

FROM TREE TO CITY

THE LABORATORY OF
KNOWLEDGE ABOUT
URBAN GREENERY

a guide to communicating
the value of trees
in urban settings

Working together for a **green, competitive** and **inclusive** Europe.

**Iceland
Liechtenstein
Norway grants**



„From tree to city: the laboratory of knowledge about urban greenery” benefits from a PLN 688 178,00 grant from Iceland, Liechtenstein and Norway through the EEA and Norway Grants. The aim of the project is to shift the perceptions of urban populations concerning the benefits and services provided to them by urban greenery. The project also benefits from a PLN 121 443,00 subsidy from the Polish government.

Authors:

Monika Szewczyk, PhD (UNEP/GRID-Warsaw)

Zbigniew Szkop, PhD (UNEP/GRID-Warsaw)

Proofreading: Elżbieta Wotoszyńska-Wiśniewska (UNEP/GRID-Warszawa)

Graphic design: Maria Łepkowska (UNEP/GRID-Warszawa)

Photos: (p.10)©Freddie Ramm on Pexels; (p.11)©Genaro Servín on Pexels; (p.13) ©Dronepicr, Creative Commons Attribution 3.0 Unported; (p.17)©Roxanne Desgagnés on Unsplash; (p.18)©Boys in Bristol Photography on Pexels; (p.19,35)©Chuttersnap on Unsplash; (p.20)©Jenna Beekhuis on Unsplash; (p.25, 30, 31, 32)©UNEP/GRID-Warszawa; (p.34)©Arek Pawłowski; (p.37)©Zarząd Zieleni m. st. Warszawy; (p.39)©Jar.ciurus, Creative Commons Attribution-Share Alike 3.0 Poland; (p.41)© Zarząd Zieleni Miejskiej w Krakowie; (p.43)©Leonid Andronov;
Other photos appearing in this publication but not mentioned above belong to the public domain.

Project coordinator: UNEP/GRID-Warszawa



Partners: Veolia Poland Foundation and Asplan Viak



miastaidrzewa.gridw.pl

Copyright © UNEP/GRID-Warszawa, 2023

Warsaw, June 2023

ISBN 978-83-963693-3-8

www.gridw.pl

FROM TREE TO CITY

THE LABORATORY OF KNOWLEDGE ABOUT URBAN GREENERY

**a guide to communicating the
value of trees in urban settings**

**It is critical to recognize the services that nature gives us.
Without them, we are poorer. In UNEP, we speak about inclusive wealth.
And understanding wealth and understanding nature as an asset class.**

INGER ANDERSEN

Executive Director of the United Nations Environment Programme (UNEP)

Contents

INTRODUCTION

1. THE URBAN STANDARD – WHY CITIES NEED GREENERY

1.1 Cities and their challenges	6
1.2 Sustainable urban development	12
1.3 Ecosystem services provided by urban greenery	14
1.4. Traditional forms of urban greenery and nature-based solutions	18

2. PROJECT FROM TREE TO CITY. HOW TO RAISE AWARENESS OF URBAN GREENERY

2.1 Project background	22
2.2 Valuation of ecosystem services	26
2.3 How to communicate the value of urban trees	29
2.3.1 Awareness campaign for residents	29
2.3.2 Awareness campaign for school students	31
2.3.3 Other activities	32

3. HOW CITIES TAKE CARE OF AND MAINTAIN THEIR GREENERY – GOOD PRACTICES.

3.1 Urban green areas management	52
3.2 Good practices from Poland	36
3.3.2 Good practices from Norway	42
Summary	44
Sources.....	46

Urban trees give us more than we see at first glance. So far, we have been mostly focusing on the costs associated with maintaining greenery, whereas a real cost-benefit analysis leads us to completely different conclusions. The project „From tree to city: the laboratory of knowledge about urban greenery” and this guide, being a direct outcome from the project, are aimed at illustrating a wider range of economic benefits that stem from maintaining trees in urban areas. Knowing about ecosystem services provided by urban trees not only leads to a greater awareness of the role and importance of green spaces in cities but can also provide present and future decision makers with arguments and tools for smart management of city resources. .

Apart from the role that this guide can play in shifting the perspective of the general public on urban trees, it can serve as support for those responsible for urban greenery in Polish cities. Here decision makers can find plenty of information – both theoretical concepts and best practices – about urban greenery. The content of this guide is divided into three main sections.

In Chapter 1 we outline the general characteristics of urban greenery. Readers can learn about the challenges that cities are facing these days, in the era of climate change, new concepts in urban development, such as “compact city” as well as the notions of ecosystem services and green infrastructure.

Chapter 2 discusses ways to educate and raise awareness about the benefits provided by urban greenery, using examples of activities conducted under the „From tree to city: the laboratory of knowledge about urban greenery” project.

Chapter 3 complements the preceding two sections by giving more examples of what cities can do to improve and support their green spaces. Here you can find examples of initiatives undertaken by both big cities and smaller towns in Poland as well as one case from abroad.

1. **The urban standard**

why cities need greenery

From tree to city
The laboratory of knowledge about urban greenery



1.1.

Cities and their challenges

URBANIZATION

Most people on the planet now live in urban areas. It is estimated that for nearly 20 years there have been more people living in cities than in rural areas and there is nothing to suggest that this trend should be reverted anytime soon. Some projections even indicate a further increase in urban population: It is estimated that by 2050 82% of Europeans [1], and 68% of global population [2; 3] will inhabit urban areas. In Poland the urbanization rate has been stable and is at 60% [4]. At the same time, however, we have seen a gradual increase in the surface area of cities. Compared to 2021, the area balance in Poland in 2022 amounted to plus 11 916 ha. This number represents the sum of surface areas of localities that have been granted city/town charters and changes in borders of urban municipalities as well as towns inside rural-urban municipalities. The number of cities/towns has grown by 10 newly established units. In total, 964 towns cover the area of 2 248 422 ha, which accounts for 7,2% of the surface area of the country [5]. These are mostly small towns, with area not larger than 50 km². Only 53 towns are 50–100 km² and 30 cities exceed 100 km² in surface area [6].



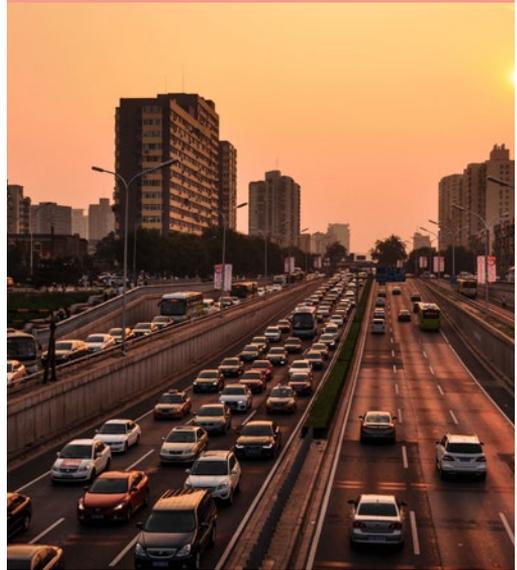
CITIES AND THEIR ENVIRONMENTAL CHALLENGES

Urban development has brought about numerous challenges. Cities are prone to environmental degradation inside their borders and at the same time they impact the surrounding nature. This negative influence is compounded by the uncontrolled development called urban sprawl [1]. The changing climate makes it absolutely necessary for us to take action in order to prevent and curb emissions of greenhouse gases (mitigation), while adapting to existing or future climate conditions (adaptation). Managing urban areas becomes an enormous challenge, which can be described as follows: How do we fit even more people in urban areas while (1) reducing their negative impact on the environment; (2) increasing resilience to climate change; (3) improving quality of life of urban populations, all at the same time?

Air pollution – about 20% of the EU's urban population live in areas where levels of air pollution exceed at least one limit¹. According to WHO, as many as 36 out of 50 most polluted cities in the EU are in Poland.

1 Main limits are linked to the levels of PM_{2,5} (fine particulate matter), PM₁₀ (particulate), O₃ (ozone), NO₂ (nitrogen dioxide).

High levels of emissions – it is estimated that cities account for 60–80% of global energy consumption and at least 70% of global CO₂ emissions.



Urban heat island (UHI) – a phenomenon that occurs due to the fact that cities experience much higher air temperatures compared to their surrounding areas. This is mostly caused by urban surfaces that absorb more of the sun's heat than they can reflect and by emitting the accumulated heat they increase the temperature, which is further worsened by the fact that cities have relatively few green areas and are poorly ventilated. The phenomenon of UHI makes heat waves more acute for urban populations, which adds to thermal stress, increases the risk of heat strokes as well as exacerbation of chronic respiratory and circulatory diseases.

Lack or low level of vegetation – according to 2019 data from 610 cities in 95 countries, the proportion of population that has access to open public spaces (distance of 400 m along street network) was on average 46,7%. In Europe it is on average 57%. In different individual countries smaller towns showed a consistently higher level of access than big cities.



Decrease in the number of native species and natural habitats – urban development impacts ecosystems within city limits as well as surrounding ones. The increase of urban areas is accompanied by the decline in the size and condition of natural and semi-natural ecosystems. They become more prone to spatial isolation and invasions of alien species. As a result, populations of wild plants and animals dwindle, causing the decline in their genetic diversity, thus increasing the risk of their extinction.

Torrential rains, flooding and management of rainwater – most of Europe experiences shifts in rain intensity and frequency. We see more and more long rainless periods interspersed by short torrential rains that cause periodic flooding. Flood hazard in cities increases with the amount of impermeable surfaces and the extent to which floodplains have been penetrated by buildings. Another factor is the capacity and condition of drainage systems in cities.



1.2.

Sustainable urban development

FOCUS ON CITIES

Given the sheer number of climate-related challenges that are concentrated in urban areas, it is expected that cities will take on a key role in achieving climate neutrality and implementing changes at national levels. How can we reconcile rapid urban development with environmental protection, successful prevention of climate change as well as good quality of life for urban populations? In other words, how do we make cities sustainable? The very idea of a **sustainable city** is all about an integrated approach to economic, social and environmental matters.

For Europe sustainable cities mean revitalization and transformation of urban areas and cities in pursuit of better quality of life, innovation and lower environmental impact, while maximizing economic and social benefits [10].

CONCEPTS OF SUSTAINABLE CITIES

Among many ideas for sustainable cities we can list such concepts as *compact city*, *livable city* and *climate-neutral city*.

The **compact city** assumes that it is best to build on the existing urban tissue, making it deliberately more compact, while providing an extensive public transit system and high accessibility of services and workplaces with mixed-use development, including public spaces like green and leisure areas [11].

Similarly, the **livable city** concept talks about creating spaces where residents have easy access to all necessary services, with mixed-use development, with focus on green spaces [12].





The notion of **climate-neutral city**, meaning a city that emits the same amount of greenhouse gases as it absorbs, focuses on: (1) low-emission transport (both private and public), heating system, energy sources, etc.; (2) lowering emissions from local industrial plants; (3) lifestyle changes introduced by residents [13].

It is worth noting that the integration of economic, social and environmental matters in cities goes way beyond the local level. This topic is raised on a global scale, and it is the foundation upon which we must act in

order to achieve **Sustainable Development Goal 11**, which is as follows: „*Make cities inclusive, safe, resilient and sustainable*” [14]. **The EU 2030 Biodiversity Strategy**, and its plan for the restoration of natural resources, includes the ambitious goal of urban greening for cities with minimum 20 000 population [15].



1.3.

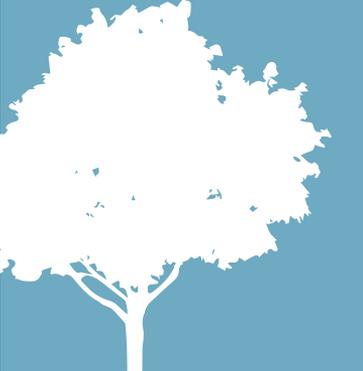
Ecosystem services provided by urban greenery

THE CONCEPT

How urban greening can support the evolution of cities towards a more sustainable model? Why do urban designers need to take into account greenery, even if they pursue the concepts of compact and climate-neutral cities?

To better understand this proposition we need to look at the so-called **ecosystem services** – basically, the benefits that nature provides for human beings. Ecosystem services are divided into three categories, which are described in the table below::

CATEGORIES OF ECOSYSTEM SERVICES

PROVISIONING SERVICES	REGULATING SERVICES	CULTURAL SERVICES
<p>the production of goods such as food, water, as well as genetic, medicinal, and ornamental resources.</p> 	<p>these include the regulation of air quality and climate, providing control for extreme weather events, regulation of hydrological cycles, absorption of waste, preventing erosion, providing control for soil fertility and nutrient cycles, pollination and biological control as well as maintaining genetic biodiversity;</p>	<p>esthetic stimuli, tourism and leisure activities, sources of inspiration for culture, art and design, spiritual experiences and improved cognitive development.</p> 

Source: [16]

ECOSYSTEM SERVICES PROVIDED BY TREES

So what are the services that urban greenery provides for us? Let us use the example of urban trees. Their provisioning services include:

- **food** urban trees can give us fruit, albeit not on a scale comparable to that of fruit arboriculture, and one has to avoid eating fruit or nuts from trees close to roads as they can contain trace quantities of metals [17].
- **wood fuel** – wood from urban trees is usually of low quality, so its use is limited to firewood. [18].

Regulating services of trees are far more important for urban environment. Services in this category include:

- **improved air quality**
urban trees remove gas and dust pollutants from the air in two ways. Firstly, they absorb gas pollutants and secondly, they catch dust particles that stick to their leaves [19];
- **CO² sequestration and storage**
trees, regardless of whether they grow in forests or urban areas, provide the service of direct sequestration of CO₂, namely capturing it from the air in the process of gas exchange and then storing carbon, whose amount increases as the tree grows, in their tissues;

- **improved acoustic comfort**

well designed urban green spaces that use high quality vegetation can help improve the efficacy of acoustic barriers by as much as 70% [20]. Moreover, even if the trees that have been planted do not offer significant noise reducing effect, their presence still mitigates the burden of noise [21];

- **reducing and slowing down the drainage of rainwater**

urban trees can be a relevant component of water resources management strategy, as they significantly help reduce and slow down the draining of rainwater into the sewage system [22]. Some rainwater is captured by leaves, making heavy rain feel much lighter thus giving the soil more time to absorb excess water [23]. Additionally, roots themselves alter soil structure, allowing higher penetration and speed of permeation of rainwater into the ground, so water drainage from the area is limited [24];

- **production of oxygen**

as much as atmospheric oxygen resources have resulted from processes that have been continuing for about 3,2 billion years and the current production of atmospheric oxygen on a global scale is only partially delivered by trees, or even more broadly by land vegetation, and the main source of oxygen in the world (50–80%) are oceans, the fact remains that trees do capture carbon dioxide in the process

of photosynthesis and release oxygen. Some scientists estimate the amount of oxygen produced by trees based on tree biomass increment;

- **regulation of microclimate**

trees can help reduce air temperature in urban spaces during the summer months, which can lower energy consumption for cooling purposes. This effect delivered by trees happens in two ways: via transpiration and shading. Moreover, urban trees can contribute to reducing wind speed – even up to 50% – which is particularly important during the winter as it prevents cold air from penetrating buildings, which again helps lower energy consumption [23; 25]. In practice, the fact that trees can indirectly regulate urban microclimate has a relevant impact on reducing emissions of CO₂ and other air pollutants.

Finally, it is good to remember about the cultural services provided by trees, which include:

- **esthetic value and improved conditions for leisure and recreation**

urban trees make our cities more beautiful, which is an important service for humans. For instance, it has been shown that the inhabitants of the Polish city of Lodz (Łódź) would be willing to pay higher taxes, if this were to lead to more trees planted along streets in the city center [26]. Urban greenery is also conducive to various leisure activities, sports or just walking. This is why urban dwellers like to live near parks.





1.4.

Traditional forms of urban greenery and nature-based solutions



URBAN BIODIVERSITY

The list of ecosystem services described above seems to be missing another role fulfilled by trees – and ecosystems – in the protection of biodiversity. It is not a coincidence. The role of trees in creating habitats and food base for numerous species, including lichens, invertebrates and birds, is not seen as an ecosystem service because the concept of ecosystem services is used to evaluate the economic importance of ecosystems and biodiversity and does not include an approach to ecosystems as reservoirs of biodiversity.

However, despite the clearly anthropocentric approach, the complex and integrated evaluation of the roles and functions played by ecosystems and the availability of goods and services, is aimed at increasing the sense of responsibility and awareness of sustainable use as well as protection of natural resources. This is of paramount importance, especially as we are facing changes in our natural environment: Continuing deterioration of ecosystems and extinction of species that is taking place also in urban areas.

Looking at cities from the point of view of greenery planning and design we see traditional solutions such as:

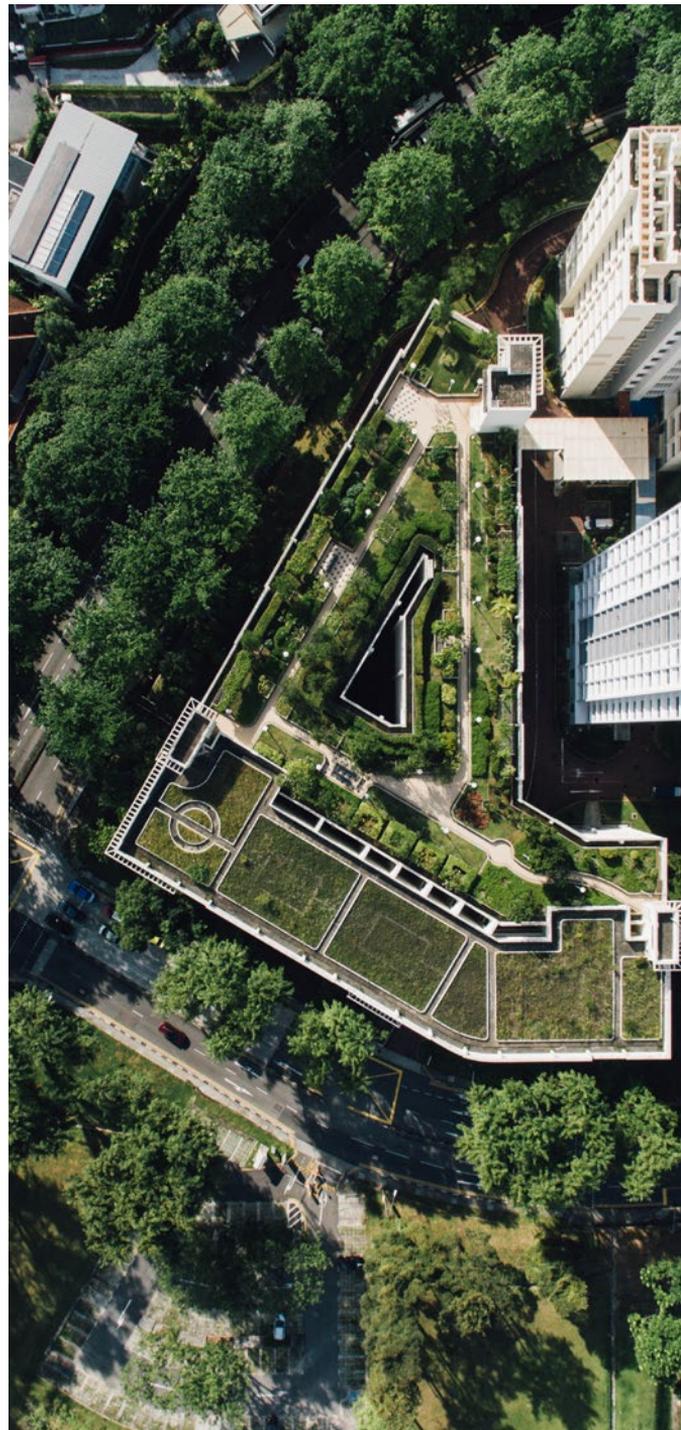
- urban parks and squares;
- street greenery;
- urban forests;
- family allotments;
- botanical gardens and zoos;
- cemeteries with old trees;

as well as, increasingly, new concepts that enrich urban greenery, called nature-based solutions.

The latter include:

- urban meadows;
- green rooftops;
- green walls (vertical gardens);
- rain gardens and retention basins;
- pocket parks and Miyawaki forests.

We see more and more appreciation for the so-called **fourth nature**, namely uncultivated urban greenery with its spontaneous vegetation and wild fauna.

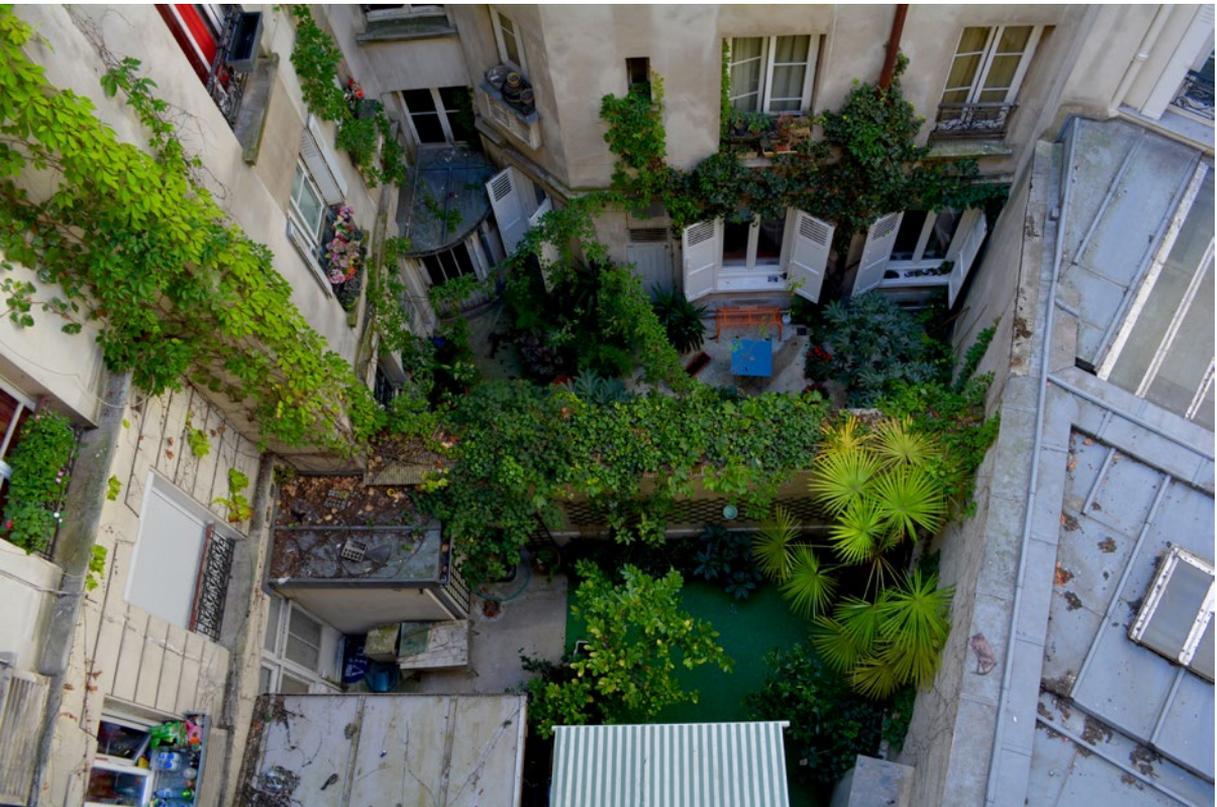


CHALLENGES IN MANAGING URBAN GREENERY

Urban greenery managers face numerous challenges: Planning for new developments in cities that become more and more compact means less and less space. Here the so-called pocket solutions, as well as vertical and rooftop gardens come in handy. At the same time the new buildings and structures should be as available for local residents as possible, while providing various social and environmental benefits as well as supporting local biodiversity. When we take all of these roles and goals of urban vegetation, we get the notion of **green-blue infrastructure**

that should penetrate urban tissue and lend – metaphorically as well as literally – a deeper breath of fresh air for all the inhabitants.

Comprehensive urban green spaces management requires planning for the maintenance of existing greenery, appropriate regulations as well as cooperation with private property owners and developers. It also calls for awareness-raising activities aimed at all the users of urban spaces. The latter were a key component in the project „From tree to city: the laboratory of knowledge about urban greenery” and are described in more detail in the following chapter.



2.

Project

From tree to city

how to raise awareness of
urban greenery

2.1.

Project background

PROJECT OBJECTIVE

Urban greenery costs money to maintain. Because these costs are known, while the real value of services provided by trees not necessarily, the simplistic economic analysis driven by low ecological awareness can mistakenly lead us to believe that the maintenance of urban greenery is “unprofitable”. Campaigns conducted so far that have been communicating the need to preserve urban green areas but failing to present any economic arguments, have not brought satisfactory results. As research shows, the number of green spaces in Polish cities has been decreasing [27; 28].

Based on this observation a project idea was born that takes on a different point of view, namely that of ecosystem services. This concept presents a relatively new, anthropocentric approach to raising ecological awareness through stressing the economic benefits that city residents can derive from urban greenery (See Chapter 1.3).

The project’s activities in cities primarily involved:

- valuation of selected ecosystem services to illustrate the value of urban trees;
- awareness campaign for local populations;
- awareness campaign for primary and secondary school students.

IMPLEMENTATION OF THE PROJECT

The project was implemented by:

- UNEP/GRID-Warsaw (project coordinator);
- Veolia Poland Foundation (assistance for cities that participated in the project);
- Asplan Viak AS (geoinformation support);

in collaboration with five cities: Lidzbark Warmiński, Miasteczko Śląskie, Przasnysz, Rzeszów, and Szczytno.

PROJECT PARTNERS



UNEP/GRID-WARSZAWA (PROJECT COORDINATOR)

is an affiliated center of United Nations Environment Programme (UNEP) that is responsible for implementing the UNEP mission in Poland by supporting and inspiring partners in their actions for sustainable development. The triple planetary crisis – climate change, biodiversity loss and growing pollution – informs the actions implemented by UNEP/GRID-Warsaw in collaboration with government institutions, local governments, businesses, scientific institutions and other supporting organizations and experts.



ASPLAN VIAK (PROJECT PARTNER)

a Norwegian consulting firm that specializes in planning, engineering and architecture. Its services include architecture, urban and spatial planning, construction, energy and environmental engineering, geomatics, visualization solutions, landscape architecture, community assessment, community planning, technical installations, and water and environmental engineering.



VEOLIA POLAND FOUNDATION (PROJECT PARTNER)

is a corporate foundation active since 2015. Its assistance is directed towards local communities in places where Veolia and its affiliated companies operate throughout Poland. The Foundation focuses on fostering intersectoral collaboration, supporting projects aimed at local communities and improving their quality of life with respect to sustainable development. According to its motto, „Good climate for collaboration” (Współpraca w dobrym klimacie), together with cities it implements a variety of activities and initiatives for the environment, biodiversity, ecological awareness and social innovation.

CITIES IN THE PROJECT



LIDZBARK WARMIŃSKI

in the Warmia–Masuria Province, is the county seat for the Lidzbark county and the Lidzbark Warmiński rural municipality; area: over 14 km²; population: approx. 16 000. Despite its modest size, this town is known for its numerous green areas, including the promenade on the Łyna river and the Irena Kwinto park.



MIASTECZKO ŚLĄSKIE

in the Silesia Province, Tarnowskie Góry county; area: nearly 68 km²; population: more than 7 000. This municipality is mostly dominated by forests, which makes it a great place for cyclists, runners and all those who want to wind down on a nice walk. The surrounding forests and the calm of Miasteczko are what makes this town a valued tourist destination.



PRZASNYSZ

Mazovia Province, county seat on the Węgi-erka river; area: over 25 km²; population: approx. 17 000. This town offers a variety of urban parks, including the Tadeusz Kosciuszko Park and the Stefan Cielecki Park.



RZESZÓW

the largest of all the cities and towns in this project, urban county with population of approx. 197 000. Its area is 128 km², including about 572 ha of urban greenery. The authority responsible for maintaining the green spaces is the Municipal Greenery Authority (Zarząd Zieleni Miejskiej).



SZCZYTNO

a town in the Warmia–Masuria Province, country seat for the Szczytno country and rural municipality; area: approx. 10 km²; population: approx. 22 000. This town has large green areas, including the Małe Domowe Lake Park.



2.2.

Valuation of ecosystem services

Urban trees are often seen mostly as an ornamental element, the maintenance of which is a cost that needs to be accommodated by the town/city budget. But although the maintenance of urban greenery in fact costs money, this expense may turn out really low when compared to the overall value of the benefits derived from urban trees. This hypothesis was verified in the process of valuation of selected ecosystem services provided by trees in cities.

ECOSYSTEM SERVICES SELECTED FOR ANALYSIS

The valuation of benefits provided by urban trees was conducted by environmental economists from the University of Warsaw. The analysis included all ecosystem services whose value can be credibly estimated based on the current state of knowledge. As a result, the valuation was conducted for the benefits that urban trees bring to:

- climate;
- air quality;
- water management;
- appeal/livability of the area.



GREEN AREAS SELECTED FOR ANALYSIS

Each city/town selected some green spaces that were to be promoted and featured in the project, which were divided in two categories:

- individual trees or copses (from one to several trees), usually natural monuments, different from other trees of the same kind or species in the municipality due to trunk circumference, height, crown spread, and age.
- Larger groups of trees, like city parks, squares, and street trees with several dozen or several hundred trees.

RESULTS OF THE VALUATION

The valuation showed that the average value of ecosystem services provided by one large tree in a Polish city amounts to as much as 15 000 - 20 000 PLN. For instance, the natural monument in Miasteczko Śląskie, Norwida street, captures 4,4 tons of carbon per year, clears the air of 1,5 kilograms of pollutions per year, reduces surface runoff by 2 m³/year,

and significantly boosts the prices of nearby properties. The scientists estimated the value of these benefits at about 17 000 PLN [29].

In case of larger groups of trees, the estimated value of their services was considerably different, which was linked to the number of trees. For instance, the value of benefits delivered by the several dozen trees in the Lech Kaczyński Square in Szczytno, amounted to 195 000 PLN. Meanwhile the estimate for another area of this town with several hundred trees – the park in Curie-Skłodowskiej street – showed benefits amounting to PLN 2,7 m [29].

The presented data points to one main conclusion: The value of benefits delivered by urban trees is enormous. Results of this study have served as the basis for an awareness raising campaign in the above-mentioned partner cities.



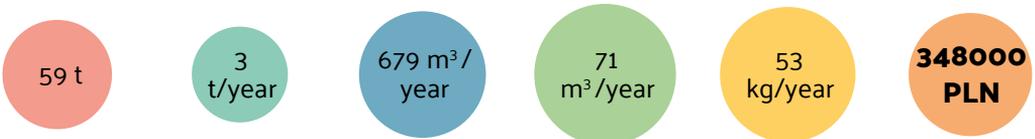
SOME RESULTS OF THE VALUATION OF ECOSYSTEM SERVICES

capturing carbon **oxygen production** **transpiration** **reducing runoff** **purifying air** **OVERALL VALUE**

Lidzbark Warmiński, Lipowa - 11 Listopada street, park near a school



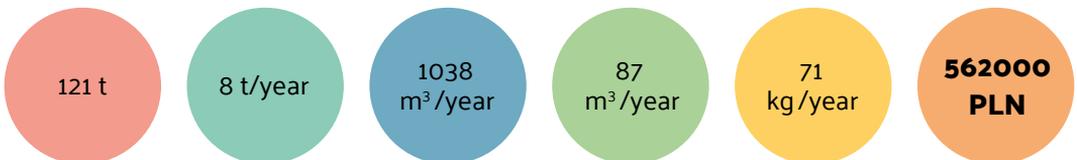
Miasteczko Śląskie, Rubin Park



Przasnysz, Park in Wojskowa street



Rzeszów, Inwalidów Wojennych Park



Szczytno, Lech Kaczyński Square



Source: [29]

2.3.

How to communicate the value of urban trees

AWARENESS CAMPAIGN FOR RESIDENTS

The data concerning ecosystem services provided by urban trees, along with the estimated value of those services, should be used not only local governments but also be widely distributed. This kind of knowledge can help raise ecological awareness of the general public concerning the importance of urban greenery in people's lives. Below we present the solutions deployed in the project.

Geoportal – allows you to locate urban green spaces submitted by cities that participated in the project. Each area has a description including the species of trees, the ecosystem services they deliver, and their economic value.

The geoportal's ultimate goal is to facilitate learning about the role that specific urban areas play in the lives of residents. Users can quickly get to know and appreciate the value of trees in their immediate vicinity.

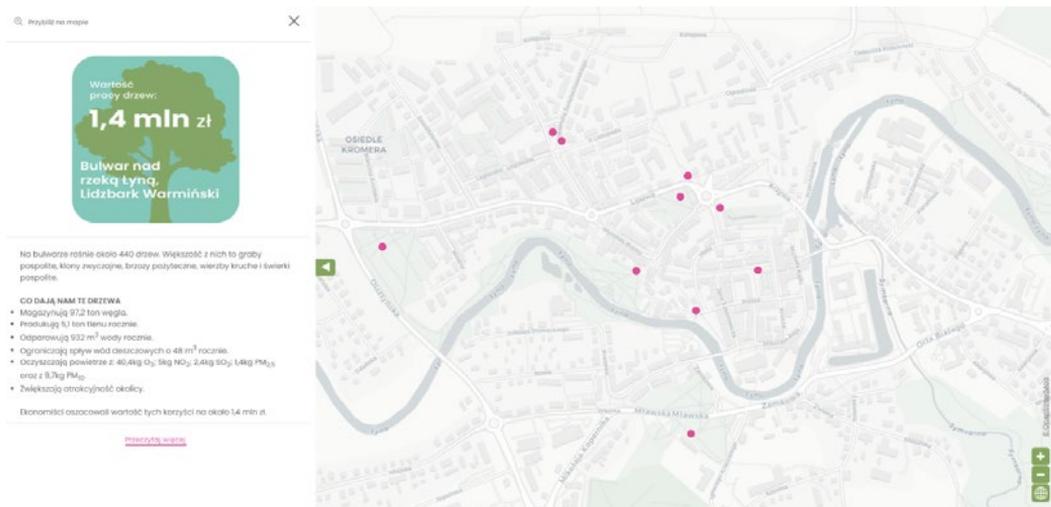


Figure 2. Geoportal view of the promenade on the Łyna river in Lidzbark Warmiński



Figure 3. A sample poster from the campaign



Figure 4. A sample board installed as a result of the awareness campaign in one of the partnering towns.

Poster campaign – posters placed in urban spaces (display cases, info boards, poster pillars and bus stops) were aimed at drawing attention of the populations of partner cities/towns to the benefits derived from urban trees and inviting them to visit the project website that features the geoportal with complete data on the estimated value of urban trees. A hundred posters were made for each partnering city.

Educational boards – placed in the areas included in the project, they contain information concerning the benefits brought by trees that grow in each specific green area. The project delivered 10 such boards for each partnering city/town.

AWARENESS CAMPAIGN FOR SCHOOL STUDENTS

The youngest generation is one of the key target groups for each awareness campaign. It is the children of today that will one day decide on the future of our towns and cities. The project addressed this important target audience.

Awareness classes – online and offline (field) classes allow students to learn about such things as the impact of climate change on urban greenery, the services provided by urban trees and how to estimate the value of those services.



Figure 5. A sample screen shown at the beginning of the awareness raising webinar in one of the project partnering towns/cities

These sessions become even more hands-on when representatives of city/town authorities responsible for urban greenery are present because they can tell the participating students more about the green areas they are surrounded with and enjoy every day.

The project included webinars for primary and secondary school students aged 12-18, from schools located in the partnering towns/cities. Over 750 students participated in these online sessions.

Competitions – a chance for students to get involved in stocktaking of selected trees and valuation of their benefits. The competition was organized, and its final results are published on the project’s website.

Figure 6.
A snapshot of one of the winning competition entries



OTHER ACTIVITIES

Apart from the above-mentioned activities and initiatives aimed at raising awareness among local populations of the partnering cities and educating them about the benefits derived from urban greenery, the project also included some additional activities in order to reach other towns and cities in Poland, and to provide useful knowledge to the decision makers of these localities. One of the ways in which this has been achieved was the project's website.



Figure 7. Main page of the project's website



Figure 8. A sample cover for an article in the media campaign

For easier navigation the website is divided into separate sections dedicated to the activities in individual partnering cities/towns, but it also features the general section with a summary concerning all the partners.

Additionally, the project included a **nation-wide media campaign** featuring content that helped promote the project throughout Poland: native articles, a quiz, infographics, a short video, and a series of social media posts.

The media campaign enabled the project to reach over 95 000 unique users and more than 204 000 social media users, while the video garnered nearly 400 000 viewers. Indirectly, the campaign helped promote the partnering towns/cities showing them as local governments that are conscious of the importance of urban greenery.

Find out more about the campaign on the project's website in the *nationwide campaign* (kampania ogólnopolska) section.

3.

**How cities take
care of and
maintain their
greenery**

good practices

3.1.

Urban green areas management

The way to stress the importance urban greenery via estimating the value of the ecosystem services it provides is an attempt to communicate compellingly that we can and even should change the conversation about urban green spaces, while our spatial planning decisions need to be informed by environmental factors, even in such unique places as cities. In this conversation we can touch upon various challenges that cities face. (See Chapter 1.1).

In this chapter we illuminate some good practices in managing urban green spaces and how to communicate them as well as how to engage local urban population, all of which can serve as an inspiration for other cities. The examples that we use come from Polish cities/towns that have received awards or honorable mentions in the Urban Green Spaces category of the Eco-Miasto competition, and the Norwegian town of Horten.

ECO-MIASTO (ECO-CITY)

a Polish nationwide program that promotes the idea of sustainable urban development. It was initiated in 2013. Eco-Miasto is a competition for local governments, but it also involves workshops, an expert publication and a conference. The initiative is implemented by UNEP/GRID-Warsaw and the French Embassy in Poland.

Website:
<https://www.eco-miasto.pl>



From tree to city
The laboratory of knowledge about urban greenery



3.2.

Good practices from Poland

A CONSISTENT CONCEPT

One good practice of fundamental importance is having a consistent, holistic approach to the entire city. **Wrocław** is a good example of this. City authorities have chosen comprehensive action and consistency in their approach to urban green spaces that has taken on the form of the city's green strategy, based on the assumption that vegetation is equally important as all the other forms of development, meaning that green spaces (both cultivated and uncultivated) should be treated as an equal component of the urban structure. The city has regulations around standards, procedures and solutions to be used in developing, maintaining and managing its green areas. These include guidelines on collecting site location data for trees. Moreover, Wrocław is the first city in Poland to have introduced Information sheets for *tree protection standards in construction projects*. These sheets form a catalog of good practices concerning trees during construction and are mandatory for all construction projects within city limits.

A comprehensive approach to urban green spaces can also be observed in smaller towns. **Kędzierzyn-Koźle** is an example of optimal use of urban green areas: The city's greenery development program represents a multi-faceted approach to urban planning, and it addresses the current challenges that cities

face in the area of greenery management: adapting to climate change, preserving biodiversity and improving safety as well as quality of urban spaces. The city is consistent in its efforts to maintain existing green areas and develop new ones.

The city of **Konin** focuses on the development of its blue-green infrastructure. Here the green tissue is being enriched with small formats such as pocket parks or green yards and squares, which is addressed by a project called *Green urban corridors (Zielone korytarze miejskie)*.

In **Zamość** we can see the consistent, comprehensive approach to urban green spaces in recent projects that have been aimed at introducing trees, for instance along streets and close to industrial areas. There is a rule that makes compensatory planting mandatory with every permit to cut down existing trees.

PROTECTING AIR QUALITY

Developing urban green spaces makes sense from the point of view of air quality and the efforts to improve it. For instance, in **Warsaw** greening of major streets is part of the city's plan to adapt to climate change and is treated as a vital contribution to the ongoing battle for clean air. Among the tools implemented to manage Warsaw's trees we can find



A *Comprehensive Map of Warsaw's Trees (Kompleksowa Mapa Drzew Warszawy)*, namely a complex inventory of over 7 million trees done with the use of geoinformation technology and made public. This map contains detailed information about the condition of trees and tree coverage in different city districts. It helps not only to plan for research and further work, for instance to identify where new trees are needed to ensure the continuity of ecological corridors, but also to forecast the impact of greenery on local air quality and possible threats, such as urban heat island. The data is all available to the public so that residents can learn about trees in their vicinity and help monitor their condition. Currently other cities are in the process of creating such maps.

The city of **Olsztyn** has addressed the same problem, air quality, by developing various forms of urban vegetation in the city center. These include pocket parks, squares, green precincts and streets. These solutions have been introduced in squares and yards in residential districts as well as in blighted areas. All this is done with focus on maintaining continuity of the city's green infrastructure.

A HOLISTIC APPROACH TO WATER MANAGEMENT

Kartuzy is a town that took a holistic approach to managing rainwater. The town was facing pollution in its lakes that are mainly fed by draining rainwater and uncontrolled dumps of wastewater. After a thorough analysis the town authorities decided to

implement a sustainable drainage system, which reduced the amount of water that needed to be drained from the town (rain gardens). Additionally, the quality of water has been improved by new multi-use green spaces and restored natural basins that are used for such purposes as water retention and purification.

In **Wrocław** schools are encouraged to get rid of concrete playgrounds and invest in rain gardens, flower meadows and rain barrels. Since 2019 the city has been subsidizing systems for rainwater collection and use. In areas with dense urban development new green spaces with blue-green infrastructure are created, including rain gardens, infiltration basins or flower meadows.

PROTECTING BIODIVERSITY

In order to protect biodiversity cities must plan for green urban spaces, some more, some less natural, or reclaim land in an attempt to maintain the natural character of existing vegetation.

The town of **Kędzierzyn-Koźle** and its efforts in 2016-2018 are an example of this good practice. In that period the town was implementing a program to reverse the declining trend in green areas, to increase biodiversity and make existing squares and parks more appealing. One of the initiatives was aimed at reducing the presence of invasive alien plant species and ensuring the right conditions for the local vegetation and animals to thrive. The project was preceded by an analysis of the state of local greenery and its implemen-



tation was informed by expert knowledge on climate change and its impact on biodiversity.

Another example of how towns can take care of their residents and pollinators at the same time is an initiative from the town of **Złotów**. It introduced a project called *Clean Air Factory (Fabryka Czystego Powietrza)* to combat emissions. When planning for new



trees the town gives priority to bee-friendly nectariferous and polleniferous species of trees and perennials. It is especially significant because Złotów is a rather small town in nature-rich surroundings.

The Vistula river and its valley that runs through **Warsaw** is a Nature 2000 area. This means that the city's natural system contains

areas that serve as habitats for precious protected species. To better perform its duty to protect nature the City of Warsaw – together with the local bird protection association (*Stołeczne Towarzystwo Ochrony Ptaków*) – conducted a several-year-long project called *Protecting habitats of key bird species in the Mid-section of the Vistula Valley while facing intense pressure from the Warsaw metropolitan area*.

Another city that is consistent in its approach to urban vegetation and shows profound awareness of the spatial context and areas of high significance in terms of nature, both within its city limits and surrounding ones, is **Betchatów**. It runs a number of land reclamation projects in the valley of Rakówka river and its tributaries. These initiatives include planting of new trees and eliminating invasive species.

RECLAMATION PROJECTS

Sometimes to develop urban green spaces we need not only revitalization efforts but true land reclamation. The city of **Zabrze** decided to take on a complex reclamation challenge of its 183 ha postindustrial area. The project called *Reclamation of the area surrounding the Bytomka river in Zabrze* helped clear the area of large amounts of waste, bioremediate it and then develop for natural and recreational purposes. New trees and shrubs were planted and approximately 15 km of walking and bike trails were built, ecological trails and viewpoints were designated along with educational infrastructure (e.g. information boards and stations).

ENGAGING LOCAL COMMUNITIES

Another good practice that can be described as fundamental and absolutely necessary is engaging local residents. Both awareness raising efforts and social participation ensure good collaboration and promote a better understanding among residents of what city authorities are trying to achieve.

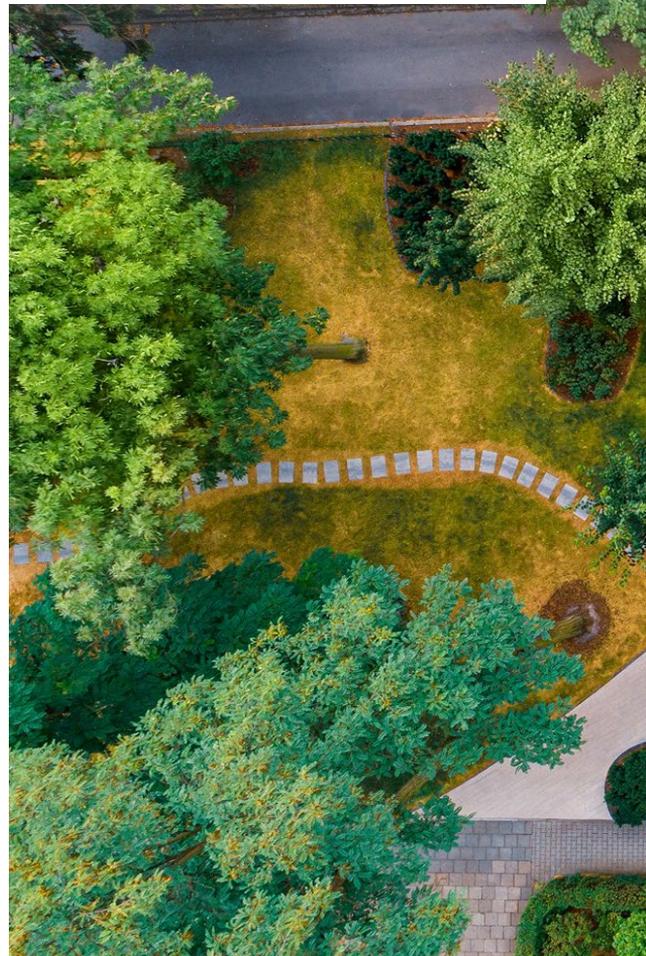
The city of **Krakow** (Cracow) has been highly involved in social dialogue and cooperation with residents as well as local NGOs at all stages of drafting the city's policy for the development of blue-green infrastructure and management of green spaces. The project *Gardens of Cracovians* supported the creation of a whole system of thematic pocket parks using a participatory approach.

Another project in another city – *Wedges of greenery in Słupsk: Developing green spaces in the city of Słupsk* is based on an assumption that greenery in yards between residential buildings is an important element that can help revitalize the city. The project was consulted with residents, who provided valuable feedback. The investment in green urban spaces was dictated by such factors as air quality, adaptation to climate change and the need to design public spaces that connect people.

The educational and participatory aspects of policy making with respect to blue-green infrastructure and urban vegetation were also taken into account in the city of **Konin**, while **Wrocław** organized a series of co-design

workshops for residents to uncover greening solutions for some of the city's districts.

In **Warsaw** there is an app called *A Million Trees (Milion Drzew)* that allows users to indicate areas that could use some trees. In **Zamość** the first rain gardens became an opportunity to engage residents in a workshop on good practices that can be replicated in their private green spaces. Preschool and primary school students were invited to start urban meadows and the city designated 3 weekends for the creation of pocket parks together with inhabitants. Local population was also invited to consult on matters concerning urban greenery.



PARTICIPATORY BUDGETING

As many cities and towns introduce the idea of participatory budgeting, local residents submit proposals of green spaces. The city of **Lublin** took this a step further. They noticed that although many greenery-related projects were submitted by residents, they did not always stand a chance when pitted against development, refurbishment, educational or sports-related proposals. For this

reason the city of Lublin implemented a separate competition for projects around greenery called *the Green Budget (Zielony Budżet)*. Any resident, NGO or district council of Lublin can submit their proposal. Projects are not subject to voting and instead they are assessed from a formal standpoint by city council officials and urban greenery experts. Projects that require zoning plans undergo public consultations.



3.3.

Good practices from Norway

PARKS AS WAY TO CONSIDERABLY BOOST THE APPEAL OF SELECTED URBAN AREAS

Horten is a seaside town on the Oslo Fjord, one hour by car south of Oslo. It has two port areas: internal and external. The internal port was used as a waste dumping site for decades. Apart from that it had a variety of industrial buildings and warehouses. The embankment was an uneven slope – inaccessible and covered with rubble, with a straight path along the coastline. The remaining area in the port – between the sea and the industrial structures – was an isolated site that did not hold much appeal.

In 2013 the municipality of Horten came up with a **zoning plan for the internal port**. The authorities wanted to make this part of town more attractive and so they embarked upon the process of remodeling it into a modern urban residential area with large stretches of greenery. Asplan Viak, a consulting company, was hired to develop plans to revitalize the area to make it better suited to the needs of local population. As a result a **holistic concept** was created to develop parks, green corridors, tree-lined streets with an open flood-water management system and a network of pipes and cables beneath. The entire concept will be implemented gradually as residential infrastructure develops in the area.



The first step was to create detailed plans and to build the main park that stretches along the coastline. It is 400 meters long and 50 meters wide. It was finalized in 2020. The park is public, but it serves as a recreational area for residents of the newly built houses nearby. It was deliberately designed to have a variety of **playgrounds**. Apart from playgrounds, the park features **picnic sites, an outdoor gym, flowerbeds with perennials, ornamental grasses, flowering bushes and trees**. The coastline itself has been transformed as well – from an austere, rubble-covered and isolated slope it became an inviting stretch of land with a long wooden walkway, wide concrete

steps leading to the sea and a large **wooden pier for swimmers and anyone who wants to relax and gaze at the sea**. The pier connects to a basketball and beachball court.

From the very beginning the park has been considered a great success and has become immensely popular among Horten residents. People use it to go for a swim, engage in water sports, training and other leisure activities. Precisely as was intended. And the areas surrounding the park, previously considered unattractive, have become popular, **transforming the whole area into an inviting and highly livable part of town**.



Summary

Urban population is growing; however, urban development brings with it numerous environmental challenges. The most significant ones include:

- high level of emissions;
- low quality of urban air;
- urban heat island,
- torrential rain and flooding;
- no or low accessibility of green areas;
- decrease in the number of native species and natural habitats.

The answer to all these challenges lies in more sustainable cities. Urban green spaces can support this process of sustainable urban development. Greenery can deliver a multitude of benefits – called ecosystem services – for urban residents. These services include:

- climate regulation;
- improvement of air quality;
- reducing surface runoff;
- boosting the appeal of surrounding areas.

The importance of the abovementioned ecosystem services has been estimated by environmental economists. The study that



they conducted has shown that the value of these benefits is tremendous. Here are some examples:

- Park near a school, Lidzbark Warmiński - 282 000 PLN;
- Rubin Park, Miasteczko Śląskie – 348 000 PLN;
- Park in Wojskowa street, Przasnysz – 401 000 PLN;
- Inwalidów Wojennych Park, Rzeszów – 562 000 PLN;
- Lech Kaczyński Square, Szczytno – 195 000 PLN.

This information can be disseminated via social campaigns that will help change residents' perceptions of urban greenery: They may start seeing it as something economically viable. Such awareness-raising activities can include:

- distributing and placing this information in public spaces, for instance, installing information boards;
- poster campaigns;
- featuring this information in a geoportal;
- webinars and competitions for school students.

A successful social campaign to raise awareness about the benefits provided by urban green spaces needs to go hand in hand with best practices in green spaces management that genuinely address actual environmental challenges faced by any given city or town. Such good practices include:

- a consistent approach to green spaces across the whole city/town;
- action to protect air quality;
- comprehensive approach to water management;
- action to support biodiversity;
- reclamation projects;
- engaging local communities;
- participatory budgeting to support urban green spaces.

All these efforts – awareness campaigns and good practices in managing urban green areas – will result in a multitude of benefits that greenery can deliver to local residents, who in turn will grow increasingly conscious of these valuable services.

ŹRÓDŁA

- [1] EEA. 2016. *Urban Sprawl in Europe*. Brochure No 11/2016, European Environment Agency
- [2] ONZ. 2014. *Urbanization prospect*. The 2014 Revision.
- [3] ONZ. 2018. *Urbanization prospect*. The 2018 Revision.
- [4] Nabielek, K. et al. 2016. *Cities in Europe: Facts and figures on cities and urban areas*, PBL Netherlands Environmental Assessment Agency. <https://ec.europa.eu/futurium/en/system/>
- [5] GUS (Statistics Poland). 2022. *Powierzchnia i ludność w przekroju terytorialnym w 2022 r* Informacje statystyczne. Warsaw.
- [6] Polska w liczbach (Poland in numbers). 2023
- [7] EEA. 2020a. *Towards zero pollution in Europe*. EEA Signals.
- [8] EEA. 2020b. *Urban adaptation in Europe: how cities and towns respond to climate change*. Brochure No 12/2020, European Environment Agency.
- [9] UN. 2020. *The Sustainable Development Goals Report 2020*
- [10] EEA. 2021. *Urban sustainability in Europe – Avenues for change*. Brochure No 06/2021, European Environment Agency.
- [11] Ogrodnik K. 2015. *Idea miasta zwartego – definicja, główne założenia, aktualne praktyki*. (*Compact city: definition, main assumptions, current practices*), Architecturae et Artibus.
- [12] IRMiR. 2021. *Raport o Stanie Polskich Miast. Środowisko i adaptacja do zmian klimatu*. [ed.] Rzeńca A., Sobol A., Ogórek P. Obserwatorium Polityki Miejskiej. Institute of Urban and Regional Development, Krakow – Warsaw.
- [13] EC. 2020 *Proposed Mission: 100 Climate-neutral Cities by 2030 – by and for the Citizens Report of the Mission Board for climate-neutral and smart cities*. Research and Innovation.
- [14] A/RES/70/1 *Transforming our world: the 2030 Agenda for Sustainable Development*.
- [15] KE. 2020. *EU Biodiversity Strategy for 2030 Bringing nature back into our lives*. Communica-

tion from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. COM(2020) 380 final.

[16] UNEP/GRID-Warsaw. 2014. *Valuation of ecosystem services for the Ramsar area: Wigry National Park*. (unpublished)

[17] Von Hoffen, L.P., Samuel, I. 2014. *Orchards for edible cities: cadmium and lead content in nuts, berries, pome and stone fruits harvested within the inner-city neighbourhoods in Berlin, Germany*. *Ecotoxicology and Environmental Safety* 101: 233–9

[18] Velazquez-Marti, B., Sajdak, M., Lopez-Cortes, I. 2013. *Available residual biomass obtained from pruning Morus alba L. trees cultivated in urban forest*. *Renew. Energy* 60: 27–33

[19] Peper, P. J., McPherson, E.G., Simpson, J.R., Gardner, S. L., Vargsas, K.E., Xiao, Q. 2007. *Municipal Forest Resource Analysis*. *USDA Forest Service*. Pacific Southwest Research Station. New York.

[20] Berezowska-Apolinarska, K., Kokowski, P. 2004. *Rola zieleni w tłumieniu hałasu - zieleń jako ekran akustyczny*. [in] *Materiały konferencyjne: Zieleń jako niedoceniony majątek miast*. 9.05.2004. Poznan.

[21] Tamura, A. 1997. *Effects of landscaping on the feeling of annoyance of a space*. [w] *Schick, A., Klatte, M., Contributions to psychological acoustics: Results of the seventh Oldenburg symposium on psychological acoustics*. Universität Oldenburg. Oldenburg

[22] Szczepanowska H. B. 2015. *Drzewa w mieście – zielony kapitał wartości i usług ekosystemowych*. *Człowiek i Środowisko* 39 (2), p: 5–28.

[23] Szczepanowska, H.B., Sitarski, M. 2015. *Drzewa – zielony kapitał miast*. *Instytut Gospodarki Przestrzennej i Mieszkalnictwa*. Warsaw.

[24] Berland, A., Shiflett, S., Shuster, W., Garmestani, A., Goddard, H., Herrmann, D., Hopton, M. 2017. *The role of trees in urban stormwater management*. *Landscape and Urban Planning* 162: 167-177.

[25] Heisler, O. M. 1986. *Effects of individual trees on the solar radiation climate of small buildings*. *Urban Ecology*. 9: 337-359.

[26] Giergiczny, M., Kronenberg, J. 2012. *Jak wycenić wartość przyrody w mieście? Wycena drzew przyulicznych w centrum Łodzi*. [in:] T. Bergier, J. Kronenberg (ed.), *Nature in the city. Ecosystem services – untapped potential of cities*. Polish TEEB guide for cities. Sendzimir Foundation. Krakow.

[27] GUS (Statistics Poland), 2019. *Lokalne planowanie i zagospodarowanie przestrzenne według stanu na 31 grudnia 2019 r.* Warsaw

[28] NIK (Supreme Audit Office of the Republic of Poland) , 2017. *Raport Zarządzanie zielenią miejską*. Warsaw.

[29] Szkop Z, Żylicz T. 2022. *Analiza dotycząca roli obszarów zieleni miejskiej i wartości świadczonych przez nie usług w miastach partnerskich projektu “Od drzewa do miasta” wykonana na zlecenie UNEP/GRID-Warszawa*. Warsaw Ecological Economics Center. University of Warsaw.



This guide was developed as part of the project called „From tree to city: the laboratory of knowledge about urban greenery”. The project benefits from a PLN 688 178,00 grant from Iceland, Liechtenstein and Norway through the EEA and Norway Grants. The aim of the project is to shift the perceptions of urban populations concerning the benefits and services provided to them by urban greenery. The project also benefits from a PLN 121 443,00 subsidy from the Polish government.