



Monitoring of socio-environmental services of urban green spaces

In recent years, the City of Barcelona has demonstrated its intention of increasing and improving greenery and biodiversity at the service of citizens through a series of policies, plans, measures, and other initiatives. In this pilot, the social and environmental services provided by urban green spaces and green infrastructure in the city are being monitored.



361 Urban green spaces analyzed

≈ **60%** the Green Horizon 2030 compliance with objectives

in 5 years, population with access to green space within a 5-minute walk increased

90.9 → 92.8%

Nature-based Solutions Benefits



Challenges

The concept of social and environmental services is insufficiently applied to urban green spaces

Need for more efficient management and support tools to enhance green policies implementation

Current status of compliance with the green policies in the city is unclear

Background

Barcelona committed itself, through the Green Horizon 2030 objectives, to increasing greenery by 1 m² per resident by 2030, at the Paris Climate Change Conference (COP21) in December 2015. This climate change adaptation measure was equivalent to 160 new hectares of greenery at that time. Achieving this goal is difficult due to the lack of space. Yet despite the density and consolidation of the city's urban fabric, there are options for increasing green spaces, which are not just concentrated in the areas provided for under the Barcelona Nature 2030 plan, such as urban parks. Over the last nine years (2015-2023), a total of 93.26 hectares of urban green areas have been added. Notable projects include the redevelopment of various areas of the city, the creation of corridors, and the construction of new parks, squares, and gardens throughout the city.



Photos by Milena Villalba

Social and Environmental services

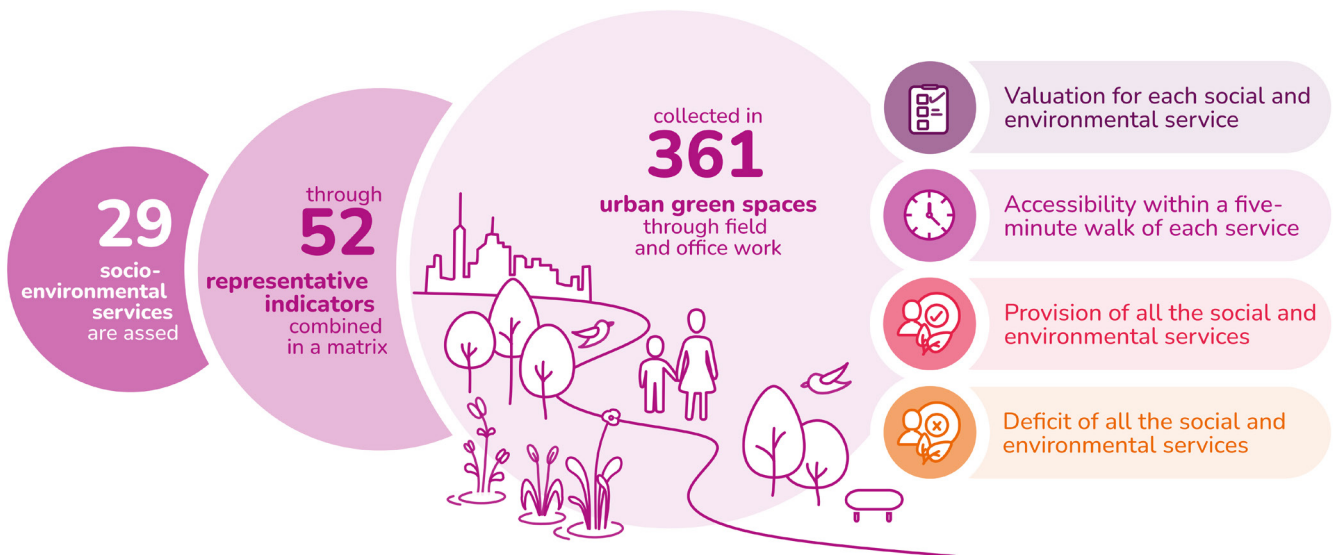
are benefits that humans obtain from ecosystems, which contribute directly or indirectly to the well-being of people



Innovative approach used at CONEXUS pilot and projected NBS benefits

In support of the green space expansion, several of the parks are developed based on environmental design criteria. The design criteria were defined in the Greenery and Biodiversity Charter and focus on three structural components of the environment: soil, water and vegetation. These components present interdependent systems, which foster mutual relationships vital for the ecological functionality of the green infrastructure. This new way of planning and designing green infrastructure provided a broader range of socio-environmental services and made it possible to deal more effectively and practically with the climate emergency.

In addition, part of different strategic green plans in Barcelona, such as the Stimulus Programme for the City's Urban Green Infrastructure and the Natura 2030 Plan, established different measures with the aim of increasing the city's green infrastructure to maximize social and environmental services, especially related to health, adaptation to climate change, and access to urban nature for all citizens. These plans also included an analysis of socio-environmental services. Assessing aspects, such as the increase in urban green spaces, accessibility to urban green spaces, or deficits in socio-environmental services is valuable for the planning, management, and design of urban green spaces. Such assessments make it possible to identify which socio-environmental services need to be enhanced and which areas of



the city need urban green spaces. In this way, it provides the city government with a useful tool for precise action in the planning and management of urban green infrastructure.

Social and environmental services of Barcelona’s green spaces

In cities, and especially in dense ones such as Barcelona, urban green spaces provide critical social and environmental services. These are the benefits that humans obtain from ecosystems, which contribute directly or indirectly to the well-being of people. In contrast to natural areas, urban parks provide avenues for cultural ecosystem services, like walking, sporting activities and playgrounds for children, and partly provisioning services, such as fresh water and wood production. These social and environmental services are grouped into eight categories. Seven of these groups of services are specifically cultural or social services, while the eighth group includes ecological and regulating services.

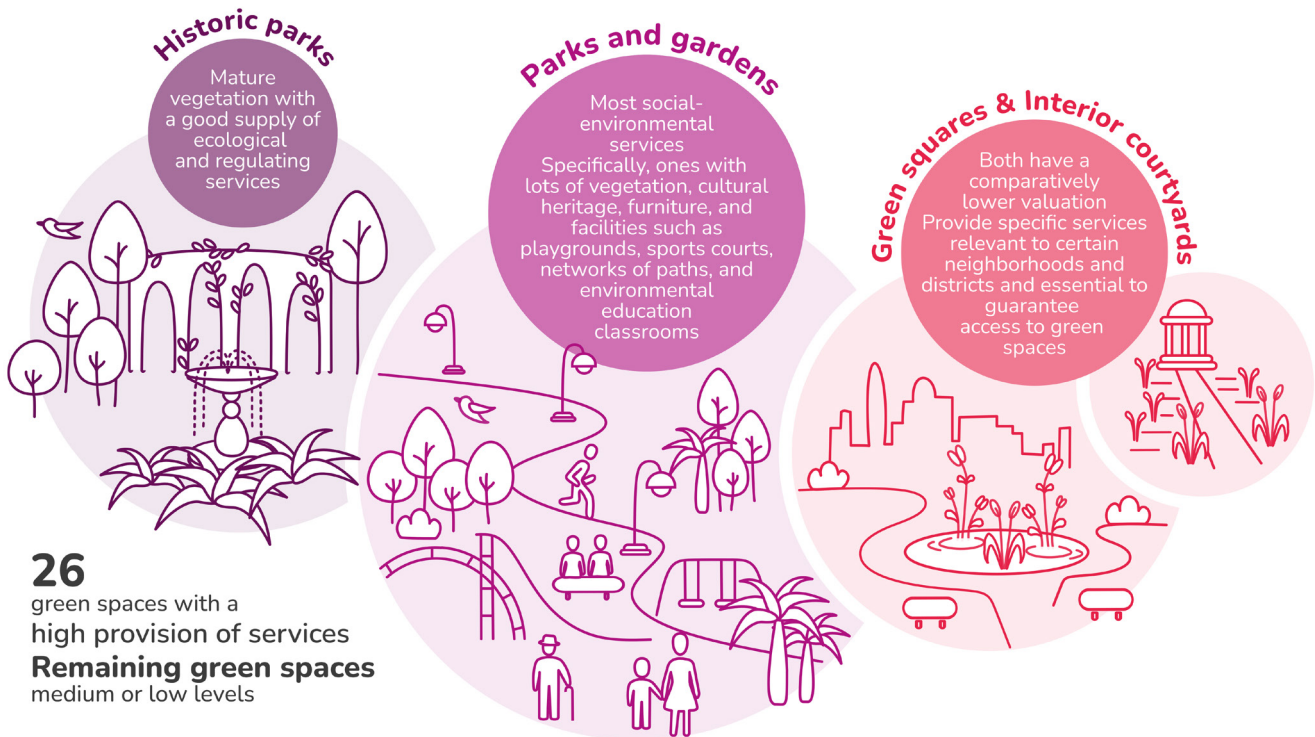
Monitoring methodology:

The Barcelona approach

In 2017, Barcelona Regional developed a methodology to analyze socio-environmental services, which has helped Barcelona to significantly increase its urban green infrastructure since then. Using the same methodology, two updates were carried out to analyze socio-environmental services in 2021 and 2023 as part of the CONEXUS project. The methodology includes 52 representative indicators, which combined in the matrix, allows calculating a total of 29 socio-environmental services. These indicators are collected for 361 urban green spaces through field and office work. A relationship matrix is used to link indicators, the influence of the indicator, and social and environmental services to subsequently calculate the value of each service for each green space. Once a valuation has been obtained for each social and environmental service, we then determined the accessibility within a five-minute walk

Valuation by greenspace type

green spaces are classified into 4 categories



of each area as well as the provision and deficit of all the social and environmental services in the study area.

The green spaces valuation

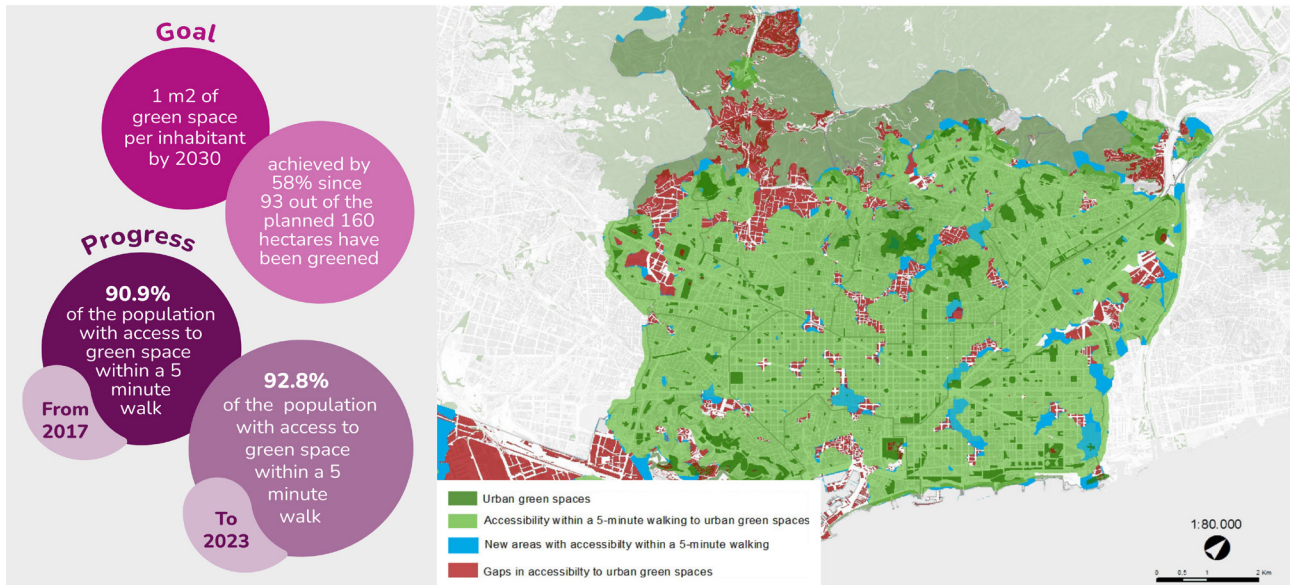
In the study conducted with CONEXUS, the social and environmental services of 361 urban green spaces, that are larger than 0.2 hectares, were analyzed. Altogether, 532 hectares of green spaces have been included in the scope of this study. Collserola Natural Park, private gardens, and some other green spaces were not included in this study, mainly because they are not managed by Barcelona City Council. This should be considered when interpreting the results, since these spaces can also offer social and environmental services in certain areas of the city. The results of the study showed

a total of 26 green spaces offer a high provision of services, while in the remaining green spaces offer medium or low levels. The higher the average valuation, the more complete the range of social and environmental services offered by the park. However, it should be noted that a green space could have a low average valuation, but offer a high level of potential in some services and low in others.

Valuation by green space type

The green spaces are classified into four categories: historic parks; parks and gardens; interior courtyards of blocks; and green squares. The green spaces that offer the most social environmental services are large parks with lots of vegetation, cultural heritage and those that contain furniture and facilities,

The status of compliance with the green policies implemented in the city



such as playgrounds, sports courts, networks of paths, and environmental education classrooms. The majority are historic parks characterized by mature vegetation with a good supply of ecological and regulating services, such as carbon retention and improvement of air quality. Comparatively, green squares and interior courtyards of blocks generally have lower valuation, although a few matched the valuations of some large parks. Nevertheless, squares and interior courtyard of blocks do provide certain services and are relevant in certain neighborhoods and/or districts, such as the Eixample, and should therefore not be overlooked. In densely populated areas with little space for new green areas, the presence of interior courtyards is important to guarantee the population's access to urban green spaces.



Status of compliance with the green policies implemented in the city / A management and support tool for the city administration

The monitoring of the green infrastructure carried out within the framework of the CONEXUS project has made it possible to know the level of compliance with the set objectives. Barcelona's goal of increasing green space by 1m² per inhabitant by 2030, is on track to being achieved, as 58%, 93 out of the planned 160, hectares have already been greened. This demonstrates that the pace of increase is on course to realizing the goal by 2030. The increase in surface area of green spaces also translates into an increase in green space accessibility. From 2017 to 2023, 31,102 inhabitants gained improved accessibility to green spaces. In percentages, this increase means going from 90.9% of the total population of Barcelona with access to green space within a five-minute walk

in 2017, to 92.8% in 2023. Many of the areas targeted in 2017 have been covered, as is the case around Plaza Catalunya or Glòries.

The analysis of socio-environmental services has made it possible to detect areas completely devoid of urban green spaces. These deficient areas will be prioritized in the future planning of urban green spaces, which would allow 100% of the population accessible within a 5-minute walk. This study has also made it possible to know the deficient socio-environmental services of each green space that will allow establishing possible future design criteria to improve it. In addition, monitoring allowed demonstrating the improvement in the urban quality of public space, which will translate into an improvement in the quality of life of its citizens. In this way, the city government had an innovative tool at its disposal for guiding precise action in the planning and management of urban green infrastructure.

Related Projects

-  **Barcelona Metropolitan Area**
[The socio-environmental values of parks.pdf](#)
-  **Peri-urban Edinburgh**
[Socio-cultural valuation of green space in peri-urban Edinburgh | Oppla](#)



References

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Key messages



1. Planning green spaces with holistic criteria, including environmental aspects, help to enhance their benefits.
2. Besides public spaces, interior courtyards, green squares, and historic parks also offer opportunities to increase green spaces in cities.
3. The Barcelona city administration can be the biggest driver of green space development if there is political will.
4. Monitoring and assessment of socio-environmental services helps to identify deficiencies, set future planning priorities, and check compliance with objectives.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 867564

City Partners



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