Environment in the City of Ljubljana

European Green Capital 2016

Mestna občina Ljubljana

LJUBLJANA Zmagovalka 2016
ZELENA PRESTOLNICA EVROPE

Published by
City of Ljubljana
City Administration
Department for Environmental Protection
Zarnikova 3, Ljubljana
November 2015

The Department for Environmental Protection is headed by
Nataša Jazbinšek Seršen, Head of Department

Authors
Zala Strojin Božič MSc, editor
Helena Regina MSc
Gorazd Maslo
Marjana Jankovič
Andrej Piltaver
Svetlana Čermelj

in cooperation with
Public company Snaga
Public company Vodovod - Kanalizacija (Brigita Jamnik, Ph.D.)

Photographs
B. Čeak, Public company Snaga, N. Rovan, Public company Vodovod - Kanalizacija, D. Wedam, V. Kontić, O. Dolenc, A. Piltaver, K. Goljat, Archive of the Department for Environmental Protection, Archive Turizem Ljubljana, Anita Šimec Mav

Layout
Rdeči oblak
Number of copies printed: 1,500

CIP - Kataložni zapis o publikaciji
Narodna in univerzitetna knjižnica, Ljubljana

504.5(497.4Ljubljana)(047)

ENVIRONMENT in the City of Ljubljana : European green capital 2016 / [authors Zala Strojin Božič ... [et al.] ; photographs B. Čeak ... et al.]. - Ljubljana : City of Ljubljana, City Administration, Department for Environmental Protection, 2015

ISBN 978-961-6449-62-5
1. Strojin Božič, Zala
281783808

Contents

Air Quality **4**

Air Quality Measures 10

Water Quality **12**

Drinking Water 12
Ground Water 14
Surface Waters 16
Waste Water 17
Water Quality Measures 19

Soil **20**

Agricultural soil 20
Urban soil 23
Forest soil 24
Soil Quality Measures 25

Waste Treatment **26**

Municipal waste 26
Illegal waste disposal sites 27
Waste Treatment Measures 28

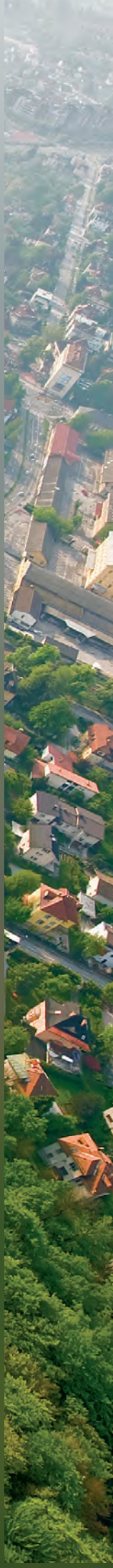
Nature **30**

Biodiversity 30
Invasive alien plant species 32
Nature Conservation Measures 34

Noise **36**

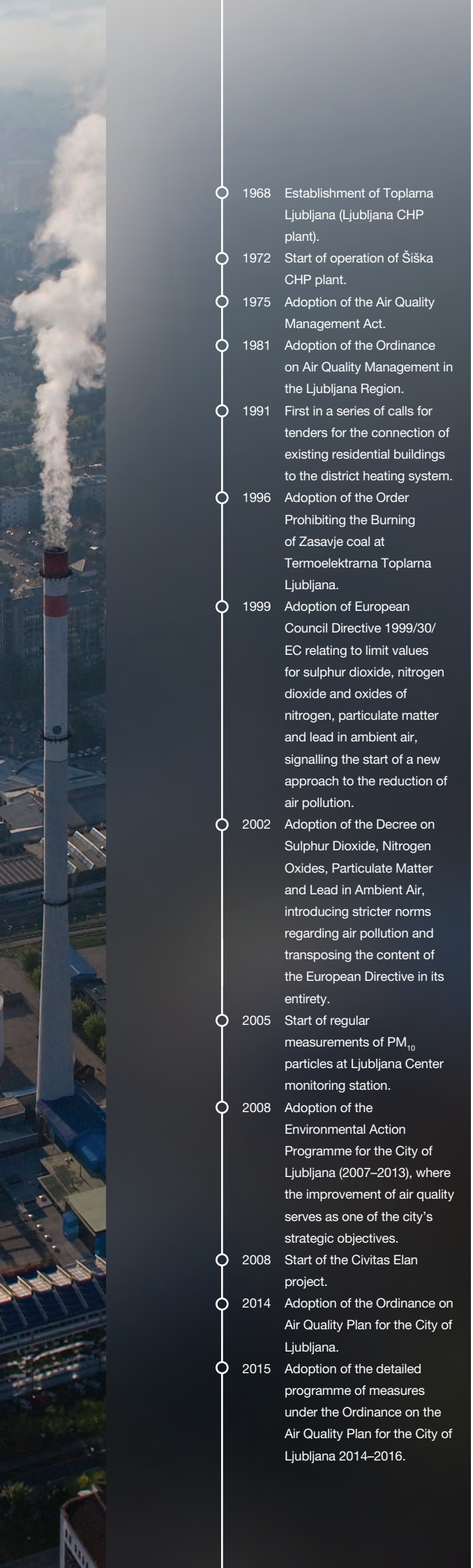
Noise Reduction Measures 38

Environmental Action Programme 2014–2020 **40**



Mestna občina
Ljubljana

LJUBLJANA
Zmagovalka 2016
ZELENA
PRESTOLNICA EVROPE



- 1968 Establishment of Toplarna Ljubljana (Ljubljana CHP plant).
- 1972 Start of operation of Šiška CHP plant.
- 1975 Adoption of the Air Quality Management Act.
- 1981 Adoption of the Ordinance on Air Quality Management in the Ljubljana Region.
- 1991 First in a series of calls for tenders for the connection of existing residential buildings to the district heating system.
- 1996 Adoption of the Order Prohibiting the Burning of Zasavje coal at Termoelektrarna Toplarna Ljubljana.
- 1999 Adoption of European Council Directive 1999/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air, signalling the start of a new approach to the reduction of air pollution.
- 2002 Adoption of the Decree on Sulphur Dioxide, Nitrogen Oxides, Particulate Matter and Lead in Ambient Air, introducing stricter norms regarding air pollution and transposing the content of the European Directive in its entirety.
- 2005 Start of regular measurements of PM_{10} particles at Ljubljana Center monitoring station.
- 2008 Adoption of the Environmental Action Programme for the City of Ljubljana (2007–2013), where the improvement of air quality serves as one of the city's strategic objectives.
- 2008 Start of the Civitas Elan project.
- 2014 Adoption of the Ordinance on Air Quality Plan for the City of Ljubljana.
- 2015 Adoption of the detailed programme of measures under the Ordinance on the Air Quality Plan for the City of Ljubljana 2014–2016.

Air Quality

References to Ljubljana's air quality appear as early as the seventeenth century (in the topographical works of Merian and Valvasor). Ljubljana's position in a basin results in poor air circulation, which is reflected in the city's air quality. In the past this led to serious air pollution, particularly during long winter inversions. Air quality management was therefore one of the first major environmental issues to be addressed in Ljubljana.

Air pollution levels in Ljubljana have been measured continuously since 1968, when the first monitoring station was set up in the city centre to measure sulphur dioxide and smoke levels. The start of measurements in the middle of 1967 more or less coincides with the start of operation of the combined heat and power plant in Moste, which began delivering the first megawatts of electricity generated by cogeneration to the network at the end of 1966. Monitoring took place subsequently in a nearby park, at one of the stations belonging to the national automatic air pollution monitoring network (ANAS).

In September 2001 the City of Ljubljana temporarily set up its own air pollution monitoring station on the pedestrian plaza in front of Figovec (a historic city-centre restaurant), as part of the "Car-Free Day" initiative. Monitoring continued in this location until October 2009, at which point the station was moved to a permanent location at the junction of Tivolska Cesta and Vošnjakova Ulica, where it has been measuring air pollution as the Ljubljana Center monitoring station since November 2009.

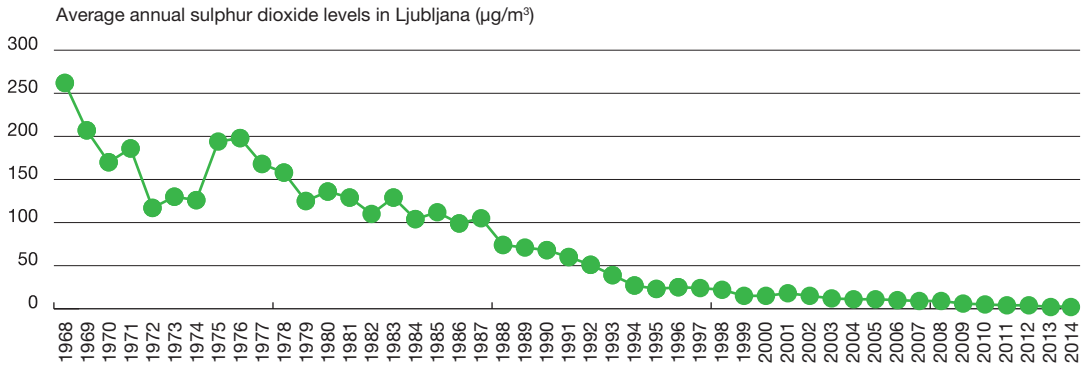
Today this monitoring station is used to monitor air pollution caused by traffic in the city centre, while also measuring noise and meteorological parameters. There is another monitoring site in Bežigrad, which is located outside the impact of major local pollution sources and acts as benchmark for the situation in the broader city environment (Ljubljana Bežigrad monitoring station).

In Ljubljana we have a 46-year data set for sulphur dioxide pollution, an 11-year data set for nitrogen dioxide pollution and a 9-year data set for PM_{10} pollution in Ljubljana city centre.

Sulphur dioxide

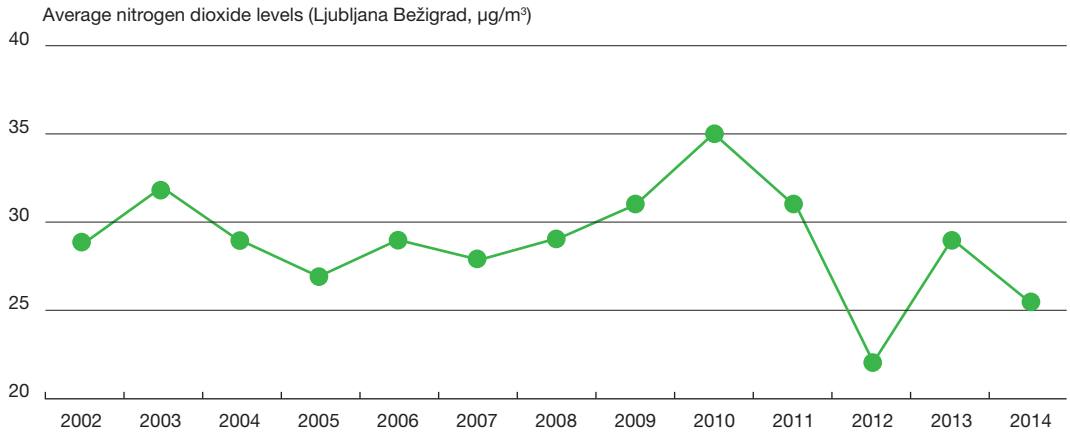
Sulphur dioxide is produced by the combustion of coal and liquid fuels containing sulphur. Although coal is still the main energy source for electricity and heat production in Ljubljana, sulphur dioxide pollution is no longer a problem. This is largely due to the gradual transition to the district heating system and gas network, the replacement of individual local boiler houses burning coal and fuel oil, and the abolition of individual solid-fuel furnaces. Ljubljana bid a definitive farewell to excessive sulphur dioxide air pollution by using coal containing less sulphur, which continues to be used today.

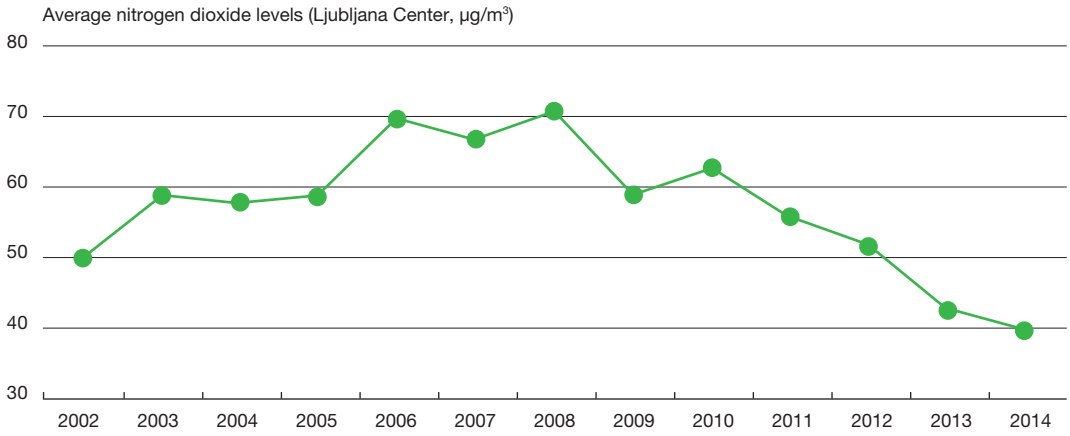
„ Sulphur dioxide pollution is no longer a problem.



Nitrogen oxides and nitrogen dioxide

Nitrogen oxides (NO_x) are generated in high-temperature combustion processes through the creation of nitrogen–oxygen bonds. Exhaust gases contain a high level of nitrogen monoxide (NO), which rapidly oxidises into nitrogen dioxide (NO_2) in the atmosphere. The oxidation rate of nitrogen monoxide from traffic into higher oxides increases with the distance from the source. The main sources of nitrogen oxides in urban areas are traffic, individual furnaces and thermal power plants. No instances of excessive hourly concentrations of nitrogen dioxide have been recorded at the Ljubljana Center monitoring station for several years. At the annual level we succeeded in bringing concentrations below the limit value of 40 µg/m³ for the first time in 2014. The levels of nitrogen oxide pollution at the Ljubljana Bežigrad monitoring station are well below the limit value.



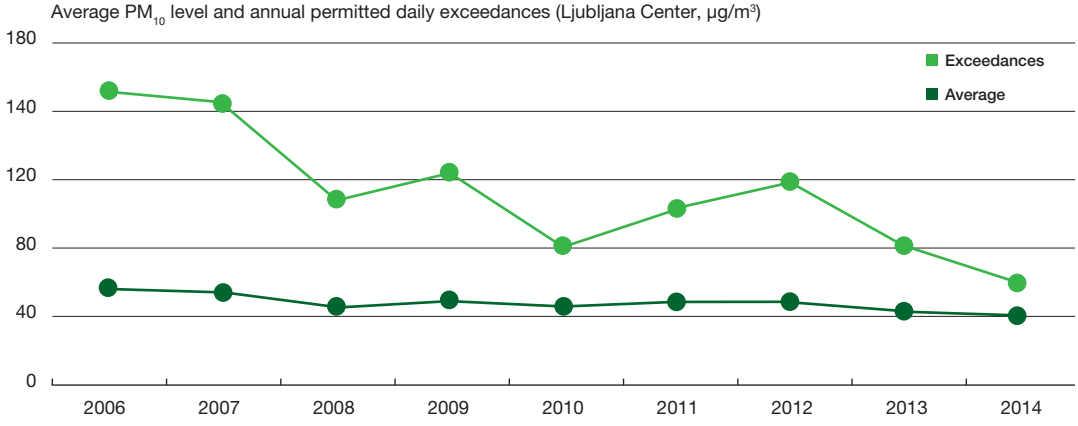


Monitoring station in the centre of the city intended for monitoring traffic pollution.

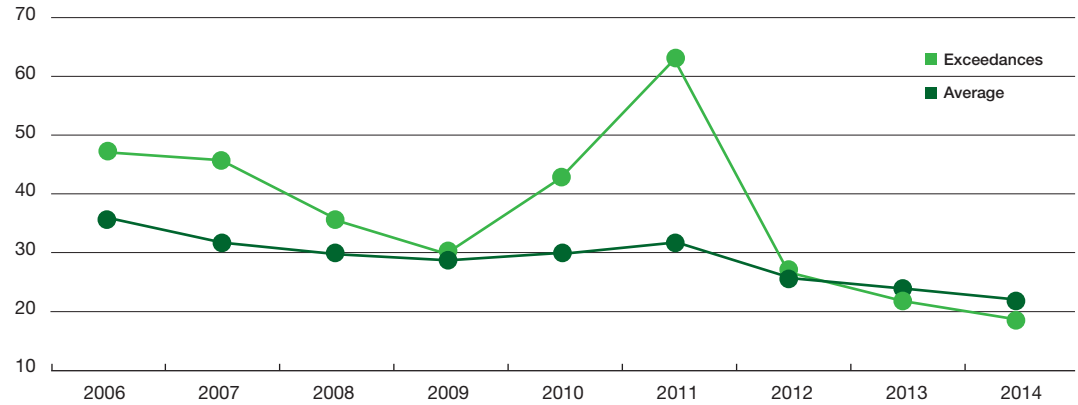
PM_{10} particles

Air pollution is not only the result of harmful gases, it is also caused by airborne particulate matter, which can affect human health. The finest particles, less than 10 µm (PM_{10}, $PM_{2.5}$) in size, are the most problematic. The smaller they are, the more damage they cause to our health. Levels of particulate pollution are affected both by emissions and by weather conditions. It is rainfall in particular that helps reduce particulate pollution by washing particles out of the air and onto the ground, where they mix with surface dust. If streets are not regularly cleaned, however, this dust can be lifted into the air again by the wind, causing additional pollution (resuspension). We have been regularly measuring PM_{10} particulates at the Ljubljana Center monitoring station since the end of 2005. The annual permitted concentration of PM_{10} particles is 40 µg/m^3, while the daily permitted concentration is 50 µg/m^3. The number of instances where both daily levels and the average annual level are exceeded is decreasing. In 2014 the annual concentration of particulates at the Ljubljana Center monitoring station fell below the permitted level for the first time. We also achieved the lowest number of daily exceedances since measurements began, although the number of exceedances of daily levels is still above the permitted level.

Average PM_{10} level and annual permitted daily exceedances (Ljubljana Center, µg/m^3)



Average PM_{10} level and annual permitted daily exceedances (Ljubljana Bežigrad, µg/m^3)

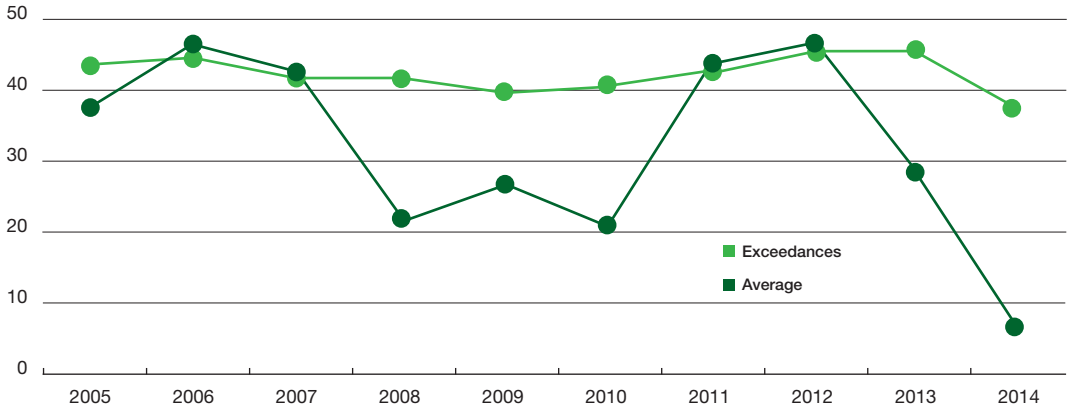


Ozone

„ Tropospheric ozone is an atmospheric pollutant.

Tropospheric (ground level) ozone forms in the atmosphere when temperatures are high and solar radiation is very intense. Ozone molecules are very unstable and break down within a few days into molecular oxygen (O_2), which is a normal component of the atmosphere, and chemically active atomic oxygen (O^{2-}), which quickly bonds with other elements or molecules and has a powerful oxidising and corrosive effect. Ozone levels in Ljubljana are only measured at the Ljubljana Bežigrad monitoring station. The annual permitted number of exceedances is 25 days.

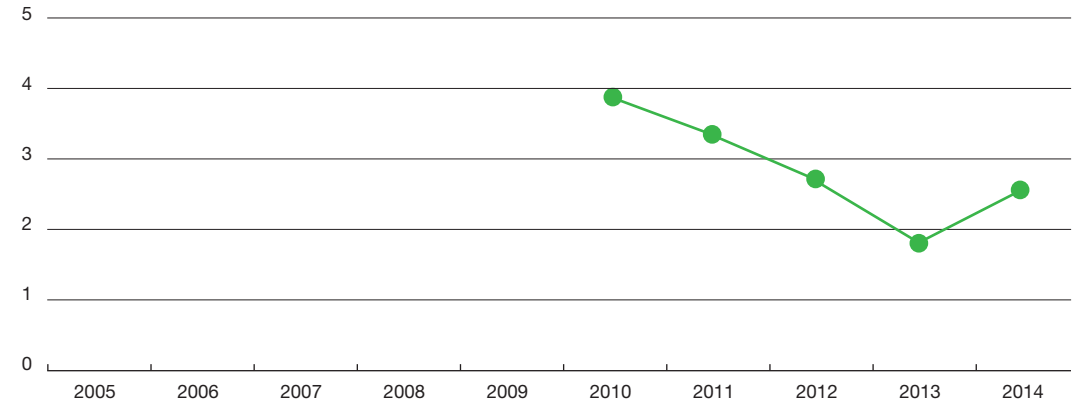
Average annual ozone levels and number of exceedances of the 8-hour target level (Ljubljana Bežigrad, µg/m³)



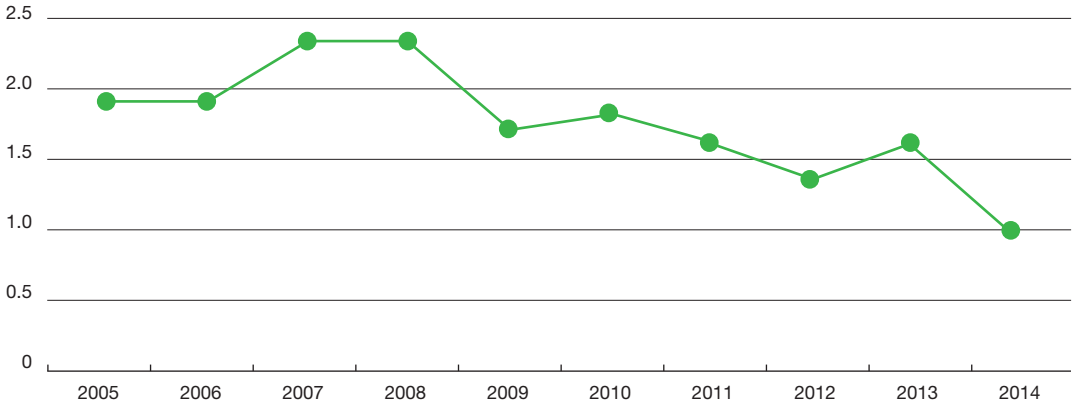
Benzene

Benzene, one of the most effective organic solvents in technological processes, was still frequently used in numerous technical and chemical processes in the middle of the last century. Following discovery of its harmful effects, it was substituted by other solvents. Today it is present in fuels (petrol), where it has partially replaced lead additives. Emissions of hydrocarbons, which are important precursors to ozone, have been significantly reduced by new refuelling systems and the use of catalytic converters. The recorded values at the Ljubljana Center monitoring station confirm the predominant impact of traffic, but there have been no exceedances of permitted level.

Average annual benzene levels (Ljubljana Center, µg/m^3)



Average annual benzene levels (Ljubljana Bežigrad, µg/m^3)



Air Quality Measures

Urban Ecological Zone

In 2007 we established an ecological zone in the city centre, which is closed to all motorised traffic. Today the area covers more than 30 city streets or 79,671 m^2. Access to the ecological zone is restricted to pedestrians and cyclists, with the exception of deliveries between 9.00 am and 11.00 am. This measure has increased pedestrian areas by 550%. Four "Kavalir" electric vehicles are available to transport pedestrians around the zone free of charge. On average they carry 300 passengers a day.

Within the ecological zone, the embankments along the Ljubljanica have been renovated and repurposed, and five new bridges have been built connecting all the key areas of the city centre. This has created a high-quality public space enabling full accessibility and shortening routes for pedestrians and cyclists. The City of Ljubljana received the European Prize for Urban Public Space 2012 for this renovation and the establishment has also been promoted as an example of good practice in the "Slovenia Reduces CO_2" national project.

District heating

The improvement to Ljubljana's air quality is mostly a result of the use of ecologically more acceptable fuels in the city CHP plant Termoelektrarna Toplarna Ljubljana and an intensive campaign to connect buildings to the district heating system. Today the City of Ljubljana has a well-developed district heating and natural gas distribution system, which provides heating for around 74% of dwellings. In terms of the accessibility of the district heating system, efficiency of the distribution network and sales figures, it is among the more advanced supply systems in Central Europe.

It is also highly energy efficient. Termoelektrarna Toplarna Ljubljana is the biggest, highly-efficient cogeneration facility in Slovenia, producing electricity and heat in cogeneration. Its main energy sources are coal and wood biomass. With existing coal technology it achieves a saving of over 18% of primary energy, which is above the 10% limit value referred to by EU Directive 2004/8/EC. Cogeneration using wood biomass contributes around 40% of green electricity in Slovenia and accounts for nearly half of heat production in district heating systems in Slovenia. In the City of Ljubljana there is also a supporting energy facility, the Šiška CHP plant, which is also a high-efficient producer of heat and electricity.

- 1991 Start of operation of the first phase of Ljubljana CTP.
- 1997 Start of groundwater quality monitoring.
- 1998 Start of surface water quality monitoring.
- 2004 Adoption of the Waters Act transfers jurisdiction over water sources to the National level.
- 2004 Adoption of the Decree on the Water Protection Area for the Ljubljansko Polje aquifer.
- 2005 Start of operation of the second phase of Ljubljana CTP.
- 2006 Adoption of the Decree on Drinking Water Supply.
- 2006 Adoption of the Decree on the Discharge and Treatment of Urban Waste Water and Meteoric Water.
- 2007 Adoption of Environmental Action Programme for the City of Ljubljana 2007–2014, where ensuring the long-term supply of natural drinking water is one of the city's strategic objectives.
- 2008 Construction of a drinking water supply and sewerage system with a biological treatment plant on Šmarna Gora (676 m).
- 2008 Construction of a new drinking water supply system with pumping station on the summit of Rožnik (394 m).
- 2008 Start of construction of a new sewerage network in the Rakova Jelša area.
- 2011 Start of operation of a waste water treatment plant from the Barje non-hazardous waste landfill.
- 2011 Creation of the Cevko.si website, intended to educate, entertain and raise awareness among children aged 6–10.
- 2012 Creation of the www.primavoda.si website, offering general information on water as well as interesting and interactive content.
- 2014 Adoption of new Decree on Drinking Water Supply in the City of Ljubljana.
- 2014 Adoption of Environmental Action Programme for the City of Ljubljana 2014–2020, where the long-term protection of water sources is one of the city's strategic objectives.
- 2014 Introduction of obligatory payments for emptying septic tanks.
- 2016 Construction of tertiary phase of Ljubljana CTP and an increase of capacity to 550,000 PE.

Water Quality

Ljubljana's natural drinking water is an irreplaceable and priceless asset, and a precious legacy left to us by past generations. Global consumption of drinking water is increasing rapidly and a large portion of the population is already facing water shortages. The appropriate protection of water sources is therefore crucial. The water quality in the City of Ljubljana's watercourses is mostly dependent on the water level. When water levels are low and temperatures are high, further deterioration to the water quality can be caused by pollution from urban waste water, which is a source of phosphates, ammonium and other substances. An effective sewerage system is therefore a very important part of municipal infrastructure and helps the city reduce human impacts on the environment. It contributes to the safety and quality of the living environment and reduces risks that could threaten the health of the inhabitants.

DRINKING WATER

Ljubljana is one of the few capital cities in Europe where its inhabitants are supplied with untreated drinking water straight from the tap. The underground water sources, which are located in the immediate vicinity of the city and beneath it, belong to two different ecosystems: the Ljubljansko Barje marshes (a Natura 2000 area) and the gravel plain of Ljubljansko Polje. Both of these aquifers, which store large quantities of groundwater, are fed by rivers and precipitation. Drinking water in Ljubljana has a good calcium and magnesium content and a pleasant refreshing taste. This is a result of a constant temperature, a favourable level of oxygen dissolved in the water, and its microbiological purity.

The drinking water supply system in the City of Ljubljana consists of a central water supply system and in suburban areas of smaller, local water supply systems and private systems. The water source for the central water supply system is supplied by five waterworks: Kleče, Hrastje, Jarški Prod, Šentvid and Brest. The local water supply systems and private systems are fed by their own local water sources, mostly springs or wells. Unlike the central water supply

system, the water in the smaller water supply systems is chlorinated. In the City of Ljubljana each inhabitant consumes between 115 and 130 litres of drinking water per day, although this figure increases to around 200 litres when industrial and other uses are taken into account. Opinion surveys show that Ljubljana's inhabitants are satisfied with the water supply system. On a scale from one to a maximum of five, they give it a rating of four.

Drinking water sources in Ljubljana and the surrounding area are safeguarded by water protection areas, in which all activities or development that might threaten the quality or quantity of water from the sources are prohibited or limited. Activities are very strictly limited in the immediate vicinity of waterworks and pumping stations, while regulations become less stringent as the distance from them increases. Ljubljana's drinking water contains no harmful microorganisms or parasites at any stage of development. It is also free of substances that alone or in combination with other substances could be harmful to human health.

Drinking water compliance controls are conducted in accordance with drinking water supply legislation that requires the application of HACCP (an international food safety management system). Internal controls include the monitoring of microbiological, physical and chemical parameters. The basic method for determining the compliance and health suitability of drinking water is regular microbiological and physico-chemical testing. Testing covers a specific number of microorganisms and parameters such as colour, visible impurities, odour, turbidity, pH, conductivity, total organic carbon, ammonium, nitrites and nitrates. Controls also include periodic tests covering a wider range of parameters, such as metals and non-metals, pesticides and their metabolites, and volatile hydrocarbons.

The percentage of non-compliant samples taken from the central water supply is very low.

In 2010, in order to further enhance the saving of drinking water, the City Council adopted the Ordinance on the Urban Master Plan of the City of Ljubljana – Implementing Plan. The Urban Master Plan determines that buildings with a gross floor area of more than 1,500 m^2 must have a system for the collection, storage and use of rainwater. The users of processing water must use closed systems that recycle the consumed water, and the water losses in the water supply network must be reduced. Slovenia's largest multi-purpose stadium, Stožice Centre, was built in 2010 and already has rainwater collectors that are used to irrigate the football pitch and other green areas.

Regular microbiological testing of Ljubljana's central water supply system and ratio of non-compliant samples

Year	No. of samples taken	No. of non-compliant samples	Non-compliance percentage
2010	2,235	33	1.5
2011	2,283	29	1.3
2012	2,258	34	1.5
2013	2,204	57	2.6
2014	2,311	87	3.8

GROUNDWATER

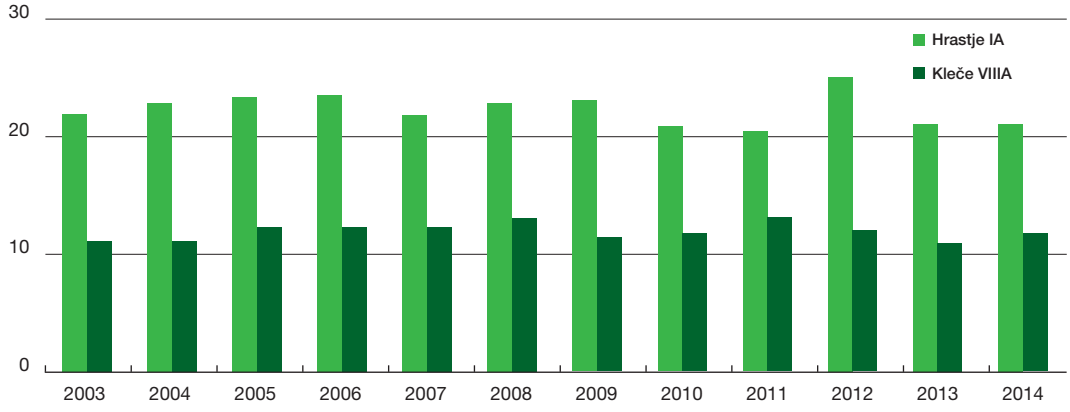
We started to monitor groundwater quality in 1997. The control measurements are designed to monitor the quality of the groundwater from the Ljubljansko Polje and Ljubljansko Barje aquifers, which are the main sources of drinking water for the city. Since 2008 groundwater monitoring has been carried out at fourteen monitoring sites, which include six wells intended for the public drinking water supply system and eight boreholes. The testing includes physico-chemical parameters, mineral oils, halogen compounds, pesticides, halogenated hydrocarbons and chromium.

„ Ljubljansko Polje and Ljubljansko Barje aquifers are the main sources of drinking water for the city.

Nitrates

Nitrates are present in underground water mostly as a result of inappropriate and/or excessive fertilization and poor and/or, in some places, outdated sewage systems. Since 2009 the permitted limit value of 50 mg/l has not been exceeded at any monitoring site. A significant fall in average annual nitrate levels has been recorded at the Brest IA well, while average annual levels have also slightly decreased at the Jarški Prod III and Šentvid IIA monitoring sites. A decreasing trend has also been observed at the Petrol monitoring site on Celovška Cesta. At other monitoring sites the average annual levels of nitrates are fluctuating, so no explicit increase or decrease trend can be determined.

Nitrates concentration (Kleče VIIIA and Hrastje IA, mg/l)



Pesticides

Pesticides and their metabolites appear in groundwater usually as a result of unprofessional and excessive use in agriculture and in non-agricultural areas, such as public green areas, gardens and roads. In 2014 the permitted limit value for the sum of pesticides (0.5 µg/l) was not exceeded at any monitoring site. Since 2009 a decrease in the average annual levels of atrazine and desethyl-atrazine has been determined at the Hrastje IA and Brest IA monitoring sites. In 2014 the permitted limit value for atrazine was slightly exceeded only in a single sample from the BŠV-1/99 borehole and Hrastje IA monitoring site, while desethyl-atrazine only exceeded limit values at the Brest IA monitoring site. The Brest IA well is not included in the central water supply system. In the groundwater, the occasional appearance of metazachlor, metolachlor ESA, metolachlor, propazine and bentazone at low concentrations has also been detected.

Volatile halogenated hydrocarbons

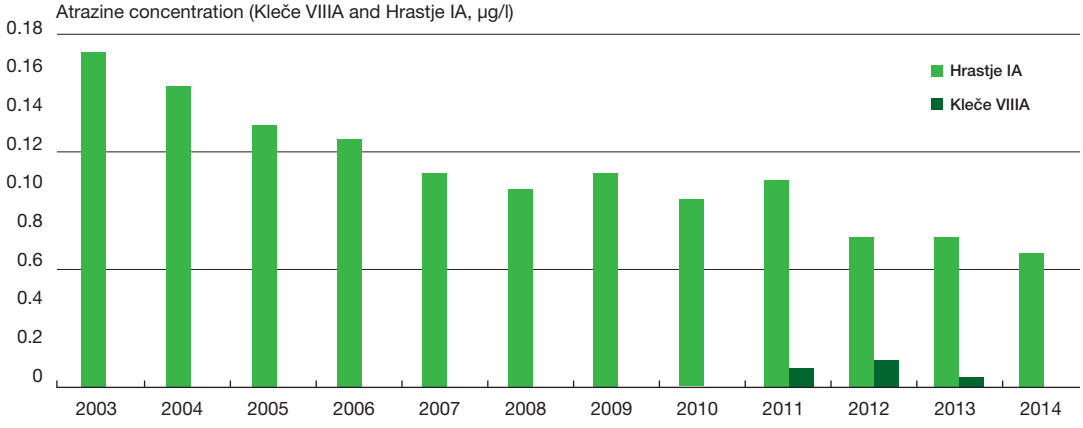
Volatile halogenated hydrocarbons (VHH) are mostly used in industry and handicrafts (dry cleaner's shops, metal processing and the like) for degreasing. Tetrachloroethene, trichloroethene and trichloromethane are present at very low concentrations throughout the Ljubljansko Polje aquifer. The permitted limit value for the sum of VHH (10 µg/l) has not been exceeded at any monitoring site since 2009. There has been a significant drop in the sum of VHH concentration at the Hrastje IA well since 2009, while at other monitoring sites the levels are fluctuating, so no explicit increase or decrease trend can be determined.

Chromium

There has been a slight decreasing trend in the average annual levels of total chromium at the Hrastje IA and Brest IA monitoring sites since 2009. In 2014, the limit value for drinking water (50 µg/l) was not exceeded at any monitoring site. At the other monitoring sites the average annual levels of chromium are fluctuating, so no explicit increase or decrease trend can be determined. The hexavalent form of chromium is present at the Hrastje IA well and at the LMV-1 Mlekarne, BŠV-1/99 and Pincome 1/10 Geološki Zavod boreholes.

Chlorides

Chlorides appear in groundwater as a consequence of winter salting of roads. The limit value for drinking water (250 mg/l) has not been exceeded at any monitoring site. The regulation on Drinking Water ranks chlorides among indicator parameters whose limit values do not present a direct danger to human health.



SURFACE WATERS

We have been monitoring surface water quality since 1998. The main purpose of the monitoring is to determine water quality at places used for bathing – in the Ižica, Gradaščica, Mali Graben, Ljubljanica and Sava watercourses. We also monitor the impact of the Barje landfill on water quality in the Curnovec stream and the Ljubljanica river. The monitoring of surface watercourses includes physico-chemical parameters, microelements in water and sediments, microbiological parameters and various pollutants such as detergents, phenols and mineral oils.

The results of monitoring in the City of Ljubljana show a significant improvement in water quality in the Sava river, Ljubljanica river and Gradaščica river upstream of Ljubljana, while the condition of the Gradaščica before the point where it joins the Ljubljanica is deteriorating. There is too little data available to be able to make a more accurate assessment of the trends.

Sava

The measured concentrations of ammonium, nitrates, total organic carbon and biological oxygen demand do not indicate major pollution of the watercourse. Oxygen conditions in the Sava river are acceptable and so is the concentration of total phosphorus. Occasionally, excessive levels of mercury are recorded in the water. The microbiological conditions in the watercourse periodically satisfy the criteria for bathing water. Endocrine disruptors (4-nonylphenol) have not been recorded, but various pharmaceutical substances (caffeine, theophylline, triclosan and trimethoprim) do occasionally appear in the water.

Ljubljanica

There are several watercourses that affect the quality of the Ljubljanica river, with outflow from the Mali Graben having a particularly negative effect. The concentration of dissolved oxygen in the river (which depends on the hydrological conditions and the amount of precipitation) is appropriate, except at the monitoring site downstream of the discharge from the Ljubljana CTP. Ammonium in the water was recorded after the confluence with the Mali Graben, but does not exceed the permitted levels. The Ljubljanica is characteristically affected by organic pollution, although conditions have recently improved with the upgrade of the sewerage system and the construction of new water treatment plants. Concentrations of microelements, detergents, phenols and mineral oils are mostly at the detection limit of the measuring methods utilised. The results of microbiological studies indicate a low level of new faecal contamination downstream of the discharge from the Ljubljana CTP and a high level of contamination downstream from the confluence with the Mali Graben at Špica. With regard to the requirements of the Decree on the Management of Bathing Water Quality, microbiological conditions upstream of Ljubljana are for the most part compliant. Endocrine disruptors have not been recorded, but various pharmaceutical substances (diclofenac, carbamazepine, sulfamethoxazole, triclosan, caffeine, paracetamol, theophylline and trimethoprim) do occasionally appear in the water.

Gradaščica

Because concentrations of biodegradable organic matter (carbon and nitrogen compounds) are not exceeded, the oxygen conditions in the water are acceptable. The watercourse becomes polluted on its way through the city, as part of the urban waste water is still discharged into it. This results in a high phosphorus content overall. These levels exceed the permitted limit value of 0.2 mg/l before the confluence with the Ljubljanica, where increased concentrations of ammonium are also recorded. Occasionally, upstream of Ljubljana, excessive levels of mercury are recorded in the water. Microbiological conditions in the watercourse do not currently satisfy the criteria for bathing water.

Assessment of chemical status of surface watercourses

Watercourse	Monitoring point	2007	2008	2009	2010	2011	2012	2013	2014
Sava	before the Črnuče bridge	good	good	good	poor	good	good	good	good
Ljubljanica	before the confluence with the Bezlanov Graben	good	good	good	poor	good	good	good	good
	after the confluence with the Mali Graben	good	good	good	good	good	good	good	good
	Zalog after the CTP	good	good	good	poor	good	good	good	good
Gradaščica	before Ljubljana	good	good	good	poor	good	good	good	good
	before the confluence with the Ljubljanica	good	good	good	poor	good	good	good	good

Assessment of compliance with bathing water criteria

Water-course	Monitoring point	2007	2008	2009	2010	2011	2012	2013	2014
Sava	before the Črnuče bridge	not accept-able	not accept-able	not accept-able	occa-sionally accept-able	accept-able	accept-able	accept-able	not ac-ceptable
Ljubljanica	before the confluence with the Bezlanov Graben	not accept-able	not accept-able	not accept-able	occa-sionally accept-able	occa-sionally accept-able	not ac-ceptable	not ac-ceptable	not ac-ceptable
	after the confluence with the Mali Graben	not accept-able	not accept-able	not accept-able	accept-able	occa-sionally accept-able	not ac-ceptable	not ac-ceptable	not ac-ceptable
	Zalog after the CTP	not accept-able	not accept-able	not accept-able	not accept-able	not ac-ceptable	not ac-ceptable	not ac-ceptable	not ac-ceptable
Gradaščica	before Ljubljana	not accept-able	not accept-able	not accept-able	not accept-able	occa-sionally accept-able	not ac-ceptable	not ac-ceptable	not ac-ceptable
	before the confluence with the Ljubljanica	not accept-able	not accept-able	not accept-able	not accept-able	occa-sionally accept-able	not ac-ceptable	not ac-ceptable	not ac-ceptable

WASTE WATER

Once used, drinking water becomes urban waste water and together with industrial wastewater and stormwater finds its way into the public sewerage network. The water cycle can only be properly completed when all the waste water is treated in a waste water treatment plant before being released back into the environment.

The treatment and discharge of waste water in the City of Ljubljana takes place via the central sewerage system and three local sewerage systems. At the end of 2014, 89% of households in City of Ljubljana area were connected to the public sewerage system. If we take into account all compact settlements of urban character, the number rises to 92.7%.

The mysteries of the sewerage system lie hidden beneath the city streets.

The Ljubljana CWWTP (central waste water treatment plant) is a combined mechanical/biological treatment plant with a capacity of 360,000 PE and is designed to remove suspended solids and carbon compounds and provide nitrification. It also treats the sludge from septic tanks and small urban waste water treatment plants. At present 82.8% of Ljubljana's households are connected to the Ljubljana CWWTP, which is the largest in Slovenia and on average treats 80,000 m^3 of waste water per day. Waste water treatment begins with the removal of suspended solids such as large particulates and fats. Mechanical treatment is followed by biological treatment, which takes place in aeration tanks using activated sludge made up of microorganisms. The activated sludge is then separated from the purified water. The urban water cycle is completed when purified water is released into Ljubljanica river.

The treatment of the excess sludge formed during the above processes involves anaerobic stabilisation in heated digesting plants, the mechanical compacting, and drying to a dry matter content of over 90%. As a result of the proper treatment, the dried excess sludge becomes a useful waste product. The biogas produced during the anaerobic process is used to dry the sludge and heat the digesting plants.

A small amount of urban waste water, the part that is not connected to the central sewerage system, is treated at local treatment plants as follows: 2.8% of inhabitants of the City of Ljubljana are connected to the Brod WWTP, with a capacity of 5,800 PE, 0.4% to the Gameljne WWTP with a capacity of 1,500 PE and 2.8% to the Črnuče WWTP, with a capacity of 8,000 PE. All three local treatment plants provide secondary treatment of the waste water. In areas with low population density, where the construction of sewerage systems is not planned due to the lack of profitability, small urban waste water treatment plants must be installed for new constructions.

The average age of the sewerage system in the City of Ljubljana is almost 40 years. The sewerage system is also affected by surface runoff, which has increased significantly over the past few decades, while the distribution of rainfall during the year has altered under the influence of climate change.

In 2014, around 20,000,000 m^3 of urban waste water and industrial waste water was generated in Ljubljana, with 62.4% attributed to households, 22.6% to service activities and 15% to industry. In the City of Ljubljana all industrial wastewater is treated before being released into the environment. In 2014, urban waste water treatment plants in the City of Ljubljana treated a total of 31,667,000 m^3 of urban waste water, industrial waste water and stormwater. By far the largest share of waste water (94.7% or 29,991,000 m^3) was treated at the Ljubljana CWWTP.

Urban waste water treatment plants operate in accordance with EU guidelines and Slovenian legislation. Minor deviations are occasionally recorded at the Brod WWTP, which is planned for closure after it is connected to the central sewerage network.

Quantity of treated waste water and treatment effect at individual TPs in 2014

	Ljubljana CWWTP	Črnuče WWTP	Brod WWTP	Gameljne WWTP
Quantity of treated waste water (m^3/year)	29,991,000	810,000	753,000	113,000
Treatment effect – COD	94.2	93.5	83.2	97.7
Treatment effect – BOD5	97.7	95.2	86.7	97.8

Water Quality Measures

Central treatment plant

The Ljubljana CWWTP (central waste water treatment plant) is a combined mechanical/biological treatment plant and is designed to remove suspended solids and carbon compounds and provide nitrification. The treatment of the excess sludge formed during the purification of water involves anaerobic stabilisation in heated digesting plants and the mechanical condensation and drying of the sludge to a dry matter content of over 90%. As a result of the proper treatment, the dried excess sludge becomes a useful waste product. The biogas produced during the anaerobic process is used to dry the sludge and heat the digesting plants.

Preparations for the introduction of tertiary phase of treatment are already under way. With the implementation of the project we will:

- increase the capacity of the Ljubljana CWWTP, which is necessary for the connection of new users,
- complete construction of tertiary phase of treatment facilities and
- make the necessary adjustments to the existing equipment.

The results of the monitoring indicate that the Ljubljana CWWTP does not cause excessive environmental pollution and that all the measured levels of emissions into water and the atmosphere are within the permitted limits. The results also indicate that the technological processes at the treatment plant do not affect the quality of groundwater in the surrounding area.

The Ljubljana CWWTP treats around 80,000 m^3 of waste water per day. The design capacity of the current treatment plant is 360,000 PE.

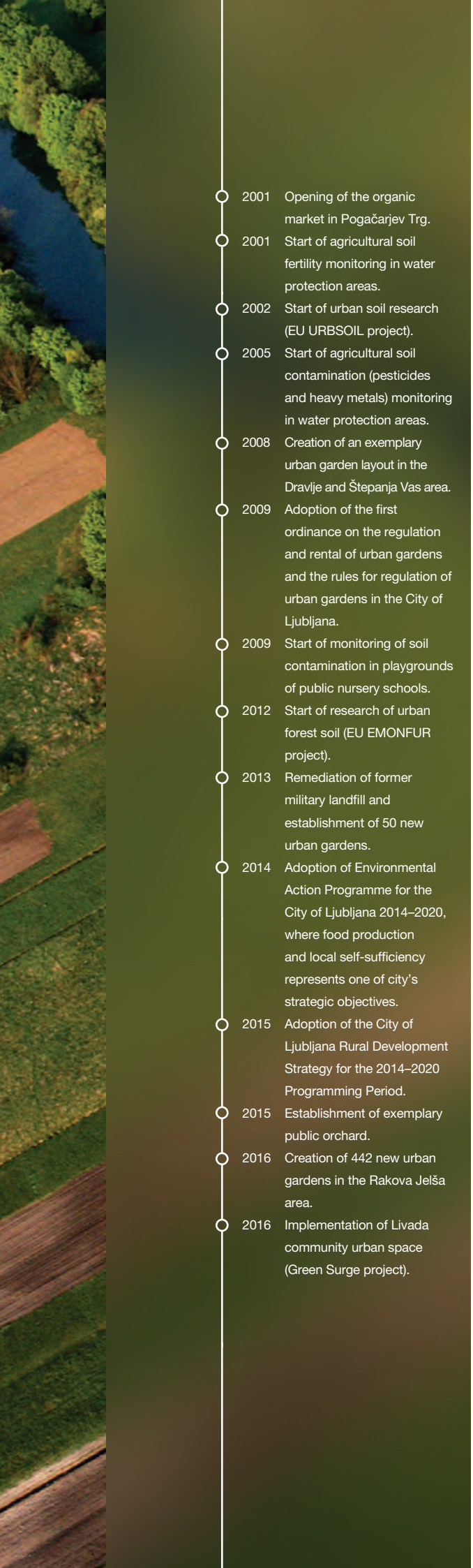
Public drinking fountains

In the hot summer days it is nice to refresh oneself with quality drinking water from the Ljubljana's fountains distributed all over the city centre and other parts of the city. The exact locations of the drinking fountains can also be located using the Tap Water Ljubljana mobile application. The water from the fountains is monitored and can therefore be completely trusted. Public drinking fountains do not serve only as urban decorations, they also remind us of the excellent quality of Ljubljana's drinking water. The public drinking fountains transmit the message that water is a natural resource which must be accessible to everyone. But it has its price, and we must protect and respect it. The list of active public drinking fountains is available on the website of the public water management company.

WATER project

The central element of the WATER project is the WATER exhibition, which presents the role of water in the past and present and the importance of preserving water for the future. Visitors can learn about the importance of water within the water cycle, ecology and the protection of drinking water in the experimental room of the City Museum of Ljubljana, which will also serve as a platform for various educational programmes designed for nursery, primary and secondary schools and families.

The project also includes a specially designed "Museum Water" bottle, which aims to encourage people to treat water with respect and care and protect it for the future. The bottle features the handprint of a villager from the Nuba Mountains, where access to drinking water is difficult. The imprint of the hand on the bottle carries a symbolic message – that drinking water is a symbol of life and the essence of humanity's future, and that we must therefore always be aware of its preciousness and the fact that it is not available in abundance everywhere on our planet. The Museum Water bottle can be bought at the City Museum of Ljubljana shop and selected locations around Ljubljana.



2001 Opening of the organic market in Pogačarjev Trg.
2001 Start of agricultural soil fertility monitoring in water protection areas.
2002 Start of urban soil research (EU URBSOIL project).
2005 Start of agricultural soil contamination (pesticides and heavy metals) monitoring in water protection areas.
2008 Creation of an exemplary urban garden layout in the Dravlje and Štepanja Vas area.
2009 Adoption of the first ordinance on the regulation and rental of urban gardens and the rules for regulation of urban gardens in the City of Ljubljana.
2009 Start of monitoring of soil contamination in playgrounds of public nursery schools.
2012 Start of research of urban forest soil (EU EMONFUR project).
2013 Remediation of former military landfill and establishment of 50 new urban gardens.
2014 Adoption of Environmental Action Programme for the City of Ljubljana 2014–2020, where food production and local self-sufficiency represents one of city's strategic objectives.
2015 Adoption of the City of Ljubljana Rural Development Strategy for the 2014–2020 Programming Period.
2015 Establishment of exemplary public orchard.
2016 Creation of 442 new urban gardens in the Rakova Jelša area.
2016 Implementation of Livada community urban space (Green Surge project).

Soil

Soil is the result and source of numerous interactions between the atmosphere, the hydrosphere, the lithosphere and the biosphere. It is a highly complex, variable and living medium. It performs numerous functions including food production, the production of biomass and the filtration and transformation of numerous substances, including water and carbon. It is also a habitat, a gene bank and a source of mineral raw materials. Last but not least, it makes numerous human activities possible.

Agricultural soil

We have been monitoring the fertility of agricultural soil in water protection areas in the City of Ljubljana since 2001. Monitoring is based on the periodic (four-year) sampling of agricultural land. Every year we test 60 locations of agricultural land use, which means that 240 locations of agricultural land use are included in the four-year cycle of monitoring agricultural soil fertility. The fertility of agricultural soil is determined through chemical soil analysis. The owners of the sampling locations are informed in person of the results of the analysis and, if necessary, recommendations on environmental friendly fertilisation are written down. The four-year soil sampling cycle allows us to very quickly detect changes in agricultural soil fertility.

Another positive aspect of the monitoring is the regulation of fertilisation in greenhouses. For example, the first few years of monitoring revealed that the soil in greenhouses is over-fertilised. For this reason, since 2007 we have regularly monitored the level of plant nutrients in the soil in selected greenhouses. During the growing season we also monitor the presence of nitrate nitrogen in the soil using soil nitrate "quick tests".

The results of the monitoring show a significant improvement in the use of fertilisers in water protection areas. Farmers are becoming increasingly aware of the importance of chemical soil analyses and consequently pay more attention to the results of the analyses and to fertilisation recommendations. They are also well informed about fertilisation restrictions on

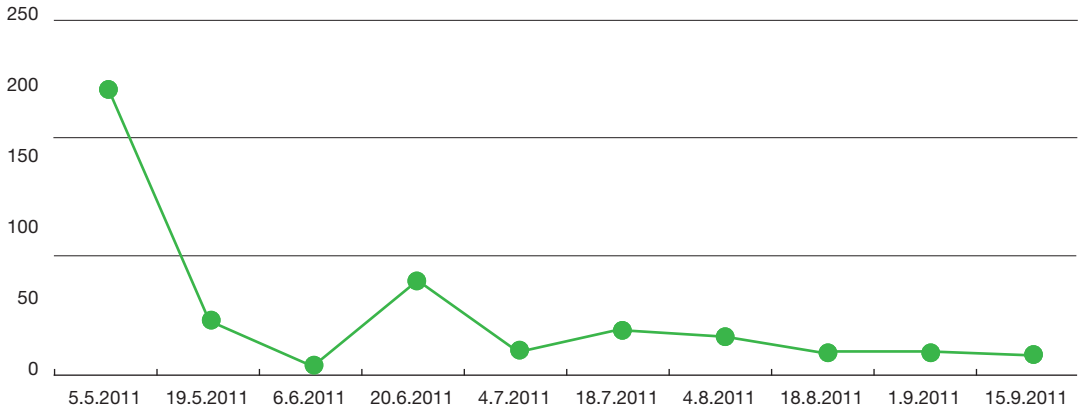
water protection areas. The decrease of nutrient levels, particularly of nitrate nitrogen, in the soil indicates that the use of fertilisers has improved considerably in recent years, even for greenhouse production, mostly due to the one-on-one counselling and intensive education efforts focused on the farmers.

Since 2005 we have also been monitoring the level of contaminants in agricultural soil on water protection areas. The aim of the research is to determine the level of contamination with plant protection products (PPPs) and heavy metals, and then draw up guidelines or adapt existing guidelines for environmentally friendly farming. Selected soil samples are tested for the presence of PPPs twice a year, once before the first application of PPPs and once after the harvest. The heavy metal content is tested only once a year, after the harvest.

Between 2005 and 2014 we analysed a total of 183 agricultural soil samples. The presence of PPP residues was recorded in 24% of all the spring samples and 26% of all the autumn samples analysed. A total of 14 different active substances were recorded in the spring soil samples and 11 different active substances in the autumn soil samples. The concentrations of active substances recorded in the soil are very low. The majority were in fact below the detection limit of the analytical method, which means that the residue concentrations did not represent a risk for environmental pollution. All the active substances detected are permitted in Slovenia and are active substances that are frequently used in farming and gardening to protect plants against weeds.

„ The results of monitoring show a significant improvement in the use of fertilisers in water protection areas.

Nitrate nitrogen dynamics in greenhouse soil during the crop growing season (kg NO_3-N/ha)



Results of agricultural soil analysis

Year	No. of locations	No. of active substances analysed	SPRING			AUTUMN		
			PPP residues absent SPRING	PPP residues present SPRING	No. of active substances found SPRING	PPP residues absent AUTUMN	PPP residues present AUTUMN	No. of active substances found AUTUMN
2005	10	19	8	2	4	5	5	4
2006	21	24	13	8	4	14	7	3
2007	21	30	16	5	3	18	3	3
2008	21	35	17	4	4	18	3	4
2009	21	35	18	3	3	9	12	8
2010	17	35	13	4	4	13	4	3
2011	18	50	13	5	3	15	3	3
2012	18	50	14	4	5	16	2	2
2013	18	50	13	5	7	12	6	4
2014	18	50	14	4	4	15	3	2
Total	183		139	44		135	48	

In addition to the presence of PPPs, we are also monitoring the presence of 11 heavy metals. Between 2005 and 2014, elevated concentrations were recorded of five heavy metals. Increased concentrations were most often recorded for lead and mercury, followed by cadmium, zinc and copper. The increased concentrations of certain heavy metals in the soil can also be a result of the presence of pollution sources in the immediate vicinity (roads, etc.), since agricultural land in the City of Ljubljana extends deep into urban areas. It is very encouraging that, from all the soil samples analysed, we recorded only one instance where the critical level for a heavy metal (zinc) was exceeded. The reason for this was probably due to many years of using composted livestock manure, which can contain heavy metals (including zinc).

Heavy metals in the upper soil layer of agricultural land (2005-2014, mg/kg)

Heavy metal	LV-limit value	WV-warning value	CV-critical value	No. of samples analysed	Distribution of soil samples			
					LV not exceeded	LV exceeded	WV exceeded	CV exceeded
lead	85	100	530	183	174	3	6	0
mercury	0.8	2	10	183	174	8	1	0
cadmium	1	2	12	183	177	5	1	0
zinc	200	300	720	173	171	0	1	1
copper	60	100	300	183	182	0	1	0
arsenic	20	30	55	183	183	0	0	0
cobalt	20	50	240	183	183	0	0	0
chromium 6+	-	-	25	183	183	0	0	0
total chromium	100	150	380	183	183	0	0	0
molybdenum	10	40	200	183	183	0	0	0
nickel	50	70	210	183	183	0	0	0

Presence of heavy metals and polycyclic aromatic hydrocarbons in urban soil (mg/kg)

Heavy metal	LV-limit value	WV-warning value	CV-critical value	No. of samples analysed	Distribution of soil samples			
					LV not exceeded	LV exceeded	WV exceeded	CV exceeded
lead	85	100	530	130	34	52	44	0
zinc	200	300	720	130	103	22	5	0
copper	60	100	300	130	111	17	2	0
cadmium	1	2	12	130	116	13	1	0
total chromium	100	150	380	130	127	2	1	0
nickel	50	70	210	130	130	0	0	0
polycyclic aromatic hydrocarbons	1	20	40	28	18	10	0	0

Urban soil

Analyses of urban soil in the City of Ljubljana indicate that soil in the centre of the city is the most contaminated. Increased levels of contaminants also appear in places along roads and in industrial zones. There are no significant differences between land use categories.

The results of analyses of the content of selected heavy metals in soil indicate that soil is most often contaminated with lead, followed by zinc, copper, cadmium, and chromium. The limit immission value for nickel was not exceeded at any location. Increased levels of polycyclic aromatic hydrocarbons were also recorded at a small number of monitoring sites, but the warning and critical levels were not exceeded at any of the sampling locations.

Due to the possibility of children ingesting dangerous substances (from dirty hands or by breathing in soil dust particulates), we have been monitoring the condition of the soil in the playgrounds at public nursery schools. The results of analyses of the soil quality in 49 of the 92 playgrounds of public nursery schools are similar to the results of the analyses of urban soil – the most contaminated soil is in the city centre. To date, we have recorded two instances of critical levels of heavy metals (zinc and lead) being exceeded in playground soil. In both cases, further analysis revealed that the contaminated soil had been brought from elsewhere. Moreover, in both cases, remediation was carried out and playgrounds are now safe for children's play. One of the potential sources of soil contamination was the past use of sand from the Mežica Valley (the site of the Mežica lead and zinc mine) in playground sandpits.

Forest represents one of the most sustainable areas in the City of Ljubljana.

Presence of heavy metals and organic substances in soil in playgrounds at public nursery schools at a depth of 0–10 cm (2002–2015, mg/kg)

Heavy metal	LV-limit value	WV-warning value	CV-critical value	No. of samples analysed	Distribution of soil samples			
					LV not exceeded	LV exceeded	WV exceeded	CV exceeded
zinc	200	300	720	70	47	14	8	1
lead	85	100	530	70	43	9	17	1
cadmium	1	2	12	70	58	7	5	0
copper	60	100	300	70	61	8	1	0
polycyclic aromatic hydrocarbons	1	20	40	55	39	8	0	0
mercury	0.8	2	10	35	34	1	0	0
total DDT/DDD/DDE	1	2	4	35	34	1	0	0
nickel	50	70	210	55	55	0	0	0
total chromium	100	150	380	55	55	0	0	0
arsenic	20	30	55	35	35	0	0	0
cobalt	20	50	240	35	35	0	0	0
molybdenum	10	40	200	35	35	0	0	0
polychlorinated biphenyls	0.2	0.6	1	35	35	0	0	0
HCH compounds	0.1	2	4	35	35	0	0	0
total "drins"	0.1	2	4	35	35	0	0	0

Forest soil

The forest soil influences the state of forests and processes in forests, or more specifically, in the whole forest ecosystems. Since numerous plants, animals, fungi and microorganisms live in or on forest soil, it represents an essential part of the forest itself. The soil in the Tivoli, Rožnik and Šišenski Hrib Nature Park has proved to be well conserved and unpolluted, representing one of the most sustainable areas in Ljubljana.

The quantity of organic carbon (Corg) in the urban forest soil declines with depth. In the mineral part of the soil, at a depth of 20 to 30 cm, there is 10 times less carbon than in the Oh subhorizon (the subhorizon of humified organic matter). This indicates that the floor is a carbon sink, although the storage of carbon in the organic subhorizons (Ol, Of and Oh) is much higher. In certain sections of the Tivoli, Rožnik and Šišenski Hrib Nature Park, the mineralisation of organic matter is so rapid and intensive that, in places, Oh is entirely absent.

The level of the six analysed heavy metals (cadmium, chromium, copper, nickel, lead and zinc) in the forest soil did not exceed the limit values according to Slovenian legislation. At only one sampling location was the concentration of lead above the critical value for potentially toxic substances in soil. The location in question is close to an area that has served for several decades as a car park for people visiting the nature park.

Soil Quality Measures

Urban gardens

The primary purpose of urban gardening is to grow vegetables for one's own needs, while at the city level it represents an important opportunity to increase the level of self-sufficiency. Producing food in small areas is also an extremely important connecting activity, with strong potential for inter-generational cooperation and increased social integration, in particular for socially disadvantaged urban residents.

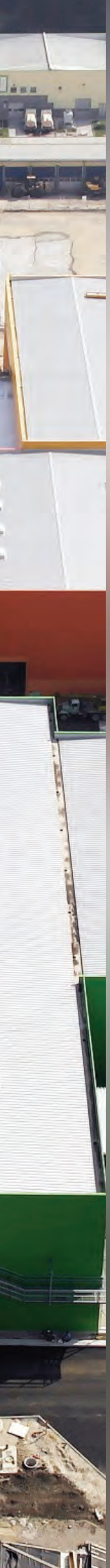
The Urban Master Plan of the City of Ljubljana – Implementing Plan identifies 46 ha of land that is suitable for the establishment of urban gardens. The 23 potential areas were selected on the outskirts of urban complexes, with account taken of the need for equal accessibility for all residents. The Urban Master Plan also envisages the establishment of urban gardens in certain residential areas or as an integral part of a major new park and sports/recreation areas. Temporary urban gardens may also be established in the locations where development projects will be carried out sometime in the future.

Due to high demand for urban gardens, which considerably exceeds the capacities available, private landowners are also encouraged to rent their non-cultivated land for urban garden purposes. The City of Ljubljana is helping these individuals, acting as an intermediary between owners offering non-cultivated agricultural land and people seeking to rent urban gardens, all in order to ensure that private urban gardens are regulated in accordance with the city's ordinance and in the public interest. This form of cooperation has now been established in almost all city districts.

Livada community urban space

Since 2013 we have been participating in the international Green Surge project, which is part of the 7th Green Cities Framework Programme. The City of Ljubljana's goal in this project is to establish an "Urban Learning Lab". The opening up of a space for public use not only prevents degradation, but also improves the quality of urban ecosystems. One of the challenges for the city's sustainable development is closer cooperation with its inhabitants. In the period up to 2018, and in cooperation with young people, we will establish a public green urban space in the Livada district, and at the same time explore whether this alternative form of management is appropriate for public urban green space management. The Green Surge project will result in the Livada community urban space, which will enable:

- the planning, establishment and use of a space suitable for its users – young people,
- a space where young people can actively spend their leisure time, with elements of the green economy,
- a common social space for the planned Ljubljana Youth Centres Network,
- the development of a healthy urban living space, local production of high-quality food and promotion of the biocultural diversity of the urban environment.



- 1987 Start of operation of the Barje non-hazardous waste landfill.
- 1995 Start of operation of the gas-fired power station at the Barje non-hazardous waste landfill.
- 2004 Adoption of the Ordinance on the Collection and Transport of Municipal Solid Waste – implementation of separate waste collection system.
- 2008 Construction of first underground collection point in Ljubljana.
- 2010 Adoption of the Ordinance on the Processing of Mixed Municipal Waste and the Disposal of Residues from the Processing or Disposal of Municipal Solid Waste.
- 2011 Start of operation of the first automatic rubbish collector, a special container with integrated compactor intended for the collection of residual mixed municipal waste.
- 2012 Adoption of the Ordinance on the Collection and Transport of Municipal Solid Waste.
- 2013 Start of operation of the Povšetova Reuse Centre.
- 2013 Start of mechanical processing of mixed municipal waste from households, small businesses and service activities.
- 2013 Start of operation of a new service/warehouse facility with a green roof and solar generator.
- 2014 Adoption of the Development Strategy for Waste Management Activities in the City of Ljubljana 2014–2035.
- 2014 Entry into the Zero Waste Europe network.
- 2016 Start of trial operation of RCERO Ljubljana.

Waste Treatment

While the amount of waste produced in the developed world continues to grow, there are signs that attitudes towards it are changing. Waste is no longer seen as something redundant that belongs only in increasingly full landfills, but as a potential raw material. That is why advanced societies are increasingly redirecting it to waste processing companies that use the most advanced technologies. Every single inhabitant of the City of Ljubljana can and should play a part in the process of transforming waste into reusable raw materials in the City of Ljubljana modern waste collection, separation and processing system.

Municipal waste

The system for the collection and transport of mixed municipal waste (residual waste) includes 99% inhabitants of the City of Ljubljana. Since 2008 we have been replacing ordinary containers in the centre of Ljubljana with underground collection points (there are currently 53 such points), thus rationalising waste management and improving the appearance of the city. Glass, packaging and paper can be deposited by anyone, while a card is required to deposit biodegradable and residual waste (available free of charge to all household users living in the area).

In 2014 just over 85,500 tons of waste were collected in the City of Ljubljana, of which 48,185 tons was separately collected from households (157 kg per inhabitant). The biggest share of separately collected waste from households is represented by biodegradable waste and packaging, followed by paper and glass with the smallest share. With the help of a "door-to-door" separate waste collection system, we are collecting more and more waste and delivering it for further processing or recycling.

The collection of separate fractions (paper, cardboard, packaging) is possible either at the user's home (household bins for packaging and, from 2013, also for paper) or at 2,628 collection points around the city, consisting of three colour-coded 1100-litre containers for paper and cardboard. The collection of residual waste

Underground collection points.

and biodegradable waste is provided by separate containers/bins of different sizes. A single collection point serves 117 inhabitants, which is significantly more than legislative requirements. In 2014 26,956 tons of packaging (41.3%), paper (40.9%) and glass (17.8%) were collected in the City of Ljubljana and 21,230 tons (69.05 kg/inhabitant) of biodegradable waste.

The City of Ljubljana operates two collection centres – the Barje Collection Centre and the Povšetova Collection Centre – where residents can deposit numerous types of waste in more than 30 containers free of charge. The collection centres also have a special section where items that are still useful can be deposited. Still-useful items such as clothes, footwear, furniture, kitchenware, toys, etc. are taken over by the Reuse Centre, which ensures that old or damaged items are given a second chance and find new owners.

Small items of electrical/electronic equipment and hazardous waste may also be deposited free of charge at a mobile collection point that is circulating around 18 locations in the City of Ljubljana according to a predetermined timetable. A total of 130 tons of hazardous waste were collected from households in 2014.

Removal of bulky waste is provided free of charge once a year for the inhabitants living in standalone housing and twice a year for inhabitants living in a multi-apartment buildings. Bulky waste removal must be ordered in advance via a special order form. Inhabitants can also deposit bulky waste free of charge at both collection centres. Collected bulky waste is carefully sorted, with still usable items being sent on for reuse and recycling.

In 2014, after ten years of separate waste collection system, the quantity of separately collected fractions in the entire area covered by the public company Snaga, grew from 16 to 145 kilograms per inhabitant (and to as much as 157 kg/inhabitant in Ljubljana). There has also been an increase in material recovery, which amounted to 53.7% in 2014. With more than 63% of separately collected waste, Ljubljana now ranks among the leading cities in Europe.

The reduction in quantities of residual waste is a consequence of more easily accessible infrastructure (door-to-door separate waste collection system) and very intensive communication activities by the public waste management company.

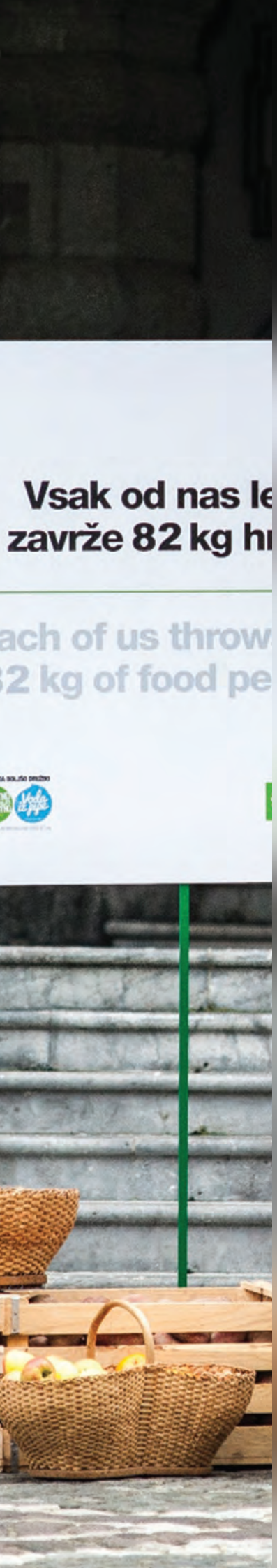
Illegal waste disposal sites

In the past we carried out several mappings of the locations of illegally waste disposal sites. The results of the mapping represent a source for a geo-information database of illegal waste disposal sites, which we update continuously. Through the systematic removal of illegal deposited waste, primarily construction waste and waste containing asbestos, we have already cleaned up the majority of the land owned by the City of Ljubljana. Due to successful remediation of the disposal sites, the restriction and prevention of new ones and intensive communication activities by the public waste management company, the number of illegal waste disposal sites has decreased markedly.

„ With more than 63% of separately collected waste Ljubljana ranks among the leading cities in Europe.

Quantities of removed illegally deposited construction waste and waste containing asbestos from land owned by the City of Ljubljana (t)

	2009	2010	2011	2012	2013	2014	Total
Construction waste	-	21,481	50,210	12,420	700	453	85,264
Waste containing asbestos	170	296	70	12	18	23	589



Waste Treatment Measures

Zero Waste Europe network

In 2014 Ljubljana become the first capital in the EU's Zero Waste Europe network. The Zero Waste initiative stands for zero waste for dumping grounds and incinerators. That means that the local community must first strengthen the first three priorities in waste management – prevention, re-usage and recycling. One of the city's priority objectives for the new long-term strategy for 2014–2035 is to reduce the quantities of waste and thus landfill. The objectives of the City of Ljubljana up to 2025 are: for the share of separate waste collection to exceed 75%, for the annual quantity of residual mixed municipal waste to be reduced to 60 kg and for less than 30 kg of waste per inhabitant to be deposited at landfill.

Food waste

At the end of 2014 the public waste management company Snaga launched an initiative called "Speak up against food waste", which includes waste containers that are "fed up" with our irresponsible behaviour, to draw attention to this problem and help inhabitants change their habits. Through various events and rubbish-bin protests, and by distributing free food storage containers, we are hoping to get the message across to the public along with tips on how to reduce food waste. At these events inhabitants are offered practical information on preparing shopping lists, planning menus, the proper arrangement of refrigerators, understanding food labels (expiry dates), and others.

Reuse Centre

The Reuse Centre has two missions. Its main purpose is to provide work for low-employability groups such as the elderly and the disabled, while on the other hand it offers a chance to reuse old, redundant or damaged items. The Reuse Centre is located at Povšetova 4 and was opened in 2013. It offers numerous items at a bargain price – from technical goods, furniture and clothing to a period analogue telephone, a leather armchair or an old radio. If you look more closely, you can find interesting items that have been repurposed by skilled craftsmen and artists, for example a shoe cupboard that used to be a gaming machine.

RCERO Ljubljana

The Ljubljana Regional Waste Management Centre (RCERO Ljubljana) is due to start operating at the end of 2015 and currently includes 37 municipalities. With a projected working life of 30 to 40 years, RCERO Ljubljana will provide a long-term waste management solution for almost 700,000 of Slovenia's inhabitants, or one third of its total population. It is the biggest Cohesion Fund project to date in Slovenia. The "waste recovery factory", as the RCERO is better known, will use the most up-to-date and sustainable waste management technology in Europe and will also provide green jobs. The most important components of the regional centre are three facilities for the mechanical and biological processing of biodegradable and residual waste.

- 1972 Adoption of the Ordinance on the Protection of the Zajčja Dobrava Nature Park.
- 1974 Adoption of the Ordinance Adopting the Land-Use Plan for the Area of the Polhov Gradec Dolomites Nature Park.
- 1984 Adoption of the Ordinance Proclaiming the Tivoli, Rožnik and Šišenski Hrib a Site of Natural Interest.
- 1988 Adoption of the Ordinance Designating the Path of Memories and Comradeship a Monument of National Importance.
- 2008 Adoption of the Decree on the Ljubljansko Barje Nature Park.
- 2008 Adoption of the Environmental Action Programme for the City of Ljubljana 2007–2014, where the protection of nature and green areas is one of the city's strategic objectives.
- 2010 Adoption of the Ordinance Proclaiming Special-Purpose Forests.
- 2011 Start of removal of giant hogweed (*Heracleum mantegazzianum*) from land owned by the City of Ljubljana.
- 2012 Inventory of harmful plants of the genus Ambrosia in the wider Ljubljana area.
- 2013 Start of removal of tree of heaven (*Ailanthus altissima*) from the Pod Turnom natural monument.
- 2014 Adoption of the Environmental Action Programme for the City of Ljubljana 2014–2020, where protecting the natural environment is one of the city's strategic objectives.
- 2015 Adoption of the Ordinance on the Tivoli, Rožnik and Šišenski Hrib Nature Park.
- 2015 Start of removal of invasive alien species from the protected Castle Hill area.
- 2016 Preparation of an action plan for eradication of the invasive alien species from land owned by the City of Ljubljana.
- 2016 Drafting of a management plan for the Tivoli, Rožnik and Šišenski Hrib Nature Park.

Nature

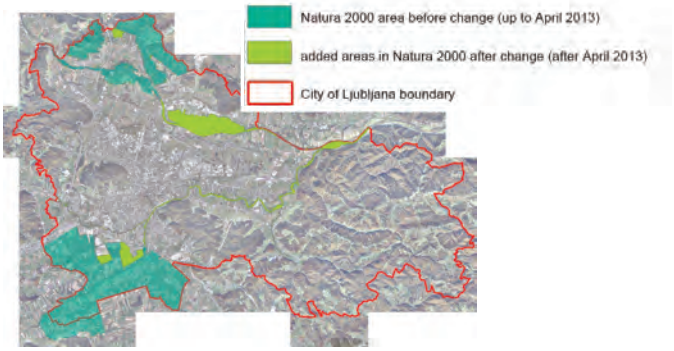
The natural environment's influence on the City of Ljubljana is significant and long-established. The city developed on a flat area, as the settlers avoided building on hilly areas and on the riverside. Today, the quality of life in Ljubljana is high due to the typical interaction of the constructed and natural environment and the great diversity and easy accessibility of valuable natural features.

Biodiversity

Because urbanisation has largely taken place on the flat basin floor, slightly fewer non-forest habitat types important for nature conservation have survived in the area. There are, however, some conserved non-forest habitat types within the City of Ljubljana that are important at the European level. These include wet mesotrophic and eutrophic grassland, oligotrophic wet grassland with purple moor grass, mesotrophic to eutrophic cultivated meadows, central European black alder and ash by running water, transitional wetlands, mat-grass swards and other types.

Forest habitat types that are in a healthy state and whose conservation is important at the European level include: central European acidophilus beech forests, lowland oak-hornbeam forests, thermophilic forests of mixed deciduous trees and red pine forests.

Due to good conservation of the natural environment, around 20% of the land within the City of Ljubljana is protected with natural environment status (Natura 2000, ecological areas and protected areas). Natura 2000 areas cover 13% of the entire area of the municipality. The largest Natura 2000 area in the municipality, the Ljubljansko Barje wetland has also been declared as a Special Protection Area, a potential Site of Community Interest, an ecologically important area and a protected nature park. Potential Natura 2000 areas in the City of Ljubljana are Šmarna Gora, Rašica and areas along the Sava River. There are also several locations within the City of Ljubljana that have been declared as ecologically important areas.



Map of Natura 2000 areas.

In the City of Ljubljana area you can visit and enjoy four protected landscapes or nature parks. Zajčja Dobrava is the oldest nature park in Ljubljana. Its proclamation as a protected landscape enabled the preservation of an area of native lowland forest that provides a green barrier between residential and industrial areas and is a favourite recreation and rest spot for city inhabitants. The Polhov Gradec Dolomites were proclaimed as a nature park more than thirty years ago. The protection regime has enabled the preservation of a sparsely inhabited landscape with exceptionally high biodiversity, including endemic species.

The Tivoli, Rožnik and Šišenski Hrib Nature Park lies right in the city centre. With more than 1.7 million visitors each year it is also the most frequently visited area in Slovenia. The area is covered with natural forest and is home to numerous species that are important in terms of nature conservation and appear on the Red List of endangered species. The recorded animal species include three species of beetle protected under the Habitats Directive. The populations of two of them, the European ground beetle (*Carabus variolosus*) and hermit beetle (*Osmoderma eremita*), have also proved to be important at the national level. A relatively small but stable stag beetle (*Lucanus cervus*) population can be found on older oaks on the margins of the park. Streams in the park are populated by the stone crayfish (*Austropotamobius torrentium*), which is listed in the Habitats Directive as a species of European importance, since it is critically endangered in some countries. This nature park is also a nesting area for two seriously endangered species, the common redstart (*Phoenicurus phoenicurus*) and the European green woodpecker (*Picus viridis*). In the area of the park it is still possible to observe the European pond turtle (*Emys orbicularis*). Plant species include the highly endangered bog arum or calla (*Calla palustris*) and three vulnerable species: the common sundew (*Drosera rotundifolia*), *Eleocharis carniolica* and the dogtooth violet (*Erythronium dens-canis*).

The city's fourth protected landscape, the Ljubljansko Barje Nature Park, covering 135 km^2, was declared in 2008. It is the largest area of wet grassland in Slovenia, with a system of hedgerows and forest, thicket and water-covered areas. Due to the extensive cultivation methods, high biodiversity has been maintained. The area is also a special protection area for 25 bird species. It is exceptional for its large number of natural features (59), natural monuments (9), nature reserves (6) and for the presence of a large number of endangered and internationally protected wild flora and fauna species (28), their habitats and habitat types (7) and for being an area of numerous cultural assets and a mosaic landscape, which is the result of the long coexistence between humans and nature.

Forests not only have important influence on the city's climate, but also protect water sources and prevent erosion. More than 46% of the total area of the City of Ljubljana is covered by native forest. In 2010 the City of Ljubljana declared almost 1,500 hectares of the forest as special-purpose forest. The special-purpose forests have an extremely important social function that must be considered when managing them.

There are different ways of monitoring the status of nature conservation, e.g. by inventorying animal and plant species, their habitats and ecosystems. The monitoring of the status of nature conservation and control over it also includes the monitoring of the status of habitat types. In 2002, the City of Ljubljana finished the first inventory of habitat types, covering 233 km^2. The inventory included 168 habitat types classified into 19 main types. An inventory of areas important from a conservation perspective followed in 2009 and by the nature conservation evaluation of previously recorded highly rated non-forest habitat types in 2010.

Birds are a good indicator of the state of nature conservation. The 2011 mapping of the birds of Ljubljana detected the presence of 161 different bird species which confirms the sustainable development of the city. Of these species, 104

Late spider orchid *(Ophrys holosericea)*.

nest in the city and 97 winter here. We are helping the birds by positioning nesting boxes at different location in the municipality, i.e. in Tivoli Park, where we have installed boxes for numerous songbirds and for tawny owls and nesting boxes for the little owl in the Ljubljansko Barje wetland.

Invasive alien plant species

The City of Ljubljana is also faced with the spread of invasive alien species. In recent years, most attention has been paid to the common ragweed (*Ambrosia artemissifolia*), mainly because it produces huge amounts of pollen in the autumn, thus afflicting millions of people who have allergies. Common ragweed is the only invasive alien species for which obligatory eradication has been prescribed in Slovenia. In 2012 we recorded 1,414 populations of ragweed in publicly accessible locations across 163.76 km^2 of mapping area. The densest populations and highest number of growths of ragweed in individual populations were recorded along railway lines and motorways. A total of 357 populations of ragweed were recorded on land owned by the City of Ljubljana and are regularly removed.

Since 2011 in cooperation with a non-profit organization, we have also been carrying out the eradication of giant hogweed (*Heracleum mantegazzianum*) from land owned by the City of Ljubljana. In Slovenia the plant is still limited to small number of growing sites. In the City of Ljubljana a larger population used to grow in the vicinity of the Botanical Garden. Since 2013 we have also been removing tree of heaven (*Ailanthus altissima*) from the Pod Turnom natural monument in the Tivoli, Rožnik and Šišenski Hrib Nature Park. The latest attempts of eradication are carried out on the Castle Hill area, which is protected as a cultural and historical monument and as a site of natural interest. There, we have also set up an "open-air laboratory", where we test different methods for removing Japanese knotweed (*Fallopia japonica*).

Between 2011 and 2015 we co-financed 19 projects of NGOs and non-profit organisations that included the removal of invasive alien plant species from the City of Ljubljana area.

„ Around 20% of land within the City of Ljubljana is protected with natural environment status.

Nature Conservation Measures

Protection of amphibians along Večna Pot road

Each spring, amphibians begin their annual migration from their winter quarters to their spawning sites. The parts of the road where the number of killed amphibians is highest are called "road mortality hotspots". One such road with a high amphibian mortality rate is also the Večna Pot road on the section along the perimeter of Ljubljana Zoo. In order to protect the amphibians, we set up a temporary protective fence each year in early spring and organise the transfer of amphibians across the road and back again. More than 4,000 amphibians were transported in the spring of 2015. The most numerous among them were the common toad (*Bufo bufo*), followed by the common frog (*Rana temporaria*) and the agile frog (*Rana dalmatina*).

Moor frog watch in Mestni Log

Very close to settlements in the Ljubljansko Barje area there lives a vital moor frog (*Rana arvalis*) population, which is on the Red List of endangered and rare species in Slovenia and is also listed by the Habitats Directives as a strictly protected species. Each spring at spawning time, we organise a frog watch in conjunction with the Herpetological Society. At spawning time, the males take on their distinctive blue coat, which attracts plenty of curious people and photographers. However, any disturbance at spawning time can seriously impact the vitality of the population.

Conservation of the hermit beetle population

The hermit beetle (*Osmoderma eremita*) is a saproxylic species that lives in the wood mulch of the trunks of old deciduous trees (usually oak, willow, beech, linden and ash). Since 2010 the presence of the hermit beetle has been confirmed in numerous old horse chestnut trees in Tivoli Park. It is highly likely that Tivoli Park is a type-site for the hermit beetle, meaning that the species was first found and described here, which adds especially important natural historical significance. The EU Habitats Directive (Council Directive 92/43/EC of 21 May 1992) lists this species among priority protection species.

Improving the habitat of the European pond turtle

The European pond turtle (*Emys orbicularis*) is the only freshwater turtle native to Slovenia. Within the Tivoli, Rožnik and Šišenski Hrib Nature Park, the pond turtle is threatened by the disappearance of suitable habitats due to urbanisation, traffic, inappropriate land improvements, drainage, pollution and fishing (swallowed fish hooks). Non-native turtle species, which the owners leave in surface water bodies when they become too big or they lose interest in them, are a particular problem. Therefore, in 2013 and 2014 we co-financed a project that resulted in the captivity of 28 non-native turtle species from Koseze Pond and the fishpond in the Tivoli Park, thereby reducing the competitive pressure on the European pond turtle.

Conservation of bat population

The trees that grow in the city are not only important for the quality of life in the city itself, they also offer a habitat for many animal species. Bats are among the most endangered fauna groups that frequently find refuge in the holes of mature trees. In 2009 we co-financed a project for the Slovenian Association for Bat Research and Conservation, which made an inventory of the bat species that live in the trees in the city's parks. Slovenia is home to 28 species of bat, of which 6 species have been confirmed as living in trees in the very centre of Ljubljana: the soprano pipistrelle (*Pipistrellus pygmaeus*), Kuhl's pipistrelle (*Pipistrellus kuhlii*), Nathusius's pipistrelle (*Pipistrellus nathusii*), Savi's pipistrelle (*Pipistrellus savii*), common noctule (*Nyctalus noctula*) and parti-coloured bat (*Vespertilio murinus*). All six species are on the Red List of endangered animal species in Slovenia. The trees that provide appropriate shelter for bats are generally older, so they may also be dangerous

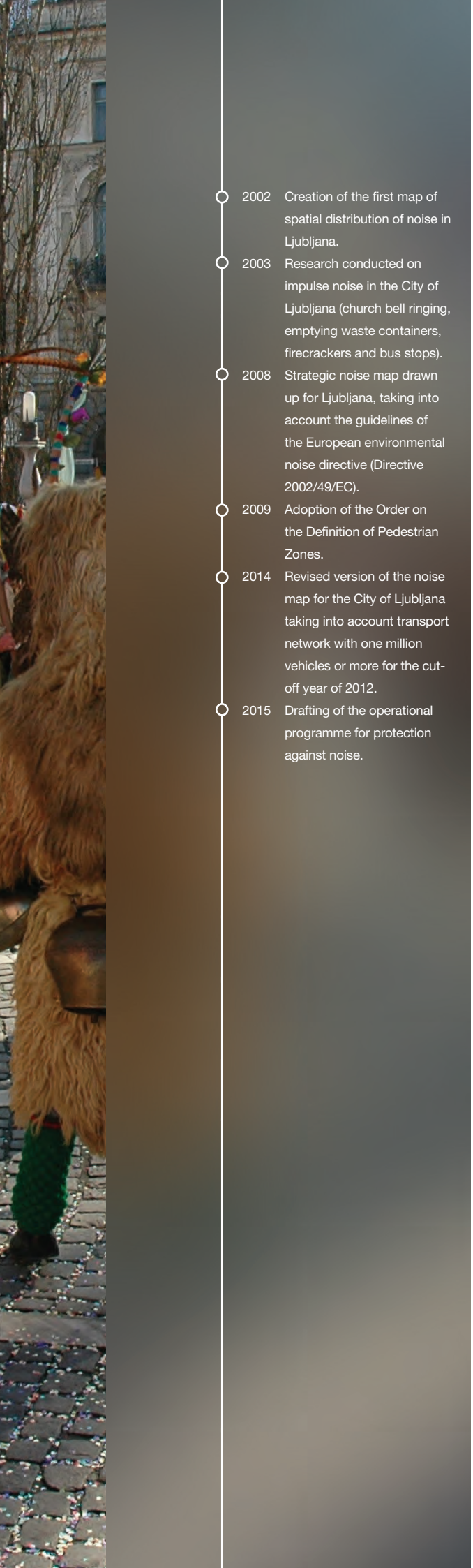
because of instability. An efficient measure to conserve the bat populations is the installation of bat boxes in the immediate vicinity of older trees that will have to be removed in the future due to safety reasons.

Conservation of kestrel population

The kestrel (*Falco tinnunculus*) is a bird of prey that usually nests in rural areas and feeds on small mammals and birds. For a variety of reasons it is increasingly observed in urban areas. In Ljubljana, kestrels usually nest on high buildings or in old crow's nests in trees. In 2011 we co-financed a project where 15 permanent nesting sites were adapted to the nesting requirements of kestrels. Nine nesting boxes were installed on buildings belonging to primary and secondary schools, thereby facilitating the raising of public awareness.

Improving the habitat of Chapman's blue

Chapman's blue (*Polyommatus thersites*) is a butterfly that is found, in Slovenia, in the Haloze hill region and on the edge of the Karst. It appears on Slovenia's Red List as an endangered species. The dry grassland along the Sava between Tacen and Jarški Prod are the last refuge of this species in central Slovenia. The development of Chapman's blue is marked by the presence of the larval host plant sainfoin (Onobrychis spp.) which only thrives in unfertilised dry grassland with shallow soil. Such grassland is, however, disappearing as a result of overgrowth and intensive agricultural land use. With the aim of improving the habitat of this very rare butterfly, we have co-financed a project for the Society for the Research and Conservation of Butterflies of Slovenia. The Chapman's blue habitat along the Sava River is most at risk from overgrowth by woody and invasive plant species and from the illegal waste disposal sites. We are revitalising the habitat by removing the waste and clearing out the overgrowth.



- 2002 Creation of the first map of spatial distribution of noise in Ljubljana.
- 2003 Research conducted on impulse noise in the City of Ljubljana (church bell ringing, emptying waste containers, firecrackers and bus stops).
- 2008 Strategic noise map drawn up for Ljubljana, taking into account the guidelines of the European environmental noise directive (Directive 2002/49/EC).
- 2009 Adoption of the Order on the Definition of Pedestrian Zones.
- 2014 Revised version of the noise map for the City of Ljubljana taking into account transport network with one million vehicles or more for the cut-off year of 2012.
- 2015 Drafting of the operational programme for protection against noise.

Noise

Noise is the term attributed to an unpleasant form of sound, the definition of which does not depend on its volume or frequency. Too much noise affects our work, free time activities and sleep. It can disturb or even prevent communication, and can cause stress, chronic tiredness and restlessness. Noise is a subjective category that influences the mood and health of people. Road traffic is the most significant source of noise in cities.

Today, different models are used for drawing up a map of the spatial distribution of noise. A quick overview of the situation can also be obtained by carrying out brief (ten-minute) measurements at various locations at different times of day. In Ljubljana noise levels at the noisiest locations reached between 75 and 78 dB, while in the quietest parts of the city noise levels of between 45 and 50 dB were recorded.

The high levels of noise in the city centre, which sometimes exceed 65 dB, are usually the consequence of the high density of motorised traffic (vehicles braking hard, stopping and then moving off again). Certain public services are also a common source of noise in the city. We have recorded exceeded noise levels along major roads, and also in a narrow corridor along railway lines, as well as from point sources (production facilities, pubs and bars, event locations and sports grounds).

The map of the spatial distribution of noise in Ljubljana shows that one fifth of Ljubljana's inhabitants live in areas with excessive noise levels. On the other hand there are a number of quiet areas in the immediate city centre where noise levels are not elevated. These are areas within closed city blocks, areas that are exclusively residential and some more recently designed residential areas located further away from busy roads.

In Ljubljana 47% of inhabitants are exposed to noise levels exceeding 55 dBA. However, the percentage of those exposed to noise pollution exceeding 65 dBA is smaller in Ljubljana (14%)

"Kavalir" electric vehicles do not generate any exhaust or noise.

than in Europe (20%). Moreover, in Ljubljana there are fewer inhabitants affected by night noise above 55 dBA (14%) than in Europe (30%).

A comparison of data with the EU15 countries shows a similar situation. In Ljubljana a relatively large number of inhabitants are exposed to noise levels of between 55 and 65 dBA, while significantly fewer are exposed to noise levels exceeding 65 dBA.

„ There are a number of quiet areas right in the city centre where noise is not elevated.

Comparison with noise pollution figures in the EU15

Noise level	Inhabitants of Ljubljana	EU15
Lden < 55 dBA	43%	68%
Lden < 55–65 dBA	40%	19%
Lden < 65–75 dBA	17%	11%
Lden > 75 dBA	0.03%	2%

Noise pollution in a city or region depends on its specific geographical characteristics, in particular the location of major roads, and is given attention when determining the use of the land in question. Among the most effective measures for noise reduction are the establishment of urban ecological zones (closing the city centre to all motorised vehicles) and the redirection of transit traffic flows.

Noise Reduction Measures

Urban Ecological Zone

In recent years the amount of public space reserved for pedestrians and cyclists has increased by 550%. Only non-motorised traffic is permitted within the ecological zone. The ecological zone therefore prides itself on its extremely low noise values (a reduction of 6 dBA), with the only noise created by the numerous pedestrians and cyclists. The establishment of the urban ecological zone has strong public support among the inhabitants: in 2013 as many as 26.6% of those surveyed identified the closure of the area to traffic as the most significant innovation in the city. Within the ecological zone four electric vehicles named "Kavalir" (“Cavalier”) are available to transport pedestrians free of charge.

Sustainable Mobility Plan

The new Sustainable Mobility Plan (SMP) emphasises the promotion of sustainable forms of mobility and the restriction of private motorised transport.

The SMP aims by 2015 to increase walking by 20%, cycling by 40% and bus journeys by 50%, and at the same time to reduce the number of car journeys by 20%. The aim by 2020 is to have improved the distribution of mobility – a third by public transport, a third by non-motorised means and a third by private vehicles. The aim of the plan is not merely to reduce emissions and noise pollution but, above all, to improve the quality of life in the city in the broadest sense of the term.

The most notable innovation in 2015 has been the establishment of "shared space" on Slovenska Cesta. Shared space is an urban design approach which seeks to minimize the segregation of pedestrians and vehicles. Once completed, Ljubljana became the first European capital to adopt this approach on the main road through its city centre.

Traffic calming zones

We are systematically introducing traffic calming zones (speed limit 30 km/h) and one-way traffic zones. The establishment of both results in a decrease in transit traffic on the city streets and means more useful space is made available for the residents. Restricted speed (30 km/h) zones within the City of Ljubljana now cover more than 2,000 hectares.

We are also establishing calming zones in the vicinity of primary schools and nursery schools. In these zones the speed is limited to 10 km/h, mainly because children are allowed to play in these areas. To date, these zones have been established outside a fifth of all primary schools.

Environmental Action Programme 2014-2020

The City of Ljubljana is already working on achieving sustainable growth and a constant improvement in quality of life, and will continue its efforts in this regard. We intend to achieve these objectives by continuously striving for a clean, safe and friendly environment for all, and through efforts to conserve and establish new green spaces with unique biodiversity. We are already implementing measures that will enable future generations to live and develop in an ecologically suitable environment. We are implementing effective and sustainable measures into our city administration and encourage cooperation with individuals, organisations and the national government.

Ljubljana must be a city of satisfied inhabitants living in a healthy environment that offers them high-quality water, air and food. The city's inhabitants must be aware of the importance of protecting the environment and demonstrate this through responsible and careful behaviour.

The sustainable development approach integrated by the City of Ljubljana into its activities in all working areas is also reflected in its budget priorities.

A strong environmental culture should be evident at all levels and in all parts of the municipality. The city environment must be well regulated and logically connected to its rural hinterland. Traffic is regulated on a sustainable basis and the whole city should function with the help of sustainably designed energy, municipal and transport infrastructure. The sustainable development should also be reflected in health indicators for the municipality's inhabitants, their levels of satisfaction and the effective social integration of all demographic groups.

In the 2014–2020 period the City of Ljubljana will ensure the realisation of four strategic objectives:

- SO1: Long-term protection of water sources in the City of Ljubljana
- SO2: Protection of the natural environment in the City of Ljubljana
- SO3: Urban gardening and local self-sufficiency
- SO4: The City of Ljubljana represents an example of good practice in terms of integrating and promoting sustainable life and work in the municipality.

SO1: Long-term protection of water sources in the City of Ljubljana

Without water there is no life, so access to good-quality drinking water is of vital importance to the municipality. For over 100 years the City of Ljubljana has had the privilege of clean drinking water which needs no preliminary treatment. The Ljubljansko Polje aquifer is an abundant source of drinking water, so the city and its inhabitants must adopt and implement all the measures required to preserve this source for the future. The defined objectives signify a continuation and enhancement of the City of Ljubljana's activities and measures from

Strategic objectives of the previous City of Ljubljana Environmental Action Programme (EPP) and the current EPP

EPP 2007–2013	SO1: The establishment of sustainable mobility system	Sustainable Mobility Plan	
	SO2: Energy efficiency and use of renewable energy sources	Sustainable Energy Action Plan	
	SO3: Secured long-term natural drinking water supply	SO1: Long-term protection of water sources in the City of Ljubljana	EPP 2014–2020
	SO4: Protection of nature and green areas	SO2: Protection of the natural environment in the City of Ljubljana	
		SO3: Urban gardening and local self-sufficiency	
		SO4: City of Ljubljana represents an example of a good practice in integrating and promoting a sustainable living and working in the municipality	

the 2007–2013 period (to secure a long-term natural drinking water supply).

Operational objectives by 2020:
- OO1: to improve the quality of drinking water sources
- OO2: to strike a long-term balance between groundwater withdrawal and recharge
- OO3: to improve the ecological state of surface water in the City of Ljubljana area

SO2: Protection of the natural environment in the City of Ljubljana

Biodiversity is one of the key indicators of quality in the living environment. By protecting the natural environment we also protect those elements that are important for health and for agreeable conditions for life, business and development. The Environmental Action Programme 2014–2020 pursues the goals of the new European strategy and, through its adopted measures, contributes to the conservation of biodiversity and the successful management of protected natural areas in the City of Ljubljana. The defined objectives signify a continuation and enhancement of the City of Ljubljana's activities and measures from the 2007–2013 period (to protect the nature and green areas).

Operational objectives by 2020:
- OO1: to conserve and improve the state of biodiversity
- OO2: to establish a comprehensive system for the effective management of natural features and protected areas
- OO3: to establish a comprehensive Green System for Ljubljana and its effective management

SO3: Urban gardening and local self-sufficiency

Self-sufficiency is a pervasive topic at both the global and local levels. The conditions and the population's increasing need for a high-quality source of healthy food have underlined the urgent need to improve the City of Ljubljana's capacity for self-sufficiency. Furthermore, this area of interest is one of the key development opportunities for the municipality: by encouraging and promoting the production of healthy food, we spread awareness of healthy eating habits, the need for sustainable production, and help develop a market for all local producers. In this way, high-quality food will become more accessible to the inhabitants of the municipality, while the City of Ljubljana will effectively improve the use of its land, raise the level of social integration, strengthen social partnerships and increase the overall level of connection between people.

Operational objectives by 2020:
- OO1: to establish an integrated approach to ensure local self-sufficiency
- OO2: to increase the amount of land suitable for agricultural production and improve its quality
- OO3: to develop an efficient urban gardening network
- OO4: to encourage and promote the consumption of organic food

SO4: The City of Ljubljana represents an example of good practice in terms of integrating and promoting sustainable life and work in the municipality.

With the adoption of the first Environmental Action Programme in 2007, sustainable development also formally became one of the City of Ljubljana's strategic priorities. Through the realisation of that programme, notable progress was made and valuable experience gained. In the next planning period we aim to realise our vision of a successful and sustainably advanced European capital. For this reason, it is vital that sustainable development is positioned at the core of the functioning and thinking of the city administration, and this also represents a great opportunity for development. In this way we will take the initiative in bringing together all the stakeholders in changing their habits and developing new, innovative approaches in order to ensure the sustainable development of the whole community. The city administration can become a role model for innovative thinking and a partner that actively creates conditions

Various stakeholders are involved in the preparation of the Programme.

and develops partnerships for the realisation of environmentally, economically and socially balanced projects.

Operational objectives by 2020:

- OO1: to set up an effective system to monitor implementation of the EPP, activate and raise the awareness of stakeholders and change habits
- OO2: to create a stimulating environment for the development of new green jobs and eco-innovations
- OO3: to ensure that the city administration, public companies and public institutions become a role model for sustainable working.

Dear visitor,

Residents of Ljubljana – and the many visitors to the city – agree that Ljubljana is a city that meets human needs. It retains the alluring friendliness of a small town but at the same time offers everything you would expect from a capital city: it is the political and cultural heart of the Slovene nation, an important European centre of commerce and business, a major conference and exhibition venue, the centre of Slovenia's scientific and academic life, and the country's most important transport hub.

At a ceremony held in Copenhagen on 24 June 2014, Ljubljana was awarded the flattering title of European Green Capital 2016. The title of European Green Capital is awarded every year to a city with high environmental standards and a commitment to ambitious targets of environmental improvement and sustainable development.

Following the announcement, Ljubljana's mayor Zoran Janković described the title as a great honour and a joy, and stated that he was extremely proud of the sustainable achievements of everyone in Ljubljana, since not only are we taking excellent care of the most beautiful city in the world, we also showed in Copenhagen that the sustainable projects of a green Ljubljana can serve as an example to many other European cities. This European award has placed us among the very best. Ljubljana's victory is proof that our sustainable orientation and our joint efforts are recognised and increasingly appreciated even outside our borders.

The publication you are holding contains a report on the state of the environment in the City of Ljubljana and a summary of the Environmental Action Programme for the City of Ljubljana 2014–2020. The Environmental Action Programme is a strategic document that takes as its starting point the present state of the environment, sets realisable goals and defines measures to achieve them. It is sustainably oriented and represents an essential basis for the spatial, economic and social development of the municipality. We believe that through its implementation Ljubljana will continue to occupy a place among advanced capital cities with a commitment to sustainable growth and a constant improvement in the quality of life.

I bid you a warm welcome to our city, the European Green Capital 2016!

Nataša Jazbinšek Seršen,
Head of the Department for Environmental Protection