Bringing cities to life, bringing life into cities

Connecting Nature Framework report for Ioannina city

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0   Summary

Ioannina is the capital and largest city of the Ioannina regional unit and of Epirus, an administrative region in north-western Greece.

Nowadays, one of the main axes for the development of the city is the sustainable management of its resources and the development of ecotourism. In that concept the city has developed a Strategic Plan for Sustainable Urban Development with its main goal to be the intelligent and sustainable urban development on the basis of the city's particular spatial and socio-economic characteristics.

Through that Plan, interventions are expected to be implemented that will cover various strategic parameters of the region, such as:

1. spatial planning
2. culture
3. environment
4. transport
5. smart applications to enhance smart entrepreneurship
6. networking and utilization of human resources

In that framework, the nature-based solutions have the potential to play a crucial role for fulfilling these targets. Although the concept of nature-based solutions is relatively new in the city, the Connecting Nature Project is an excellent opportunity to introduce them to Ioannina and showcase their importance and effectiveness in the sustainable development of the city.

One of the most important nature-based solutions implementing in the city and the city's exemplar in the Connecting Nature Project, is the restoration of Pirsinela Park. Pirsinela Park is a neglected park located in the urban boundaries of the city. It is considered to be the largest area of existing greenspace (almost 250.000 m2). The site contains a forest and several built infrastructures, which are currently in decay. Historically, this region used to serve as the green and entertainment hub of the city, offering opportunities for physical activities (running, tennis) and access to nature. However, the last fifteen years the park has been totally abandoned, due to a legal dispute between the Municipality of Ioannina and the Greek State over the ownership of the land. Finally, the Municipality has dealt with the ownership matters and as we have already been informed the Pirsinela park is one of the first line projects for the new government. The municipality of Ioannina has the ambition to make the park more accessible and to revive its cultural use, while doing so in an environmentally friendly and sustainable manner. In this ambition, the municipality will focus on the main part of the park.

The following Connecting Nature Framework figure summarizes the approach of Ioannina city towards the adoption of Connecting Nature Framework in the design and implementation of the exemplar, during the three phases of the Project: Planning, Delivery and Stewardship.

IOANNINA

PLANNING — NATURE-BASED SOLUTION

- Selection of exemplar: Restoration of Pyrsinela Park
- Workshop on Business Model Canvas
- Open Public Consultation
- OSMOS workshop on open innovation teams
- Developing impact assessment plan; determining performance indicators
- Open public consultation process for the determination of the key elements of the restoration of the park

DELIVERY — NATURE-BASED SOLUTION

- City Council approval of Pyrsinela Park's Management Plan
- Securing 10M € funding
- Implementing impact assessment plan
- Engaging stakeholders to the developing of the exemplar

STEWARDSHIP

- Evaluate performance according to impact assessment methodology
- Evaluating exemplar's performance
- Defining and establishing co-production strategies in the management of the park

1 Connecting Nature Framework

Step 1. Identify the city context

Ioannina is the capital and largest city of the Ioannina regional unit and of Epirus, an administrative region in north-western Greece. According to the 2011 census, the city population was 65,574, while the municipality had 112,486 inhabitants. It lies at an elevation of approximately 500 metres above sea level, on the western shore of lake Pamvotis. Ioannina is located 410 km (255 mi) northwest of Athens, 260 kilometres (162 miles) southwest of Thessaloniki and 80 km (50 miles) east of the port of Igoumenitsa in the Ionian Sea.

The city's foundation has traditionally been ascribed to the Byzantine Emperor Justinian in the 6th century AD, but modern archaeological research has uncovered evidence of Hellenistic settlements. Ioannina flourished in the late Byzantine period (13th–15th centuries). It became part of the Despotate of Epirus following the Fourth Crusade and many wealthy Byzantine families fled there following the sack of Constantinople, with the city experiencing great prosperity and considerable autonomy, despite the political turmoils. Ioannina surrendered to the Ottomans in 1430 and until 1868 it was the administrative center of the Pashalik of Yanina. In the period between the 18th and 19th centuries, the city was a major center of the modern Greek Enlightenment. Ioannina was ceded to Greece in 1913 following the Balkan Wars

In recent times, the city has become the centre of three particular functions. It is home to two large regional hospitals. Over the last decade, the university and technical college have fused, to create the University of Ioannina with a 30,000 strong student body. Finally, it is home to a number of key agricultural activities including poultry (~70% of Greece's demands), dairy products (representing a large share of the Greek market) and mineral water (~50% of Greece's market).

The territorial economy is an important vector for change. While roads have opened to both Athens and Thessaloniki in the last years, cutting travel from a full day down to a few hours, and the airport has gained more regular schedule, Ioannina's age-old spirit persists. There is a fairly reactive approach to problems. Tourism is poorly defined and there is a serious risk that mass-tourism will bring more trouble than it is worth.   There is attraction from European business to build on the city's university and educated graduates yet there are no clear programs for hosting new business. The two large regional institutions, the hospitals and the university, are largely disconnected from the old city. Finally, there is a challenge to inspire social entrepreneurship, where the community plays a larger role in developing projects that concern them.

Nowadays, one of the main axes for the development of the city is the sustainable management of its resources and the development of ecotourism. In that concept the city has developed a Strategic Plan for Sustainable Urban Development with its main goal to be the intelligent and sustainable urban development on the basis of the city's particular spatial and socio-economic characteristics.

Through that Plan, interventions are expected to be implemented that will cover various strategic parameters of the region, such as:
1. spatial planning
2. culture
3. environment
4. transport
5. smart applications to enhance smart entrepreneurship
6. networking and utilization of human resources

One of the specific goals of the Strategic Plan is "the Protection, rehabilitation and strengthening of the natural environment and history of the city and its cultural heritage as factors of enhancing competitiveness and employment promotion."

In that framework, the nature-based solutions have the potential to play a crucial role for fulfilling these targets. Although the concept of nature-based solutions is relatively new in the city, the Connecting Nature Project is an excellent opportunity to introduce them to Ioannina and showcase their importance and effectiveness in the sustainable development of the city.

Step 2. Define the goals of your nature-based solution

The exemplar project for Ioannina city is the restoration of Pirsinela Park, popularly known as 'the living room of Ioannina'.

The objectives of this exemplar project are outlined in the list below:

- Connecting nature-people: restore the experiential relationship of residents with the largest green park in the city. In terms of architectural planning, some focal points are: redesign the existing lanes, add new paths, stops and special areas of interest throughout the park, improvement of the overall park structure.
- Connecting people: Turning the park into a hub of a multitude of cultural, sports and educational activities. The aim is to promote social cohesion through a variety of opportunities that will arise from the different uses of the park.
- Connecting nature: Conservation, protection and further enhancement of the park's green space based on resilience.
- Sustainable economic development through the integration of commercial and social actions in the site. Possible value outcome: job creation, increase in the value of the land property, revenue for the Municipality, increased number of visitors.
- Upgrade the quality of city's life, by providing a neglected park with historical significance to the citizens.

The Restoration of Pirsinela Park is directly linked to the general agenda for sustainable urban development of the city, as part of the Strategic Plan for Sustainable Urban Development described in the previous chapter. Moreover, the Management Plan of the Pirsinela Park, developed after a public consultation process, was approved by the city council and the restoration plan secure a funding of 10M € by national funds (and specifically by Greek Recovery Fund).

Step 3. Identify your target audience and other relevant actors

The Connecting Nature Framework Report was developed by the City of Ioannina's CN Team, in collaboration with other colleagues in different Departments of the Municipality (e.g. Technical Department, Department of Green Spaces, Department of Finance).

The CN Framework Report addresses to a wide audience which includes both the internal structure of the municipality, but also the general public. Internally, the Report is used as a tool for the information of all the colleagues involved in the exemplar regarding the current status of the Project and also as a valuable guiding document in the meetings with the elected leadership of the municipality.

Moreover, the Report is used as a dissemination tool in reaching the general public and increasing public awareness regarding both our exemplar and the nature-based solutions in general.

Step 4. Introduce your nature-based solution exemplar

Pirsinela Park is a neglected park located in the urban boundaries of the city. It is considered to be the largest area of existing greenspace (almost 250.000 m^2). The site contains a forest and several built infrastructures, which are currently in decay. Historically, this region used to serve as the green and entertainment hub of the city, offering opportunities for physical activities (running, tennis) and access to nature. However, the last fifteen years the park has been totally abandoned, due to a legal dispute between the Municipality of Ioannina and the Greek State over the ownership of the land. Finally, the Municipality has dealt with the ownership matters and as we have already been informed the Pirsinela park is one of the first line projects for the new government. The municipality of Ioannina has the ambition to make the park more accessible and to revive its cultural use, while doing so in an environmentally friendly and sustainable manner. In this ambition, the municipality will focus on the main part of the park.

The planning phase of the Project was concluded with the completion of a Public Consultation Process for determining the key characteristics of the restoration of the Park, which led to the development of the Management Plan of Pirsinela Park, approved by the city council.

The delivery phase of the Project (which we are currently on) started with the securing of the fundings for the work. The next step in that phase is the tendering process for the external contractors working in the Project, that is scheduled to be finished in the first semester of 2022.

Figure 1. Pirsinela Park

Step 5. Position this report

The Connecting Nature Framework is a valuable tool in the implementation of the exemplar as it serves as the central point that connects all the key contributors of the project and helps them all to stay focused in the same target.

Various elements of the Framework, like the Reflexive Monitoring, were incorporated for the first time in the development of a Project, as important as the restoration of Pirsinela Park is, in the Ioannina City. With their use, the multidiciplimary team that was created from different Departments of the municipality manages to co-operate in a systematic, organised and timely fashion while all its members have a clear picture of the project and its status at any given time.

In addition, the work done for the Framework was a significant help in developing the 'story' of our Project and communicatng it effectively to the general public, something that is evident in the significant participation of all the citizens of Ioannina in the public consultation process during the design of the project.

Finaly, the Connecting Nature Framework could be used as a guidebook and a best-practise example in the development and implementation of other nature-based solutions in the area.

2 Technical Solutions

Step 1. Define the nature-based solution

The exemplar project for Ioannina city is the restoration of Pirsinela Park, popularly known as 'the living room of Ioannina'.

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The objectives of this exemplar project are outlined in the list below:

- Connecting nature-people: restore the experiential relationship of residents with the largest green park in the city. In terms of architectural planning, some focal points are: redesign the existing lanes, add new paths, stops and special areas of interest throughout the park, improvement of the overall park structure.
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- Upgrade the quality of city's life, by providing a neglected park with historical significance to the citizens.

The following Figures present the location of the Park relative to the city, an overview of the current status of the Park and the main technical solutions that are going to be implemented in the Park..
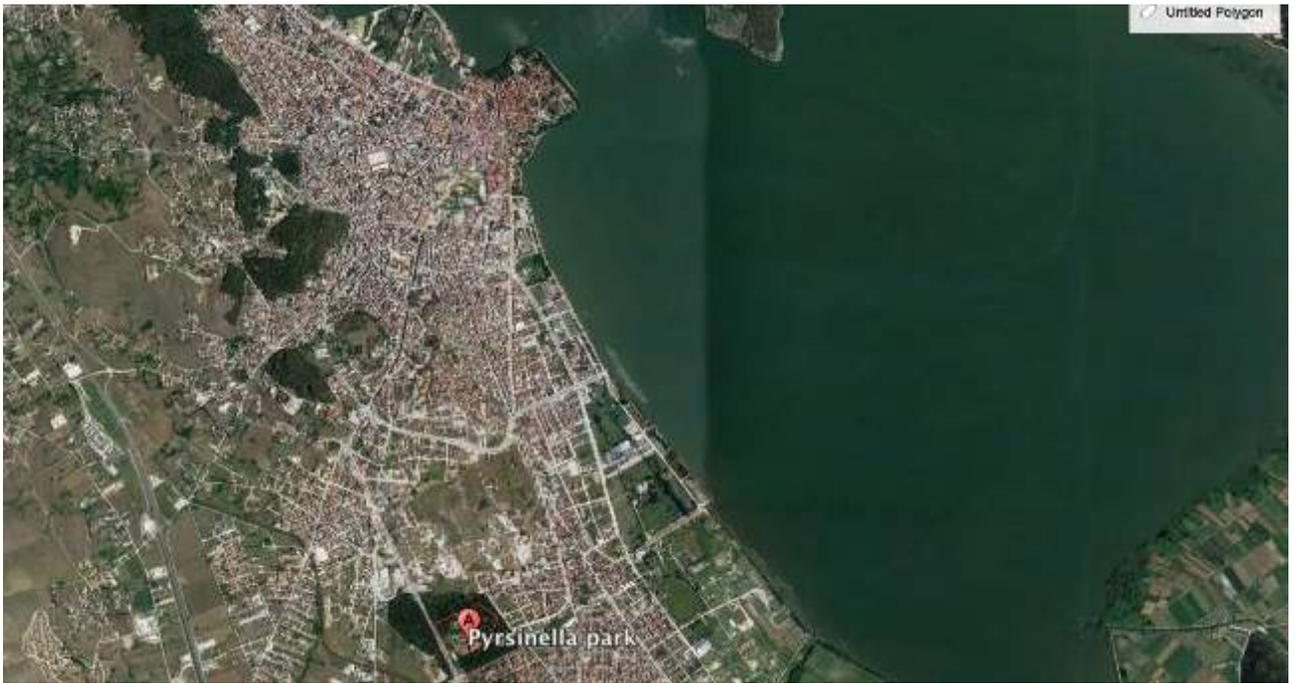
General masterplan for the regeneration of Pirsinella park

A. Redesign of pedestrian and cycling paths
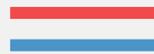
B1. Wooden warehouse for Environmental education center

B2. Urban green gardens

C. Restoration of the main building

D1. Maintain and expand sports infrastructure (tennis court, free for leisure activities court)

D2. Outdoor fitness - gym equipment

E. Dog park (former local animals zoo)

F1. Regeneration of the lake

F2. Cultural activities (outdoor event space - theatre)

G. Environmentally oriented playground

More precisely, the technical design includes:

A. **Path network design**

Objectives:
- maintain the existing character of the parkland landscape as a priority
- use materials that are visually sympathetic to the setting, where necessary

Natural 'soft' soil paths

2. Combination of 'soft' and 'hard' paths : two walking and cycling routes

Large walking and cycling route (1.5 km)

Small walking route (800 m)

2. Replacement of the old 'hard' surfaces with new paving stones
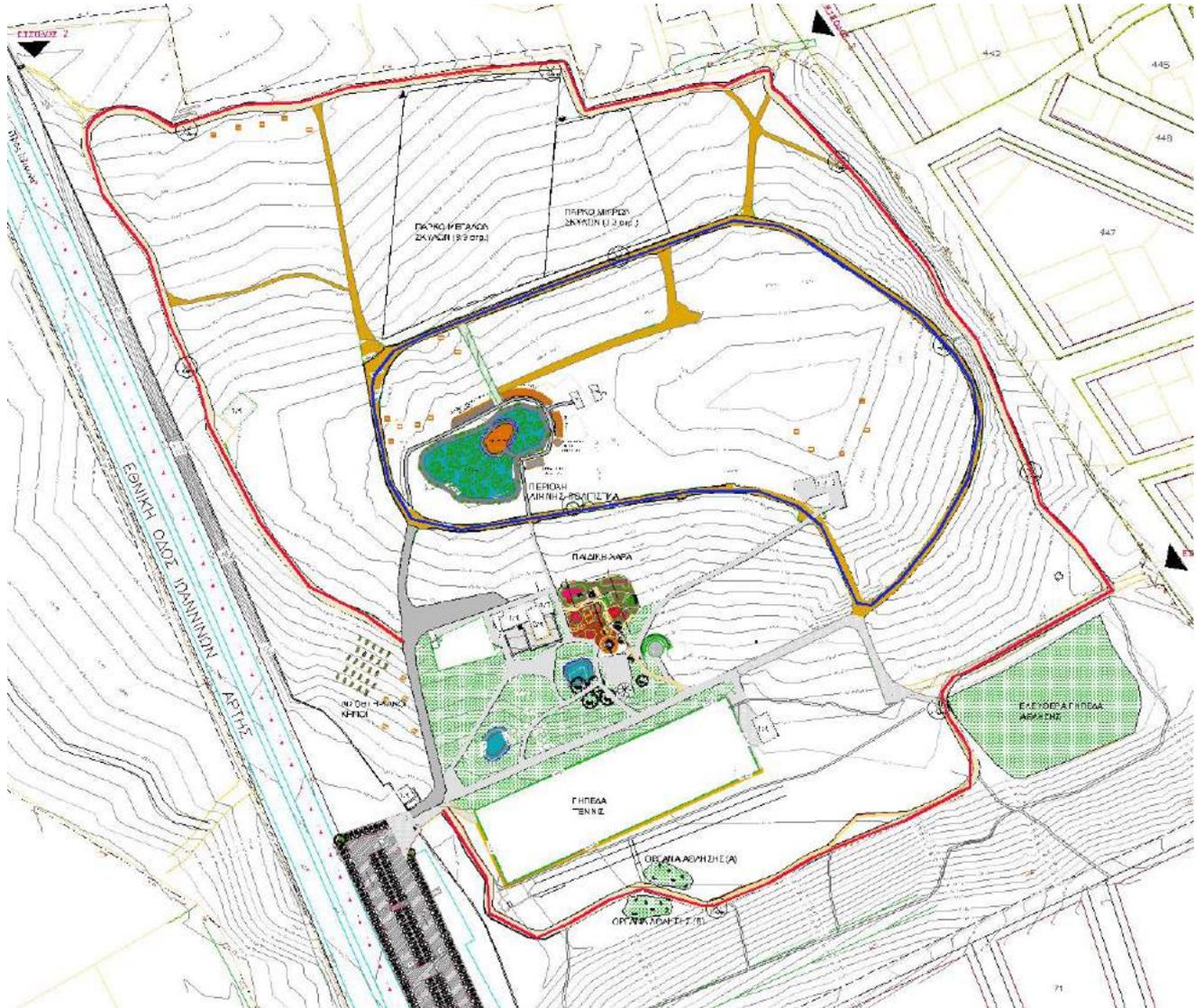
Path network design

A1. Redesign of pedestrian and cycling paths

- Pedestrians comprise the majority of visitors across the parks, but with many other users including cyclists, provision for all visitors needs to be balanced to maintain a high quality of experience.

- The proportion between hard and soft landscaping across the park remain the same. Current path alignments are to be preserved where designated as an important part of the park character.
- The only newly proposed alignment is the south part of the red -walking ad cycling- route.

USERS   +

PATH
FOR PEDESTRIANS ONLY

SHARED USE PATH
FOR PEDESTRIANS & CYCLISTS

Current natural walking paths

Path network design

— Large walking and cycling route (1.5 km)

— Small walking route (800 m)

Α. ΜΕΓΑΛΗ ΔΙΑΔΡΟΜΗ (σταθερό πλάτος 4 μ.)

δ.χωμάτινο σταθεροποιημένο δάπεδο από κουρασάνι

ΚΤ1-Γ3

α.καθαρισμός κ αρμολόγηση λίθινου τοιχίου

ε. κράσπεδο από γρανίτη γκρι (25x10xμήκος)

καθαίρεση λίθινου τοιχίου

ΤΟΜΗ Α-Α

α.καθαρισμός κ αρμολόγηση λίθινου τοιχίου

δ.χωμάτινο σταθεροποιημένο δάπεδο από κουρασάνι

ΠΕΖΟΔΡΟΜΟΣ

καθαίρεση λίθινου τοιχίου

κράσπεδο από γρανίτη γκρι (25x10xμήκος)

ΚΑΤΟΨΗ
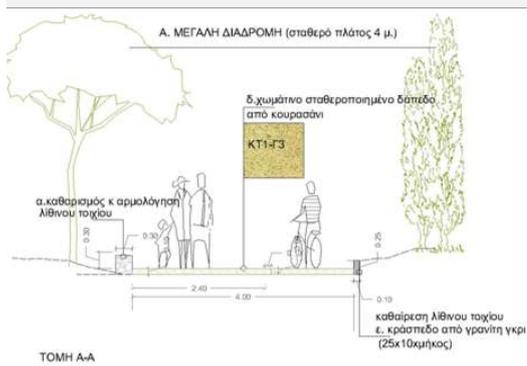
SHARED USE PATH
FOR PEDESTRIANS & CYCLISTS

Large walking and cycling route (length 1.5 km – width 4m) from natural stabilized earth floor, an environmentally friendly material that give a soil-like look, suitable for pedestrian walkway and bike path.
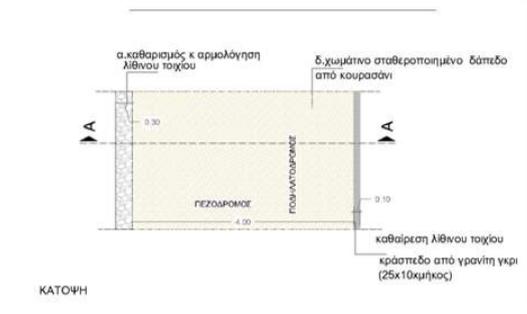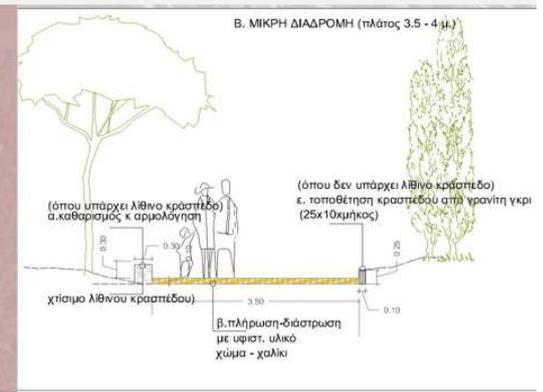
PATH
FOR PEDESTRIANS ONLY

Small walking route (800 m): maintenance and enhancement of the existing natural soil flooring.

Β. ΜΙΚΡΗ ΔΙΑΔΡΟΜΗ (πλάτος 3.5 - 4 μ.)

(όπου υπάρχει λίθινο κράσπεδο) α.καθαρισμός κ αρμολόγηση

(όπου δεν υπάρχει λίθινο κράσπεδο) ε. τοποθέτηση κρασπέδου από γρανίτη γκρι (25x10xμήκος)

χτίσιμο λίθινου κρασπέδου)

β.πλήρωση-διάστρωση με υφιστ. υλικό χώμα - χαλίκι

Β. ΜΙΚΡΗ ΔΙΑΔΡΟΜΗ (πλάτος 3.5 - 4 μ.)

(όπου υπάρχει λίθινο κράσπεδο) α.καθαρισμός κ αρμολόγηση

(όπου δεν υπάρχει) χτίσιμο λίθινου κρασπέδου στο πρότυπο του υφιστάμενου

ΠΕΖΟΔΡΟΜΟΣ

β.πλήρωση-διάστρωση με υφιστ. υλικό χώμα - χαλίκι

A2. Rest areas in the path network

Large walking and cycling route (1.5 km) – **6 rest areas**

Small walking route (800 m) - **3 rest areas**

- Creation of 9 rest areas across the two main pathways

- The rest areas will also be info points with informative signalization

- Reuse the branches of the trees that will be cut to make natural park furniture out of them

B1. Ecological education center
B2. Urban sensory gardens

B1
Wooden warehouse

- **B1:** In the east side of the park there is a wooden warehouse that would be reused and could host the ecological education center or an environmental educational hub for teenagers.

- **B2:** Next to the wooden warehouse a place (total area of 600 m2) is designated for urban gardening to be included in the educational activities

➢ These are botanical gardens mainly endemic plants that follow the philosophy of sensory gardens with a large number of different plants, such as aromatic, herbs, flowers in different colors.

➢ Planting classes will be available to groups of students or others interested in growing herbs, spices and flowers to encourage people to get in touch with nature - the use of pesticides and biocides will be strictly prohibited.

➢ They will consist of separate planting sections of 2.5m2 with dimensions of 1m x 2.5m and with a soil depth of 0.5m.Indicatively, it is proposed to place 25 sections, following the natural altitudes of the area, with different species and a distance between them of about 3 meters.
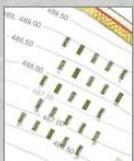
B2 Urban sensory gardens

C. Restoration of the main building
D. Sport infrastructure

C: The main building and its outdoor space and kiosk will be renovated to host its former use (coffee / eco - restaurant operation)

D: In the southern part of Pyrsinella Park are located the organized sports areas:

D1: free sports fields with 4,340 sq.m. lawn, with flexibility in the use of space - possibility of utilization in different sports activities (football, golf, paintball, etc.)

D1. Maintain and expand sports infrastructure (tennis court, free for leisure activities court)

D2. Outdoor fitness - gym equipment

D2: Installation of free training equipment, south of the tennis courts. Indicatively, a total area of about 500 sq.m. is proposed, divided into two sections, on either side of the section of the long route, south of the tennis courts.

E. Dog park

- The total area of Pyrsinella Park that can be a Dog Park classifies it in the category of large Dog Parks, with an area of about 11.6 acres.

- The features and dimensions, however, allow the park to be divided into two sections - with a separate entrance, depending on the size of the dogs it hosts: the large dog park occupies 8.3 acres and the smaller park for small dogs area 3.3 acres

- The dog park will be a fenced area with two secure gates

F1. Regeneration of the lake

F1: The design of the large lake area was carried out with the aim of:

- The smooth coexistence of the water element of the park and the human element that surrounds it as well as the integration of mild cultural uses in the area by the lake.

- The preservation and enhancement of the existing aquatic vegetation and the biodiversity of the lake, minimizing the interventions regarding the hydrology and the earthworks on the bottom and the shore of the lake

- The creation of a natural landscape: a combination of plant element that grow on its water surface and a small ecosystem - water lilies and plants-oxygenators that clean and oxygenate the water

F2. Cultural activities (outdoor event space - theatre)

F2: The large lake and its surrounding space, due to the special natural beauty and the central location in the park, is proposed to be used as an area of mild cultural activities.

➤ The existing small island in the middle of the lake could function as a place of action - a stage for cultural events.

➤ A metal – reversible- structure with three rows of stands for the spectators will be located in the northeast side of the lake, following its natural curve.

G. Environmentally oriented playground
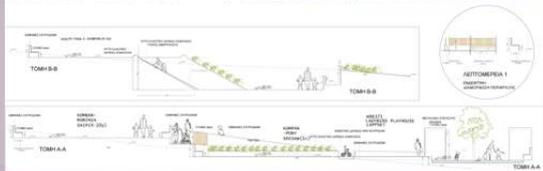
- The general design shapes the playground into two parts (upper and lower), according to the age group of children, utilizing the existing path that separates the two spaces, with the ultimate goal mainly the optimal physical and mental development of children, of all age groups.

- The design separates the functions (movement-attitude-play), but at the same time 'unifies' the space within the connection of the two parts and the use of the same natural and environmentally friendly materials

- The green is used as a natural boundary in all the playground areas while the equipment is mainly made of recycled wooden material.

Total management of the park

- Green management: take care of the forest area. Lots of the existing pine trees that have been planted around 60 years ago are sick. New trees should be planted for replacement. The forestry management agency of the municipality will follow the use plans that are decided upon by the city council.

- Redesign of 4 entrances of Pyrsinella Park and equip the entrances with complimentary functions, such as a bike rental.

- Redesign of fencing and facade throughout the perimeter of the park (necessary for the well-groomed appearance and for the safety of the space)

- Creation of information points within the park (info kiosks) with the peculiarities of the specific area or short information stories about the environment of the park or the city of Ioannina and its special features.

- Creation of additional parking spaces.
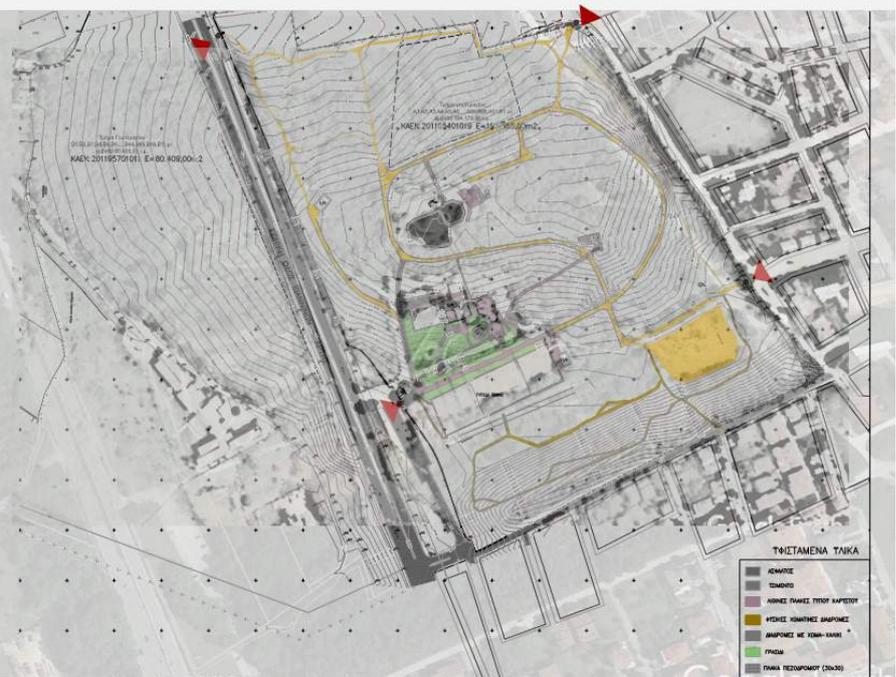
Step 2. Develop an understanding of the landscape context and ecosystem services needs

The main characteristic element, in terms of environment, of the municipality of Ioannina is the lake Pamvotida, where the island of Ioannina is also located. With the JM 22943/2003 (Government Gazette 649 / Δ / 5.6.03) the area of the Lake Pamvotida has been designated as an "eco-development area" and the Pamvotida Lake Management Body was established (K.Y.A (135074/5193 / Sheet No. 1531/9/12/2002). With previous decisions (Government Gazette 648 / B / 25.11.68), 4425/212/75 / 4.3.77 (Government Gazette 266 / B / 21.3.77) and (Government Gazette 660 / B / 1981), Lake Pamvotida and the perimeter areas have designated as an area of "special natural beauty" and are therefore inextricably linked to the long history of the city.

Lake Pamvotida is an aquatic ecosystem and has been designated as an area of eco-development. The island of the lake and the cave of Perama are touristic attractions. From the natural environment of the area, the suburban forest of the city stands out, as is one of the 19 aesthetic forests of the country. Beyond the suburban forest, the green spaces in the city are limited and focus on the small parks of Litharitsia and Kouramba in the city center, in Katsari park in the lakeside area, as well as the Pirsinella park which occupies a large area and is located at the entrance of the city.

It is also noted that the "Suburban Forest of Ioannina" belongs to the landscapes of special beauties with a total area of 106.06 ha. An artificial pure pine forest, aged 80-90 years, which extends on the outskirts of the city of Ioannina on 3-4 hills and tends to become an urban one grove, since it has already been surrounded by the residential expansion of the city.

Regarding the social and economic context of the area, the Municipality of Ioannina has a permanent population of 112,486 inhabitants, it is the largest Municipality of Region of Epirus and the 10th largest in the country according to the 2011 census.

Based on the 2001 census, there is an increase in the population of the Municipality in the decade 2001-2011 which is in line with its general development in infrastructure, employment and especially in the tertiary sector of services and enterprises. In addition, it is due to the general tendency of Greek residents to move to large urban centers, such as the city of Ioannina for the region of Epirus.

The fact that at the same time throughout the country there is a decrease in population by a percentage of 1.34% while in the Prefecture of Ioannina an increase of the population of 3.96% is recorded, documenting the role that the city of Ioannina begins to play in Epirus and the wider region of Northwestern Greece.

Regarding the educational level of the residents of the Municipality, based on the 2011 census, 25% have completed post-secondary or tertiary education, 36% are graduates of secondary education (high school, lyceum) and 20% are graduates of elementary school. Also 10% of the population dropped out of primary school or does not know how to write/read.

School dropout is an indicator that is associated with specific social and economic problems and is related to social exclusion, ie the social degradation of the individual. According to official data of the Ministry of Education (Research of the Pedagogical Institute for student dropout) the student dropout in primary school education is considered almost negligible since in primary school it has been almost eliminated. In the first cycle of secondary education (Gymnasium) the student dropout is significantly lower (3.81%) compared to the average condition of the country (13.1% in 2011), in the Unified Lyceum is relatively small (1.73%) while more severe is the situation in technology education where the percentages approach those of the national average of 20.28%.

Regarding gender, the following are noted:
- 48% of the permanent population are men and 52% are women.
- In relation to the university graduates of the Municipality 53% are women and 47% are men.
- From all the graduates of the secondary education the proportion is approximately the same between men and women (50.3% men and 49.7% women).
- Regarding the population that has dropped out of primary school or is illiterate, women represent 58.7% of the population, compared to 41.3% of men.

The Municipality is distinguished by a positive population dynamic in relation to other urban centers of the Region, but also from a fairly educated and educationally upgraded human resources. The combination of these features and further investment on them make the base for the economic and development growth of the city.

The city's economy has purely urban characteristics determined by the fact that the city is the commercial and administrative center of the Region, as well as by its existence of the University of Ioannina.

The majority of employees are in the tertiary sector, while the corresponding percentage for the primary sector is minimal. In the secondary sector prominent place is occupied by the manufacturing activity that is concentrated both in the industrial area of the city as well as in scattered form.

Tourism also plays an important role in both the economy and social mobility, which in recent years has increased due to the better interconnection of the area. The traditional historic town, the Lake and its surrounding landscapes, monuments, history and the city's traditions attract tourism and the developing tourist infrastructure of the city supports it.

However, the local economy in recent decades has not developed particularly large incentives to improve its macroeconomic environment. Beyond the existence of industrial area of Ioannina and the establishment of the Science and Technology Park of Epirus near the University, no policies were developed for the reorganization and promotion of the local economy, in order to make large investments.

In recent years, the city's economy, like that of Greece, has experienced a recession resulting in a significant increase in unemployment.

Step 3. Embedding multiple functions into the planning, delivery, and stewardship of the nature-based solution

The restoration of Pirsinela Park will have a significant environmental, social and economic impact in the wider city area. The historical importance and magnitude of the Park in combination with the public support of the Project guaranties the success of the exemplar.

In addition, the vast public participation in the open public consultation during the planning phase indicates a successful co-production process in that phase. The significant experience of the Technical Department of the municipality in the delivery of numerous similar projects in the area guarantees a successful implementation of the delivery phase as well.

Step 4. Monitoring and evaluation

Regarding the stewardship phase of the Project, until now all the parks of the city are managed exclusively by the municipality. The magnitude and the significance of the exemplar in the city make t a difficult case in order to try and implement a different management scenario. On the other hand, the experience of the municipality in the management of large green spaces will guarantee the successful implementation of the stewardship phase of the project.

Step 5. Build an evidence base to promote nature based solutions to a wider catchment

As mentioned in the previous chapter, the main barrier during the stewardship management of the park is not technical, but more a lack of flexibility in the management models for green spaces, something that can be contributed in part to bureauctratic restrains and ineffective legislation and in part to the significance of the project which doesn't allow opportunities for trying out new management scenarios.

The key lessons learned from the implementation of the planning phase of the exemplar and the city's attempt to utilise a different approach based on the Connecting Nature Framework was the importance of co-operation both internally and externaly. Internally, the project showcased the effectiveness of multidisciplinary teams working systematicaly under a common framework for the development of a project, while externaly the co-operation with the general public created a base for a Management Plan for the Park which incorporates and respects the needs of all the citizens of the city.

3 Governance

Step 1. Make the case: aligning nature-based solutions with the wider goals of a city or a community

- ***Home of the exemplar within the city departmental structure and other departments needed for successful implementation***

The Technical Department of the municipality is the responsible Department for the implementation of the Project. Nevertheless, due to the nature and complexity of it, a number of other departments is involved as well. For instance, the Department of Green Spaces will assist in the initial design of the green spaces in the park and with their maintenance after the restoration phase. Additionally, the Department of Finance contribute to the determination of the appropriate funding tools for the implementation and assists in the preparation of the funding request.

- ***Legal framework within which the exemplar will be implemented, for example by being formally integrated into the city spatial plan, climate resilience plan***

The exemplar is part of the city's goal of sustainable development, as described in the Strategic Plan for Sustainable Urban Development.

- ***City strategic goals at various scales (local/ city/national/larger) that the exemplar helps to achieve***

The strategic goals of the city of Ioannina for the next period (as described in the city's Strategic Plan for Sustainable Development) that the exemplar helps to achieve can be summarized as follows:

  o Promoting and strengthening the transnational - national - interregional role of the city of Ioannina.
  o Promoting sustainable organization, functionality and territorial cohesion in the urban area of Ioannina, in favor of the quality of the built environment, the efficiency of interconnections and the adaptation to the new requirements of sustainable mobility and energy management.
  o Protection, restoration and promotion of the natural environment, the historicity of the city and the cultural heritage as factors enhancing competitiveness and promoting employment.
  o Supporting social cohesion and promoting employment, through enhancing competitiveness and innovative entrepreneurship. Promoting the social economy and developing the skills of human resources.
  o Facilitate access to work for socially vulnerable groups through proactive policies as well as preventive measures.
  o Stopping the consequences of the crisis and tackling the phenomena of social exclusion, poverty and social impoverishment through the development of integrated structures and functions of social care, social protection and solidarity.

Step 2. Current status of the location: identify the current use, ownership and management of where you want to implement your nature-based solution

The Pirsinela Park is owned by the Municipality of Ioannina City which currently both uses and manages the space.

Step 3. Who are the required partners: identify all relevant partners and bring everyone together to co-create a vision and goals for the nature-based solution

The main partners involved in the project are presented in the following list. These partners are more heavily involved in the planning phase of the exemplar delivery, as the delivery phase of the project will be conducted mainly by the Technical Department of the municipality and regarding the stewardship phase, the Department of Green Spaces will be the responsible authority.

- Political leadership of the Municipality
    - Mayor
    - Vice Mayors
- Different Departments of the Municipality
    - Technical Department
    - Department of Finance
    - Department of Green Spaces
    - Department of Planning
- Other Agencies outside of the Municipality
    - Prefecture
    - Forestry Directorate
    - Archaeological Agency)
- University
- Environmental NGOs
- Chambers (Technical Chamber, Chamber of Commerce)
- Cultural associations
- All citizens of Ioannina city

The communication between the various stakeholders is conducted mainly through meetings, both internal and external. The internal meetings are conducted within the municipality in two levels: i) in the first level regular monthly meetings are conducted with the participation of the members of the interdepartmental Project team, ii) frequent meetings with the political leadership of the municipality and other members of the different Departments are conducted in key moments of the project implementation. External meetings were planned and conducted with all the other key stakeholders of the project, both in one-to-one basis, but also more open with the participation of more than one stakeholder.

A very important tool in the development of the planning phase of the project was the open public consultation process which was conducted through the city's internet platform. In that

process every citizen of Ioannina had the opportunity to express its opinion for the project and how it can better suit everyone's needs. The great number of participants in that process ensured that the design and planning of the restoration of the Park (which took into consideration all the remarks of the consultation process) is accepted by the majority of the citizens and express their vision for the functions and design of the Park.

Step 4. What will you need to succeed? Identify conditions, skills and reflexive learning capacities to ensure ongoing success

The concept of nature-based solutions is relatively new in the municipality and as a result the Connecting Nature Project has the potential to become an example and an introduction to innovative solutions in planning and managing a project. On the other hand, the vast experience of the city's Departments in planning and implementing large scale project are a very important asset in the successful implementation of the exemplar as well. The combination of these two conditions (the innovations of the Connecting Nature Framework and the city's experience in project implementation) create the opportunity to put the Framework in a real-life test and in addition to further enhance and improve the capacity of the Department's employees.

4 Financing and business models:

Step 1. Lessons learned from how NBS has been financed in each city to date

Both capital and operational costs of NBS projects in Ioannina city to date have been financed by the same sources: a. regional municipal budget b. national public investment plan (government grants) and c. government and EU co-funding programs. NBS projects are usually managed by the Municipality of Ioannina (Mainly by the Technical Department or the Department of Green Spaces). There have been also cases where a programmating agreement has been created between the Municipality of Ioannina and other public bodies (such as the Region of Epirus and the Ministry of Culture), in order to foster synergies for the co-design or co-operation of a project. In limited cases, there have been public-private partnerships, that is long-term contracts between a private party and the Municipality, for providing a service, in which the private party bears significant risk (as every 4 years the administration may change, the decisions taken from the previous administration may not be followed by the new one, making it a risky investment environment for private investors to invest within municipality) and the Municipality carries the management responsibility.

One major challenge concerning financing and business models of NBS projects to date is the bureaucratic Greek legislation (a lot of different and conflicted laws and Decisions, many different Agencies and Ministries have to issue an opinion). In terms of governance, one challenge already faced is how to bring together and connect different public actors, in order to overcome co-production issues (with main problems being the lack of experience from all parties, as this form of governance is not common in the city resulting in mistrust issues in the process).

For the Pyrsinela Park, the Municipality has secured a budget of 10M € through the National Recovery Fund.

Step 2. Explore opportunities for innovation in financing, governance and business models

Initially, in order to cover the upfront capital expenditure costs of the NBS, possible sources of revenue were examined, including additional municipal taxes, public funds or private donations (plhilanthropic contributions).

In terms of new sources of recurring operational costs as part of a sustainable business model, revenues could be generated by user fees (entrance fee for the park), voluntary contributions, rents from the key beneficiaries (building owners, investors).

Eventualy, for the restoration of the Pyrsinela Park the up-front cost will be covered by the National Recovery Fund, with a budget of 10M €.

Step 3. Planning the financing and business model of Connecting Nature NBS exemplars

Brief Description of exemplar

The exemplar project for Ioannina city is the restoration of Pirsinela Park. Pirsinela Park is a neglected park located in the urban boundaries of the city. It is considered to be the largest area of existing greenspace (almost 250.000 m^2). Historically, this region offered opportunities for physical activities (running, tennis) and access to nature. However, the last fifteen years the park has been totally abandoned, due to a legal dispute between the Municipality of Ioannina and the Greek State over the ownership of the land.
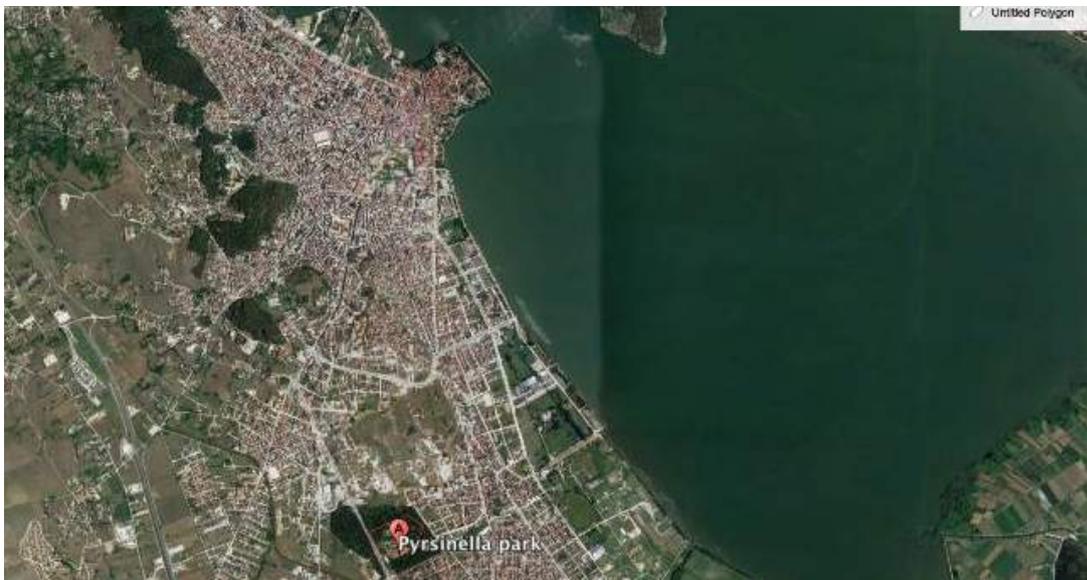
1. Value proposition:

In terms of environmental value our exemplar will contribute to the conservation, protection and further enhancement of the park's green space based on resilience. More precisely, it will enhance biodiversity, improve air quality and contribute to the better maintenance of the largest green space in the city. Social cohesion is going to be promoted as well through the new activities (hub of a multitude of cultural, sports and educational activities) that will take place in the park. Regarding the societal challenges that the exemplar will address, these include improvement of quality of life, improvement of health and well-being, social cohesion, environmental education enhance of historical and cultural identity. Apart from that, the restoration of the park has historical and emotional value for the city as it used to serve as the green and entertainment hub of the city, providing an improved quality of life for the residents. Possible economic value outcome: job creation, increase in the value of the land property, revenue for the Municipality, increased number of visitors and attraction of new businesses-investment in the area.

2. Value creation:

    a. Key activities and resources
    Activities:
       i. Identify fund resources. During 2020 and 2021 a number of different fund opportunities were examined. Eventually, a funding of 10M € was secured through the National Recovery Fund.
      ii. Create communication plan and communicate it to the public.
     iii. Organize open public consultation
         As part of points (ii) and (iii) above, a communication strategy was developed during the previous period and an open public consultation process was implemented, resulting in the finalization of the details of the architectural elements of the Park.
      iv. Obtain political support and city council decisions. During 2021, all the necessary city council decisions were obtained for the submission of the funding proposal and the approval of the Park's Masterplan.
      v. Develop the Park's Management Masterplan. The Park's Masterplan was developed and approved by the city council in 2021.
      vi. Implement the Masterplan
     vii. Create and develop a monitoring system with the appropriate indicators
   viii. Create a Strategy of Entrepreneurship for the promotion and enhancement of nature-based enterprises
      ix. Create a strategy for social cohesion improvement

    Resources:
       i. Human resources
          o Municipality's staff
          o External experts
          o Researchers – university

- o General public
- o Partnerships (e.g. Connecting Nature partners)
  ii. Financial resources
  - o Municipality's budget
  - o National and European funds
  iii. Infrastructure

b. Key partners and beneficiaries
   i. Political leadership of the Municipality (Mayor, Vice mayors). The support of the Mayor and the city council has been instrumental for the design, implementation and funding of the Project thus far.
   ii. Different Departments of the Municipality (Technical, Economic, Green Spaces, Planning)
   iii. Other Agencies outside of the Municipality (Prefecture, Forestry Directorate, Archaeological Agency)
   iv. University
   v. Environmental NGOs
   vi. Chambers (Technical Chamber, Chamber of Commerce)
   vii. Cultural associations
   viii. All citizens of Ioannina city

Regarding the governance model of the Park, The Technical Department is the main responsible authority for the planning and delivery phase of the Project, while the Department of Green Spaces will be responsible for the governance of the park during the stewardship phase. That framework is historically implemented in all the parks in the city and this model will be followed in the Pirsinela Park as well.

3. Value capture
   a. Cost structure
      i. Maintenance
      ii. Personnel cost
      iii. Infrastructure

   b. Are there opportunities to reduce costs e.g. through volunteers?

   Due to the scale of the exemplar and its nature, its maintenance is the largest part of the ongoing costs (e.g. energy, water consumption, personnel, materials for building maintenance, promotion of the park. Costs may be reduced through volunteering, smart and bioclimatic solutions, rainwater harvesting, solar energy (eg. Solar panel on building roofs), philanthropy-donations, rents from the buildings and University's contribution as a living Lab.

   c. Capturing value- what does success look like? How will you know if you have succeeded in delivering your value proposition e.g. economically – is direct revenue generated or new business supported? What are the indicators for capturing social or environmental value?

The successful delivery of the value proposition can be measured through the implementation of an indicators monitoring program. These indicators include environmental, social and economic indicators, as developed in the framework of the Connecting Nature Project.

Table 1. Draft version of Business Model Canvas for Ioannina's NBS Exemplar

Business Model for Sustainability	Key Activities:	Key Resources	Value Proposition	Key Partners	Key Beneficiaries
	• Improve flora • Restore pathways • Clean ponds • Restoration of buildings and infrastructure • Create sports facilities • Conduct a communication campaign • Choose indicators and establish an evaluation programme	• Technical Department: Technical expertise • Department of Green Spaces: personnel and equipment • Support from the city council • Funding • Support from the citizens of Ioannina	• Enhance biodiversity • Improve the quality of the environment • Better management of the green spaces • Improve the quality of life for the citizens • Social cohesion through new activities • Jobs creation • Improve land value • Revenue for the Municipality	• Political leadership of the Municipality • Mayor • Vice Mayors • Different Departments of the Municipality • Technical Department • Department of Finance • Department of Green Spaces • Department of Planning • Other Agencies outside of the Municipality (Prefecture • Forestry Directorate • Archaeological Agency) • University • Environmental NGOs • Chambers (Technical Chamber, Chamber of Commerce) • Cultural associations • All citizens of Ioannina city	• Municipality of Ioannina • Citizens • Land owners • Business and entrepreneurs

Governance

• Traditional

Cost Structure	Cost Reduction	Capturing Value
• Personnel • Maintenance - Materials • Energy – water consumption • Communication and promotion costs	• Volunteering • Philanthropy • Rent from the buildings and facilities	• Increase in the value of property • job creation, • increase attractiveness, due to increased number of visitors

Financing Up-front Costs

Capital Expenditure Costs	Sources of Capital Investment:
• Delivery phase costs • Reforestation and infrastructure costs • Demolition costs • Excavations • Renovations • Communication costs	• Municipal Budget • European Funding • Donations

Step 4. Implementation of financing and business model plans for specific NBS exemplar

Name of NBS exemplar	Action to be undertaken (arising from BMC & financing plan)	Responsible person	Timeframe for implementation
Restoration of Pirsinela Park	Determining the legal framework governing the Park and the different types of land uses and activities allowed in it	CN Project Team	Done
	Internal meetings with the different Departments of the Municipality and its political actors	CN Project Team	Done
	Osmos workshop with external stakeholders	CN Project Team	Done
	Completion of studies and procurement plans in order to secure the budget of 10M € from National Recovery Fund	CN Project Team	31/12/2021
	Continued engagement of all stakeholders in preparation for implementation of business model.	CN Project Team	31/03/2022

Financing & Business Model Implementation Plan

5   Nature-based enterprises

Step 1. Awareness and strategic alignment

• What are the priorities for economic development in your city? E.g. priority sectors for development, priority geographical areas for economic development, other economic priorities?

According to the Strategic Plan for Sustainable Urban Development, the priorities for economic development in Ioannina can be summarized as follows:

- o long-term and structural upgrade of the tourism product that will create sustainability and development with a perspective of decades.
- o Internationalization and European integration - formulating a strategy for attracting investment and endogenous development
- o Mobilization of EU resources
- o Business development programs and the development law

• How can the planned NBS contribute to these economic development priorities?

Ioannina's exemplar, the restoration of Pirsinela Park, is in liaison with the above economic development priorities, as it will:

- ✓ Contribute to the improvement of the city's attractiveness and touristic development
- ✓ Mobilize EU resources, through the Connecting Nature Project
- ✓ Contribute to the business development of the area and the city in general, due to its size, importance and budget

• For each NBS exemplar please consider, how could NBEs contribute to the planning, delivery, maintenance and sustainability of these solutions?

The involvement of NBEs in the exemplar could be initiated in the delivery phase of the project and expanded to the stewardship phase as well. Currently NBEs are planned to be contracted in the construction work of the Park. Different alternatives are investigating regarding the way to promote the contract of NBEs without conflicts with Greek and European legislation. In accordance, the same is planned for the stewardship phase of the project, with the companies that will contracted in the maintenance of the park.

• What are the challenges and enablers from a city perspective in involving NBEs in the implementation of NBS?

For the municipality of Ioannina, the main challenge in involving NBEs in the implementation of the NBS is the novelty of the concept of NBEs. Even local companies that are identified from Ioannina CN team as NBEs had difficulties in answering if they can be considered themselves NBEs. As a result the Connecting Nature Project, its Framework and the city's exemplar can act as a mean to introduce and enhance the concept of NBEs in the area.

Step 2. Building alliances

• *From an NBE perspective what are the challenges and enablers to start-up and growth of NBEs? Do NBEs face specific challenges or enablers?*

As described in the previous chapter, the main challenge that NBEs face in the area is the novelty of the term, that is not recognized by local stakeholders and the general public. In some cases, even the companies involved in the environmental sector, are not familiar with the term.

• *Who are the main actors in the innovation ecosystem in each city (see figure)?*

During the planning phase of the exemplar the Ioannina CN team contacted the Chamber of Commerce, due to the institutional role of both. During these meetings the concept of NBEs were discussed and a number of local companies were identified. These meetings will continued and an open infoday willl be planned in the Park in order to present the concept of NBEs to the public and to different stakeholders in the area. In addition, frequent contacts and meetings with the local university and NGOs for identifying synergies during the stewardship phase of the Project are planned.

• *How can these actors be engaged to stimulate a culture of nature-based entrepreneurship and support the emergence and growth of nature-based enterprises?*

The municipality has the will to support the growth of these businesses through contracts for various works during the delivery and stewardship phases of the project. This could set an example and trigger the further involvement and collaboration of NBEs with the municipality. Moreover, the municipality could promote the concept of NBEs through open infodays and through the allocation of spaces in the park for their promotion. Initial meetings with the Chamber of Commerce revealed a willingness for cooperation in that direction.

• *What is the level of knowledge and skills of the Connecting Nature team in your city in terms of supporting the emergence and growth of NBE? If skills gaps have been identified, how do you plan to address them*

The concept of NBEs is new for the team, nevertheless there is the willingness to promote their participation in the city works and the Connecting Nature exemplar is a way to showcase their importance. Moreover, the magnitude of the Project made necessary the collaboration of different Departments in the Municipality (Technical Department, Department of Finance, Green Spaces Department) and the Connecting Nature Framework was a valuable tool in this collaboration.

Step 3: Planning NBE strategy

What are the primary objectives of your NBE strategy?

The primary objective of our NBE strategy is to introduce these enterprises in the works of the municipality through the tenders in the implementation of the exemplar.

How will NBE contribute to the implementation of your NBS?

NBEs could be utilized in the delivery and stewardship phases of the exemplar, during the construction of the park and later on during the maintenance work of it.

What measures are you putting in place to stimulate the emergence of a culture of nature-based entrepreneurship and to support the emergence and growth of NBEs?

The municipality has the will to support the growth of these businesses through contracts for various works during the delivery and stewardship phases of the project. This could set an example and trigger the further involvement and collaboration of NBEs with the municipality. Moreover, the municipality could promote the concept of NBEs through open infodays and through the allocation of spaces in the park for their promotion.

What innovation ecosystem actors have been engaged in the development of your NBE strategy and what actors are engaged in the implementation of the strategy?

How will you know if your NBE objectives have been achieved? How will impact be measured?

The achievement of the goals and objectives will be determined with the monitoring of appropriate indicators, like the number of contracts in the municipality with NBEs and number of jobs created and related to NBEs.

Step 4: Implementation

Name of NBS exemplar	Action to be undertaken relating to NBE	Responsible person	Timeframe for implementation
Restoration of Pirsinela Park	Initial meeting with Chamber of Commerce	CN Project Team	Done
	Procurements with NBEs during the construction works in the Park	CN Project Team	31/12/2021
	Open Infodays for public awareness in NBEs	CN Project Team	31/03/2022

NBE Implementation Plan

NBE Strategy Summary Table

NBS	NBS Phase	Type of NBE Involved	Challenge	Goal of NBE Programme	How will this be achieved?	Partner	What does success look like and how will you measure it?
Restoration of Pirsinela Park	Planning	None	Lack of knowledge about NBEs. Lack of NBEs in the region	Build knowledge of NBEs in the region, create a database of NBEs	Meetings with stakeholders	None at the moment	No. of companies in the database,
	Delivery	NBEs in the construction works in the Park	Lack of knowledge about NBEs. Lack of NBEs in the region	Utilization of NBEs in the works to be done during the restoration of the park	Contracting NBEs in the construction works	To be determined	no. of tenders with the municipality
	Stewardship	NBEs in the maintenance works in the Park	Lack of knowledge about NBEs. Lack of NBEs in the region	Utilization of NBEs in the works to be done during the maintenance of the park	Contracting NBEs in the maintenance works	To be determined	no. of tenders with the municipality

6 Co-production

Step 1. Define the goals of the co-production process

One of the main goals of Ioannina's Exemplar, the Restoration of Pirsinela Park, is to restore the Park in line with the needs of its multiple groups of users. In order to achieve that goal, it is really important to involve as many actors and citizens as possible in all phases of the Project. Beginning from the design phase of the Project, a number of different actors were identified and included in the co-production process, including:

- Political leadership of the Municipality (Mayor, Vice mayors)

- Different Departments of the Municipality (Technical, Economic, Green Spaces, Planning)

- Other Agencies outside of the Municipality (Prefecture, Forestry Directorate, Archaeological Agency)

- University

- Environmental NGOs

- Chambers (Technical Chamber, Chamber of Commerce)

- Cultural associations

- All citizens of Ioannina city

Step 2. Use the design principles to flesh out the coproduction goals and structure

Regarding the Co-production Principles, we tried to address them during the Design Phase of the Project, that is currently ongoing. More specifically:

➢ Inclusivity: the open consultation conducted in the Design Phase led to responses from all relevant stakeholders ranging from individual citizens to institutions and organizations. As a result, the process covered all the different actors involved in it.

➢ Openness: the process and mainly the open consultation was open to anyone willing to participate and advertised and communicated through various channels, like newsletters, municipality's website and social media, local media. The results of the open consultation were communicated through the same channels, as well.

➢ Legitimacy: The participation of well-established and respected actors in the process (like the University, Chamber of Commerce and Technical Chamber) helped to make the process legitimate.

➢ Actionable knowledge: The public had the opportunity to express its opinion directly and improve the design of a project according to its actual needs.

➢ Usable knowledge: The Project provided an example of an alternative way of designing and implementing a project in the city with the actual participation of the public, a

methodology that can be used in other projects as well.

➢ Extending institutions: The Project presented the CN Framework to different Departments of the Municipality providing an alternative methodology for working and collaboration.

Step 3. Plan the co-production steps and activities / Co-production tools used

During the Design Phase of the Project, the co-production activities were conducted both internally (within the municipal Departments) and externally (open consultation process) in 5 discreet steps, as highlighted below:

A/A	Step	Goal	Actors Involved	Tools used
1.	Preparation of Draft Design of the Restoration	Preparation of the 1st Draft Design to be used as a base for further development	Municipality's Technical Department	Internal meetings
2	Presentation of the Draft Design to the Mayor, Vice Mayors and rest of the Departments	Feedback, remarks and approval of the Draft Design to be presented to the Public during the Open Consultation	Mayor, Vice Mayors, municipal Departments	Presentations, meetings, open discussions
3	Open Public Consultation	Sharing the draft design to the local community to seek their suggested amendments / Collect opinions on the different suggested uses in the Park	Citizens, University, NGOs, Technical Chamber, Chamber of Commerce, Cultural associations	Public participation platform
4	Preparation of the Final Park Design	Collection of the results of the public consultation and production of the Final Park Design	Municipality's Departments	Internal Meetings
5	Approval of the Final Park Design – Masterplan	Approval of the Final Park Design – Masterplan from the City Counsil	City Council	Presentation, discussion and final decision made

Step 4. Reflect on the co-production process and results

From the beginning of the Project, its main goal was to restore the Park in line with the needs of the multiple groups of users. After the completion of its Design Phase and the co-production process described in the above section, this goal was achieved taking into consideration the

participation of the Public in the Open Public Consultation process and the feedback that this process provided.

Regarding the main opportunities faced in the co-production process during the Design Phase of the Project, the process has a positive impact both internally in the municipality and externally in the communication and interaction of the municipality with the public. Internally, the process provided an opportunity for various Departments of the municipality to work together and more closely in the implementation of a project, bypassing barriers of bureaucracy and responsibilities. Externally, the Project, through its Open Consultation Process, provided a mean and a place for the citizens to express their opinion for a project that will have a positive impact in their everyday life. Moreover, the inclusion of many suggestions of the open consultation to the Final Design of the Park strengthens the relationship and trust between the citizens and municipality.

The main barriers faced during the co-production process in the Design Phase derived mainly from the restrictions imposed by the implications of the recent pandemic in the operation of the municipality and in the limitations of social gathering. Additionally, a lack of previous examples of co-production in the municipality made both the public and the municipality initially reluctant in the process, but the final result proved that such a process has a great value in the implementation of a Project in the city.

7 Reflexive monitoring

Step 1. Rethink what learning process you need to achieve the goals of the nature-based solution

• What are the (different) goals of your nature-based solution? • What are the main learning questions that need to be addressed to achieve these goals? Think what needs to change for a successful implementation of the naturebased solution compared to a regular planning process. Which barriers or challenges are expected? Can these be translated into things your team or other actors in the process need to learn? • Which actors have a role in this process and how can they be activated to contribute to answer your learning questions? • How to create a learning environment and plan for additional time to get acquainted with the reflexive monitoring method for the reflexive monitor and the team members involved?

The goals of the NBS are: a) restore the experiential relationship of residents with the largest green park in the city. b) Turning the park into a hub of a multitude of cultural, sports and educational activities. c) promote social cohesion through a variety of opportunities that will arise from the different uses of the park. d) Conserve, protect and further enhance the park's green space based on resilience. e) Sustainable economic development through the integration of commercial and social actions in the site. f) Upgrade the quality of city's life, by providing a neglected park with historical significance to the citizens.

The main learning questions that identified, up until now, in the implementation of the project are summarized below:

- How can the CN team in Ioannina identify which community projects should get prioritized in order to scale-up NBS as quickly as possible under the Open Space Strategy and Local Contexts?

- How do we determine the key design elements to include in the restoration of the Park

- How do we finance the Project

- How to implement the construction of the Project

- How do we develop a viable, sustainable way for financing the operation of the Park

- What will be the governing model of the Park

The main barrier / challenge that the CN team in Ioannina faced in implementing the reflexive monitoring was the whole innovation of the process for the team and the personnel of the municipality. But eventually, in adopting the reflexive monitoring in the design and implementation of the Project, we learn to utilize it and understanding it in practice and eventually the reflexive monitoring became a valuable tool that helps the team to stay I focus and be informed on all the aspects of the Project in any given time.

The team was introduced to the reflexive monitoring methodology through the knowledge transfer workshop in Nicosia, while the various reflexive monitoring webinars helped us further understand its philosophy. The knowledge transfer workshop in Malaga was an opportunity to put all the theoretical knowledge of the reflexive monitoring in practice. Finally, the frequent meetings with the team in Poznan (as our 'mentor' city) provided valuable insights and guidance in the implementation of reflexive monitoring in our city and exemplar.

Step 2. Define the roles within the project team

• Who is involved in the reflexive monitoring process? • How are the roles divided over the team? It is possible to divide the different tasks of the reflexive monitor over multiple team members but important to explicate who is responsible for what. In case the project manager takes the (or parts) of the role as reflexive monitor: How do you ensure there is no conflict between these two roles? • How do you ensure there will be enough space for the reflexive monitor to familiarize his-/herself with the reflexive monitoring tools and the capacities required for this role?

All members of the CN team in Ioannina are involved in the implementation of the reflexive monitoring process and while all members could contribute to its development, one member of the team (different than the Project manager) was designated as monitor and has the responsibility to update the process.

Step 3. Recording important events and analysing critical turning points

• How do you track the important events in time? When do you discuss what happened with your team and formulate to critical turning points? Is it connected to 'regular' project meetings? Do you organize an additional meeting for this step and if yes, who is involved in this 'timeline meeting'?

• Who is involved in updating the dynamic learning agenda? How often are the updates made? With whom is this agenda shared?

• How to you keep track on the follow-up actions, especially when they are executed by colleagues who are not (closely) involved in the reflexive monitoring process?

• Can you give 2-3 example(s) of follow-up actions and describe who was responsible for them and how they relate to the critical turning points and learning questions?

Depending on your team parts of the process can be done together or alone. The reflexive monitor is responsible to produce the dynamic learning agenda and the other team members can be involved at different levels. However, the different responsibilities and the planning needs to be transparent and clear for all people involved in order to ensure everybody is contributing in time and follow-up actions are implemented in practice. This to avoid parallel processes between 'regular' project meetings and the reflexive monitoring process.

In Ioannina regular bi-weekly project meetings are held with the participation of all the members of the city's CN team, where the status of the project is discussed and the critical turning points are formulated.

Responsible for updating the dynamic learning agenda is the monitor with contributions of all the members of the team. Updates are made when a significant event happened. The dynamic learning agenda is shared with all the members of the CN team.

Because of the fact that the CN team consists of members from almost all Departments of the municipality, all the follow-up actions in the project are known to a member of the team and are communicated to the rest of the team in the scheduled meetings.

Some examples of follow up actions are those related to one of the most important Critical Turning Point, which was "Designing the key elements of the Exemplar" and its Learning Question "How do we determine the key design elements to include in the restoration of the

Park". The follow up actions in essence reveal all the methodology that was followed and involved internal and external meetings, city board decisions and public participation. Particularly, the follow up actions in this LQ and CTP were:

- Prepare a draft design with the key proposed features of the park

- Present the draft design to the Mayor, Vice Mayors and Technical Department for remarks and approval

- Present the project to the local community - open public consultation.

- Incorporating the results of the Public Consultation and finalizing the design

- Presenting the final Park Design to the City Council for approval

- Approval of the Park's Master Plan from the City Council

Step 4. Use learning sessions to identify learning outcomes

• What are the main opportunities and barriers you experienced throughout your reflexive monitoring process (including working with the reflexive monitoring tools)?
• How did you include the reflexive monitoring process into your daily activities?
• What came up during the learning sessions that influenced the planning, co-production and/or implementation of your nature-based solution?

The main barrier was the innovation of the process for the CN team, as the reflexive monitoring process was a new approach on managing a project. As a result, in the beginning, every member and stakeholder involved in the Project had to be persuaded in participating in the process. Eventually, with everyone on board, we find the methodology of reflexive monitoring to help us be more focused in the targets of the project and every member of the team be constantly aware of all the critical points of the project.

Step 5. Share your findings with others

What lessons on reflexive monitoring did you learn from the other cities? And what lessons did you share with other cities?
• Did you organize an eye-opener workshop and what did you and the participants gain from it?
• How was it to write a learning history narrative? Did the learning history narratives from other cities inspire or surprise you and in what way?
• What are the main take ways from the peer-to-peer learning sessions you participated in (these are the knowledge transfer workshops and learning platform webinars)?

The one-to-one reflexive monitoring sessions with Poznan provided valuable and very productive insights in the implementation of the methodology by our team. We had the opportunity to discuss questions arose in the actual use of the process and gain from their experience. For instance, their experience in turning the reflexive monitoring process from a theoretical concept to an actual tool that they used in their everyday work was an inspiration for us to try and implement it more actively in our exemplar.

Writing a learning history narrative helped us to have a clearer perspective of our Project and been able to communicate it more effectively both to the municipality, in order to gain political

support, and to the public, to the citizens of Ioannina, in order to ensure their participation in the planning phase of the Project. In addition, the learning history narrative proved to be a very useful tool in our effort to prepare the proposal for securing the budget for our Project through national funds.

Step 6. Reflecting on the method and peer-to-peer sharing

• How is reflexive monitoring new/different from your usual way of working?
• How does this method help you in the process of co-producing and scaling nature-based solutions?
• Did it influence your change existing relations, rules, social practices and discourses for the co-production and scaling of nature-based solutions (reflect upon why or why not)?
• What are the main lessons learned for the internal organization of the exemplar?
• Did the applied reflexive monitoring tools help you with the analysis of key barriers and opportunities for the co-production and scaling of nature-based solutions (if yes, explain how)?
• Did the applied reflexive monitoring tools help you with enabling third party learning, i.e. transferring the lessons learned in the project to project outsiders (if yes, explain how)?

Reflexive monitoring is a new methodology for the municipality, quite different from the usual way of managing a project. Through the identification of critical turning points and the formulation of learning questions, the team can be more proactive and anticipate possible problems, in contrast to the traditional way of managing a project, where a substantial amount of time is dedicated in dealing with problems after their appearance.

Ioannina city Dynamic Learning Agenda

Critical Turning Points (CTPs)	Dynamic Learning Agenda (DLA) - Learning Questions (LQ)		C. Follow Up Action (FUA)		
	Nr.	description	Nr.	description	Status
Determining the NBS exemplar for Ioanina City	LQ1	How can the CN team in Ioannina identify which community projects should get prioritized in order to scale-up NBS as quickly as possible under the Open Space Strategy and Local Contexts?	FUA1	Schedule official meeting with the new municipal authority in order to present the four projects and get the final approval for the exemplar project. Share a canvas model for the exemplar with Municipality of Ioannina and see how it will us move forward	Done
Designing the key elements of the Exemplar	LQ2	How do we determine the key design elements to include in the restoration of the Park	FUA2.1	Prepare a draft design with the key proposed features of the park	Done
			FUA2.2	Present the draft design to the Mayor, Vice Mayors and Technical Department for remarks and approval	Done
			FUA2.3	Present the project to the local community - open public consultation.	Done

			FUA2.4	Incorporating the results of the Public Consultation and finalising the design	Done
			FUA2.5	Presenting the final Park Design to the City Council for approval	Done
			FUA2.6	Approval of the Park's Master Plan from the City Council	Done
Implementing the restoration of the Park (Financing, construction)	LQ3.1	How do we finance the Project	FUA3.1.1	Schedule meetings with Financial Department and Vice Mayor in order to determine possible funding opportunities	Done
			FUA3.1.2	Preparing funding proposal to be submitted under Recovery Fund (NextGenerationEU)	Done
	LQ3.2	How to implement the construction of the Project	FUA3.2.1	Determine the work to be done in-house or contracted	Done
			FUA3.2.2	Prepare Open Tender Contests	Ongoing
Financing the operation of the Park	LQ4	How do we develop a viable, sustainable way for financing the operation of the Park	FUA4.1	Prepare a proposal with different financing alternatives, according to CN guidebooks	Ongoing
			FUA4.2	Schedule meetings with Financial Department and Vice Mayor in order to determine possible funding tools	To Be Done
			FUA4.3	Scheduler meetings with various stakeholders and businesses	To Be Done

Governing of the Park	LQ5	What will be the governing model of the Park	FUA5.1	Prepare a proposal with different governing alternatives, according to CN guidebooks	Ongoing
			FUA5.2	Schedule meetings with different Departments and Vice Mayors in order to determine possible governing models tools	To Be Done

8   Impact assessment

The following Figure 7.1 presents the relationships between objectives, actions and results, Table 1 presents the strategic objectives of the city related to the United Nations Sustainable Development Goals, Table 2 presents the characteristics of the NBS and expected impact and Table 3 the expected results. Table 4 presents the possible synergies or trade-offs between the expected results:
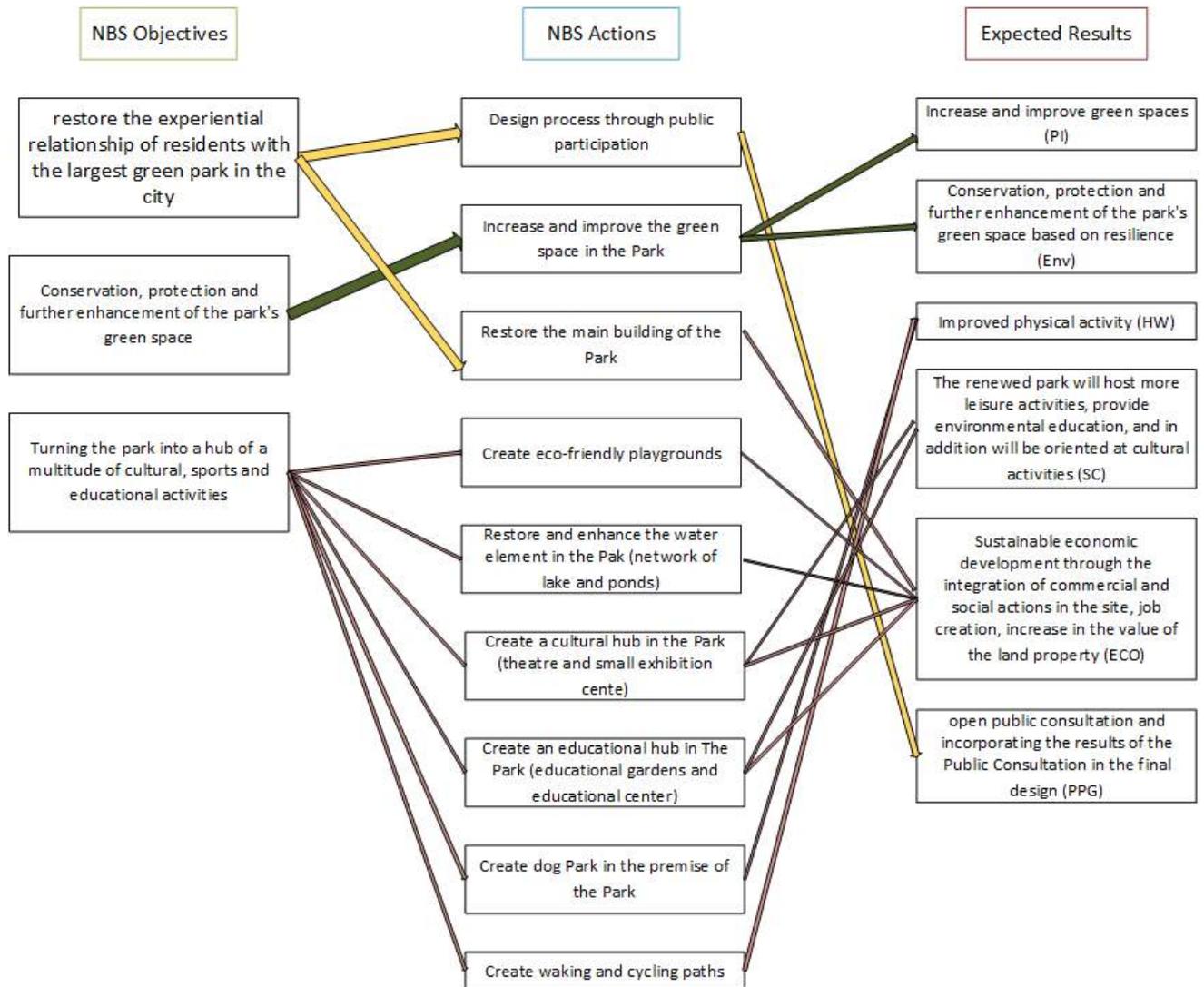
Table 1. Strategic objectives of the city related to the United Nations Sustainable Development Goals

City´s strategic goals	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Increase and improve green spaces			X								X		X		X		
Increase cultural, sports and educational activities			X	X							X						
Upgrade the quality of city's life			X														
Improve citizens' wellbeing			X														

Table 2. Characteristics of the NBS and expected impact

Description of the NBS	
Type	Urban park
Context description	Restoration of Pirsinela Park, the biggest park in the city and the largest area o existing greenspace (25 ha)
Scale	25 hectares
Location (Geographical coordinates)	39°38'25"N - 20°51'17"E
Process of design and implementation	1. Prepare a draft design with the key proposed features of the park, 2. Present the draft design to the Mayor, Vice Mayors and Technical Department for remarks and approval, 3. Present the project to the local community - open public consultation, Incorporating the results of the Public Consultation and finalising the design 4. Presenting the final Park Design to the City Council for approval 5. Approval of the Park's Master Plan from the City Council
NBS objectives	restore the experiential relationship of residents with the largest green park in the city, Turning the park into a hub of a multitude of cultural, sports and educational activities, Conservation, protection and further enhancement of the park's green space based on resilience, Sustainable economic development through the integration of commercial and social actions in the site

Table 3. NBS Expected Results

NBS Expected Results

Primary (PI)[1]	Increase and improve green spaces
Environmental (Env)	Conservation, protection and further enhancement of the park's green space based on resilience
Health and Wellbeing (HW)	Improved physical activity
Social Cohesion (SC)	The renewed park will host more leisure activities, provide environmental education, and in addition will be oriented at cultural activities
Economic (ECO)	Sustainable economic development through the integration of commercial and social actions in the site, job creation, increase in the value of the land property
Participatory planning and governance (PPG)[2]	open public consultation and incorporating the results of the Public Consultation in the final design

Table 4. Possible synergies or trade-offs between the expected results

NBS Actions	Expected results	Assumptions	Synergies	Trade-offs
Design process through public participation	open public consultation and incorporating the results of the Public Consultation in the final design	If citizens participate in the co-design of the park they will like the final result more	If citizens like the park they will use it more for social activities and exercise	None
Increase and improve the green space in the Park	Increase and improve green spaces	Citizens will like to see the park with dense vegetation, many trees and shady places	If citizens like the park they will use it more for social activities and exercise	Depending on the species it can increase allergies
Restore the main building of the Park	The renewed park will host more leisure activities, provide environmental education, and in addition will be oriented at cultural activities	Citizens will like a place which could host educational and cultural activities	If citizens like the park they will use it more for social activities and exercise	None
Create eco-friendly	Sustainable economic	Citizens will like to see a safe	If citizens like the park they	None

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[1] Results related to the use of the exemplar, for example, that the NBS is visited 3 times a week by neighbours, or that the average visit lasts 20 minutes

[2] Results related to the implementation process of the exemplar, for example, that citizens have confidence in decision-makers

playgrounds	development through the integration of commercial and social actions in the site, job creation, increase in the value of the land property	and eco-friendly place for their kids to play	will use it more for social activities and exercise	
Restore and enhance the water element in the Pak (network of lake and ponds)	Sustainable economic development through the integration of commercial and social actions in the site, job creation, increase in the value of the land property	Citizens will appreciate a more versatile environment combining green and blue elements	If citizens like the park they will use it more for social activities and exercise	None
Create a cultural hub in the Park (theatre and small exhibition cente)	The renewed park will host more leisure activities, provide environmental education, and in addition will be oriented at cultural activities	Citizens will like a place which could host educational and cultural activities	More opportunities for social interaction between citizens	None
Create an educational hub in The Park (educational gardens and educational center)	The renewed park will host more leisure activities, provide environmental education, and in addition will be oriented at cultural activities	Citizens will like a place which could host educational and cultural activities	More opportunities for social interaction between citizens	None
Create dog Park in the premise of the Park	Improved physical activity	Citizens will like a safer and more organised place for them and their pets	If group physical activity is favoured, social interaction will increase	It may increase noise in the Park
Create waking and cycling paths	Improved physical activity	Citizens will like a greener place for physical activities in the city	If group physical activity is favoured, social interaction will increase	None

The following Table 5 presents the selection of indicators based on the NBS expected results

CODE	NAME	City selection	NBS expected result (previous sub-building block)	Selection reasoning
PRIMARY INDICATORS				
PI1	Type of interaction with NBS	X	The renewed park will host more leisure activities, provide environmental education, and in addition will be oriented at cultural activities	Measure what type of activities the citizens more often do in the Pak
PI2	Frequency of interaction with NBS	X	The renewed park will host more leisure activities, provide environmental education, and in addition will be oriented at cultural activities	Measure how frequently the citizens visit the Park
PI3	Duration of interaction with NBS	X	The renewed park will host more leisure activities, provide environmental education, and in addition will be oriented at cultural activities	Measure how much time the citizens spend in the Park
ENVIRONMENTAL INDICATORS				
CORE				
Env23	Public green space distribution	X	Increase and improve green spaces	Measure how the Pak affected the green space distribution in the city fabric
Env89	Community garden area per capita and in a defined distance	X	Sustainable economic development through the integration of commercial and social actions in the site, job creation, increase in the value of the land property	Measure how the Pak affected the green space distribution in the city fabric

FEATURE				
Env26	Community accessibility	X	The renewed park will host more leisure activities, provide environmental education, and in addition will be oriented at cultural activities	Measure the ease of access to the Pak
Env38	Urban green space	X	Increase and improve green spaces	Measure how the Pak affected the green space distribution in the city fabric
HEALTH AND WELLBEING INDICATORS				
CORE				
HW12	Enhanced Physical Activity	X	Improved physical activity	Establish the amount of physical activity that the residents of the park do
SOCIAL COHESION INDICATORS				
CORE				
SC1	Bonding social capital	X	The renewed park will host more leisure activities, provide environmental education, and in addition will be oriented at cultural activities	Know how are the social relations between the same social groups
SC5.1	Perceived safety	X	Sustainable economic development through the integration of commercial and social actions in the site, job creation, increase in the value of the land property	Know how the restoration of the Pak affected the feeling of safety in the area
SC11.1	Positive environmental attitudes motivated by contact with NBS	X	The renewed park will host more leisure activities, provide environmental education, and in	Know how the Park changed the citizens' relationship with nature

			addition will be oriented at cultural activities	
		FEATURE		
SC10	Environmental education opportunities	X	The renewed park will host more leisure activities, provide environmental education, and in addition will be oriented at cultural activities	Measure the new education activities conducted in the Park
	ECONOMIC INDICATORS			
		CORE		
ECO1	New Businesses 'attracted' or started and additional rates received	X	Sustainable economic development through the integration of commercial and social actions in the site, job creation, increase in the value of the land property	Establish if there are new businesses since the implementation of the park
		FEATURE		
ECO2	New customers attracted to businesses in the area	X	Sustainable economic development through the integration of commercial and social actions in the site, job creation, increase in the value of the land property	Establish how the rest of the businesses in the area affected since the implementation of the park
	PARTICIPATORY PLANNING AND GOVERNACNE INDICATORS			
		CORE		
PPG3	Transparency of co-production	X	open public consultation and incorporating the results of the Public Consultation in the final design	Know the public perception of whether the park implementation process was transparent

Table 6 depicts the data collection moments for the indicators:

Code	Indicator	Connecting Nature Method	Available data before exemplar implementation	Implemented exemplar	Causality analysis	Season
PI1	Type of interaction with NBS	survey procedure, paper-and-pencil administration, computer-based administration)				It is indifferent for this indicator
PI2	Frequency of interaction with NBS	survey procedure, paper-and-pencil administration, computer-based administration				It is indifferent for this indicator
PI3	Duration of interaction with NBS	survey procedure, paper-and-pencil administration, computer-based administration				It is indifferent for this indicator
Env23	Public green space distribution	GIS analysis				It is indifferent for this indicator
Env89	Community garden area per capita and in a defined distance	GIS analysis				It is indifferent for this indicator
Env26	Community accessibility	GIS analysis				It is indifferent for this indicator
Env38	Urban green space	GIS analysis				It is indifferent for this

						indicator
HW12	Enhanced Physical Activity	survey procedure, paper-and-pencil administration, computer-based administration				It is indifferent for this indicator
SC1	Bonding social capital	survey procedure, paper-and-pencil administration, computer-based administration				It is indifferent for this indicator
SC5.1	Perceived safety	survey procedure, paper-and-pencil administration, computer-based administration				It is indifferent for this indicator
SC11.1	Positive environmental attitudes motivated by contact with NBS	survey procedure, paper-and-pencil administration, computer-based administration				It is indifferent for this indicator
SC10	Environmental education opportunities	survey procedure, paper-and-pencil administration, computer-based administration				It is indifferent for this indicator
ECO1	New Businesses 'attracted' or started and additional rates received	survey procedure, paper-and-pencil administration, computer-based administration				It is indifferent for this indicator
ECO2	New customers attracted to businesses in	survey procedure, paper-and-pencil administration, computer-based				It is indifferent for this indicator

	the area	administration			
PPG3	Transparency of co-production	survey procedure, paper-and-pencil administration, computer-based administration			It is indifferent for this indicator

The following Table 7 presents the Fieldwork planning for the collection of data for the indicators:

Code	Indicator	Procedure	Sample	Data management	Budget
PI1	Type of interaction with NBS	Questionnaire to be distributed in the Park	200 citizens, aged between 18-80	The data will be collected by external expert	3.000,00€ to hire an external expert for all indicators analysis
PI2	Frequency of interaction with NBS	Questionnaire to be distributed in the Park	200 citizens, aged between 18-80	The data will be collected by external expert	3.000,00€ to hire an external expert for all indicators analysis
PI3	Duration of interaction with NBS	Questionnaire to be distributed in the Park	200 citizens, aged between 18-80	The data will be collected by external expert	3.000,00€ to hire an external expert for all indicators analysis
Env23	Public green space distribution	GIS analysis of existing data	Available data	Analysis will be conducted by the municipality's Technical Department	

Env89	Community garden area per capita and in a defined distance	GIS analysis of existing data	Available data	Analysis will be conducted by the municipality's Technical Department	
Env26	Community accessibility	GIS analysis of existing data	Available data	Analysis will be conducted by the municipality's Technical Department	
Env38	Urban green space	GIS analysis of existing data	Available data	Analysis will be conducted by the municipality's Technical Department	
HW12	Enhanced Physical Activity	Questionnaire to be distributed in the Park	200 citizens, aged between 18-80	The data will be collected by external expert	3.000,00€ to hire an external expert for all indicators analysis
SC1	Bonding social capital	Questionnaire to be distributed in the Park	200 citizens, aged between 18-80	The data will be collected by external expert	3.000,00€ to hire an external expert for all indicators analysis
SC5.1	Perceived safety	Questionnaire to be distributed in the Park	200 citizens, aged between 18-80	The data will be collected by external expert	3.000,00€ to hire an external expert for all indicators analysis
SC11.1	Positive environmental attitudes motivated by contact with NBS	Questionnaire to be distributed in the Park	200 citizens, aged between 18-80	The data will be collected by external expert	3.000,00€ to hire an external expert for all indicators analysis
SC10	Environmental education opportunities	Questionnaire to be distributed in the Park	200 citizens, aged between 18-80	The data will be collected by external expert	3.000,00€ to hire an external

					expert for all indicators analysis
ECO1	New Businesses 'attracted' or started and additional rates received	Questionnaire to be distributed in the Park	200 citizens, aged between 18-80	The data will be collected by external expert	3.000,00€ to hire an external expert for all indicators analysis
ECO2	New customers attracted to businesses in the area	Questionnaire to be distributed in the Park	200 citizens, aged between 18-80	The data will be collected by external expert	3.000,00€ to hire an external expert for all indicators analysis
PPG3	Transparency of co-production	Questionnaire to be distributed in the Park	200 citizens, aged between 18-80	The data will be collected by external expert	3.000,00€ to hire an external expert for all indicators analysis

Table 8 presents the type of data analysis

Code	Indicator	CN Method	Quantitative	Qualitative	Geolocation
PI1	Type of interaction with NBS	survey procedure, paper-and-pencil administration, computer-based administration)	X		
PI2	Frequency of interaction with NBS	survey procedure, paper-and-pencil administration, computer-based administration	X		
PI3	Duration of interaction	survey procedure, paper-and-pencil	X		

		with NBS	administration, computer-based administration			
Env23	Public green space distribution	GIS analysis	X	X	X
Env89	Community garden area per capita and in a defined distance	GIS analysis	X	X	X
Env26	Community accessibility	GIS analysis	X	X	X
Env38	Urban green space	GIS analysis	X	X	X
HW12	Enhanced Physical Activity	survey procedure, paper-and-pencil administration, computer-based administration	X		
SC1	Bonding social capital	survey procedure, paper-and-pencil administration, computer-based administration	X		
SC5.1	Perceived safety	survey procedure, paper-and-pencil administration, computer-based administration	X		
SC11.1	Positive environmental attitudes motivated by contact with NBS	survey procedure, paper-and-pencil administration, computer-based administration	X		
SC10	Environmental education opportunities	survey procedure, paper-and-pencil administration, computer-based administration	X		
ECO1	New Businesses 'attracted' or started and additional rates received	survey procedure, paper-and-pencil administration, computer-based administration	X		
ECO2	New customers	survey procedure, paper-and-pencil	X		

	attracted to businesses in the area	administration, computer-based administration			
PPG3	Transparency of co-production	survey procedure, paper-and-pencil administration, computer-based administration	X		

Table 9 describes how we are planning to represent the evaluation results of the indicators to stakeholders:

Code	Indicator	Results presentation			Disclosure to stakeholders				
		Documentary report	Visual charts	Spatial Dashboard	Scientific partners	Economic sector	Higher political levels	Media	Citizens
PI1	Type of interaction with NBS	X							
PI2	Frequency of interaction with NBS	X							
PI3	Duration of interaction with NBS	X							
Env23	Public green space distribution	X	X	X					
Env89	Community garden area per capita and in a defined distance	X	X	X					
Env26	Community accessibility	X	X	X					
Env38	Urban green space	X	X	X					
HW12	Enhanced Physical Activity	X							
SC1	Bonding social capital	X							
SC5.1	Perceived safety	X							
SC11.1	Positive environmental attitudes motivated by contact with NBS	X							
SC10	Environmental education opportunities	X							
ECO1	New Businesses 'attracted' or started and additional rates received	X							
ECO2	New customers attracted to businesses	X							

	in the area								
PPG3	Transparency of co-production	X							