
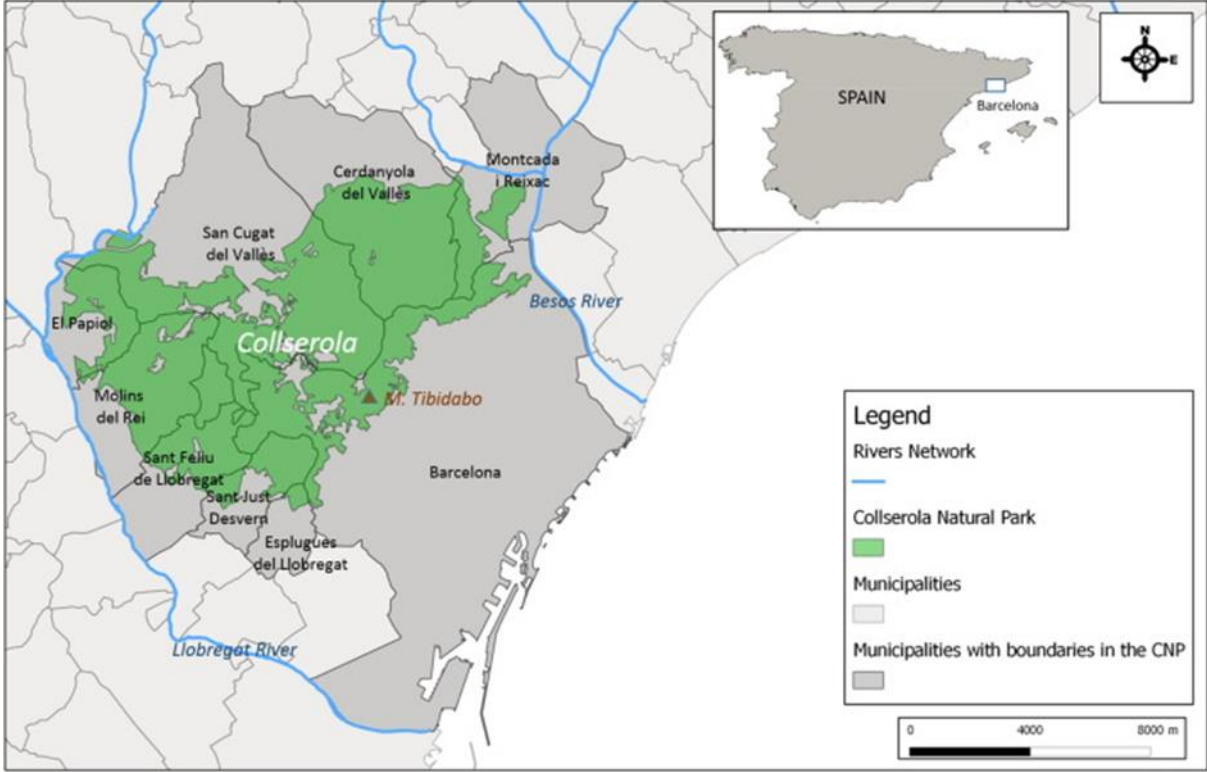


## SERRA DE COLLSEROLA NATURAL PARK – BARCELONA, SPAIN

<p>Section</p>	 <p><b>CLEARINGHOUSE</b> 中欧城市森林应对方案</p> <p><i>This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 821242</i></p>
<p>1</p>	<p><b>TITLE OF CASE STUDY AREA:</b> Serra de Collserola Natural Park, BARCELONA, Spain</p>
<p>2</p>	<p><b>INTRODUCTION</b></p> <p>Serra de Collserola Natural Park (CNP) is located on the north-western part of Barcelona and covers an area of 8170 ha. Collserola forms part of a complex network of protected green areas in the region and it is one of the hotspots of biodiversity in a highly urbanised landscape, with an important ecosystem services demand. It has a complex green infrastructure (mainly forests, but also scrublands, grasslands, croplands and aquatic environments). Patch forests (in the area of Font Groga) are among the best represented in Catalonia and they are considered of exceptional value. The park also conserves an important cultural heritage (such as old churches which serve as meeting points for various pilgrimages and popular gatherings). CNP is also a reference for education and outdoor learning activities (Can Coll Environmental Education Centre) and it shelters a research station (Can Balasc, where CREAF developed permanent monitoring areas within the European Network LTER, Long Term Ecological Research Network). Since 2006, the Serra de Collserola has formed part of the Natura 2000 Network, which was set up under the aegis of the EU Directive on the conservation of natural habitats and wild flora and fauna. In 2010, Serra de Collserola became a Natural Park, although the area had previously been protected by different legal instruments. The Barcelona Metropolitan Territorial Plan (2010) includes the Serra de Collserola in the special protection category due to its natural and agricultural importance within the system of open spaces in the metropolitan area.</p>
<p>3</p>	<p><b>KEY FACTS AND FIGURES OF THE CASE STUDY AREA</b></p> <p><b>Biogeographic region<sup>1</sup>:</b> Mediterranean  <b>Surface area:</b> 8120 ha  <b>Country:</b> Spain  <b>Region/Province:</b> Catalonia/Barcelona</p>

<sup>1</sup> <https://www.eea.europa.eu/data-and-maps/data/biogeographical-regions-europe-3>



<p>4a</p>	<p><b>LOCATION MAP(S)</b></p> 
<p>4b</p>	<p><b>GIS</b></p> <p>Map viewer of the park here: <a href="https://www.arcgis.com/home/item.html?id=643ac5d11f47425db66eb694ad7606dc">https://www.arcgis.com/home/item.html?id=643ac5d11f47425db66eb694ad7606dc</a></p>
<p>5</p>	<p><b>NAME OF MUNICIPALITY AND WEBSITE ADDRESS</b></p> <p>Metropolitan Area of Barcelona <a href="https://www.parcnaturalcollserola.cat/en/">https://www.parcnaturalcollserola.cat/en/</a></p>
<p>6</p>	<p><b>LEAD ORGANISATIONS:</b></p> <p>The Consortium of the Serra de Collserola Natural Park (<i>Consorti del Parc Natural de Collserola</i>) is a public consortium of local character and an associative and institutional nature. It is made up of three institutions and the nine municipalities of the Metropolitan Area that have part of their term in the Park:</p> <p>Institutions:</p> <ul style="list-style-type: none"> <li>• Metropolitan Area of Barcelona</li> <li>• Diputació Barcelona</li> <li>• Generalitat de Catalunya</li> </ul> <p>Municipalities (City Councils):</p> <ul style="list-style-type: none"> <li>• Barcelona</li> <li>• Sant Feliu de Llobregat</li> <li>• Sant Just Desvern</li> <li>• Esplugues de Llobregat</li> <li>• Montcada i Reixac</li> <li>• El Papiol</li> <li>• Molins de Rei</li> <li>• Sant Cugat del Vallés</li> <li>• Cerdanyola del Vallés</li> </ul>

7	<p><b>LOCAL CONTACT(S)</b>          Consorci del Parc Natural de la Serra de Collserola Ctra. de l'Església, 92          08017, Barcelona          Tel: + 34 932 803 552          ci@parccollserola.net</p>
8	<p><b>PRINCIPLE UF-NBS (Urban Forests as Nature-Based Solutions) ACTION(S)</b></p> <ul style="list-style-type: none"> <li>• Restoration of forest fringe areas (peri-urban)</li> <li>• River and riparian forests restoration (Vallvidrera)</li> <li>• Control and eradication of invasive trees (i.e. <i>Ailanthus altissima</i>)</li> <li>• Routes of therapeutic forests</li> </ul>
9	<p><b>OTHER PRINCIPLE NBS ACTION(S) – non-UF</b></p> <ul style="list-style-type: none"> <li>• Preservation of agricultural belts at the peri-urban fringe (i.e. in the Vallès plain)</li> <li>• Introduction of traditional practices to maintain certain habitats, decrease fire risks and promote landscape diversity (i.e. grazing)</li> <li>• Provision of sustainable food, cultivated in the park</li> <li>• Preservation and improvement of ecological connectors (i.e. small rivers, such as Riera de Sant Cugat, Riera de Vallvidrera, or Torrent de Can Cabassa)</li> <li>• Regulation of bicycle path networks and bike number</li> <li>• Dynamic naturalist and NGO's actions to promote and disseminate the park's values and the education for nature (i.e. "Birds party" includes birds watching, drawing and photo workshops, gamification, guided itineraries etc.)</li> </ul>
10	<p><b>LOCAL STAKEHOLDERS LIST ONLY</b></p> <p>1. <b>Governing authorities:</b> Metropolitan Area of Barcelona; Diputació Barcelona; Generalitat de Catalunya</p> <p>2. <b>Associations:</b>          Various association participate at various levels: park's management (i.e. control and eradication of invasive plants; cleaning, such as Associació Collserola Verda/Green Collserola), organizing cultural events education (routes in the Park designed for schools, organization of events such as Birds Day, Birds Watching, farming for kids etc), promoting sustainable farming (L'Ortiga is located in the Park, and commercialize "0 km" ecological products, organizes attractive educational activities for schools and adults - on schools gardens, agroecology and sustainable food) and sport and outdoor recreation (especially Mountaineers Associations, involved in trekking activities or various well-known sports competitions).          The complete list of associations who collaborate with the park can be consulted at:  <a href="https://www.parcnaturalcollserola.cat/es/participacion/">https://www.parcnaturalcollserola.cat/es/participacion/</a></p> <p>3. <b>Citizens:</b>          Volunteers help to preserve biodiversity and the cultural heritage CNP (i.e. Neighbors' associations, Mountaineers Clubs, among others). Historic citizen's movements are documented to stop the urbanisation in the 90's (i.e. related to the emblematic pine, Pi d'en Xandri, situated at the peri-urban fringe of Sant Cugat del Vallès).</p> <p>4. <b>Municipalities:</b> Barcelona; Sant Feliu de Llobregat; Sant Just Desvern; Esplugues de Llobregat; Montcada i Reixac; El Papiol; Molins de Rei; Sant Cugat del Vallés; Cerdanyola del Vallés</p> <p>5. <b>Public/private institutions:</b></p> <ul style="list-style-type: none"> <li>• Metropolitan Area of Barcelona</li> <li>• Diputació Barcelona</li> <li>• Generalitat de Catalunya</li> </ul> <p>6. <b>Park planner and authorities:</b></p> <ul style="list-style-type: none"> <li>• Metropolitan Area of Barcelona</li> <li>• Diputació Barcelona</li> <li>• Generalitat de Catalunya</li> </ul> <p>7. <b>Technicians for park maintenance/monitoring and to educate and support citizens:</b> Park's technicians, administrative personnel, and volunteers; Can Coll Environmental Education Centre</p>

11	<b>UF-NBS FRAMEWORK</b>		
a.	<b>UF-NBS typology</b>		<p>Peri-urban forests (mainly Aleppo pine, <i>Pinus halepensis</i> and Holm oak, <i>Quercus ilex</i>), Shrublands, Community gardens, Grasslands, Smaller patches of vineyards and dry cereal fields, Rivers</p>
b.	<b>Integration</b>		<p>Built-up structure (e.g., houses, farms, information points); Transport infrastructure (e.g., parking lots, underground system and above-ground railway)</p>
c.	<b>Network/connectivity</b>		<p>Connectivity is one of the most important functions of Collserola. In the last decades, landscape fragmentation increased (Marull and Mallarach 2005) and the transition areas between built-up urban and peri-urban park raised serious pressures for biodiversity conservation. The peri-urban forests of Collserola are <i>reservoirs</i> which enhance the flows of ES, given their proximity to areas with high demand (Basnou et al. 2020). Smaller patches of cereals crops act as green corridors between the Collserola Natural Park and the Vallès plain, preserving at the same time the traditional landscape of dryland agriculture (Serra et al. 2017).</p>
d.	<b>Multifunctionality</b>		<p>A recent study found that the protected peri-urban forests of Collserola are among the most multifunctional areas in the Province of Barcelona (Basnou et al. 2020). Data on multifunctionality combined various biodiversity indexes, functions and ecosystem services.</p>
e.	<b>Multi-scale</b>		<p>The park's biodiversity and green infrastructure is protected through the coordination of strategic of plans at different levels: local, municipal and regional. The focus is to improve green connectivity at city scale (Barcelona), with a broad scale level (i.e. establishing green corridors between the main parks and Collserola, through renaturing the main streets and tree planting in Barcelona). The Urban Master Plan of Barcelona also defines the strategy to build on green structuring axes at the metropolitan scale.</p>
f.	<b>Strategic planning processes</b>		<p>Strategic planning will be mainly designed according to the new 'Plan Especial de Protección del Medio Natural y del Paisaje del Parc Natural de la Serra de Collserola' (PEPNat) (The Special Plan of Protection of the Environment and Landscape in Serra de Collserola Natural Park), which was recently approved (2020). This plan is focussed on biodiversity conservation, enhancing ecosystem services and improving ecological connectivity. These key points are embedded into a dynamic and adaptive planning strategy.</p>
g.	<b>Inter- and transdisciplinary</b>		<p>A Socioecological Integrated Analysis (SIA), developed by the Metropolitan Laboratory of Ecology and Territory of Barcelona (LET), which combines the landscape ecological framework with the material and energy flow assessment under an integrative perspective of social cohesion allows for a</p>

			multicriterial and transdisciplinary assessment of the proposals.
	<b>h. Social cohesion and biocultural diversity</b>		A rich cultural heritage is preserved in Collserola. Various associations from the surrounding municipalities organise various cultural events (such as the popular gathering at Sant Medir church, <i>Ball de la Soca</i> - Dance of the Tree Stump in Sant Feliu de Llobregat). The Mountaineers Association of Horta organizes every year the popular Marató of Collserola, promoting sports, outdoor recreation and social cohesion.
	<b>i. Governance arrangements</b>	I. Project management structure.	Consorci del Parc Natural de Collserola
		II. Local community engagement and the nature of their engagement.	Mainly Mountaineers' associations and NGO's. In specific cases, local communities from various districts are also engaged.
		III. City-scale and/or region-wide governance for the project and/or UF-NBS (city and regional stakeholders and character of their engagement)	There is an ongoing process for the approval of an Urban Master Plan (including the whole case study) led by the Barcelona Metropolitan Area under the aim of enhancing the structure and socioecological multi-functionality of the green infrastructure, implementing a Socioecological Integrated Analysis (Marull et al., 2020; Padró et al., 2020). SIA will also set the foundations for a Decision Support System based on the participation of the stakeholders.
		IV. National and international governance context (national and international stakeholders and character of their engagement)	n/a
		V. Other (specify)	One of the challenges of the governance arrangement in CNP is that 60% the park territory is private.
	<b>j. Institutional frameworks</b>	I. Project staff responsibilities.	Education, Communication, Management, Infrastructure, Maintenance
		II. Project Management Committee (Y/N) if Y.	Governing bodies are formed by Presidency, General assembly and the Executive Committee (operational body). The advisory body is made by the Consultative Committee and the Scientific Committee
		III. Frameworks <u>above the project</u> that exert influence on the project and/or UF-NBS e.g. Municipality, National Forestry Department.	Municipalities who are part of the Consortium of the Serra de Collserola Natural Park can exert influence on UF-NBS projects.
		IV. Private companies that work on behalf	Arran de Terra leads a participative process to define a "Collserola Agricultural Contract" as a tool to pay

		of/or are embedded within the project.	for ecosystem services provided by agricultural activities in the park.
		V. Trade representative organisations that are involved in the project	n/a
		VI. Regulatory frameworks that the project operates within (i.e. bylaws, municipal laws, national laws, licences and leases, partnership agreements etc)	n/a
		VII. Other (specify)	n/a
<b>k.</b>	<b>Economic frameworks</b>	I. Community fundraising	n/a
		II. Project delivered services and monies raised by project	n/a
		III. City, regional general funds	A participatory framework to renature the river basin of Vallvidrera was set up in 2007. Catalan Water Agency (ACA) executed the project.
		IV. Special funds e.g. National Lottery, Challenge funds	n/a
		V. National government funds	The Barcelona Metropolitan Area has funded the Socioecological Integrated Analysis implementation for the assessment of scenarios for the Urban Master Plan to the whole metropolitan area. The calibration of the model under land-use planning also facilitates new scenario analysis of the UF-NBS proposals. The different scenarios already assessed allowed for a Decision Support System that will be the basis for a DSS on UF-NBS. The Spanish Ministry of Science, Innovation and Universities funded the project BIOLANDSCAPES RTI2018-093970-B to identify historical cultural landscapes that provide of multiple ES to society. The western slopes of the Serra de Collserola Natural Park still maintain certain bio-cultural agroforestry mosaics that can provide insights on the synergies and trade-offs of multi-functional spaces in peri-urban areas.
		VI. Private sector investment	n/a
		VII. International funds e.g. European Union structural funds, LIFE + etc.	n/a

		VIII. Other (specify)	n/a
	<b>i. Sino/European comparative relevance</b>		Serra de Collserola Natural Park is one of the biggest metropolitan parks in Europe. The provision and conservation of both biodiversity and ecosystem services for Barcelona and the surrounding municipalities is of crucial importance, given the existing pressures derived from complex and rapid landscape changes and population demand in this area. Its relevance for Sino/European relevance consists in possible transferability of good practices, especially in the field of urban planning strategies at various territorial levels, in the context of a highly urbanised landscape. Outdoor education is another best practice example of replicability.
	<b>m. UF-NBS valorisation</b>		n/a
	<b>n. Procurement of UF-NBS</b>		n/a
	<b>p. Ecosystem services (list the three most important services being provided in no more than 50 words)</b>		Serra de Collserola Natural Parks is a hotspot of biodiversity, ecosystem functions and services in the Metropolitan Area of Barcelona. Evapotranspiration contributes to urban microclimate regulation. Important ecosystem services, such as CO <sub>2</sub> sequestration and air quality regulation, are mainly provided by the forests. Education, recreation and leisure, sense of place and aesthetic values are important cultural services provided by the park.
	<b>q. Renaturing</b>		Further actions related to renaturing will be related to the strategies of the Urban Master Plan.
<b>12</b>	<b>LESSONS AND TRANSFERABILITY</b>		
	The strategies of the New Urban Master Plan and the Decision Support System that will be implemented and applied to various metropolitan parks in the Metropolitan Area of Barcelona are good examples of transferability for protected green areas from other regions.		
<b>13</b>	<b>REFERENCES (Harvard style)</b>		
	<p>Basnou C., Baró F., Langemeyer J., Castell C., Dalmases C., Pino J. (2020). Advancing the green infrastructure approach in the Province of Barcelona: integrating biodiversity, ecosystem functions and services into landscape planning, <i>Urban Forestry &amp; Urban Greening</i> 55, <a href="https://doi.org/10.1016/j.ufug.2020.126797">https://doi.org/10.1016/j.ufug.2020.126797</a></p> <p>Marull, J., &amp; Mallarach, J. M. (2005). A GIS methodology for assessing ecological connectivity: Application to the Barcelona Metropolitan Area. <i>Landscape and Urban Planning</i>, 71, 243–262. <a href="https://doi.org/10.1016/S0169-2046(04)00079-9">10.1016/S0169-2046(04)00079-9</a></p> <p>Marull, J., Padró, R., Cirera, J., Giocoli, A., Pons, M., Tello, E. (in press). A socioecological integrated analysis of the metropolitan green infrastructure of Barcelona. <i>Ecosystem services</i></p> <p>Padró, R., La Rota-Aguilera, M.J., Giocoli, A., Cirera, J., Coll, F., Pons, M., Pino, J., Pili, S., Serrano, T., Villalba, G., Marull, J., 2020. Assessing the sustainability of contrasting land use scenarios through the Socioecological Integrated Analysis (SIA) of the metropolitan green infrastructure in Barcelona. <i>Landsc. Urban Plan.</i> 203, 103905. <a href="https://doi.org/10.1016/j.landurbplan.2020.103905">doi:10.1016/j.landurbplan.2020.103905</a></p>		



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