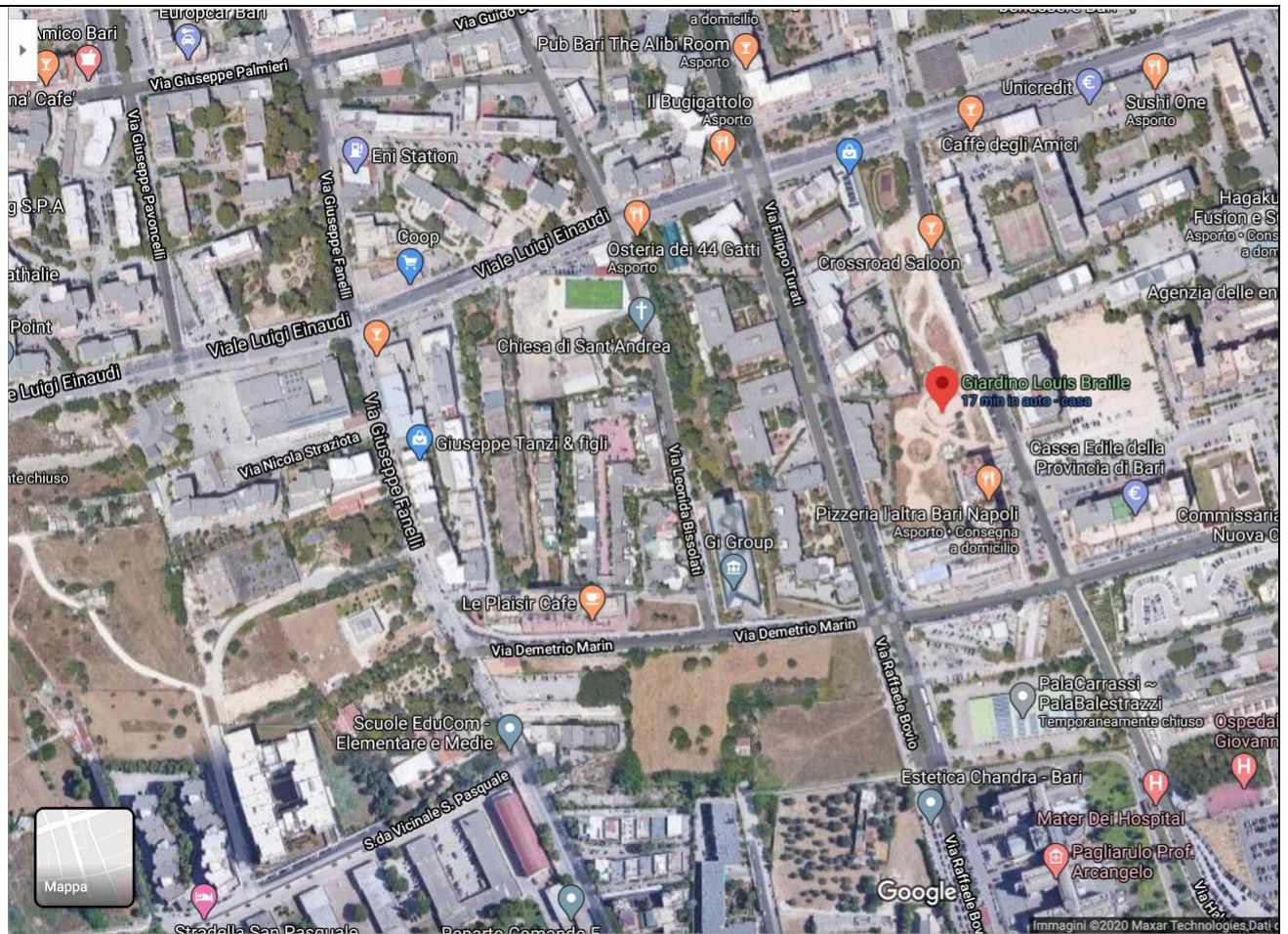


L. BRAILLE PUBLIC GARDEN – BARI, ITALY

Section	 <p>CLEARINGHOUSE 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>
1	TITLE OF CASE STUDY AREA: L. Braille Public Garden, BARI, Italy
2	<p>INTRODUCTION (max. 150 words)</p> <p>L. Braille Public Garden was an uncultivated urban green space owned by the Municipality of Bari and illegally used as a parking lot. The garden covers approximately 9500 m² and consists of 104 planted trees (including one almond tree and five olive trees already present) and over 1600 shrubs and plants served by a remote-control irrigation system. It has an internal foot-/cyclepath, benches, game tables in reconstructed stone, waste bins, dry stone walls, a children's play area and facilities accessible also to the disabled. Alongside are several parking spaces, a bi-directional cyclepath and two dog-walking areas. A LED lighting system was installed, while a video surveillance system is predisposed for future use. Macrotherm turf and natural lawn were strategically placed. Strategies adopted for the efficient use of water include a water retention basin, draining trench, underground and deep root watering sprinklers for trees, and plant selection.</p>
3	<p>KEY FACTS AND FIGURES OF THE CASE STUDY AREA</p> <p>Biogeographic region¹: Continental/Mediterranean Surface area: approximately 9500 m² Country: Italy Region/Province: Puglia/Puglia</p>
4a	LOCATION MAP(S)

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



Map of L. Braille Public Garden - Bari, Italy (red indicator) (credits: Google, 2020).

5	<p>NAME OF MUNICIPALITY AND WEBSITE ADDRESS Municipality of Bari: https://www.comune.bari.it</p>
6	<p>LEAD ORGANISATIONS:</p> <ul style="list-style-type: none"> • Municipality of Bari • Parks and Gardens Division (Municipality of Bari)
7	<p>LOCAL CONTACT(S) 1) Erminia Traversa: Technical Manager/Director – Parks and Gardens Division; 2) Umberto Medicamento: Agronomist and Assistant to Director of Works – Parks and Gardens Division Bari, Italy 1) Tel: + 39 (080) 5772857 Email: e.traversa@comune.bari.it 2) Tel: + 39 (080) 5772727; 5772723 Email: u.medicamento@comune.bari.it</p>
8	<p>PRINCIPLE UF-NBS (Urban Forests as Nature-Based Solutions) ACTION(S)</p> <ul style="list-style-type: none"> • A public garden composed of tree, flowerbed, shrub and turf plantations for a total of 104 trees, more than 1600 shrubs, and 2200 m² of turf (in areas without plants) • Lawn patches consisting of spontaneous species (<i>Pennisetum clandestinum</i>) and a ground cover plant (<i>Lippia repens</i>) in a flowerbed (as a testbed) • Surface reclamation • Water retention basin to collect rainwater runoff and to prevent flooding • The garden connects two roads (one with a flowerbed) providing connectivity between private green areas and corridors and public green areas • Two green areas for dogs
9	<p>OTHER PRINCIPLE NBS ACTION(S) – non-UF</p> <ul style="list-style-type: none"> • Four access gates placed in line with the garden’s paths to provide continuity, two of which are larger with one giving access to cars



	<ul style="list-style-type: none"> • Various networks: black sewer, water, electricity supply, public lighting system, irrigation, video surveillance (to be installed) • Computerized drip irrigation system for all plants and trees; the lawn is irrigated by dynamic pop-up sprinklers • A fence surrounding the entire garden to protect it from nighttime vandalism and for security reasons • Sidewalk constructed along one side of the garden • A soft mobility plan introducing a central footpath and bi-directional foot-/cyclepath, which leads to outside parking spaces, and spaces inside equipped for children of various age-groups to encourage bike riding, impacting climate change adaptation • Restroom facilities consisting of two units for men, one for women and one for the disabled • Recreational areas (e.g., game tables, a playground) 						
<p>10</p>	<p>LOCAL STAKEHOLDERS LIST ONLY</p> <ol style="list-style-type: none"> Governing authorities: Municipality of Bari; Parks and Gardens Division (of the Municipality) Associations: 'Reti Civiche Urbane' ('Urban Civic Networks') association Park planner and authorities: Park planner: Parks and Gardens Division; Authorities: Commissioner of Public Works, the Mayor of Bari, and President of 'District 2' (comprised of five distinct groups of urban zones) Technicians for park maintenance/monitoring: Parks and Gardens Division of the Municipality of Bari (i.e., director of works, project manager, project designer, technicians and assistants to the director of works) 						
<p>11</p>	<p>UF-NBS FRAMEWORK</p> <table border="1" data-bbox="188 846 1487 2074"> <tr> <td data-bbox="188 846 252 1169"> <p>a.</p> </td> <td data-bbox="252 846 533 1169"> <p>UF-NBS typology</p> </td> <td data-bbox="533 846 1487 1169"> <p>Small to medium urban park/public garden Includes amenity green spaces, local areas for play (LUP), species-rich trees, bushes, flowerbeds, shrubs and lawn; artificial turf; built structures also comprising irrigation, drainage and lighting systems. Choice of ornamental trees and plants (i.e., indigenous and acclimated species; medium-sized trees with a proper balance between deciduous and evergreen). In total 104 trees, over 1600 shrubs and 2200 m² of turf (a small portion of <i>Lippia repens</i>) were planted.</p> </td> </tr> <tr> <td data-bbox="188 1169 252 2074"> <p>b.</p> </td> <td data-bbox="252 1169 533 2074"> <p>Integration</p> </td> <td data-bbox="533 1169 1487 2074"> <p>Green and gray infrastructures are integrated: a water management system (e.g., water retention basin, or drainage trench, computer-timed drip irrigation system) for green spaces; a LED lighting system and video surveillance cameras (to be installed) for nighttime public security and to avoid vandalism. These are integrated using a high-tech computerized system that connects with mobiles for monitoring and management of water and light use. Two dog-walking areas were created in a pre-existing green space. Other built-up gray infrastructures include turf in an area where natural lawn was not suitable, a children's play area, central foot-/cyclepath, a rest area with elements of urban furniture (benches and stone game tables), restrooms - accessible to the disabled; a pre-designed area with water and energy connections for the future installation of a stand to provide animation for children; fence delimiting the garden with four entrances; parking lots outside the garden and an outer foot-/cyclepath connecting to the cyclepath of a nearby planned green space. The garden is equipped with the following networks:</p> <ul style="list-style-type: none"> - black sewer; - water; - electricity supply; - green area irrigation - predisposition of video surveillance - public lighting </td> </tr> </table>	<p>a.</p>	<p>UF-NBS typology</p>	<p>Small to medium urban park/public garden Includes amenity green spaces, local areas for play (LUP), species-rich trees, bushes, flowerbeds, shrubs and lawn; artificial turf; built structures also comprising irrigation, drainage and lighting systems. Choice of ornamental trees and plants (i.e., indigenous and acclimated species; medium-sized trees with a proper balance between deciduous and evergreen). In total 104 trees, over 1600 shrubs and 2200 m² of turf (a small portion of <i>Lippia repens</i>) were planted.</p>	<p>b.</p>	<p>Integration</p>	<p>Green and gray infrastructures are integrated: a water management system (e.g., water retention basin, or drainage trench, computer-timed drip irrigation system) for green spaces; a LED lighting system and video surveillance cameras (to be installed) for nighttime public security and to avoid vandalism. These are integrated using a high-tech computerized system that connects with mobiles for monitoring and management of water and light use. Two dog-walking areas were created in a pre-existing green space. Other built-up gray infrastructures include turf in an area where natural lawn was not suitable, a children's play area, central foot-/cyclepath, a rest area with elements of urban furniture (benches and stone game tables), restrooms - accessible to the disabled; a pre-designed area with water and energy connections for the future installation of a stand to provide animation for children; fence delimiting the garden with four entrances; parking lots outside the garden and an outer foot-/cyclepath connecting to the cyclepath of a nearby planned green space. The garden is equipped with the following networks:</p> <ul style="list-style-type: none"> - black sewer; - water; - electricity supply; - green area irrigation - predisposition of video surveillance - public lighting
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			<p>Therefore, integration of a variety of technical systems with green space planning/preparation (e.g., terrain modeling) and implementation.</p> <p>Another form of integration is social cohesion and UF-NBS through planned public events (see section 'I.II')</p>
c.	Network/connectivity		<p>Connectivity is ensured by the garden's green infrastructure as a connecting element with the pre-existing green area on the side street. The other side of the garden flanks a nearby flowerbed. Gray infrastructure (e.g., foot- and cyclepath) connects with the nearby built-up urban areas. Green spaces in the public garden are not to be considered so much as a connected framework with other green spaces but rather as more of an isolated infrastructure, as part of a mosaic with other green patches in the urban context. Nevertheless, it is intended as a strategy for addressing issues of climate change, human health and wellbeing and social cohesion as well as connectivity.</p>
d.	Multifunctionality		<p>Through its green and gray infrastructures, the garden carries out multiple functions, such as improved aesthetics compared with its former state as derelict land avoided by pedestrians and as an illegal parking lot. People now pass through and bring their children to play. The entire garden enhances human health and wellbeing with better air quality, increased biodiversity and by meeting the needs of the community (i.e., recreation, social activities, environmental education, a water fountain and restroom facilities accessible also to the disabled, areas for dogs). The gray infrastructure introduces innovative concepts for the development and monitoring of the green and gray implementations by means of the latest technology for running the water, electrical and lighting systems (e.g., management of trees/plants and safety for visitors). This efficient use of water reduces maintenance interventions, guaranteeing a healthy state of trees and plants. An indirect multifunctional aspect is the increased value of nearby real estate.</p>
e.	Multi-scale		<p>This is not a multi-scale project. It is a municipal and independent garden project for local residents. The project was borne from the idea of completing a garden that exists on the corner connected to it. However, the regional authority, 'Apulia Region', was involved to provide the best practices upon which to base its development.</p>
f.	Strategic planning processes		<p>The implementation strategy is quite simplistic. The garden was strongly desired by the local administration (Municipality of Bari) and was, in fact, entirely financed with its own funds. It is characterized by a strong participatory approach in terms of promotion and planning on behalf of the mayor of Bari, who wanted to implement this project, the Commissioner of Public Works and the President of 'District 2'. The administrative authorities envision the garden as part of a continuous, long-term process of strategic green infrastructure planning at the urban scale. An example of strategic planning from a management perspective is the redevelopment of the abandoned and adjacent parking lot covering 7500 m²</p>



			to replace the illegal parking lot that was used to build the garden. This infrastructure compensated for the lost parking spaces taken up by the garden and thus received approval by the residential community, which otherwise would not have approved the project.
g.	Inter- and transdisciplinary		The project brought together, in a synergistic participatory process, public administrative authorities, project designers and actors from the technical sector with their knowledge of urban landscape planning, irrigation, lighting, and computer systems; specifically, surveyors, engineers, the Director of Works and his assistants of the Parks and Gardens Division of the Municipality of Bari, as well as road, construction and installation technicians. The community association and stakeholder, 'Urban Civic Networks', refers to and engages with the public authority 'District 2' for every issue and request it may have, e.g., tidying up and organizing events in the garden.
h.	Social cohesion and biocultural diversity		L. Braille public garden had and continues to have a strong impact on local citizens, fostering social cohesion and biocultural diversity. District 2 presented motions in favour of these aspects to organize public events and provide garden amenities (green and gray infrastructure) to attract visitors, regardless of social class. The 'Urban Civic Networks' association was a major stakeholder that supported the project in this perspective (see section 'I.II').
i.	Governance arrangements	I. Project management structure.	There are no higher governance arrangements above the municipal level; the same is true for the institutional and economic frameworks. The only reference to a higher level is for best practices from the regional authority. The project is based on participatory governance: management of the garden and organization of environmentally sustainable activities undertaken by the Municipality of Bari's Parks and Gardens Division, the private landscape company, technicians and the citizens association 'Urban Civic Networks'. However, governance is the main responsibility of the Municipality of Bari.
		II. Local community engagement and the nature of their engagement.	The local community association 'Urban Civic Networks' plays a main role in the city of Bari, which is to provide social activities within select urban areas and to build citizen awareness. For L. Braille garden, the association acts as a stakeholder for attracting visitors, holding events, and giving life and value to the garden. It also uses Facebook to publicize events to involve all age-groups (e.g., inauguration of the garden in 2019; the garden was part of the urban-wide "urban trekking" initiative for citizens to walk in the city's green spaces; educational gatherings to teach citizens about plants and flowers; the garden is also used as a receptacle, or place, to hold activities dealing with how to recycle and use materials; exercise and dance activities; parties for children).
		III. City-scale and/or region-wide governance for the project and/or UF-	The stakeholder with the most significant involvement for the governance of the project is the Municipality of Bari – its engagement is at city scale. Its partner stakeholder, part of the Municipality of Bari itself, is



		NBS (city and regional stakeholders and character of their engagement)	the Parks and Gardens Division, which besides being responsible for monitoring, managing and implementing biodiversity in the garden, sits on committees and provides financial incentives for the project. Initially, District 2 requested the municipal administration to set up a tendering process for the project. Also at city-scale is the 'Urban Civic Networks' association, the active stakeholder organizing events and promoting the public garden. The Apulia Region, at regional level, provided the best practices.
		IV. National and international governance context (national and international stakeholders and character of their engagement)	n/a
		V. Other (specify)	n/a
j.	Institutional frameworks	I. Project staff responsibilities.	Each sector of the city's public administration and member of the technical staff/office is responsible for the greening, maintenance and operating conditions of the garden according to his/her own expertise (e.g., the Sole Project Manager supervises the project works; the Project Designer planned and monitors the project; the Director of Works was responsible for risk management during the design phase; two assistants were assigned to the Director of Works and are in charge of green infrastructure and irrigation; the Municipality made decisions regarding location of the garden and funding).
		II. Project Management Committee (Y/N) if Y.	N. Each technical office occupies itself with its own field of expertise for the maintenance of the garden (see above).
		III. Frameworks <u>above the project</u> that exert influence on the project and/or UF-NBS e.g. Municipality, National Forestry Department.	The Municipality of Bari as well as District 2 (composed of five distinct groups of urban zones) exert influence on the project. Both are responsible for all governance aspects of the project. The regional body, Apulia Region, provided best practices that were applied to the project: runoff collection; irrigation; reduced lawn space for decreased water consumption; LED lighting with shields to reduce light pollution and save on electricity. All decisions were and are taken at the municipal level. The Parks and Gardens Division directly influences UF-NBS.
		IV. Private companies that work on behalf of/or are embedded within the project.	The private landscape company – 'Colucci Garden Srl' – designed and constructed the garden and provides maintenance.
		V. Trade representative organisations that are involved in the project	n/a
		VI. Regulatory frameworks that the project operates	In general, whether both UF-NBS or non-UF-NBS were being considered for the garden, the only regulation in



		within (i.e. bylaws, municipal laws, national laws, licences and leases, partnership agreements etc)	force at the building stage was the Puglia Region's 'Regional Document for the General Structure' (DRAG). However, there were no specific guidelines for the green space design of the garden. Only the Minimum Environmental Criteria for Public Green, Ministerial Decree of 13 December, 2013, had been applied. As mentioned above in 'J.I.', each member of the technical staff was responsible for the greening, maintenance and operating conditions of the garden according to his/her own expertise. Each technician had a personal method of control within the garden. Hence, this was an internal monitoring method and could be considered an unofficial partnership agreement. However, in May 2020 a new regulation specifically containing guidelines for the construction and maintenance of new public green areas with quality standards for green design (Art. 28 of UNI/PdR 8:2014) was drafted by the Municipality and approved; technical specifications were now addressed (non-UF-NBS, e.g., lighting and drainage systems most likely had their own guidelines since the start of the project. This could not be verified.).
		VII. Other (specify)	n/a
k.	Economic frameworks	I. Community fundraising	None. All funding was provided by the Municipality of Bari. The local citizen association 'Urban Civic Networks' does not provide fundraising.
		II. Project delivered services and monies raised by project	Project-delivered services by the Municipality of Bari: design of the project (in collaboration with District 2 and the Parks and Gardens Division of the Municipality) and launch of a tender to hire a private landscape company to build the garden. Project-delivered services by District 2 and Parks and Gardens Division: contributed to the decision-making process for the construction of the garden and to improve its design to meet residents' needs. The project design and technical direction were provided by the Municipality's Parks and Gardens Division. No monies were raised outside of the Municipality of Bari.
		III. City, regional general funds	All funding was provided by the Municipality of Bari's budget for public works. The Municipality designed the project and launched a tender to hire (and pay) a private landscape company to build the public garden (see above).
		IV. Special funds e.g. National Lottery, Challenge funds	n/a
		V. National government funds	n/a
		VI. Private sector investment	n/a
		VII. International funds e.g. European Union structural funds, LIFE + etc.	n/a
		VIII. Other (specify)	n/a



<p>I.</p>	<p>Sino/European comparative relevance</p>		<p>L. Braille public garden is a small UF-NBS project that has just recently been established (June 2019). In comparison with Chinese urban projects, this one is quite small. However, it is a good example of a multifunctional approach and warrants comparison with Chinese examples at the same scale. The public garden also exemplifies how derelict land caused by urban expansion can be transformed into green spaces that have the potential to become part of green networks through connectivity, similar to the Chinese green belts. In contrast, it's governance, institutional and economic frameworks as well as stakeholder support are quite different due to the size of the project and single lead actor (the Municipality). Perhaps Chinese projects can be comparable in the use of leading-edge technology for providing the basic social, environmental and technological services.</p>
<p>m.</p>	<p>UF-NBS valorisation</p>		<p>The promotion and dissemination of respectful and environmentally, economically and socially conscious interventions with a view to sustainability constitute values of this UF-NBS. Urban parks are green spaces that can contribute to the maintenance of animal and plant biodiversity in such a highly anthropized environment. Green spaces, like L. Braille public garden, play a fundamental role as they improve air quality by absorbing carbon dioxide and consequently contribute to breaking down the greenhouse gases responsible for climate change. They also counteract the urban heat island effect through shading and the transpiration of trees and plants, mitigating the temperature of the surrounding environment and improving human health and wellbeing. A valuable aspect of the project is the reclamation of derelict soil and land, as well as of the adjacent parking area as a compensation measure for lost parking space, simultaneously valuing social needs. Valuable aspects from the environmental and economic perspective include an innovative underground anchoring system for trees, the creation of a rainwater collection network, which is then conveyed into a sedimentation, filtering and accumulation system destined for reuse for irrigation purposes and to resolve the issue of runoff and flooding. Therefore, the garden's irrigation system has been designed to meet two main needs: efficient use of water resources and ease of use, based on the installation of a device that allows the control and programming of remote irrigation shifts. The system is accessible via internet thanks to data connection using the SIM card through a graphic interface that allows to check its operation as well as to program or simply switch the system on and off. The presence of an operator on site is therefore not necessary, since the system can be managed from an office or, in an emergency, from a Smartphone. As mentioned above, residents' needs have been valued mainly by the local representatives of District 2. These authorities have contributed to the decision-making process for the construction of the garden and have contributed to improving its design to meet residents'</p>

			needs (e.g., attention to children with dedicated recreational areas, the delimitation of the garden by a fence, and the creation of areas for dogs are some of the measures taken).
	n.	Procurement of UF-NBS	Procurement of UF-NBS was a joint effort between the Municipality of Bari and private landscape company, which is ongoing. Specifically, the Parks and Gardens Division (of the Municipality) was and has been formally entrusted with selecting and procuring the garden's UF-NBS.
	p.	Ecosystem services (list the three most important services being provided in no more than 50 words)	1) Mental and physical wellbeing through aesthetic appreciation, recreational facilities and social cohesion; 2) Habitat restoration – i.e., renovation of derelict land; increased biodiversity, mitigation of the urban heat island; reduced noise, air and light pollution; 3) economical and 'smart' waterflow regulation and runoff mitigation
	q.	Renaturing	Renovation and environmental redevelopment into an UF-NBS of a derelict area that was once an illegal parking lot.
12	LESSONS AND TRANSFERABILITY (max. 100 words)		
	<p>Ingredients for successful UF-NBS projects are: collaboration among different sectors of expertise, exchanges with public authorities, respecting roles and citizens' needs, citizen awareness and involvement, continuous funding, a minimum regulatory framework.</p> <p>Regulatory frameworks at a very small-scale of UF-NBS projects are not necessary at the initial stage since criteria for selecting UF-NBS are based upon expert decisions and regulated by a major planning instrument (PUG - Bari) that provides guidelines.</p> <p>This project can be easily reproduced in other urban regions. 'Smart' technical solutions are advantageous from an environmental, economic, and social perspective.</p>		
13	REFERENCES (Harvard style)		
	<p>Marchione, V. "I tappeti erbosi nell'Italia meridionale. Scelta delle specie e gestione agronomica." ("Grass mats in southern Italy. Choice of species and agronomic management.") Training course session on planning and management of green spaces and landscaping, "Landscape and green urban planning", 23-30 September, 2015; organized in Bari by ARPTRA Puglia.</p> <p>'Reti Civiche Urbane' Association. https://www.bariinnovazionesociale.it/reti-civiche-urbane/carrassi-san-pasquale-mungivacca-bari-rcu</p> <p>Google (2020). Map of L. Braille Public Garden - Bari, Italy. Available at: https://www.google.com/maps/place/Giardino+Louis+Braille/@41.1007532,16.884603,2452m/data=!3m1!1e3!4m5!3m4!1s0x0:0x553eb12a9a587c9d!8m2!3d41.1007532!4d16.884603.</p> <p>Municipal regulation of urban green. https://www.comune.bari.it/-/regolamento-comunale-del-verde-urbano</p>		
14	Acknowledgements		
	<p>We wish to thank the following project members for their contribution to this case history:</p> <p>Erminia Traversa – Technical Manager/Director (Parks and Gardens Division, Municipality of Bari)</p> <p>Umberto Medicamento – Agronomist/Assistant to Director of Works; and Francesco Crudele – Agricultural Expert and Assistant to Director of Works (Parks and Gardens Division, Municipality of Bari)</p> <p>Eng. Claudio Laricchia – Sole Project Manager; Director of Infrastructure, Roads and Public Works Distribution (Municipality of Bari)</p> <p>Surveyor Fernando Ciavarella – Director of Works (Primary Urbanization Sector, Municipality of Bari)</p> <p>Surveyor Fabrizio Trotta – Project Design (Primary Urbanization Sector, Municipality of Bari)</p>		