weaknesses of the currently binding consultation system.

The diagnosis indicated the following issues:

I. Management and competence:

- The lack of coordination of social consultations by a competent body
- Officials lack knowledge and qualifications in the field of social consultations
- The lack of sharing social consultation-related responsibilities among the staff of the City Office.

II. Rules of procedure for the Social Consultations:

- The lack of special social consultation-focused website
- Consultation-related information is very general
- The language of relevant communication is not adapted to the audience
- Consultation-related information is communicated too late
- The lack of reliable consultation-related reporting
- The lack of independent moderators and experts during social consultations
- Consultation process lacks transparency

2 SWOT ANALYSIS

A. WATER AND SEWAGE INFRASTRUCTURE

Water infrastructure in the City of Łódź – decline in water consumption

Strengths	Weaknesses
<ul style="list-style-type: none"> - Intake of a smaller quantity of ground and surface water than it has been permitted in the provisions of permits required by the Water Law Act; - Lower environmental charges for water collection and wastewater drainage; - Lower charges for energy consumption, - Insignificant environmental impact – less sewage for drainage and less sludge deposits, - - Smaller water consumption – maintenance of production and distribution equipment is easier. 	<ul style="list-style-type: none"> - Lower revenue level of the ZWiK, which forces the company to raise the price of water collection and wastewater drainage payable by the Łódź consumers on annual basis; - Higher unit operating costs of the water supply network; - Due to a slower flow of water and long duration of its stay in the water mains, there is no on-line measurement option available in the water mains of the water supply network; - There are no relevant provisions in the local legislation that would enable to centralise the management system of the water supply for the City of Łódź.
Opportunities	Threats
<ul style="list-style-type: none"> - The reserve of water available for sale allows to search for new buyers outside of the City of Łódź, and the ZWiK may implement new investments to develop the water supply network; 	<ul style="list-style-type: none"> - Deteriorated quality of water in the water supply network due to the slower flow of water and long duration of its stay in the pipeline.

Sewage-related infrastructure and rivers in the City of Łódź

Strengths	Weaknesses
<ul style="list-style-type: none"> - Implementation of EU co-financed programmes related to water supply and sewage management; - Reducing the number of illegal sewage disposal into the rivers; - Improved water quality in the Ner and its tributaries; - Location on the watershed of the Wisła and the Odra; - The network of rivers functioning in the stormwater drainage system and combined sewage system; - Gravitational system of sewage drainage to wastewater treatment plant; - Increased interest of institutions in the issues of water supply and sewage management in the city; - Cooperation of scientific/research institutions with companies dealing with 	<ul style="list-style-type: none"> - Many institutions dealing with the sewage system and rivers in the city; - The lack of legal solutions to delegate to a single institution operation, maintenance and repairs of natural streams, canals and ditches included in the stormwater drainage system in long-term, however limited, time-scale; - The lack of a single and transparent procedure related to sewage network management, collectors and wastewater treatment plant; - Insufficient funds for maintenance and use of the rivers, and flood protection investments for the City; - Uncompleted investments for the City; - No institution is responsible for monitoring of sewage system in the context of the city's urban development, and drainage of new

<p>water supply and sewage management in the city;</p> <ul style="list-style-type: none"> - Use of EU funding by the scientific/research institutions for conducting studies of the sewage network; - Master Plan of the water supply and sewage management for the City of Łódź; - Environmental Protection Programme for the City of Łódź; 	<p>urban areas;</p> <ul style="list-style-type: none"> - Low level of awareness of institutions, investors and residents of the need of stormwater retention at its source; - The lack of incentives/incentive system for investors and residents to encourage them to take actions to manage stormwater; - The lack of inventory of retaining stormwater; - The lack of updated versions of General Projects for stormwater and sanitary sewage drainage systems, and for rivers.
Opportunities	Threats
<ul style="list-style-type: none"> - organise water supply and sewage management in the City; - organise municipal sewage management in the areas that so far have not been connected to the network; - limit negative impact of sewage on ground water; - deliver appropriate management of stormwater and snow-melt; - adapt quality of stormwater and snow-melt to the binding law by pre-treating it; - improve water quality in surface streams; - construct retention reservoirs on the rivers for the purpose of flood protection and improvement of water conditions in the ground; - introduce retention to the combined sewage network in order to limit sewage discharge through stormwater outflows; - modernise sewage network and rivers; - improve city's protection against floods and inundations; - adapt river valleys for recreational purposes (parks, footpaths, cycle lanes, water sports, etc.); - improve quality of life of residents; 	<ul style="list-style-type: none"> - the lack of coordinated and consistent goals in making decisions by many institutions of importance to sewage system operation; - deterioration of condition of the technical infrastructure of the system; - flood risk and increased probability of occurrence of local inundations; - negative impacts of sewage on ground water; - deterioration of water quality in surface streams; - frequent impact of stormwater overflows on the combined sewage system; - deterioration of water conditions in the ground; - overgrowing and silt development in the river-beds and significant limitation to flow of stormwater and snow-melt in collectors; - limited receiving capacity of the rivers will lead to slower discharge in stormwater drainage and combined sewage systems, and consequently to occurrence of inundations and flood risk in the city; - increased costs of management of sewage drainage network and of rivers; - uncontrolled increase in the surface run-off coefficient; - transport-related issues in the city; - dissatisfaction of residents; - higher costs of management of sewage system;

B. MANAGEMENT OF WATER AND NATURAL RESOURCES

Water resources in Łódź in the context of the sustainable management

Strengths	Weaknesses
<ul style="list-style-type: none"> - In the non-urbanised part, fragments of unmodified or just slightly modified riverbeds and valleys have remained, (territory of Łagiewnicki Forest and the Bzura and Wrząca catchment); unbuilt sites in the river valleys have also remained and ultimately they will house small retention facilities – Wasiak Pond (location of former fish ponds), wet meadows at Liściasta Street (Żabieniec Reservoir); - An opportunity of introducing provisions concerning such aspects as retention and other measures in the catchment to new local plans; - Developing general projects for rivers and stormwater drainage – relevant documents need to be updated; - Developing small retention programme for the City of Łódź. - Implementation of the Sokołówka river rehabilitation project; - Introduction of regulations concerning maintenance of order and cleanliness in the municipality, and duties of residents implied by these regulations; - Limiting water consumption by implementation of water-saving technologies. 	<ul style="list-style-type: none"> - Rivers of the urbanised zone have been modified into covered canals or concrete open stormwater sewers; - Source areas of the streams have moved or disappeared due to periodical lowering of the ground water table; - Mill reservoirs and fish ponds have been degraded, filled with sand and overgrown; - River valleys have been irreversibly modified (roads and housing development) – covered channels of the Łódka, Jasien and Karolewka; - Dispersed competence in the field of river maintenance (state administration task delivered by regional government, additional duties imposed on the Municipality pursuant to decisions). - The lack of study of spatial development, local plans of spatial development or there are no water-related regulations; - The lack of efficient enforcement of recommendations laid down in the regulations (City Wardens); - Water-saving habits of residents.

Natural system in Łódź in the context of the sustainable water resources management

Strengths	Weaknesses
<ul style="list-style-type: none"> - The non-urbanised (peripheral) zone holds the areas characterised by natural and semi-natural biocenosis of high biodiversity, low or moderate degree of anthropogenic transformations, great landscape values related to forests, river valleys, which house aquatic, wetland, meadow and river water-heads habitats; - Establishing within Łódź territory 22 conservation sites: Łódź Hills Landscape Park, 5 nature-landscape protection complexes, 14 ecological sites and 2 nature reserves excluded from urbanisation-related plans or limiting them to nature conservation requirements; - Covering of insignificantly modified anthropogenic fragments of the Sokołówka valley (including its tributaries: Brzoza and 	<ul style="list-style-type: none"> - Urbanisation and anthropopressure on naturally valuable areas, which results in direct or indirect devastation of natural habitats, modification of natural topography, modification of water conditions, the way of using land, liquidation of natural habitats, aquatic and wetland in particular, introduction of housing development in the river valleys and development of road network; - The lack of local spatial development plans which constitute the most efficient tool to prevent excessive or inappropriately addressed urbanisation of the most valuable nature sites – river valleys, river water heads areas, municipal forest complexes, adjacent areas of human-created greenery – and degradation of their values;

<p>Wrząca) and the Ner valley (including the Dobrzyńska, its tributary) with forms of nature conservation.</p> <ul style="list-style-type: none"> - Developing a complex nature valuation for Łódź and indicating the naturally valuable sites, including 8 sites of protected landscape proposed to be covered by legal conservation measures. - Developing the concept of the Blue-Green Network, which is complementary to the network of naturally valuable sites; - Developed network of well managed urban green areas located within the city territory (in the inner city zone which constitutes the core of biologically active areas), also in the areas located in the river source areas and within the river valleys (this mainly concerns these rivers that have been significantly modified due to anthropopressure and are located in the urbanised zone: the Jasien, Łódka and Olechówka); - Availability of scientific and research centres which hold the latest know-how concerning status of naturally valuable areas, and which research anthropogenic impacts on functioning of natural systems and modern biotechnologies; - Introduction of nature and environment conservation issues into formal school curricula, activity of relevant school clubs. 	<ul style="list-style-type: none"> - The lack of flood protection studies elaborated by directors of the Regional Boards of Water Management in Poznań (the Warta catchment) and in Warsaw (the Central Wisła catchment) that would indicate the areas that are directly or potentially threatened with flood – an administrative tool which protects valleys against development in the situation where no local plans have been developed; - Low resistance of aquatic and wetland habitats to anthropopressure; - Significant modification of natural elements in the city's urbanised zone. - Fragmentation and separation of natural habitats, including forest and valley habitats, which are important in terms of developing a coherent urban natural system and regional network of protected areas; - Insufficient surface of green areas in the urbanised zone and in new residential estates; - Insufficient spatial connectivity in the form of green corridors, between managed greenery areas, municipal forests and natural greenery areas; - Few generally available materials promoting such sites.
Opportunities	Threats
<ul style="list-style-type: none"> - Maintaining natural topography and capacity of natural habitats and biocenoses, which facilitate implementation of rehabilitation projects in the river valleys; - Opportunity of shaping positive image of the city based on its natural values; - Technical progress and experience of research centres specialising in nature conservation and implementation of modern eco-technologies; - Improving qualifications and experience in management of protected areas. - Environmental policy of the European Union and Poland which financially support environmental protection projects; - Financial assistance of the Regional Fund for Environmental Protection for tasks related to active nature conservation measures and dissemination of nature and environmental conservation issues; - Harmonisation of the network of the existing and planned site-based nature conservation forms with the spatial 	<ul style="list-style-type: none"> - Lack of statutory guarantee of cohesion between provisions of the decisions concerning conditions of development and provisions formulated in studies of conditions and directions of spatial management developed for the municipality; - Lack of sufficient statutory guarantee of protection of the river valleys in the nature conservation law; - Shortages in environment-protecting infrastructure (sewage system) in the areas newly designated for development; - Insufficient environmental awareness of Łódź residents and the lack of knowledge of the rules of law related to the environmental protection; - Insufficient pool of funding for active nature conservation, purchase of real estate, maintenance of the existing green areas and development of the new; - Complicated procedures to apply for EU assistance funds; - High cost of implementation of

development plan for Łódź Province.	<p>environmental protection tasks;</p> <ul style="list-style-type: none"> - Progressing urbanisation of the areas of neighbouring municipalities in the borderline zones, which affects functioning of the river valleys as corridors of movement water and air masses and animals; - Designating protected landscape sites pursuant to a resolution passed by the regional parliament – municipality does not issue its opinion of designation of the PLS; it issues its opinion concerning its potential liquidation; - Lack of financial support for farmers who hold land in the city territory and manage it in the way favourable for biodiversity protection, maintenance of meadows, pastures, buffer zones along the streams (equivalent of agricultural-environmental programmes); - Lack of efficient legal tool to protect arable land.
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C. STRATEGIC PLANNING

Łódź seen from strategic planners' perspective

Strengths	Weaknesses
<ul style="list-style-type: none"> - Central location in Poland and in Europe – excellent location in the categories of logistics and transport - Strong academic centre of major scientific and research potential - Access to highly qualified human resources - Capital city of the province, which holds key regional institutions and metropolitan functions - Industrial traditions - Multi-cultural nature of the city - Multi-functional hall – Atlas Arena - Diverse economic structure resistant to economic crises - Well-developed specialised economic sectors – clusters (household appliances, logistics, BPO and ITC), - City's competitive investment offer – to attract major investors - Łódź Special Economic Zone - High ratings of the city (BBB+/stable) - Many attractive green areas – green city (potential of the parks, bioactive sites – 2 reserves within the city borders) - Modern municipal infrastructure – (WTP, sorting plant and compost plant) - Modern water supply and sewage network 	<ul style="list-style-type: none"> - Decline in the number of city population - Low income level in comparison to other urban centres in Poland - Lack of city by-pass road and key elements of the Central Transport Node (motorways, express highways, Fast Railway and central airport) - Lack of installations for thermal treatment of communal waste (waste combustion) - Few local spatial development plans - Lack of city stadium to accommodate large audience - Many degraded areas or areas requiring regeneration - Lack of head-offices or management centres of international institutions and companies - Few R&D centres - Inefficient and poorly functioning city transport system - Lack of systemic solutions for car parks integrated with public transport – park and ride – problem of congestion on the city access and exit roads during rush hours - Lack of integrated transport system of metropolitan range - Lack of good railway connections due to

<ul style="list-style-type: none"> - High quality potable water obtained from deep water wells - International experience and innovative know-how in the field of river restoration and rehabilitation of river valleys and ecological corridors - Relatively low prices of properties in comparison to other large Polish cities - Well used EU funds 	<p>the final railway station (it is not the so-called “through” station) in the city centre (Łódź – Fabryczna)</p> <ul style="list-style-type: none"> - Lack of wide access to broadband Internet in the city and in the metropolitan area - Infrastructural barriers which reduce internal accessibility of the city - Architectonic barriers to disabled people - Weak position of business environment institutions - Lack of sufficient maintenance of cleanliness in the city - Unregulated legal status of municipal plots - Insufficient number of accommodation, the lack of hotels of high standard
Opportunities	Threats
<ul style="list-style-type: none"> - Poland’s membership in the EU - Opportunities of benefitting from EU funds and other external funds - Favourable transport-related location: on the currently constructed crossing of A1 and A2 motorways, KDP line, availability of an international airport in Łódź and Central Airport for Poland between Łódź and Warsaw, whose construction is planned - Extension of the Reymont airport in Łódź - International centre of culture and avangarde arts - Strong centre of film industry with long-term and rich tradition - Possibility to implement investments under new formulas of cooperation (PPP, licensing and new investment models) - Fast rail connection planned, the so-called „Y” Line Warsaw – Łódź – Wrocław/Poznań, including a tunnel under the city centre, which will be integrated with the metropolitan train connection - Development of knowledge-based economy – achieved due to benefiting from Łódź academic potential - Development of university education sector - Activities implemented in relation to award of the European City of Culture 2016 title - Development of the international centre of fashion - Development of the city as a strong centre of culture (e.g. the New Centre of Łódź project) - Possibility of using own resources of geothermal energy - Attractive green areas – opportunity to develop eco-efficient forms of recreation and tourism, promotion of „green lifestyle” - Complex projects to activate post-industrial areas – creative revitalisation based on 	<ul style="list-style-type: none"> - Negative birth-rate and negative migration balance - Population ageing - Emigration of residents to adjacent municipalities - Migration of specialised staff to other domestic and foreign metropolitan centres - Competitiveness of other cities in the field of attracting investors - Lack of improvement of the condition of road and rail infrastructure around Łódź - Roads overloaded by transit traffic as the city does not have by-pass roads - Proposed charges for using motorways within the city territory – risk of payment for the use of the city by-pass roads - Efficient mechanisms of active social participation and consultation have not been established - Insufficient funds to improve technical condition of city properties - Lack of effective idea to animate Piotrkowska Street - Lack of systemic approach to stormwater management - Degradation of naturally valuable sites - Łódź Special Economic Zone – specific and privileged conditions to run business activities will have been available to enterprises until 2020 – the lack of forecasts concerning scenarios for these areas and enterprises after 2020 - City spreading phenomenon - Unstable authorities

<p>innovative ideas</p> <ul style="list-style-type: none"> - Full use of services of business support organisations – the Regional Park of Science and Technology, incubators and enterprise accelerators - Implementation of the System of Environment-Friendly Public Procurement - Rationalisation of energy consumption costs in the city, renewable energy sources – innovative approach to metropolitan and municipal energy generation - Tidying the urban spatial structure in the context of the declining population size 	
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D. PUBLIC PARTICIPATION

public participation in decision-making

Strengths	Weaknesses
<ul style="list-style-type: none"> - Diverse opportunities of delivering social consultations (written form, meetings with stakeholders for which minutes are drafted, discussion forum aided by Łódź City Office web-site, project workshops, emails, on-line surveys, etc.) – <i>Resolution No LXXXIII/1454/10 of the City Council in Łódź of 31 March 2010 concerning implementation of the Rules of Procedure for Social Consultations</i> (there is a local law - Rules of Procedure for Social Consultations (NGO2) - Direct and indirect access to public information available through web-sites of the Łódź City Office and City Planning Office (the City Planning Office web-site is redeveloped with the use of the state-of-the-art tools – easy access to information, downloading of new information); - Residents' involvement in the public life matters; - Implementation of new investments raising controversies and determining community activation –community groups are established; - Organisation of urban planning and architectonic competitions, discussions and public debates related to the competition results; - Operations of several NGOs – some of them become recognised even by larger community circles; - Availability of a range of tools possible for use (theoretically), openness of NGO's, 	<ul style="list-style-type: none"> - There are no generally available local press publications that directly concern community life - Lack of dissemination of information concerning events in which residents may take part (City Planning Office); - Most residents are not interested in the condition of public space, even in a close vicinity to their homes; - Other priorities of the city authorities, provided that there are any clear priorities to note at all; - Too few people are interested in resolving specific issues, related to the environment's condition in particular, to support NGOs; - Low level of involvement of Łódź academic community with regard to the issues of urban natural environment; - Poor legislation and poor level of compliance (the issue of tree trimming); - Lack of cooperation among various NGO's – most of them deliver their own objectives; - Lack of residents' trust to the city authorities; - Lack of implementation of the Rules of Procedure for Social Consultations (no relevant web-site, the lack of compliance with the principles concerning delivery of such consultations, avoiding to apply the rules of procedure – avoiding to contribute bigger efforts as required by the rules of procedure; - Lack of consultation management and relevant internal official procedures (each department delivers the consultations in its

<p>bottom-up indicatives (such as consultations concerning application for the title of Łódź the European City of Culture 2016, which is a programming document of importance to the city development) a relatively easy way to submit resolutions in cooperation with councillors of the City Council.</p>	<p>own way);</p> <ul style="list-style-type: none"> - Lack of a team in charge of consultations which would be specifically responsible for the consultation management; - Lack of a concept, methodology, cooperation of the city with experts specialised in consultations, the lack of social consultation/conflict resolution-related training for officials, the lack of cooperation with other Polish cities with well-developed consultation-related activities (Warsaw, Kraków); - Lack of diagnosis of conflict-raising areas and alleviating their effects through a dialogue; - Residents are unaware that they may and should influence the image of their immediate environment; - Superficial nature of consultations (general information – residents do not know how to influence the image of the subject consulted – examples of consultations concerning incineration plant, changing competence of the councils of the residential districts, the lack of reports (residents do not receive feedback whether and why the city has/has not considered their opinions); - Residents do not „get invited” to take part in the consultations (in fact they do not have relevant knowledge, consultations are not promoted, there are no leaflets/brochures/publications, the City Office usually promotes them through the media it has to use (such as its web-site, no special efforts are made in this respect); - Officials lack relevant experience. Staff do not hold appropriate professional skills; - “Bad experience” – delivery of information and consultation-focused activities against good practice principles acquired in the past –this observation is particularly relevant in the context of cooperation of the City Office with its ancillary entities – councils of the residential districts; - Insufficient number of the so-called community human resources (voluntary workers operating outside of a structured programme); - Consultations concerning key projects of the Marshal’s Office (such as regional operational programme); - High threshold for resolution-related initiative;
Opportunities	Threats
<ul style="list-style-type: none"> - Elaboration of new planning documents, 	<ul style="list-style-type: none"> - Progressing migration outflow;

<p>including a study of conditions and directions of Municipality's spatial management and local spatial development plans;</p> <ul style="list-style-type: none"> - Organisation of urban planning and architectonic competitions and public debates related to the results of these competitions; - Activities leading to the construction of the „New Centre of Łódź”; - Presentation of experience held by better developed countries where public space and its environment are valued more; - Experience sharing with foreign partners and appreciating this experience by Polish decision makers; - Emphasising and disseminating information on development-related needs, organisation of relevant public debates, study visits and training for officials; - Community activity, cooperation with public administration and monitoring of the city authorities; - Establishing a team of officials who will only focus on the dialogue with Łódź community, large urban areas designated for regeneration (it is time that the skill of communicating with residents should be acquired); - Legal conditions – amended act on the public benefit forces local administration to implement specific participation building tools; - Adoption of the act on elaboration of spatial development plans for the city centres – a legal procedure which regulates delivery of social consultations; - Independent projects implemented by NGOs support social participation; - Numerous large investment projects approved for EU financing – their development may be enhanced by social consultations; - Amended statutes of the councils of the residential districts which broaden their competence in terms of consultations concerning the city budget; - Benefitting from experience of programmes and projects implemented in other Polish cities; - Broad access to information being developed. 	<ul style="list-style-type: none"> - Keeping up participation-related appearances –e.g. by organisation by the city authorities of meetings which are rather unproductive as social partners are entrusted with the tasks they are unable to perform (e.g. preparing expertise that should be subcontracted to experts); - NGOs start „losing their impetus” – they lack funds, human resources, and ideas on how to obtain funds. They do not know how to „professionalise” their operations; - he lack of funds in the city budget; - City authorities ignore the problem; - Passive attitude of residents (they do not believe that they are able to change anything); - The City Office does not feel responsible for relations with residents; - The lack of strong/reliable candidates to the office of the Mayor of the City; - Lack of trust towards city authorities' approach to the process of social participation building, - Lack of trust towards ranking of the expenditure related to social participation in the new city budget (in the previous budget the subsidy for the councils of the residential districts was reduced); - Tendency to make decisions as fast as possible (e.g. in the field of local plans of spatial development) - simplifying / excluding the real social dialogue – in particular in the areas covered by EU funding for the so-called “key projects”, such as the areas in the vicinity of Łódź Fabryczna Station; - Unfavourable amendments of national legislation –in particular the regulations concerning spatial planning to disavow the role of social and local community consultations in order to deregulate planning procedures; - Rejecting comments to the study of spatial management resulting from the Blue-Green Network concept, which facilitates sustainable urban development (the sustainable development concept has been misunderstood or the city architects and planners are unwilling to develop this concept).
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3 KEY STRATEGIC OPTIONS FOR ACTION AND IMPLEMENTATION MECHANISMS

A. WATER AND SEWAGE INFRASTRUCTURE

a. Key strategic options for water infrastructure

The following measures should be implemented in order to prevent negative consequences caused by the declined water consumption:

- Provide the ZWiK Sp. z o.o. with equipment for water intake, purification and distribution – centralise the management system,
- Continue the work of cementing the Łódź water supply network to prevent deterioration of water quality – eliminate negative effects of corrosion, with a relatively lower output volume,
- Continue the work to reduce diameters of the pipeline operating within the water supply network, which will accelerate flow of water to its recipients, with a relatively lower output volume, and shorten the duration of its flow to them,
- Replace the water supply pipeline that has been used for several decades with a new pipeline made of PEHD (high density Polyethylene) and ductile iron,
- Implement monitoring of the transit pipeline and water mains to measure water discharge, water pressure, key parameters of water quality: chlorine, Chlorine Dioxide, turbidity and colour, including remote data transmission to the load-dispatching centre,
- Implement monitoring of intakes and local unmanned pumping stations operating in the north-eastern part of Łódź in terms of: limiting electricity supply, efficiency, pressure and quality of water pumped (chlorine, turbidity and colour),
- Consciously limit production by selecting wells of the top parameters of water quality,
- Introduce frequency inverters in the pumping stations of local water supply systems instead of hydrophor-powered network pressure boosting network supply, which will reduce the number of failures and ensure maintenance of stable water pressure at the recipients,
- Search for new recipients in Łódź and in Łódz Province,
- Establish the system of co-financing of new utility connections and transfer them to the ZWiK, where the Łódź City Boards decides upon centralisation of the management system of water supply for the City of Łódź,
- Develop water supply network in these parts of Łódź where family housing develops fastest, for instance in the district of Nowosolna.

b. Key strategic options – sewage infrastructure and rivers

Due to an obligation of improving river quality by 2015 in order to achieve the so-called good ecological and chemical status of water, which has been imposed by virtue of the Water Framework Directive, and flood protection for urban areas, it is necessary to implement such measures that will limit discharge in streams, improve quality of flowing water, restore ground water resources and provide conditions for active leisure activities for the city population. The following factors should be taken into account in the process of making relevant investment decisions:

- Increased discharge in river-beds related to the extent of the city urbanisation;
- Poor condition of technical infrastructure of river-beds and reservoirs;
- Excessive discharge in relation to the capacity available in river-beds and certain stretches;
- Pollution of flowing water;

- Technical condition of stormwater outflows;
- Rivers' capacity of self-purification;

The so-called General Projects developed at the request of the Łódź City Office provide the basis to decide upon investments and develop them. The latest General Projects for rivers were developed between 2001 and 2003. In order to identify needs in the field of river modernisation and construction of retention reservoirs precisely, a subsequent review of the rivers in terms of reinforcements of the river-beds and capacity of water and transport facilities should be carried out. Characteristics of discharge in the specific rivers in combination with stormwater and combined sewage systems should be identified.

Such a complex approach will ensure appropriate identification of the capacity of the river-beds, the scope of their reconstruction, capacity of retention reservoirs in the combined sewage system and retention reservoirs on the natural streams, and enable to verify granting of new technical conditions for connecting to stormwater drainage system. A hydraulic model of the stormwater and combined sewage systems and rivers should be developed in order to prioritise investment needs and risks to sewage system and rivers.

Monitoring of water quality in the river-beds will allow locating flowing water oxidising structures which will allow to enhance such parameters as its quality. Construction of retention reservoirs will allow to reduce discharge. It will also contribute to improved quality of river water. New biosystems will develop and conditions for active ways of spending free time by residents will be created.

c. Implementation of strategic options – water and sewage infrastructure and rivers in Łódź

The key areas of the relevant measures should include:

- Amendments to the local laws to appoint a single body that will be responsible for all aspects of the water supply and sewage management in the city, and that will be competent and responsible for implementation of the delegated tasks concerning water supply and sewage management. These tasks should be implemented based on procedures which will facilitate coordination of individual tasks implemented by various institutions operating in the area of water supply and sewage management. A platform to exchange information on investment-related plans related to the scope of competence held by these institutions should be established.
Actions and incentives in the field of retention and re-use of stormwater at its source, which will be addressed to institutions, investors, designers and residents, should be considered as an important element.
- Construction of a dynamic hydraulic model of the sewage network and rivers in order to develop a tool that will enable to make appropriate investment decisions and simulation of risks and fast response of the network's manager in order to remove causes. Such a dynamic simulation of the network model will allow to minimize investment costs and establish hierarchy of investment needs.
- Adapting the water supply and sewage management to regulations of the binding national and EU laws achieved by implementation of the measures described in such documents developed at the request of the Łódź City Office as the Master Plan for Water Supply and Sewage Management and the Programme for Environmental Protection for the City of Łódź. These documents should be verified based on the updated General Projects, including simulation of the dynamic model of the network.

B. MANAGEMENT OF WATER AND NATURAL RESOURCES

a. Water management – Key strategic options

- Introduce the integrated system of water resources management in the city,
- **Improve the condition of infrastructure to ensure that it meets ecohydrological functions and needs of residents and guarantees good ecological status of water,**

- Recreate small retention in the city and deliver conservation measure for green areas in the river valleys,
- Apply new environment-friendly technologies to improve water resources
- Develop environment-friendly attitudes and disseminate the relevant know-how.

b. Water management – Implementation of strategic options

1. Implementation mechanisms

Competent authorities responsible for water management include:

- The minister in charge of water management;
- The President of the National Board for Water Management – as the central body of government administration, supervised by the minister in charge of water management;
- The director of the regional board for water management as a body of the non-consolidated administration, who reports to the President of the National Board for Water Management;
- The Governor; authorities of the territorial government entities.

The President of the NBWM and directors of the RBWM control water management with respect to:

- The status of implementation of water management plans and programmes agreed pursuant to the Act;
- Water consumption;
- Compliance with conditions prescribed in the decisions granted pursuant to the Act;
- Maintenance of water and water equipment;
- Compliance with obligations and restrictions imposed on land owners;
- Compliance with conditions binding in the protected zones and sites established pursuant to the Act;
- Compliance with conditions binding in the area of flood embankments and in the areas that are directly threatened with flooding;
- Condition of flood protection system and the process of removing flood effects related to water maintenance and water equipment;
- Construction and maintenance of permanent gauging devices located on the banks and in water;
- Performance of works and activities in the vicinity of the water equipment, which may cause risks to water equipment or damage it;
- Removing water management-related damages which affect operations of mines (article 156 of the Act).

Pursuant to the Act of 18 July 2001 – the Water Law (Dz. U. [*Journal of Laws*] No 115, item 1229 with subsequent amendments), the territory of Poland has been divided into 7 regions managed by the Regional Boards for Water Management with their head-offices in Gdańsk, Gliwice, Krakow, Poznan, Szczecin, Warsaw and Wrocław. They report to the Ministry of Environment and constitute authorities of the non-consolidated government administration. Territorial administration (in municipalities, districts and provinces) is a separate administration.

The main objective of the RBWM is to manage water resources in the territory of the catchments covered by its supervision in order to ensure potable water of adequate quantity and quality for the citizens, protect water against pollution, protect against floods and droughts, ensure water for industry, navigation and water-generated power, and manage rivers and canals on behalf of the State Treasury.

The rights of ownership to public water held by the State Treasury are executed by the competent minister, President of the National Board for Water Management, Director of national park and Marshal of the Province, as a task of the government administration performed by the regional government – with regard to waters of importance to regulation of water conditions for the needs of agriculture that will help to improve soil production capacity and facilitate the relevant production, and with regard to the remaining water resources.

The regional board may appoint its own entities to perform the public administration tasks. In Lodz Province, the Regional Board for Drainage and Water Infrastructure Facilities performs the following tasks on behalf of the Marshal:

- Executes ownership rights to water resources owned by the State Treasury which are of importance to agriculture, and the remaining water resources laid down in article 11(1) item 4 of the Water Law Act;
- Manages water resources (rivers, canals and streams) and the main drainage system equipment (flood embankments, pumping stations, agricultural retention reservoirs, hydro-technical structures and other);
- Performs the function of the investor for investment tasks related to the main drainage and field drainage systems;
- Performs obligations related to maintenance and repairs of the main drainage system equipment, agricultural retention reservoirs, hydro-technical structures, devices protecting against flood and drought that are of importance to regulation of water conditions for the needs of agriculture, and other water resources to which ownership rights are executed by the Marshal of the Province;
- Cooperates in the field of flood and drought protection with:
 - Regional Resilience Forum,
 - Territorial government entities,
- Manages the Regional Depot of Flood Control Equipment;
- Monitors implementation of the measures related to the regional water management programmes which help to deliver regional development strategy.

Municipality – local governments

Article 7.1. of the act concerning the municipality level government mentions the aspect of meeting collective needs of the community (municipality) and specifies municipality's own tasks, which include: meeting the needs related to pipelines and water supply, sewage system, disposal of municipal sewage, maintenance of cleanliness and order, and sanitary equipment, landfills and rendering municipal waste harmless, supply of electricity, thermal energy and gas, as well as safety of citizens, and fire and flood protection.

The relevant scope, planning, financing and implementation constitute obligations of the municipality.

In accordance with the provisions of the Water Law Act, Municipality is obliged to participate in the cost of maintenance of the rivers due to the fact of using them for such purposes as stormwater drainage. Including rivers, canals and ditches in the urban system of stormwater drainage, Municipality has to incur the cost of their use. The network of rivers and streams in the City of Łódź is maintained with state budget funds spent under ownership-related obligations and city budget funds. Where Municipality implements any measures on the rivers, streams or in the catchment for which the permit required by the Water Law Act is needed, the relevant authority shall lay down in a decision the scope of the measure, and where applicable, its cost.

All the measures implemented by Municipality are prescribed under the obligation of implementing the so-called Municipality's own tasks, in accordance with the binding provisions.

The amount of funding for these purposes is determined on annual basis (or for the period of several years under multi-annual investment plans) in the city budget by business departments, and approved

by the City Council. A similar approach is adopted for determining the amount of funds available under the state budget: the Marshal proposes this amount to the Sejm (Parliament) and the President of the Republic of Poland for their approval (budget resolution). At the stage of adopting guidelines to the budget, the amount of funding is agreed, which is then split into specific tasks by the local authorities – the Inspectorate submits a proposal of tasks for implementation in the following year.

Assumptions of the environmental policy of the City were adopted by the City of Łódź by virtue of Resolution No LXVIII/674/97 of the City Council of Łódź of 24 September 1997. In accordance with this Resolution, the Small Retention Project for the City of Łódź and the "Concept of the Programmed and Spatial Natural Regulation (rehabilitation) of the Sokołówka River's Stretch between Zgierska and Szczecińska Streets in Łódź (adopted by virtue of a resolution of the City Council) were developed. These three documents provided the basis to implement measures in the subsequent years.

c. Water resources - implementation plan based on the strategic options (until 2038)

Measures that are to improve the condition of water resources (ground and surface) may be subdivided into two groups:

1. Improve the condition of ground and surface water (quantity and quality)

- Increase small retention
- Construct pre-treating devices on the stormwater drainage system (pre-treatment facilities, separators and sedimentation tanks)
- Divide the combined sewage system into sanitary and stormwater systems. Protect dispositions of ground water assets, limit the use of the areas covered by conservation measures and improve water capacity of self-purification.
- Develop or modernise wastewater treatment plant for Łódź Agglomeration
- Appropriate land management of the areas along banks of the streams with an aid of conservation of the existing natural types of habitats (such as riparian forests) and restoration and appropriate development of vegetation belts (buffering).

2. Sound use of water resources

- Optimal water use by preventing water losses during its transfer and implementation (tasks related to infrastructure management) of closed water circulation in industry, and sound water consumption by individual users (water-saving household devices and gauging system)
- Full identification and institutionalisation of surface and ground water collection, for household and agricultural purposes in particular, and eliminating groundwater consumption for industrial purposes (with an exception of food and pharmaceutical industries),
- Ensuring potable water of good quality for residents,
- Sound use of mineral water resources; thermal and saline,
- Use of retained stormwater to water city greenery and meet the needs of residents

Measure 1 area: Protection of reservoirs

Objective: Improve water quality

1 Elimination of sources of household and industrial sewage

Desired status: water quality at the level of watercourses designated for recreational use. Elimination of illegal sewage disposal. Sanitary sewage system or local household sewage treatment facilities. Efficient system of monitoring of sewage quality.

Dynamics: improvement of water quality in subsequent catchments. Target: municipal reservoirs used for recreation-related purposes in 2038

2 Limit the load of nutrients in the collector

Desired status: water quality at the level of watercourses designated for recreational use. Support to

processes of self-purification of water and retention reservoirs by application of ecohydrology, modern technologies which use natural biological processes.

3 *Making the collector's catchment permeable*

Desired status: reduce run-off coefficient by 5% within the area of the inner centre of the city. Determine run-off coefficient at a specific level. Replace impervious surfaces (car parks and squares) with grasscrete and permeable systems. Construct green roofs and infiltration systems in the city centre.

4 *Increase bioactive surface*

Ban on designating new land development without application of BMP's methods.

5 *Introduce semi-natural ecosystems*

Rehabilitate stretches or rivers to be designed and developed in a way that will preserve and enhance the existing ecosystems.

6 *Increase biodiversity*

7 *Separate combined sewage system*

8 *Limit development in the river valleys*

Ban development in the river valleys. Ban implementing burden-causing activities in the river valley areas. Develop "green corridors" along the river valleys.

Measure 2 area: Flood protection

Objective Safe and efficient retention and stormwater drainage from the city

1 *Construct small retention facilities*

2 *Make the catchment permeable*

3 *Increase bioactive surface*

4 *Identify floodplains*

5 *Regulate and rehabilitate rivers*

Desired status: identify flood plains where a ban on development and constructing permanent structures has been imposed. Retention reservoirs and rivers have sufficient retention capacity and retain and drain stormwater in the way which is safe for residents. Stormwater outflows are not needed. Efficient flood protection.

Measure 3 area: Social environmental awareness

Objective Raising environmental awareness of citizens

- 1 *Access to new technologies*
- 2 *Implement new technologies*
- 3 *Disseminate basic ecology-related know-how*
- 4 *Promote environment-friendly solutions*

Desired status: Designers and architects have access to new technologies and use them in new implementations. The community desire to live in environment-friendly buildings and use environment-friendly solutions. Portals offering know-how and good practices in the field of the sustainable water management. Łódź residents feel responsible for their city, surroundings and public space. Community involvement, and NGO sector takes relevant actions at high level. Schools and organisations deliver numerous campaigns related to responsibility for urban space. There are demonstration sites of good BMP practices. There are residential estates built and operating in accordance with the sustainable development assumptions.

50 % of the city population are familiar with the rules of sustainable water management. Children and youth know that stormwater is a valuable resource. Residents select environment-friendly solutions themselves - stormwater re-use, local retention to decide upon development in their surroundings.

Measure 4 area: Water resources use

Objective Sound use of water resources

- 1 *Access to tourism and water recreation*
- 2 *Shaping landscape with use of open water*
- 3 *Improved image of the city*
- 4 *Improved micro-climate*
- 5 *Urban planning and architectonic guidelines of land management in accordance with the principles of sustainable development*
- 6 *Stormwater re-use*
- 7 *Use of new technologies*

Desired status: surface water (retention reservoirs, ponds and rehabilitated river stretches) constitutes an important element of urban space, which positively impacts its image. The city holds characteristics of the “blue-green network”. Access to tourism and recreation is at a good level. There are well organised and functioning bathing sites. Most of stormwater is managed at its source (+5% in the inner centre). The city promotes the use of new technologies and BMP’s. Local spatial development plans lay down clear principles of stormwater management.

d. Green areas and naturally valuable areas – key strategic options

The key strategic objectives of the urban natural system management include:

- Develop and adopt local spatial development plans which cover the areas that compose the urban natural system, having regard to the principles of the sustainable water resources management and restrictions imposed by the nature conservation regulations;
- Extend the network of protected sites with the protected landscape sites, which relatively do not cause major burdens (in the context of binding restrictions concerning land development), and at the same time implement efficient legal tools to protect river valleys from development;
- Increase the surface of public green areas and open areas used for the purpose of leisure and recreation.
- In order to maintain and enhance attractiveness and sustainability of Łódź natural system, the following measures should be implemented:
 - Protect the most valuable natural and landscape values (forests, urban green areas, water resources and legally protected sites) against degradation, and expose them in the urban structure in the key planning documentation;
 - Improve efficiency of the nature conservation measures so far implemented in the protected sites (by updating normative acts establishing the Łódź Hills Landscape Park and nature reserves);
 - Ensure spatial connectivity of the system's components within the whole city territory;
 - Maintain connectivity of the urban natural system with biologically active sites located outside of the city based on the river valleys, having regard to free migration of animals between nodal areas of the system (by stabilising wide ecological corridors sufficiently);
 - Provide the areas within the system with complete infrastructure necessary to supply water for residents, drain sanitary and industrial sewage and deliver waste management;
 - Preserve natural wetlands and water-head areas (by managing their surrounding environment in a way that will not affect ground water level and protect them against development of their zones of maintenance), preserve natural characteristics of the streams, and where possible, restore the natural characteristics (rehabilitate) their degraded stretches;
 - Protect all valley depressions from development, sealing them, modifying natural topography, irrespective of stability in water discharge, having regard to imposing restrictions on sealing of surface in the upper stretches of the river-basins.

C. STRATEGIC PLANNING

a. Key strategic options

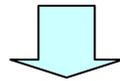
- Raise awareness of the territorial government entities and residents in the context of achievement of common objectives (organisation of joint training projects of appropriate functioning of the principle of subsidiarity, sustainable development and social dialogue).
- Develop and implement principles of adequate functioning of the policy of informing about activities undertaken by authorities which facilitate involvement of local community.
- Integrate activities of institutions and improve mechanisms of intra-institutional communication.
- Establish a forum of exchanging information, know-how and ideas among the community, territorial government entities and science and business community.

- Develop a system of monitoring of efficiency of activities implemented.
- Use an institution of mediator to resolve emerging conflicts.
- Develop and implement a systemic solution which helps to involve local community to elaborate and implement strategic documents.
- Develop data resources, indicators, measurements and comparators reflecting real situation.
- Include water resources as a priority factor which conditions improvement of the living standard of residents.

b. Plan of cooperation/integration at the institutional level and cooperation with the community

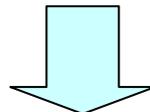
Integrating factor

Recognise the sustainable development principle as the foundation and primary objective of well-considered urban development, which integrates options, measures, groups of stakeholders and community



Measures

Institutional assistance to form structure of emerging organisations.
Financial and accommodation-based assistance to newly emerging organisations that integrate local community.
Develop the system or organisational and financial incentives for most creative and innovative individuals and groups.
Support social communication by establishing schools of leaders.
Develop the system of direct contacts with residents and their needs.
Elaborate mechanisms of efficient intra and inter-institutional cooperation and communication.



Result

Integration at the institutional level and effective cooperation with the community

D. PUBLIC PARTICIPATION

a. Key strategic options for social participation issues

- Elimination of communication barriers and closer cooperation between institutions responsible for specific elements of the water system in Łódź (rivers, sewage system, water supply, ground water, protection and control of environment's quality) and institutions whose measures indirectly impact quality of water resources (spatial planning and architecture) and living standard in the city;
- Lobbying concerning legislative improvements (by the community or authorities);
- Establishing a central decision making system on the basis of a joint database and a model Decision Support Systems (DSS);
- Dissemination of the information on the progress achieved in implementation of the (EU) programmes and obligations and outputs of their implementation, or on the lack of their implementation.
- Social consultations, promotion and inclusion of disadvantaged groups;
- Spatial management plan that will cover 100% of the Łódź territory;
- Raising social awareness in the field of undertaking initiatives, cooperation with the city and impacting shaping the living standard in the City;
- Social consultations system;
- Development of environmental awareness of residents to ensure appropriate functioning of the areas available for general public;
- Development of a central, integrated database of water resources and environmental aspects, spatial management, which will be available for general public, including professional groups and community members;
- Development of the GIS database in a single system for all the City entities – the base will be the foundation for development of specific systems by these entities to meet their individual needs;
- Development of an interactive map of the city, which will present measures planned/implemented with respect to the vision, progress and results achieved;
- Initiating a forum for social consultations, information exchange (innovations and investments);
- Cooperation of institutions/units of such organisations as the Crisis Management Centre for information sharing;
- Promotion (information, advertising, media campaigns) of a modern environment-friendly image of the city based on the latest technologies;
- Developing demonstration sites presenting the latest technological and environmental solutions in practice, promotion of these solutions and their replication in other parts of the city (such as modern environment-friendly residential districts; river re-naturalisation; valley management; BMP in the rainwater management);
- Intensification of environment-based measures at the operational level of the ancillary entities of the city – councils of the residential districts;
- Education – developing curricula for schools, educational paths (in Łódź and its vicinity), ecological villages (practical education for children and youth with an aid of these parts of the City that are managed in accordance with the vision).

b. Plan of cooperation/integration at the institutional level and cooperation with the community

- Follow-up of the SWITCH Łódź Learning Alliance,
- Introduce platforms of stakeholders as a horizontal method to resolve complex problems in the city, acquire skills, exchange of know-how, raise awareness and upgrade qualifications,
- Establish a system to involve community, including disadvantaged groups, in the process of making decisions concerning the living standard in Łódź (yards, residential estates, streets, quarters and districts) based on such approaches as the one involving voluntary workers – trained voluntary workers will act as „liaison officers” between institutions/platforms of stakeholders and residents,
- Reliable cooperation with NGOs,
- Develop further stages of the sustainable development and related social participation (Local Agenda 21, Programme of Participation of the WHO: Healthy Cities) based on the existing projects and documents,
- Verify/consult/complement the “Programme of cooperation between the City of Łódź, NGO’s and entities referred to in article 3(3) of the Act of 24 April 2003 concerning Public Benefit Activity and Volunteer Service for 2011”.

VII ANNEXES

ANNEX 1:

Guidelines to the Study of Conditions and Directions of Spatial Development of the City of Łódź with respect to Sustainable Rainwater Management

APPLICATION

Guidelines to the Study of Conditions and Directions of Spatial Development of the City of Łódź with respect to Sustainable Rainwater Management

23 April 2009

1. General Information

- 1.1. This application has been submitted by virtue of a decision taken during a meeting of key decision makers responsible for water management, urban infrastructure, Spatial Development and strategic planning of the City of Łódź. The meeting concerned sustainable rainwater management and it took place on 21 April 2009 in the head-office of the ZWIK (the Company of Water Supply and Sewage Treatment) (Annex 1: the list of participants and persons involved in drafting of this application).
- 1.2. Proposals presented in this application are based on results of the integrated research conducted by Łódź scientists, social consultations held with a group of more than 60 key decision makers and experts specialising in water management in Łódź and the region (*Lodz Learning Alliance*; Annex 2: the list of institutions of the LA Group members), and international consultations delivered under a SWITCH Project (“Sustainable Water management Improves Tomorrow’s Cities’ Health”, GOCE 018530) coordinated by the Faculty of Applied Ecology of the University of Łódź and the International Institute of the Polish Academy of Sciences - the European Regional Centre for Ecohydrology under the auspices of UNESCO in Łódź.
- 1.3. This application is a step towards achieving the Łódź 2038 Vision “Łódź Uses Its Water Wisely”, which has been developed by the above-mentioned group of stakeholders as a measure aiming to resolve Łódź’s problems of water management and to achieve long-term sustainable development (Annex 3: the Łódź 2038 Vision: “Łódź Uses Its Water Wisely”).
- 1.4. This application contains general information and it will be extended with detailed drafts of provisions and guidelines for new and transformed investments at the stage of developing detailed Spatial Development Plans.

2. The Subject of this Application

- 2.1. **We request that the Study of Conditions and Directions of Spatial Development of the City of Łódź should take into account the guidelines concerning support to sustainable methods of rainwater management.**
- 2.2. **Sustainable rainwater management involves simultaneous implementation of non-structural and structural measures**, which contribute to slowing down run-off of rainwater from urban areas in order to intensify its infiltration, transpiration, retention and treatment based on natural processes taking places in the city.
- 2.3. **The following elements of the urban space planning are crucial for implementing the Sustainable Rainwater Management:**
 - **Structural measures:** controlling the share of impervious spaces;
 - **Structural measures:** the following elements should be arranged in the urban space: rivers (restoration of river-beds); reservoirs, catchments, ponds; belts of buffer vegetation; infiltration systems; permeable spaces; and in the suburban spaces: the green areas that determine quality of rivers and the condition of surface and ground water, micro-climate, urban and suburban greenery restoration and health condition of the inhabitants.

3. The detailed scope of the guidelines to be developed further in order to include them in the Spatial Development plan

It is requested that the following solutions should be taken into account in the Study of Conditions and Directions of Spatial Development of the City of Łódź in particular:

3.1. Decreasing the share of impervious spaces in the city and quantity of rainwater runoff from the impervious spaces to the rainwater runoff system and combined sewer system;

- **Preservation, conservation and increasing the surface of green areas** necessary to maintain and functionally restore the water cycle (parks, green squares, open river valleys, orchards, gardens, green belts along roads), achieved by taking into account the following complementary concepts:
 - The Blue-Green Network (Annex 4: information leaflet);
 - The Green Circle of Tradition and Culture;
 - Nature sites identified under the “Geobotanic Inventory and Zoological Valuation of the Naturally Valuable Sites within Łódź’s Administrative Borders that so far have not been under Conservation in order to Select the Sites to be Covered by Legal Protection”; and
 - Taking decisions which will facilitate functional links among the above-mentioned areas with the Cultural and Natural Circle of Łódź Metropolitan Area.
- **Preservation and conservation of open water sites** (open river valleys and their restoration, ponds, reservoirs and wetlands),
 - In the context of the river valleys management, taking into account the guidelines contained in the paper entitled the “Analysis of the River Valley Reach within the Territory of the City of Łódź and the Principles of their Management for the Needs of the Study of Conditions and Directions of Spatial Development of the City of Łódź” (2007);
 - The zone-based management of the river valley catchments, including their immediate environment which determines appropriate functioning of hydrological and ecological systems in the City:
 - Zone 1 – Strict protection and eco-hydrological regulation of the catchment valley of the rivers, including the absolute ban on erecting buildings in order to preserve

biodiversity, elements needed for the purpose of hydrological processes and improved efficiency of self-purification;

- Zone 2 – buffer zone/recreation areas, where it will be possible to develop the so-called light recreation infrastructure;
 - Zone 3 - residential (low rise); this zone covers external edges of the valleys and their immediate environment, and it has been designated to hold low rise buildings provided that the development-related conditions will be strictly complied with and the new buildings will be equipped with sustainable stormwater runoff systems adapted to the local conditions, such as garden ponds, vegetated swales (biofilters), lawns and soil) and vegetation increasing infiltration and water retention.
- **Reducing impervious space in the City** by defining development conditions for individual urban zones in the field of new investments and regenerated areas, which will identify:
- Minimum size of the plot / density of the buildings within the plot;
 - Maximum permitted share of impervious space;
 - Permitted materials to be used to harden and construct such surfaces as car parks, driveways, pavements, etc. (grasscrete, absorptive materials);
 - Guidelines to disconnect the impervious spaces from the rainwater runoff system and combined sewer system by applying the systems of site infiltration and retention, and increasing catchment (landscape) retention; (item 3.2);
 - Recommendations to use the existing zones of degraded infrastructure and land designated to regeneration in order to develop the system of infiltration, and create recreation areas, such as the areas available after demolition works in the city centre.

3.2. Use of the site infiltration and retention systems and source control of rainwater:

- **Obligation of locating lawns and other forms of urban greenery below the level of road traffic flows** in order to minimise run-off of stormwater from the road network to rainwater runoff system and combined sewer system, increase water retention and infiltration and treatment of water flushed from roads;
- **Developing natural barriers** by planting trees which will constitute border and insulation zone from the road traffic;
- **Management of stormwater outlets** by constructing sequential sedimentation and biofiltering systems which will facilitate periodical retention of this water (reduction of flood flows) and its treatment by sedimentation and allocation of contaminants in the flora biomass;
- **Use of the sustainable rainwater management methods** which will be possible for application in the individual zones of the city, based on the appropriate combination of potential measures (manuals, mathematical models), such as:
 - Reservoirs, catchments, ponds (including: constructed wetlands, dry reservoirs, lagoons, retention and detention reservoirs and sedimentation tanks);
 - Buffer vegetation belts (including buffer belts, ditches with buffer vegetation and green roofs);
 - Infiltration systems (including: infiltration catchments, infiltration ditches, soil filters and drain wells);
 - Pervious and absorbent surfaces (asphalt and pavements);

4. Justification of the Application

4.1. Traditional and modern systems of rainwater management

Intensive urbanisation causes **changes to the following natural conditions, and disturbances in the hydrological characteristics of the rivers:**

- Acceleration and intensification of surface run-off, reduction of infiltration and evapotranspiration that causes: i) rapid run-off of surface waters during rainfall which results in inundations and floods; ii) long-term and intensive droughts and prolonged periods of low water levels which results in deterioration of micro-climate, lower ground water level, disturbances to hydrographic conditions and contribute to atrophy of urban vegetation;
- Degradation of the environment: intensification of the “heat island” effect, which is characterised by overdrying of air and overheating of the urban space; deteriorated water quality (chemical status, hydraulic overload, reduced biodiversity of rivers, structure and functioning of water ecosystems and rivers’ capacity to self-purification, and as a result, gradual degradation of water quality and decreasing recreation and utility-related value);

These changes **contribute to occurrence of a range of adverse social and economic phenomena** in the cities, such as:

- Deteriorated quality of the living standard and health: intensified occurrence of cardiovascular diseases and respiratory diseases resulting from micro-climate deterioration and heat island effect;
- Higher costs of the city’s functioning caused by the costs of: i) floods and inundations; ii) exceeding capacity of the sewage treatment plants powered by rainwater sewage through the combined sewer system during periods of intensive rainfalls; iii) maintenance of urban greenery; iv) social costs resulting from the social health condition and the Period of Incapacity for Work; v) limitations to the city development due to low and unattractive living standard.

These adverse phenomena are intensified due to the use of traditional rainwater management system, which was binding in the European states roughly 10-15 years ago, and involved possibly fastest runoff of water from the city, and then its central treatment in a collective sewage treatment plant (the so-called end-of pipe approach). At the time of intensifying climatic changes, this approach is highly **inefficient, ineffective and uneconomic, it offers little opportunities to improve city’s competitiveness in the country and region and to achieve sustainable development and comply with the requirements binding pursuant to the Community legislation** (Water Framework Directive, 2000/60/EC; Directive 2006/7/EC concerning the management of bathing water quality), the lack of compliance with these requirements will result in imposing of high fines.

4.2. Łódź’s specifics and implications for rainwater management resulting from this specifics

Łódź’s hydrological status is determined by its location on the first order watershed between tributaries of the Vistula and the Oder, which flow through the northern part of the city (from Stoki through Bałuty). The city lacks a transit river, and the **system of rivers is only composed of source sections with minimal flows, which totally depend on retention and quality of rainwater**, running-off from the city. Due to the changes resulting from strong urbanisation of this area, i.e. sealing of the catchment area, in the source sections in particular, and sealing river-beds and valleys which constitute the former areas of natural supply of water – the watercourses hold little quantity of their own water. During dry periods, corridor flows almost reach zero, and the share of natural supply resulting from exchanges with ground waters is very small, thus soil and air humidity drops, which causes increased dusting and affects health condition of Łódź inhabitants. During rainfalls, river flows become rapid and extremely high, which results in numerous problems of flooding these parts of the city that are located lower, and the areas of continuous flooding have a repeating tendency. This is mainly due to insufficient capacity of the traditional sewer systems and the lack of site retention.

4.4. Sustainable rainwater management as a key element of the spatial planning policy in Łódź

An alternative approach, (i.e. the source control approach, which is a decentralised rainwater management, and covers its retention and treatment in the place of occurrence) **has been binding in many European states and worldwide for approximately 10-15 years**. According to this approach, rainwater is managed by an integrated management system which combines a number of methods, such as unsealing of the catchment, soil infiltration (through a range of such solutions as wetlands, swales – i.e. lowering a grass-covered ground, soil drainage system, or a combination of these solutions), green roofs and other, supported only by separate or combined sewer systems. **Many**

years' experience confirms that this approach is durable, sustainable and much more economic. The areas managed with an aid of this approach limit negative impacts involving floods, droughts, water degradation (contamination, hydraulic burden, morphological structure degradation). **Such approach is enhanced by using methods of ecohydrology**, which is a transdisciplinary science developed by Łódź scientists, and which investigates links among such hydrological processes as rainfall, infiltration, run-off formation, interception, transpiration, and biological processes, such as evaporation, self-purification, biodegradation, primary production, denitrification, cascade effect and microbial loop. This knowledge is used in mutual regulation of the above listed processes in order to improve water quality, restore hydrological cycle in the landscape, increase biodiversity, and in particular, to increase the environment's capacity to absorb constantly growing anthropogenic stress.

Due to its characteristics as the area located on the first order watershed, Łódź's hydrological system entirely depends on rainwater. That is why its efficient management and focus on the catchment-based retention (landscape) and site-based rainwater treatment will reduce the risks (inundations, low quality of rivers, and the falling level of ground waters). Under these hydrological circumstances, rainwater is a valuable resource that will enable to raise the level of ground waters, create and economically maintain a friendly green landscape, improve quality of life and health of the inhabitants, and develop attractive residential and leisure sites. Scientific foundations that will enable to develop a complete and innovative plan of Spatial Development and of river valleys and management of the city's water resources, are prepared in Łódź. Under these documents, ecohydrology is perceived as a basis. Such institutions as the United Nations Organisation (e.g. UNESCO, UNEP International Hydrological Programme) and the European Union, are very interested in this approach.

4.4. The Blue-Green Network for improvement quality of life and health, and economic development in Łódź

The solutions offered by ecohydrology may significantly increase efficiency of remedial measures in Łódź and lower their cost at the same time, and contribute to the city's development. They will contribute to a general and higher level of education and social awareness, which involve higher expectations of improved living standard. These notions are often associated with healthy environment and they depend on the proper functioning of the aquatic and terrestrial ecosystems, and the size and distribution of green areas in the city (the "green city"). The studies conducted between 2007 and 2008 indicate that accessibility to high quality green areas is the most important factor impacting selection of the place of residence. Green areas are a carrier of aesthetic and cultural values for their residents. European studies confirm that the living standard translated into the quality of the natural environment, which ensures health and opportunities of psychophysical recreation, is the critical factor to attract to the city creative individuals who are of key importance to accelerate metropolitan development and improve competitiveness.

The research conducted in Łódź indicates that a higher and more stable humidity in the air caused by green areas and reservoirs reduces the volume of the factors that cause asthma, allergies and other diseases. That is why contemporary engineers, planners and architects of the urban spaces perceive the river valleys and green areas as an axis around which there will be functionally organized urban spaces. This is a trend which will comply with a currently developing idea of integrated historical regeneration of Łódź's urban tissue, which involves both restoration of the City's historical architecture and care of its historical values (including water resources as a basis of the initial urban development).

Sustainable rainwater management is of a key importance to spatial organisation of our city, and it will generate long-term impacts not only on its aesthetics and identity, but also on its ecological security, living standard and health of the residents, which will contribute to Łódź's competitiveness in the country and region (the European Union). It is necessary for establishing the **Blue-Green Network** (Zalewski, ERCE PAN UNESCO/UL) based on the system of rivers and natural sites in the city. This concept benefits from Łódź's location on the borderland of watersheds, and assumes that the existing restored system of rivers and green areas will be used, where possible, as a basis for economic and logical organisation of space. The green areas and reservoirs (the Blue-Green Network) constitute an

attractive element of the city and a basis and location to introduce cycle lanes, pathways, turf grounds for playing team games, picnic sites, cross-country skiing routes, and so on. A possibility of developing educational paths for children and youth, and educational sites concerning systemic innovative solutions in the field of sustainable planning of urban space for the community, is an additional advantage. Spatial organization based on the consistent and functional system of the Blue-Green Network preserves continuity of ecological processes in Łódź, and provides the following benefits:

Improved living standard and health of the inhabitants

- Greater access to green areas for residents of all the districts and housing estates, which will ensure their good living standard in the conditions of progressing climatic changes and urbanisation;
- Developing opportunities of every-day psycho-physical regeneration without the need of using car transport, and developing an attractive network of walking and cycle lanes;
- Reducing the risk of occurrence of development-related defects in children, asthma and allergies;
- Improving the living standard of the inhabitants and the City's aesthetics, in the degraded parts of Łódź in particular (social inclusion);

Improved quality of the environment and reduced cost of management

- Improving micro-climate, air and water quality, and biodiversity in the urban areas;
- Reducing the risk of inundations and the related cost during intensive rainfall periods by intensification of rainwater retention in the landscape;
- Improving urban vegetation and reducing the cost of its maintenance due to larger quantities of water kept in the landscape;
- Reducing rainwater run-off through a combined sewer system which improves operation and economics of sewage treatment and limits negative impact on the rivers during torrential rains;
- Connecting green areas within the city and around it, which improves integration of ecological processes (ecological corridors, biodiversity and city ventilation);

Preservation and regeneration of cultural heritage

- Enhancing the idea of integrated regeneration under the Integrated Regeneration Programme for Łódź Inner City by including natural elements which are historically connected with Łódź identity next to architectonic elements;

Improved attractiveness of the City and sustainable development

- Enhancing attractiveness of Łódź as a residential area, which will translate into attracting professionals and creative individuals, keeping and attracting capital, urban development and improved competitiveness in the region;
- Creating new jobs for the needs of organisation and maintenance of the Blue-Green Network system;
- Improving ecological and public security, reducing social costs resulting from diseases and creating conditions for sustainable development in the meaning of the UNO Agenda 21 assumptions;

ANNEX 2:

Guidelines to the Study of Conditions and Directions of Spatial Development of the City of Łódź with respect to Management of Łódź's Natural Elements: the Blue-Green Network

APPLICATION

Guidelines to the Study of Conditions and Directions of Spatial Development of the City of Łódź with respect to Management of Łódź's Natural Elements: the Blue-Green Network

17 June 2009

1. General Information

- 1.1. This application is a result of multi-annual research carried out by Łódź scientists representing the University of Łódź, the International Institute of the Polish Academy of Sciences – the European Regional Centre for Ecohydrology under the auspices of UNESCO, the Nofer Institute of Occupational Medicine, the Medical University, and the Technical University of Łódź.
- 1.2. This application is a result of a meeting of representatives of scientific circles, experts and key decision makers involved in management and conservation of Łódź's natural elements to facilitate the City's sustainable development. The meeting took place on 28 May 2009 at the Department for Environmental Protection and Agriculture of the Łódź City Office, under the patronage of Mr Jerzy Kropiwnicki, the Mayor of the City of Łódź (Annex 1: the List of the participants of this meeting). This activity was delivered under an EU SWITCH Project (GOCE 018530).
- 1.3. Within its scope, this application refers to the application of 23 April 2009 submitted at the Teren Company: the Guidelines to the Study of Conditions and Directions of Spatial Development of the City of Łódź with respect to Sustainable Rainwater Management, and it remains consistent with this application.

2. The Subject of this Application

- 2.1. **We request that the Study of Conditions and Directions of Spatial Development of the City of Łódź (hereinafter referred to as the Study) should take into account the studies concerning Łódź's natural elements carried out by Łódź scientists, and in particular:**
 - 2.1.1. The Blue-Green Network (the concept developed in 2008 by the Faculty of Applied Ecology of the University of Łódź and the International Institute of the Polish Academy of Sciences – the European Regional Centres for Ecohydrology under the auspices of UNESCO in Łódź, which was provided to the Teren Company in the first quarter of 2009);
 - 2.1.2. Analysis of the range of the valley areas within the territory of the City of Łódź, and principles of their management (the study carried out in 2008 by a team chaired by Professor M. Zalewski, the Faculty of Applied Ecology of the University of Łódź, the International Institute of the Polish Academy of Sciences ERCE/UNESCO and the

Technical University of Łódź, which was provided to the Teren Company by the City's Urban Planning Office at the initial stage of the Study development);

- 2.1.3. The geobotanic inventory and zoological valuation of the naturally valuable areas within Łódź's administrative borders that so far have not been under conservation in order to select the sites to be covered by legal protection (the study carried out in 2009 by a team chaired by Professor J. Kurowski: the Faculty of Geobotany and Vegetation Ecology of the University of Łódź, the Faculty of Nature Conservation of the University of Łódź, the Łódź Hills Landscape Park and the City Botanical Garden; this paper was submitted to the Teren Company by the Department for the Environmental Protection and Agriculture at the initial stage of the Study development);
 - 2.1.4. The Green Circle of Tradition and Culture (the concept developed for the purpose of the Łódź Spatial Development Plan of 1993);
- 2.2. **We request that the Study should take into account the spatial solutions that will enable to maintain continuity of the Blue-Green Network's elements within the City, including their buffer zone in the adjacent municipalities and Łódź Region, and the source areas of Łódź rivers in the eastern part of the city outskirts, which ensure that the city's natural system operates appropriately, protect elements of special natural value, and provide necessary ecological benefits and sustainable development of Łódź and the Region. It is necessary that the spatial continuity with the following areas should be maintained:**
- 2.2.1. The Cultural and Natural Circle of Łódź Metropolitan Area (the concept developed by the Marshal's Office in Łódź);
 - 2.1.4. The Łódź Region Circle related with the valleys of the Warta, Bzura and Pilica.

3. Justification of the Application

1. **The Blue-Green Network** is a concept that combines and extends the already existing publications concerning natural elements and green architectural elements of Łódź and Łódź Region (see 2.1, 2.2). This concept benefits from Łódź's location on the borderland of the first order watershed, and where possible, assumes using the restored system of rivers and green areas of the city as a basis for a functional, economic and logical organization of space. Retention of rainwater treated with an aid of ecosystem biotechnologies, which is a valuable asset for Łódź being the city located on the watershed, is a key and new element of this organization.
2. **Taking the Blue-Green Network concept into account in the Study of Conditions and Directions of the Spatial Development of the City of Łódź is necessary to ensure the City's sustainable development in the meaning of the UNO Agenda 21 and the EU Sustainable Development Strategy.** The principle of sustainable development obliges the EU and UNO member states to implement in their policies horizontal measures based on sound management of cultural and natural resources in the local and global scale in a way that will ensure that the needs of the current generation shall be met without decreasing opportunities available to future generations. Decisions concerning management of Łódź's natural elements are of a key importance to the City's sustainable development, and they will generate long-term impacts on its functionality, aesthetics, identity, dynamics of its development, ecological security, living standard and health of its inhabitants, which will contribute to Łódź's competitiveness in the country and region (the European Union).
3. **Conservation and sustainable management of the natural elements in Łódź is a basis for adaptation to global climatic changes, in accordance with the strategy proposed by the European Commission.** The EU White Paper identifies a two-staged strategy of actions based on the results of integrated scientific studies, which are specific for the individual regions, and necessary in order to strengthen the Union's capacity to adapt to the changing

climate. The results of the studies conducted under the EU SWITCH Project demonstrate that due to the location on the first order watershed and in the central region of Poland, which is vulnerable to desertification process, maintaining functional connections among the natural elements and river valleys in Łódź (the Blue-Green Network) and rainwater retention are key elements to adapt to climatic changes.

4. **The Blue-Green Network is a basis for improving living standard and health of Łódź inhabitants.** Improved access to recreation areas for inhabitants is an important tool to promote health-oriented behaviours, which is one of Łódź's top priorities. Statistics for our city indicate that among major Polish cities, Łódź has the highest rate of diseases that can be prevented by regular physical exercises and a possibility of psycho-physical regeneration (such as cardiovascular diseases, tumours, psychic disturbances resulting from excessive stress). Improved health conditions are possible to achieve through conscious development of natural elements in the city, which provide recreation areas for its inhabitants, and their promotion. Presence of green areas and water reservoirs in urban areas also improves the city's micro-climate by increasing air humidity and reducing factors causing asthma, allergies and other health problems.
5. **Maintaining continuity of the natural system provides a basis for urban economic development.** A research conducted in Europolies between 2007 and 2008 indicated that accessibility to green areas of high quality is the most important factor contributing to selecting the place of residence. These results have been confirmed in social surveys delivered among Łódź inhabitants. Green areas provide aesthetic and cultural values to their inhabitants. The European research has confirmed that the living standard, which translates into quality of the natural environment ensuring health and possibility to relax, is a key factor that attracts creative individuals to the cities, which significantly contributes to acceleration of metropolitan development and improved competitiveness.
6. **The Blue-Green Network responds to social expectations concerning organisation of public space, green and recreational areas of Łódź inhabitants.** The scientific research delivered by Łódź scientists (the Grant of the Mayor of the City of Łódź implemented by the Department of Geographic Sciences) and social consultations with 10 non-governmental organisations (II ERCE PAN/UNESCO) have indicated an important role of the Blue-Green Network in the City's Spatial Development. Łódź inhabitants decided that the green areas and water ecosystems constitute an attractive element of the City, which provides a basis for implementing such infrastructure components as cycle lanes, pathways, turf grounds for playing team games, picnic sites, cross-country skiing routes, culture zones, cafés and restaurants, street greenery, green yards (in particular the yards of the buildings in the city centre, where options to develop new green sites are limited). A possibility of developing educational paths for children and youth, and educational sites concerning systemic innovative solutions in the field of sustainable planning of urban space for the community, is an additional advantage. The respondents also expressed the need to maintain natural and historical complex in Księży Młyn, whose landscape perfectly fits the adjacent areas, and develop the grounds surrounding the EC4, to provide a basis for Łódź's identity and its future development.
7. **Conservation of Łódź unique and valuable nature and landscape complexes and ecological sites covered by the Blue-Green Network, and upgrading them to obtain higher forms of environmental protection are only possible where they will be functionally connected with major green areas constituting their external protection zone.** The geobotanic inventory and zoological valuation delivered in 2008 for the area of the City of Łódź indicated that there are numerous sites holding valuable natural resources. 4432.64 hectares have been envisaged for conservation, and they include city forests and naturally and culturally valuable river valleys in particular. The Blue-Green Network constitutes a natural protection zone for these sites. It facilitates conservation and preservation of these valuable natural resources, their appropriate functioning and sustainable recreation-related use of specific elements of this system.

8. **Functioning of the Blue-Green Network in Łódź is only possible where it shall be connected with natural sites of the adjacent municipalities and region.** This will ensure continuity and maintenance of natural processes which contribute to ecological benefits to the inhabitants of the city and region.

4. Benefits resulting from the Blue-Green Network

Improved living standard and health of the inhabitants

- Greater access to green areas for residents of all the districts and housing estates, which will ensure their good living standard in the conditions of progressing climatic changes and urbanisation;
- Developing opportunities of every-day psycho-physical regeneration without the need of using car transport, and developing an attractive network of walking and cycle lanes;
- Reducing the risk of occurrence of development-related defects in children, asthma and allergies;
- Improving the living standard of the inhabitants and the City's aesthetics, in the degraded parts of Łódź in particular (social inclusion);

Improved quality of the environment and reduced cost of management

- Improving micro-climate, air and water quality, and biodiversity in the urban areas;
- Reducing the risk of inundations and the related cost, during intensive rainfall periods by intensification of rainwater retention in the urban space;
- Improving urban vegetation and reducing the cost of its maintenance due to larger quantities of water kept in the landscape;
- Reducing rainwater run-off through a combined sewer system which improves operation and economics of sewage treatment and limits negative impact on the rivers during torrential rains;
- Connecting green areas within the city and around it, which improves integration of ecological processes (ecological corridors, biodiversity and city ventilation);

Preservation and regeneration of cultural heritage

- Enhancing the idea of integrated regeneration under the Integrated Regeneration Programme for Łódź Inner City by including natural elements which are historically connected with Łódź identity next to architectonic elements;

Improved attractiveness of the City and sustainable development

- Enhancing attractiveness of Łódź as a residential area, which will translate into attracting professionals and creative individuals, keeping and attracting capital, urban development and improved competitiveness in the region;
- Creating new jobs for the needs of organisation and maintenance of the Blue-Green Network system;
- Improving ecological and public security, reducing social costs resulting from diseases and creating conditions for sustainable development in the meaning of the UNO Agenda 21 assumptions;