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Infraestructura verde y azul como herramienta para la promoción de la salud

Green and blue infrastructure as a tool for health promotion

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Resumen: La aportación de beneficios de las infraestructuras verdes y azules desde los servicios ecosistémicos es una de las grandes contribuciones que, desde la Unión Europea, ha permeado ya en la legislación española con la Estrategia Nacional de Infraestructura Verde y de la Conectividad y Restauración Ecológicas. Esta investigación aborda un nuevo enfoque, centrado en el bienestar y la calidad de vida de las personas, respondiendo a la pregunta: ¿puede la red interconectada de espacios verdes y azules, mitigar o adaptarse al cambio climático y promover la salud? Para ello se sigue la metodología que propone la Guía para planificar ciudades saludables [1] y se cruzan sus tres líneas estratégicas (ciudades para caminar, incremento de zonas verdes y SbN y espacios de convivencia intergeneracional), con los componentes de la infraestructura verde: nodos, corredores y áreas de amortiguación. Los resultados aportan indicadores que cumplen estas dos premisas y que servirán para diagnosticar los territorios y proponer Planes de Acción en Salud desde el concepto de infraestructura verde de la Estrategia Nacional y la Emergencia Climática. Los indicadores ayudarán a concretar los Objetivos de Desarrollo Sostenible (ODS) 3, Salud y Bienestar, 11 Comunidades más sostenibles, 13 Acciones preventivas para el cambio climático y 15 Biodiversidad.

Palabras clave: servicios ecosistémicos; soluciones basadas en la naturaleza; adaptación-mitigación; cambio climático; salud urbana.

Abstract: The contribution of the benefits of green and blue infrastructures from ecosystem services is one of the great contributions from the European Union that have already permeated into Spanish legislation with the National Strategy on Green Infrastructure and Ecological Connectivity and Restoration. This research addresses a new approach, focused on the well-being and quality of life of people, answering the question: can the interconnected network of green and blue spaces mitigate or adapt to climate change and promote health?

To do this, the methodology proposed by the "Guía para planificar ciudades saludables [Guide to Planning Healthy Cities]"[1] is followed and its three strategic lines - cities for walking, increase of green areas, Nature-based solutions (NbS) and spaces for intergenerational coexistence are combined with the components of the green infrastructure: nodes, corridors and buffer areas. The results provide indicators that meet these two premises and that will serve to diagnose the territories and propose Health Action Plans from the concept of green infrastructure of the Spanish National Strategy and Climate Emergency. The indicators will help to consolidate the Sustainable Development Goals (SDGs) 3, Health and Welfare, 11 More Sustainable Communities, 13 Preventive Actions for Climate Change and 15 Biodiversity.

Keywords: ecosystem services; nature-based solutions; adaptation-mitigation; climate change; urban health.

INTRODUCCIÓN

El concepto de infraestructura verde ha evolucionado en los últimos años adoptando nuevos enfoques desde los que contribuir a un desarrollo y planificación urbana-territorial sostenible del territorio.[2] La conservación de la biodiversidad, los beneficios ambientales, los servicios ecosistémicos o su papel en la acción climática urbana son ya parte de su constructo conceptual. Sin embargo, su aportación a la promoción de la salud urbana aún no forma parte de él.

La literatura internacional vinculada con la infraestructura verde toma como constante de partida que este instrumento, además de aportar a la conservación de biodiversidad,[3] aporta beneficios para la calidad de vida de las personas.[4] Los estudios son diversos y se enfocan en el análisis de las tendencias de uso culturales,[5] en los cambios y características diferenciales según el espacio y el tiempo[6] o en la evaluación de su calidad.[7] Un gran bloque de literatura se centra en el proceso y mecanismos de planificación e implementación. En él, se incluyen los estudios que analizan la potencial multifuncionalidad y escala de aplicación,[8] los mecanismos de participación para su identificación e implementación[9] o los criterios y concepciones aplicables en la planificación urbana,[10] que incluye la contención del crecimiento urbano,[11] la prevención del riesgo[12] y la acción climática urbana.[13] Sin embargo, hasta ahora, los estudios que vinculan específicamente la infraestructura verde y azul con

INTRODUCTION

The concept of green infrastructure has evolved in recent years integrating new approaches that contribute to sustainable urban and regional planning and territorial development.[2] Biodiversity conservation, environmental benefits, ecosystem services and their role in urban climate action are already framed within its conceptual construct. However, its contribution to urban health promotion has not yet been adequately addressed.

International literature on green infrastructure takes as a starting point that this framework not only contributes to the conservation of biodiversity[3] but also improves people's quality of life.[4] The studies are diverse and focus on the analysis of cultural use trends,[5] on changes and differential characteristics according to space and time[6] or on evaluating their quality.[7] A considerable amount of literature focuses on the process and mechanisms of planning and implementation. This includes studies that analyse the potential multi-functionality and scale of application,[8] participatory approaches for identifying and implementing the green infrastructure[9] and the criteria and conceptions applied in urban contexts,[10] which includes the containment of urban growth,[11] risk prevention[12] and urban and climate action.[13] However, to date, studies that specifically link green and blue infrastructure

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la salud de la población son escasos,[14] por lo que se plantea como novedad del artículo explorar y esbozar las potenciales relaciones entre ambos conceptos.

Los objetivos internacionales, como los acordados en París y los Objetivos de Desarrollo Sostenible (ODS), carecen de sentido sin medidas concretas que aseguren su cumplimiento.[15] La Estrategia Nacional de Infraestructura Verde es un marco de gran oportunidad y relevancia para materializar estos objetivos generales en propuestas concretas. En este contexto, se plantea la pregunta de investigación de si pueden los componentes de la infraestructura verde (nodos, corredores y espacios de amortiguación) servir como factores determinantes para mejorar los servicios ecosistémicos, aportar a la mitigación-adaptación al cambio climático y mejorar la calidad de vida y salud de las personas. Se propone como objetivo materializar una metodología de diagnóstico de la infraestructura verde que recopile una serie de indicadores por cada una de las tres dimensiones propuestas y que permita articular los componentes de una infraestructura verde a diversas escalas desde la perspectiva de la promoción de la salud de las personas que habitan las ciudades y los territorios.

Los resultados del artículo aportan un conjunto de indicadores que permiten analizar y diagnosticar un territorio concreto desde el enfoque de la salud. El artículo se estructura de la siguiente manera. En primer lugar, se revisan en el marco teórico la literatura y los puntos clave que relacionan la salud con las tres dimensiones vinculadas con la infraestructura verde -servicios ecosistémicos, cambio climático y barrios saludables. Después, se describe la metodología que permite revisar y seleccionar los indicadores para cada dimensión. En los resultados se desarrollan los indicadores, poniendo énfasis en su medición y en su aportación a la salud. Además, se clasifican según su potencial aplicación a los componentes de la infraestructura verde y azul, así como su potencial escala de aplicación. Las discusiones apuntan a plantear la importancia de la aplicación transescalar, la adaptación a los distintos paisajes y tipos de ciudades y poblaciones

with population health are scarce.[14] Therefore this article aims to explore and outline the potential relationships between both concepts.

International goals, such as those agreed in Paris and the Sustainable Development Goals (SDGs), are meaningless without specific measures to ensure their implementation.[15] The Spanish National Green Infrastructure Strategy is a of great opportunity and relevance for translating these general goals into specific proposals. In this context, the research question i framework s raised as to whether the components of green infrastructure (nodes, corridors and buffer spaces) can serve as determinants to improve ecosystem services, and do they contribute to the mitigation-adaptation of climate change and improve the quality of life and health of people? The proposed goal is to develop a diagnostic methodology for green infrastructure that integrates indicators for each of the three proposed components. This will enable the development of these aspects of the green infrastructure at various scales from the perspective of the promotion of the health of the people who inhabit cities and territories.

The results of the study presented in this article provide a set of indicators that analyse and diagnose a specific territory from the health perspective. The structure is as follows: firstly, the literature and key points that relate health to the three components linked to green infrastructure are reviewed in a theoretical framework - ecosystem services, climate change and healthy neighbourhoods. Secondly, a methodology is described to review and select the indicators for each component. In the results, the indicators are developed emphasising their measurement and their contribution to health. Furthermore, they are classified according to their potential application to green and blue infrastructure components, in addition to their potential scale for application. The discussions aim to raise the importance of cross-scale application, adaptation to different landscapes and types of cities and populations and the contribution to health

y a la aportación a la salud de la metodología. Las conclusiones resaltan el principal hallazgo, los limitantes y la aplicabilidad de la metodología.

LA INFRAESTRUCTURA VERDE Y AZUL Y SU VINCULACIÓN CON LA SALUD

La Estrategia Nacional de Infraestructura Verde, alineada en enfoque con la de escala europea, concibe la Infraestructura Verde como "una red ecológicamente coherente y estratégicamente planificada de zonas naturales y seminaturales y de otros elementos ambientales, diseñada y gestionada para la conservación de los ecosistemas y el mantenimiento de los servicios que nos proveen."[16] Estos servicios se complementan con los de abastecimiento, los de regulación y los culturales dinámicamente equilibrados en cada territorio. Esta Estrategia define dos temas clave para el desarrollo de esta metodología: sus componentes y la escala de aplicación.

En relación con sus componentes, destacan (1) las áreas núcleos o nodos, como áreas de biodiversidad prioritaria protegidas o no; (2) los corredores, que mantienen la conectividad ecológica y ambiental mediante nexos físicos entre los nodos; y (3) las áreas de amortiguación, que protegen la red ecológica de influencias dañinas externas y permiten la consolidación de nodos y corredores a largo plazo.[17] Por otra parte, en términos de escala se plantea la identificación de los componentes a diversas escalas: local, regional y nacional, para asegurar una coherencia en las diversas escalas geográficas.[18]

La infraestructura verde y azul tiene un impacto significativo en la salud de las personas a través de varios mecanismos evidenciados por la literatura científica. Desde los servicios ecosistémicos la aportación de la infraestructura verde a la salud está relacionada con sus tres tipos, ya que son áreas de abastecimiento de materias primas y son sumideros de gases y contaminantes desde los servicios de abastecimiento. Los árboles y las plantas en la infraestructura verde absorben contaminantes y producen oxígeno, reduciendo

of the methodology. The conclusions summarise the main findings, limitations and the applicability of the methodology.

GREEN AND BLUE INFRASTRUCTURE AND ITS RELATIONSHIP TO HEALTH

The Spanish National Green Infrastructure Strategy, aligned in its focus with the European scale, sees green infrastructure as "an ecologically coherent and strategically planned network of natural and semi-natural areas and other environmental elements, designed and managed for the conservation of ecosystems and the maintenance of the services they provide."[16] These services are complemented by supply, regulatory and cultural services that are dynamically balanced in each territory. This strategy defines two key themes for the development of this methodology: its components and the scale of application.

In relation to their components, the main areas are (1) the core areas or nodes, as protected or not priority biodiversity areas; (2) the corridors, which maintain ecological and environmental connectivity through physical links between the nodes; and (3) the buffer areas, which protect the ecological network from external harmful influences and allow the consolidation of nodes and corridors in the long term.[17] On the other hand, in terms of scale, the identification of components at various levels is proposed: local, regional and national, to ensure coherence in the various study areas.[18]

Through various mechanisms evidenced by the scientific literature green and blue infrastructure has a significant impact on people's health. From an ecosystem services perspective the contributions of green infrastructure to health are related to its three types, since these supply areas provide raw materials and are sinks for gases and pollutants. Trees and plants in green infrastructure absorb pollutants and produce oxygen, reducing air pollution and improving the

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la contaminación del aire y mejorando la salud respiratoria de la población.[19] En cuanto a los servicios de regulación, la infraestructura verde y azul fomenta la biodiversidad, lo que a su vez mejorará los servicios ecosistémicos como la polinización, la estabilización del suelo, la reducción de plagas y la mejora del suelo.[20] Finalmente, desde los servicios culturales el aporte "del verde" desde el bienestar físico perceptivo personal, la identidad de las comunidades, el paisaje cultural y la relación emocional-trascendental es clave para la salud mental de las personas y las poblaciones.[21]

Desde el enfoque del cambio climático la aportación de la infraestructura verde a la salud se estructura en tres bloques. El primero, está vinculado con los beneficios para el bienestar humano y la biodiversidad de las soluciones basadas en la naturaleza.[22] Investigaciones apuntan a que estas mejoran la salud mental y física reduciendo la incidencia de la depresión y el número de muertes derivadas del calor.[23] Un segundo enfoque apunta a los beneficios de la reducción de la isla de calor urbana, proporcionando áreas más frescas durante el verano, lo cual reduce el riesgo de enfermedades relacionadas con el calor[24] y la mejora del microclima urbano.[25] Estudios recientes identifican los patios escolares como los espacios clave para actuar como refugios climáticos de los barrios.[26] El tercer bloque se vincula con la adaptación de las ciudades frente al cambio climático mediante el fortalecimiento del papel de la agricultura urbana y periurbana.[27] Algunos de estos estudios llegan a vincular el cambio climático, agricultura local y seguridad alimentaria[28] o incluso con la potencial autosuficiencia alimentaria.[29]

Desde el enfoque de la ciudad y barrios saludables se proponen tres líneas de trabajo complementarias que serían la caminabilidad, las zonas verdes de proximidad y los espacios de convivencia.[30] En el primero, los parques, senderos y espacios verdes se identifican como espacios accesibles para caminar, correr o andar en bicicleta y que así promuevan la actividad física, lo que contribuye a prevenir enfermedades cardiovasculares, la obesidad y la diabetes.[31] El segundo componente identifica que el contacto con la naturaleza desde la proximidad con las viviendas tiene un impacto positivo en la salud

respiratory health of the population.[19] In terms of regulatory services, green and blue infrastructure fosters biodiversity, which in turn will improve ecosystem services such as pollination, soil stabilisation, pest reduction and soil improvement.[20] Finally, from cultural services the contribution of 'green' from the personal perceptive of physical well-being, the identity of communities, the cultural landscape and the emotional-transcendental relationship is key to the mental health of individuals and populations.[21]

From the approach of climate change the contribution of green infrastructure to health is structured in three blocks. The first is linked to the benefits for human well-being and the biodiversity of nature-based solutions.[22] Research suggests that these improve mental and physical health by reducing the incidence of depression and the number of heat-related deaths.[23] The second block points to the benefits of reducing the urban heat island by providing cooler areas during the summer, which reduces the risk of heat-related diseases[24] and improving the urban microclimate.[25] Recent studies identify school yards as the key spaces to act as climate refuges in neighbourhoods.[26] The third block is linked to the adaptation of cities to climate change by strengthening the role of urban and peri-urban agriculture.[27] Some of these studies go so far as to link climate change, local agriculture and food security[28] to potential food self-sufficiency.[29]

Regarding the city and healthy neighbourhoods, three complementary lines of work are proposed; walkability, nearby green areas inand the spaces of coexistence. [30]In the first, parks, trails and green spaces are identified as accessible spaces for walking, running or cycling and thus promote physical activity, contributing to the prevention of cardiovascular disease, obesity and diabetes.[31] The second component identifies that contact with nature close to dwellings has a positive impact on mental health, reduces stress, anxiety

mental, reduciendo el estrés, la ansiedad y la depresión al proporcionar espacios para la relajación y el ocio.[32] El tercero apunta a que es necesario diseñar lugares que actúen como puntos de encuentro y socialización, fortaleciendo la cohesión comunitaria y mejorando el bienestar psicológico general de la comunidad que evite la soledad, la depresión o el estrés urbano.[33]

METODOLOGÍA

Para alcanzar el objetivo propuesto, se diseñó una metodología innovadora que identificó e integró indicadores para el diagnóstico de la infraestructura verde desde el enfoque de su aportación a la salud de las personas (física y mental).

Búsqueda documental especializada de indicadores. (Fase 1)

La búsqueda se enfocó en trabajos científicos relacionados con la infraestructura verde y azul que vincularan o tuvieran el potencial de vincular su papel como proveedor de servicios ecosistémicos, herramienta para la lucha climática o elemento clave en la generación de barrios y ciudades saludables. Para ello, se realizó una revisión de la literatura científica y gris en Google Scholar y WOS en el periodo 2015-2025, utilizando como ámbito geográfico de referencia los países mediterráneos. Los ámbitos de análisis en los que se buscaron los indicadores fueron los siguientes:

- Servicios ecosistémicos: (i) evaluación de la potencialidad de los servicios ecosistémicos; (ii) valoración y reconocimiento de la red hídrica superficial; y (iii) evaluación de zonas de alta erosión potencial y pérdidas de suelo.

- Adaptación-mitigación al cambio climático: (i) caracterización de las diferentes tipologías de soluciones basadas en la naturaleza; (ii) identificación de la potencialidad de escuelas y mercados de escala local; y (iii) evaluación del potencial agroalimentario.

and depression by providing spaces for relaxation and leisure.[32] The third points out that it is necessary to design places that act as meeting points and for socialisation, strengthening community cohesion and improving the overall psychological well-being of the community to avoid loneliness, depression or urban stress.[33]

METHODOLOGY

To achieve the proposed goal, an innovative methodology is outlined that identifies and integrates indicators for the diagnosis of green infrastructure from the approach of its contribution to the health of people (physical and mental).

Specialised documentary search for indicators. (Phase 1)

The search focused on scientific works related to green and blue infrastructure that linked or had the potential to link its role as a provider of ecosystem services, to a tool for climate control or To a key element in generating healthy neighbourhoods and cities. To do this, a review of the scientific and grey literature in Google Scholar and WOS was carried out in the period 2015-2025, using Mediterranean countries as a geographical reference area. The areas of analysis in which the indicators were searched were as follows:

- Ecosystem services: (i) assessment of the potential of ecosystem services; (ii) valuation and recognition of the surface water network; and (iii) assessment of areas of potential high erosion and soil losses.

- Adaptation-Mitigation to climate change: (i) characterisation of the different types of nature-based solutions; (ii) identification of the potential of schools and markets of local scale; and (iii) assessment of the agri-food potential.

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- Ciudad saludable: (i) evaluación de la caminabilidad de las personas; (ii) análisis de la accesibilidad de zonas verdes de proximidad; y (iii) diagnóstico de los espacios de convivencia intergeneracional.

Se partió con la búsqueda de las palabras clave "infraestructura verde" o "infraestructura azul" "salud" y cada uno de los ámbitos de análisis "servicios ecosistémicos", "cambio climático" y "ciudad saludable". Sin embargo, puesto que el objetivo era el de encontrar indicadores de interés aplicables, se recurrió posteriormente a literatura vinculada con temáticas que pudieran emerger de un primer filtrado.

Selección de indicadores para la evaluación de la infraestructura verde desde la perspectiva de la salud. (Fase 2)

Se seleccionaron entre 1 y 3 indicadores por cada sub-ámbito que, de forma integrada, permitieran generar un diagnóstico de cada uno de los ámbitos. Los criterios de selección de los indicadores fueron los siguientes:

- Ajustados a los objetivos, y diversos dentro de cada temática para entender de forma integral cada temática.
- Sencillos de calcular y con variables que dependían de fuentes primarias de fácil obtención y en abierto en cualquier territorio.
- Potencialmente analizados desde los tres componentes de la infraestructura verde: nodos, corredores y espacios de amortiguación.
- No solo físico-espaciales, sino en su papel relacional con las personas.

De forma conjunta, los indicadores de los tres ámbitos permitieron tener una metodología de diagnóstico integral de la infraestructura verde desde la salud. Esta selección se recopila en la Tabla 1 y es el núcleo principal de los resultados de este artículo.

- Healthy City: (i) evaluation of the walkability for people; (ii) analysis of the accessibility of green areas in proximity; and (iii) diagnosis of spaces of intergenerational coexistence.

We started by searching for keywords such as 'green infrastructure', 'blue infrastructure' or 'health' and each of the areas of analysis: 'ecosystem services', 'climate change' and 'healthy city'. Since the objective was to find applicable indicators of interest, then we expanded the scope to include literature on related topics that emerged from the initial selection.

Selection of indicators for the assessment of green infrastructure from a health perspective. (Phase 2)

Between one and three indicators were selected for each sub-scope that, systematically, enabled the development of a diagnosis for each area. The criteria for selecting the indicators were as follows:

- Adjusted to the goals, diverse within each topic to understand each topic comprehensively.
- Simple to calculate and with variables that depend on primary sources that are easy to obtain and open in any territory.
- Potential analysis from the three components of the green infrastructure: nodes, corridors and buffer spaces.
- Not only physical-spatial, but also their relationship with people.

Together, the indicators for the three areas allowed for a methodology of integral diagnosis of green infrastructure from the perspective of health. This selection is compiled in Table 1 which represents the main core of the results of the study.

Clasificación de los indicadores en función a su papel en relación a los componentes de la infraestructura verde. (Fase 3)

Los indicadores se clasificaron según si su análisis permite evaluar y diagnosticar los nodos, los corredores y/o las áreas de amortiguación. Se recurrió a su clasificación en un gradiente de 0 a 3 en el que 0 es que no aporta, 1 aporta poco, 2 aporta y 3 para clasificarlo como indicador clave. Esto permitió identificar su potencial papel transformador en el ámbito de la salud y calidad de vida de la población. Esta clasificación se incluye en la Tabla 1.

RESULTADOS

Tras el análisis de sistematización y selección de indicadores en torno a las tres grandes áreas (servicios ecosistémicos, adaptación-mitigación al cambio climático y salud) estos se recopilan en la Tabla 1 y se justifican los indicadores y su aportación a la evaluación de cada uno de los ámbitos seleccionados por áreas.

A la vista de la tabla, se seleccionan los indicadores determinantes del objetivo de la investigación que son 12, y se describen a continuación.

Indicadores propuestos de evaluación de servicios ecosistémicos

Indicadores A1: Evaluación de la potencialidad de los servicios ecosistémicos de un territorio

En el primer caso, en el ámbito del abastecimiento del territorio, la superficie de suelo fértil por habitante (ha/hab)[34] permite vincular capacidad ecológica y presión demográfica, y tiene un impacto indirecto en la salud humana al influir en la seguridad alimentaria.

En lo que respecta a la regulación, se ha considerado la superficie permeable (%) como indicador de medida que evalúa la regulación hídrica y climática permitiendo identificar zonas con mayor capacidad de infiltrar

Classification of indicators according to their role in relation to green infrastructure components. (Phase 3)

The indicators were classified according to whether their analysis allowed the evaluation and diagnosis of nodes, corridors and/or buffer areas. Classification was used in a gradient of 0 to 3 in which 0 did not contribute, 1 contributed little, 2 medium contribution and 3 was used to classify as a key indicator. This allowed the identification of a potential transformative role in the area of health and quality of life of the population. This classification is included in Table 1.

RESULTS

After the analysis of the systematisation and the selection of indicators related to three main areas (ecosystem services, adaptation-mitigation to climate change and health): These results? are compiled in Table 1 and include a justification of their contribution to each areas are.

With respect to the table above, twelve indicators determining the goals of the research were selected and are described below.

Proposed indicators for the evaluation of ecosystem services

A1 indicators: assessment of the potential of ecosystem services of a territory

In the first case, the land supply, the farmland per inhabitant (ha/inhab)[34] links ecological capacity and population pressure, and impacts indirectly on human health by influencing food security.

Regarding regulation, permeable surface (%) has been considered as a measurable indicator that evaluates water and climate regulation. It identifies areas with greater capacity to water infiltration, regulate runoffs and mitigation of

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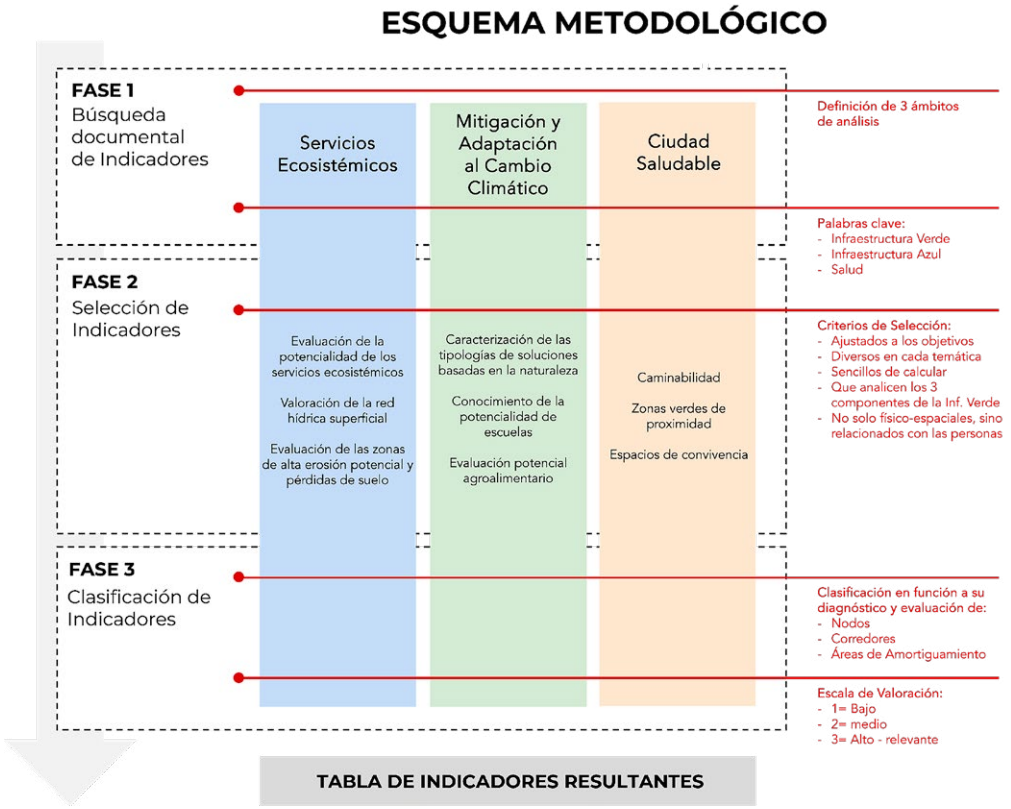

Figura 1. Diagrama metodológico. Elaboración propia 2025.

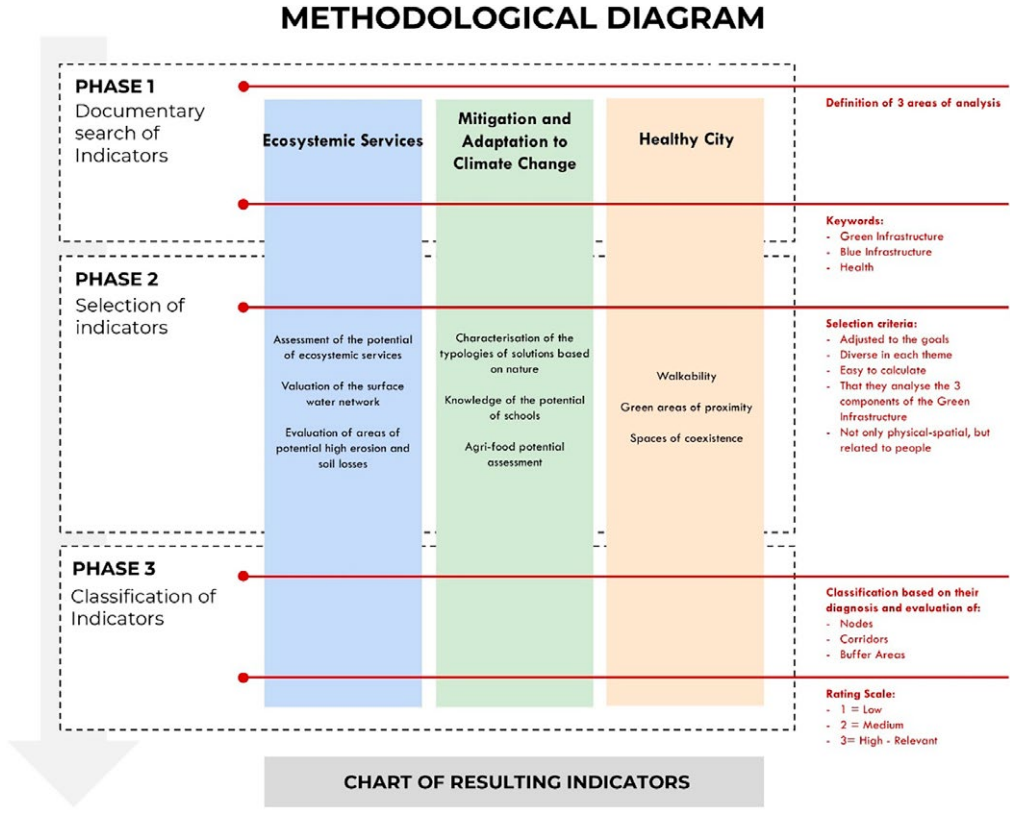

Figure 1. Methodological diagram. The Authors' own work 2025.

Tabla 1. Resumen de indicadores. Elaboración propia 2025.

ÁREAS		OBJETIVO	REQUISITO	INDICADOR (UNIDAD DE MEDIDA)	REFERENCIAS	COMPONENTES IVA			ESCALA		
						NODOS	CORRE DORES	ZONA AMORT	SUPRA MUNIC	MUNIC	LOCAL
SERVICIOS ECOSISTÉMICOS	A1	Evaluación de la potencialidad servicios ecosistémicos	Abastecimiento	Superficie de suelo fértil per cápita (ha/ habitante).	(Ferreria et al., 2022); (MITECO, 2021)	2		3	SÍ	SÍ	
			Regulación	Superficie permeable (%)	(Ramos y Hurtado, 2021)	3	2	3	SÍ	SÍ	
				Temperatura media reducida por cobertura verde (°C)	(Mao et al., 2020)	3		2		SÍ	SÍ
			Cultural	Superficie de espacio verde por habitante (m^2/hab)	(Santiago-Ramos et al., 2022); (Pouya et al., 2022)	3		3			SÍ
				Bienes de Interés Cultural per cápita (número de sitios patrimoniales por habitante).	(de Maya-Matallana et al., 2025)	3		3			SÍ
				Valor psicológico, estético y social del paisaje	(Krsnik et al., 2024)	3		2	SÍ	SÍ	SÍ
	A2	Valoración de la red hídrica superficial	Estrés hídrico	Índice de Explotación del Agua (WEI^+)	(Casadei et al., 2020)			3	SÍ	SÍ	
				Meses de estrés hídrico	(Farizo et al., 2024)			3	SÍ	SÍ	
			Inundaciones	Superficie inundable (%)	(Cánovas-García et al., 2024); (Faccini et al., 2021)	3		3	SÍ	SÍ	
				Exposición poblacional a inundaciones (%)	(Olcina et al., 2025); (Papagiannaki et al., 2025)			3			SÍ
			Permeabilidad	Superficie impermeabilizada (%)	(Ranta et al., 2021)	3	3	3			SÍ
				Índice de permeabilidad del suelo (%)	(Nickayin et al., 2021)	2	3	3		SÍ	SÍ
			Alteración Antrópica	Metros lineales de cauce entubado por habitante	(Zerega et al., 2021); (Faccini et al., 2021)		3	2		SÍ	SÍ
				Densidad de presas o azudes (nº/km río)	(Jumani et al., 2022)		3		SÍ		
	A3	Evaluación zonas alta erosión potencial y pérdidas de suelo	Erosión potencial del suelo	Tasa de pérdida de suelo (t/ha/año)	(Nieto et al (2024)	2		3	SÍ	SÍ	
				Tierras en riesgo alto de desertificación (porcentaje del territorio).	(Ferreira et al., 2022)	3	3	3	SÍ	SÍ	
			Pérdida de suelo productivo y fértil	Pérdida de superficie agrícola (ha/año)	(Milazzo et al., 2022)	2		3	SÍ	SÍ	
				Pérdida de superficie ganadera (ha/año)	(Panagopoulos et al., 2019)	2		3	SÍ	SÍ	
				Pérdida de superficie forestal (ha/año)	(Corbelle-Rico et al., 2024); (Wang et al., 2023); (Stefanidis et al., 2022)	2		3	SÍ	SÍ	
					TOTALES (max 60)	**36**	**17**	**51**	**12**	**14**	**8**

ÁREAS		OBJETIVO	REQUISITO	INDICADOR (UNIDAD DE MEDIDA)	REFERENCIAS	COMPONENTES IVA			ESCALA		
						NODOS	CORRE DORES	ZONA AMORT	SUPRA MUNIC	MUNIC	LOCAL
MITIGACIÓN-ADAPTACIÓN CAMBIO CLIMÁTICO	B1	Caracterizar soluciones basadas naturaleza	Escala espacial	Cuenca hidrográfica	(World Bank, 2021)	2	3	3	SÍ	SÍ	
				Ciudad	(World Bank, 2021)	3	3	2		SÍ	SÍ
				Barrio	(World Bank, 2021)	3	2	1			SÍ
	B2	Conocer la potencialidad escuelas	Patio Escolar	Superficie de patio escolar total (m2)	(García-Serrano, et al., 2016)	3	2	3			SÍ
				Número de alumnos	(García-Serrano, et al., 2016)	1	3	1			SÍ
			Superficie de Potencial Uso Familiar (SPUF)	Radio de influencia (200m) para determinar espacios de proximidad relacionados con el SPUF	(García-Serrano, et al., 2016)	3	3	3		SÍ	SÍ
	B3	Construir una red social agroalimentaria	Agrosistema	Agricultura urbana existente y potencial	(Lucertini y di Giustino (2021)		2	3		SÍ	SÍ
				Suelo agrario protegido (%)	(Callau et al., 2022); (Simón, 2023)		2	3		SÍ	SÍ
				Tendencia de pérdida de suelo agrícola	(Callau et al., 2022)		2	3		SÍ	SÍ
				Dotación alimentaria o el suelo necesario para abastecer a una persona durante un año	(Schreiber, 2021); (Callau et al., 2022)	3	2	3	SÍ	SÍ	SÍ
				Autosuficiencia alimentaria o % de población que puede abastecerse con el suelo agrario disponible y una dieta determinada	(Godenau et al., 2020); (Li et al., 2021); (Callau et al., 2022)	3	2	3		SÍ	SÍ
			Producción	Empresas agrícolas	(Callau et al., 2022)	3	2	3		SÍ	SÍ
				Producción ecológica	(Callau et al., 2022)	3	2	3	SÍ	SÍ	SÍ
					TOTALES (max 39)	**27**	**30**	**34**	**3**	**10**	**12**

Tabla 1, continúa en la página siguiente.

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Table 1. Resumen de indicadores. Elaboración propia 2025.

AREAS		GOAL	REQUIREMENT	INDICATOR (UNIT OF MEASUREMENT)	REFERENCES	GBI COMPONENTS			SCALE		
						NODES	CORRIDORS	BUFFER AREA	SUPRA MUNIC	MUNIC	LOCAL
ECOSYSTEMIC SERVICES	A1	Assessment of the potential of ecosystemic services	Supply	Farmland per capita (ha/ inhabitant).	(Ferreria et al., 2022); (MITECO, 2021)	2		3	YES	YES	
			Regulations	Permeable surface (%)	(Ramos y Hurtado, 2021)	3	2	3	YES	YES	
				Average temperature reduced by green cover (°C)	(Mao et al., 2020)	3		2		YES	YES
			Cultural	Green space area per inhabitant (m2 / inhab)	(Santiago-Ramos et al., 2022); (Pouya et al., 2022)	3		3			YES
				Goods of cultural Interest per capita (number of heritage sites per inhabitant).	(de Maya-Matallana et al., 2025)	3		3			YES
				Psychological, aesthetic and social value of the landscape	(Krsnik et al., 2024)	3		2	YES	YES	YES
	A2	Valuation of the surface water network	Water stress	Water exploitation index (WEI+)	(Casadei et al., 2020)			3	YES	YES	
				Months of water stress	(Farizo et al., 2024)			3	YES	YES	
			Floods	Flooding surface (%)	(Cánovas-García et al., 2024); (Faccini et al., 2021)	3		3	YES	YES	
				Population exposure to floods (%)	(Olcina et al., 2025); (Papagiannaki et al., 2025)			3			YES
			Permeability	Waterproof surface (%)	(Ranta et al., 2021)	3	3	3			YES
				Soil Permeability Index (%)	(Nickayin et al., 2021)	2	3	3		YES	YES
			Anthropogenic alteration	Linear metres of river piping per inhabitant	(Zerega et al., 2021); (Faccini et al., 2021)		3	2		YES	YES
				Density of dams or diversion dams (no./river km)	(Jumani et al., 2022)		3		YES		
	A3	Evaluation of areas of potential high erosion and soil losses	Potential soil erosion	Soil loss rate (t/ha/year)	(Nieto et al (2024)	2		3	YES	YES	
				Land at high risk of desertification (percentage of territory).	(Ferreira et al., 2022)	3	3	3	YES	YES	
			Loss of productive and fertile soil	Loss of agricultural area (ha/year)	(Milazzo et al., 2022)	2		3	YES	YES	
				Loss of livestock area (ha/year)	(Panagopoulos et al., 2019)	2		3	YES	YES	
				Loss of forest area (ha/year)	(Corbelle-Rico et al., 2024); (Wang et al., 2023); (Stefanidis et al., 2022)	2		3	YES	YES	
					TOTAL (max 60)	**36**	**17**	**51**	**12**	**14**	**8**

AREAS		GOAL	REQUIREMENT	INDICATOR (UNIT OF MEASUREMENT)	REFERENCES	GBI COMPONENTS			SCALE		
						NODES	CORRIDORS	BUFFER AREA	SUPRA MUNIC	MUNIC	LOCAL
MITIGATION-ADAPTATION TO CLIMATE CHANGE	B1	Characterising solutions based on nature	Spatial scale	Water basin	(World Bank, 2021)	2	3	3	YES	YES	
				City	(World Bank, 2021)	3	3	2		YES	YES
				Neighbourhood	(World Bank, 2021)	3	2	1			YES
	B2	Knowledge of the potential of schools	School Playground	Total school playground area (m²)	(García-Serrano, et al., 2016)	3	2	3			YES
				Number of pupils	(García-Serrano, et al., 2016)	1	3	1			YES
			Area of potential family use (SPUF)	Influence radius (200m) to determine proximity spaces related to SPUF	(García-Serrano, et al., 2016)	3	3	3		YES	YES
	B3	Building an agro-food social network	Agrosystem	Existing and potential urban agriculture	(Lucertini y di Giustino, 2021)		2	3		YES	YES
				Protected farmland (%)	(Callau et al., 2022); (Simón, 2023)		2	3		YES	YES
				Trend of loss of farmland	(Callau et al., 2022)		2	3		YES	YES
				Food supply or farmland needed to supply a person for one year	(Schreiber, 2021); (Callau et al., 2022)	3	2	3	YES	YES	YES
				Food self-sufficiency or % of the population that can be supplied with the available farmlandl and a given diet	(Godenau et al., 2020); (Li et al., 2021) (Callau et al., 2022)	3	2	3		YES	YES
			Production	Agricultural enterprises	(Callau et al., 2022)	3	2	3		YES	YES
				Organic production	(Callau et al., 2022)	3	2	3	YES	YES	YES
					TOTAL (max 39)	**27**	**30**	**34**	**3**	**10**	**12**

Table 1, continued on next page.

Tabla 1, continúa de la página anterior.

ÁREAS		OBJETIVO	REQUISITO	INDICADOR (UNIDAD DE MEDIDA)	REFERENCIAS	COMPONENTES IVA			ESCALA		
						NODOS	CORREDORES	ZONA AMORT	SUPRA MUNIC	MUNIC	LOCAL
CIUDAD SALUDABLE	C1	Caminabilidad	Diseño urbano	Limitación de las barreras arquitectónicas	(D'Onofrio y Trusiani, 2022)	3	3	3			SÍ
				Existencia de espacios peatonales	(D'Onofrio y Trusiani, 2022)		2				SÍ
				Existencia de zonas ciclistas de proximidad	(D'Onofrio y Trusiani, 2022)		2				SÍ
			Proximidad a servicios	Existencia de actividades comerciales y servicios	(D'Onofrio y Trusiani, 2022)	3	3	1			SÍ
			Accesibiidad	Utilización de vehículos motorizados	(D'Onofrio y Trusiani, 2022)	3	3	1			SÍ
				Anchos de aceras que generen espacios de comodidad	(Baobeid et al., 2021)	2	3	1			SÍ
			Seguridad	Velocidades de los vehículos motorizados	(Baobeid et al., (2021)	3	3	2			SÍ
				Existencia de temporizadores de señales de cuenta atras en cruces	(Imam et al., 2019)		2				SÍ
			Calidad	Número de árboles por kilómetro lineal	(Imam et al., 2019)		3	2		SÍ	SÍ
				Cobertura de sombra en acera (árboles caducos, pérgolas...)	(Imam et al., 2019)	3	3	3			SÍ
				Condiciones de mantenimiento de limpiezadel espacio público	(Baobeid et al., (2021)	3	3	3			SÍ
				Comfort térmico exterior	(Baobeid et al., (2021)	2	2	2		SÍ	SÍ
	C2	Zonas verdes de proximidad	Cantidad / proporción de espacio verde	Proporción de espacio verde por habitante (m2/hab)	(Psara et al., 2023); (Andersson et al., 2019)	3		3		SÍ	SÍ
				Superfície de verde urbano	(González et al., 2024); (Polo-Martín et al., 2025)	3	2		SÍ	SÍ	SÍ
				Número de árboles o dosel vegetal	(González et al., 2024)		2		SÍ	SÍ	SÍ
				Porcentaje de cobertura verde dentro de un radio determinado (ej., 500 m, 1 km).	(Dennis et al., 2020)			2		SÍ	SÍ
				Presencia y cantidad de parques, plazas, jardines o áreas naturales urbanas.	(Dennis et al., 2020)	3	2	1		SÍ	SÍ
			Accessibilidad	Espacios verdes (mínimo 2 ha.) disponibles en relación al % de población a una distancia caminable de max 300m.	(Psara et al., 2023); (Andersson et al., 2019); (González et al., 2024); (Dennis et al., 2020)	3	3				SÍ
				Existencia de pasos peatonales	(Beltrán et al., 2025)		2				SÍ
				Existencia de rampas	(Beltrán et al., 2025)		2				SÍ
				Percepción de accesibilidad	(Dennis et al., 2020)	3	2	2		SÍ	SÍ
				Diferencias en el acceso a espacios verdes entre barrios de distinto nivel socioeconómico.	(Polo-Martín et al., 2025)	3	2	2		SÍ	SÍ
				Frecuencia de visitas a espacios verdes	(Polo-Martín et al., 2025); (Andersson et al., 2019)	2	2	2		SÍ	SÍ
			Seguridad	Existencia de alumbrado público	(Beltrán et al., 2025)		3				SÍ
				Seguridad percibida	(Dennis et al., 2020)	3	3			SÍ	SÍ
				Índices de criminalidad	(Andersson et al., 2019)	2	2				SÍ
				Tiempo promedio de permanencia	(Andersson et al., 2019)	3	2				SÍ
			Calidad	Niveles de calidad del aire	(Andersson et al., 2019); (González et al., 2024); (Polo-Martín et al., 2025)	3	3	3		SÍ	SÍ
				Calidad de vida relacionada con la salud (HRQOL), medida mediante cuestionarios estandarizados.	(Dennis et al., 2020)	3	3	1		SÍ	SÍ
				Niveles de actividad física vinculados al uso de espacios verdes.	(Dennis et al., 2020); (Andersson et al., 2019)	3	3	2		SÍ	SÍ
				Mediciones de temperatura superficial y ambiental en áreas verdes vs. áreas construidas.	(Andersson et al., 2019)	3	2	2		SÍ	SÍ
			Mobiliario urbano	Presencia de infraestructura (bancos, juegos, iluminación, baños).	(Menna et al., 2019); (Andersson et al., 2019)	3	2	1		SÍ	SÍ
			Mantenimiento	Valoración de la limpieza y mantenimiento de los espacios	(Dennis et al., 2020); (Andersson et al., 2019)	3	3	1			SÍ
				Número de voluntarios o programas de co-gestión.	(Andersson et al., 2019)	3	2	2	SÍ	SÍ	SÍ
			Biodiversidad de especies	Número de especies vegetales y animales registradas en los espacios verdes	(Andersson et al., 2019)	3	3	3	SÍ	SÍ	SÍ

Tabla 1, continúa en la página siguiente.

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Table 1, continued from previous page.

AREAS		GOAL	REQUIREMENT	INDICATOR (UNIT OF MEASUREMENT)	REFERENCES	GBI COMPONENTS			SCALE		
						NODES	CORRIDORS	BUFFER AREA	SUPRA MUNIC	MUNIC	LOCAL
HEALTHY CITY	C1	Walkability	Urban design	Limitation of architectural barriers	(D'Onofrio and Trusiani, 2022)	3	3	3			YES
				Existence of pedestrian spaces	(D'Onofrio and Trusiani, 2022)		2				YES
				Existence of cycling areas of proximity	(D'Onofrio and Trusiani, 2022)		2				YES
			Proximity to services	Existence of commercial activities and services	(D'Onofrio and Trusiani, 2022)	3	3	1			YES
			Accessibility	Use of motor vehicles	(D'Onofrio and Trusiani, 2022)	3	3	1			YES
				Widths of sidewalks that generate spaces of comfort	(Baobeid et al., 2021)	2	3	1			YES
			Security	Speeds of motor vehicles	(Baobeid et al., (2021)	3	3	2			YES
				Existence of countdown signal timers at intersections	(Imam et al., 2019)		2				YES
			Quality	Number of trees per linear kilometre	(Imam et al., 2019)		3	2		YES	YES
				Shade cover on the sidewalk (deciduous trees, pergolas...)	(Imam et al., 2019)	3	3	3			YES
				Conditions of cleaning maintenance of public space	(Baobeid et al., (2021)	3	3	3			YES
				Thermal comfort exterior	(Baobeid et al., (2021)	2	2	2		YES	YES
	C2	Green areas of proximity	Quantity / proportion of green space	Proportion of green space per inhabitant (m2/ inhab)	(Psara et al., 2023); (Andersson et al., 2019)	3		3		YES	YES
				Surface of urban green	(González et al., 2024); (Polo-Martín et al., 2025)	3	2		YES	YES	YES
				Number of trees or vegetable canopy	(González et al., 2024)		2		YES	YES	YES
				Percentage of green coverage within a given radius (e.g., 500 m, 1 km).	(Dennis et al., 2020)			2		YES	YES
				Presence and quantity of parks, squares, gardens or urban natural areas.	(Dennis et al., 2020)	3	2	1		YES	YES
			Accessibility	Green spaces (minimum 2 ha.) available in relation to the % of population at a walking distance of maximum of 300m.	(Psara et al., 2023); (Andersson et al., 2019); (González et al., 2024); (Dennis et al., 2020)	3	3				YES
				Existence of pedestrian crossings	(Beltrán et al., 2025)		2				YES
				Existence of ramps	(Beltrán et al., 2025)		2				YES
				Perception of accessibility	(Dennis et al., 2020)	3	2	2		YES	YES
				Differences in access to green spaces between neighbourhoods of different socioeconomic level.	(Polo-Martín et al., 2025)	3	2	2		YES	YES
				Frequency of visits to green spaces	(Polo-Martín et al., 2025); (Andersson et al., 2019)	2	2	2		YES	YES
			Security	Existence of public lighting	(Beltrán et al., 2025)		3				YES
				Perceived security	(Dennis et al., 2020)	3	3			YES	YES
				Crime rates	(Andersson et al., 2019)	2	2				YES
				Average length of stay	(Andersson et al., 2019)	3	2				YES
			Quality	Air quality levels	(Andersson et al., 2019); (González et al., 2024); (Polo-Martín et al., 2025)	3	3	3		YES	YES
				Health-related quality of life (HRQOL), measured by standardised questionnaires.	(Dennis et al., 2020)	3	3	1		YES	YES
				Levels of physical activity linked to the use of green spaces.	(Dennis et al., 2020); (Andersson et al., 2019)	3	3	2		YES	YES
				Surface and environmental temperature measurements in green areas vs. built areas.	(Andersson et al., 2019)	3	2	2		YES	YES
			Urban furniture	Presence of infrastructure (benches, games, lighting, bathrooms).	(Menna et al., 2019); (Andersson et al., 2019)	3	2	1		YES	YES
			Maintenance	Evaluation of the cleanliness and maintenance of the spaces	(Dennis et al., 2020); (Andersson et al., 2019)	3	3	1			YES
				Number of volunteers or co-management programs.	(Andersson et al., 2019)	3	2	2	YES	YES	YES
			Biodiversity of species	Number of plant and animal species recorded in green spaces	(Andersson et al., 2019)	3	3	3	YES	YES	YES

Table 1, continued on next page.

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Tabla 1, continúa de la página anterior.

CIUDAD SALUDABLE	C3	Espacios convivencia	Mobiliario urbano	Existencia de juegos infantiles	(Higueras et al., 2020); (Orsetti, et al., 2022)	2					SÍ
				Existencia de Bancas, zonas de descanso	(Higueras et al., 2020); (Orsetti, et al., 2022)	3	2				SÍ
				Existencia de baños públicos	(Higueras et al., 2020); (Orsetti, et al., 2022)	3					SÍ
				Existencia de zonas de ejercicios para mayores	(Higueras et al., 2020); (Orsetti, et al., 2022)	2					SÍ
			Proximidad y conectividad	Distancia caminable a la vivienda (100m, 300, 500 o 1000m)	(Higueras et al., 2020); (Pozo Menéndez, 2022); (Georgiou, et al., 2021); (Nelischer y Loukaitou-Sideris, 2023); (Ghel Institute, nd)	3				SÍ	SÍ
			Accesibilidad universal / diseño para todos	Pendientes adecuadas (menor a 10%)	(Higueras et al., 2020); (Orsetti, et al., 2022) (Pozo Menéndez, 2022)	3	3			SÍ	SÍ
				Rampas	(Ghel Institute, s.f.)	3	3				SÍ
				Sin barreras arquitectónicas	(Ghel Institute, s.f.)	3	3	3			SÍ
			Diversidad de usos	Complejidad, densidad de usos	(Higueras et al., 2020); (Orsetti, et al., 2022) (Ghel Institute, s.f.)	3	3	1		SÍ	SÍ
			Densidad suficiente y complejidad sociodemográfica	Densidad de personas por edad, nivel socioeconómico, género, etc	(Higueras et al., 2020); (Orsetti, et al., 2022); (Ghel Institute, s.f.)	2	2	1		SÍ	SÍ
			Participación de la comunidad	Existencia de redes sociales comunitarias	(Higueras et al., 2020); (Ghel Institute, s.f.)	3			SÍ	SÍ	SÍ
				Existencia de procesos de participación ciudadana	(Ghel Institute, s.f.)	3			SÍ	SÍ	SÍ
				Existencia de apoyo y activos comunitarios	(Ghel Institute, s.f.)	3			SÍ	SÍ	SÍ
			Seguridad	Seguridad autopercibida	(Higueras et al., 2020); (Orsetti, et al., 2022); (Ghel Institute, s.f.)	3	2	2			SÍ
				Seguridad objetiva	(Higueras et al., 2020); (Orsetti, et al., 2022); (Ghel Institute, s.f.)	3					SÍ
				Iluminación	(Ghel Institute, s.f.)	3	2	1			SÍ
			Calidad y mantenimiento	Nivel de mantenimiento	(Ghel Institute, s.f.)	3	3	1			SÍ
			Políticas	Existencia de políticas y planificación como Ciudades Amigables con los mayores y/o con la infancia	(Nelischer y Loukaitou-Sideris, 2023)	3	2	2		SÍ	SÍ
			Calidad de vida	Percepción de bienestar	(Nelischer y Loukaitou-Sideris, 2023)	3	3	2			SÍ
				Percepción de satisfacción	(Nelischer y Loukaitou-Sideris, 2023)	3	3	2			SÍ
				Salud auto percibida	(Nelischer y Loukaitou-Sideris, 2023)	3	3	3		SÍ	SÍ
					TOTALES (max 168)	**134**	**116**	**63**	**7**	**27**	**56**

agua, regular escorrentías y mitigar el efecto isla de calor, todos ellos factores estrechamente vinculados al bienestar físico y mental de la población.[35]

Por último, medir los Bienes de Interés Cultural per cápita (BIC/hab), ha demostrado estar relacionado con mayores niveles de satisfacción vital, bienestar mental y cohesión social,[36] refleja la disponibilidad patrimonial individual en el territorio.

the heat island effect, all of which are closely linked to the physical and mental well-being of the population.[35]

Finally, measuring the assets of cultural interest per capita (BIC/inhab), has shown to be related to higher levels of life satisfaction, mental well-being and social cohesion,[36] and reflects the availability of individual assets in the territory.

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Table 1, continued from previous page.

HEALTHY CITY	**C3**	**Spaces of coexistence**	Urban furniture	Existence of children's games	(Higueras et al., 2020); (Orsetti, et al., 2022)	2					YES
				Existence of benches, rest areas	(Higueras et al., 2020); (Orsetti, et al., 2022)	3	2				YES
				Existence of public bathrooms	(Higueras et al., 2020); (Orsetti, et al., 2022)	3					YES
				Existence of exercise areas for older adults	(Higueras et al., 2020); (Orsetti, et al., 2022)	2					YES
			Proximity and connectivity	Walking distance to housing (100, 300, 500 or 1000 metres)	Higeras et al., 2020); (Pozo Menéndez, 2022); (Georgiou, et al., 2021); (Nelischer and Loukaitou-Sideris, 2023); (Ghel Instittute, nd)	3				YES	YES
			Universal accessibility / design for everyone	Adequate slopes (less than 10%)	Higueras et al., 2020); (Orsetti, et al., 2022) (Ghel Instittute, 2022))	3	3			YES	YES
				Ramps	(Ghel Instittute, s.f.)	3	3				YES
				No architectural barriers	(Ghel Instittute, s.f.)	3	3	3			YES
			Diversity of uses	Complexity, density of uses	(Higueras et al., 2020); (Orsetti, et al., 2022) (Ghel Instittute, s.f.)	3	3	1		YES	YES
			Sufficient density and complexity sociodemographic	Density of people by age, socioeconomic level, gender, etc.	(Higueras et al., 2020); (Orsetti, et al., 2022); (Ghel Instittute, s.f.)	2	2	1		YES	YES
			Community participation	Existence of community social networks	(Higueras et al., 2020); (Ghel Instittute, s.f.)	3			YES	YES	YES
				Existence of citizen participation processes	(Ghel Instittute, s.f.)	3			YES	YES	YES
				Existence of community support and assets	(Ghel Instittute, s.f.)	3			YES	YES	YES
			Security	Self-perceived security	(Higueras et al., 2020); (Orsetti, et al., 2022) (Ghel Instittute, s.f.)	3	2	2			YES
				Objective safety	(Higueras et al., 2020); (Orsetti, et al., 2022) (Ghel Instittute, s.f.)	3					YES
				Lighting	(Ghel Instittute, s.f.)	3	2	1			YES
			Quality and maintenance	Level of maintenance	(Ghel Instittute, s.f.)	3	3	1			YES
			Policies	Existence of policies and planning as cities that are friendly to the elderly and/or children	Nelischer and Loukaitou-Sideris, 2023)	3	2	2		YES	YES
			Quality of life	Perception of well-being	Nelischer and Loukaitou-Sideris, 2023)	3	3	2			YES
				Perception of satisfaction	Nelischer and Loukaitou-Sideris, 2023)	3	3	2			YES
				Self-perceived health	Nelischer and Loukaitou-Sideris, 2023)	3	3	3		YES	YES
					TOTAL (max 168)	**134**	**116**	**63**	**7**	**27**	**56**

Indicadores A2: Valoración de la red hídrica superficial

Por lo que respecta al estrés hídrico, se ha optado por la cuantificación de los meses de estrés hídrico en un año (nº meses/12), ya que tienen un impacto indirecto en la salud pública, al comprometer la producción agrícola, la calidad del aire, y el confort térmico urbano. Estos representan períodos en que la disponibilidad

A2 indicators: valuation of the surface water network

With regard to water stress, we have chosen to quantify the months of water stress in a year (no. months/12), since they have an indirect impact on public health, by compromising agricultural production, air quality and urban thermal comfort. These represent periods when

de agua es limitada para la vegetación y los usos humanos, afectando la provisión de agua dulce y la productividad primaria.[37]

En lo que respecta a la exposición a riesgos fluviales, la superficie inundable (%) permite evaluar la capacidad del territorio para integrar soluciones basadas en la naturaleza como parte de una infraestructura verde-azul regional más equilibrada.[38]

Por último, los metros lineales de cauce entubado por habitante (ml/hab), son un indicador que revela el grado de ruptura de la conectividad ecológica de la red hidrográfica, además, impide que estos corredores funcionen como elementos activos de la infraestructura verde-azul, y puede agravar inundaciones aguas abajo.[39]

Indicadores A3: Evaluación de las zonas de alta erosión potencial y pérdidas de suelo

Se escogen los indicadores de pérdida de superficie agrícola anual (m^2/año),[40] pérdida de superficie ganadera anual (m^2/año)[41] y pérdida de superficie forestal anual (ha/año).[42]

En el primer caso, su pérdida constituye una amenaza directa a la seguridad alimentaria, la economía rural y el equilibrio ecosistémico, pero permite cuantificar la pérdida anual o acumulada (en m^2 o ha) permite identificar zonas críticas, priorizar su protección y orientar estrategias de planificación integradas.

En el segundo, su pérdida implica la desaparición de ecosistemas únicos y prácticas sostenibles ligadas al territorio. La medición en m^2 o ha perdidos por año permite diagnosticar tendencias de transformación o abandono y diseñar planes específicos de recuperación o manejo adaptativo.

En el último, su pérdida acelera procesos de degradación ambiental y altera los microclimas locales, afectando al acceso a espacios recreativos y restaurativos naturales esenciales para la salud mental.[43]

water availability is limited for vegetation and human usage, affecting freshwater supply and primary productivity.[37]

In terms of exposure to river risks, the flood hazard area (%) allows assessing the capacity of the territory to integrate nature-based solutions as part of a more balanced regional green-blue infrastructure.[38]

Finally, the linear metres of river piping per inhabitant (ml/inhab), are an indicator that reveals the degree of breakdown of the ecological connectivity of the hydrographic network. In addition, to preventing these corridors from functioning as active elements of the green-blue infrastructure, and possibly aggravating downstream flooding.[39]

A3 indicators: evaluation of areas of potential high erosion and soil losses

The indicators chosen were the annual loss of farmland m^2/year),[40] livestock land (m^2/year)[41] and forested land (ha/year).[42]

In the first case, the loss of farmland constitutes a direct threat to food security, the rural economy and the ecosystem balance, but it allows quantification of the annual or cumulative loss (in m^2 or ha) to identify critical areas, prioritise their protection and guide integrated planning strategies.

In the second case, the loss of farmland implies the disappearance of unique ecosystems and sustainable practices linked to the territory. Measurement in m^2 or ha lost per year allows diagnosis of the transformation or abandonment trends and to design specific recovery or adaptive management plans.

So finally, the loss of forested land accelerates processes of environmental degradation and alters local microclimates, affecting access to natural recreational and restorative spaces essential for mental health.[43]

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Indicadores propuestos de evaluación de adaptación y mitigación al cambio climático

Indicadores B1: Caracterización de tipologías de Soluciones Basadas en la Naturaleza (SbN)

Para esta caracterización se toma como referencia el "Catálogo de soluciones basadas en la naturaleza para la resiliencia urbana" realizado por el World Bank.[44] Se recurre a una clasificación según escalas espaciales y geográficas: la maso escala y la meso escala. La maso escala incluye las SbN que actúan como primera barrera de protección frente a los efectos del cambio climático interceptando o disminuyendo su intensidad desde etapas tempranas lo que contribuye a reducir el riesgo y la presión en zonas urbanas (bosques, llanuras de inundación, lagos naturales y zonas agrícolas). La meso escala incluye las SbN implementadas dentro de las zonas urbanas que reciben un impacto ya atenuado o reducido del problema, presentan una amplia variedad y están influenciadas en su aplicación por diversos factores como el relieve, el clima, la hidrología, la ecología y los aspectos sociales (lagos artificiales, zonas verdes, corredores verdes, bosques urbanos, agricultura urbana, cubiertas vegetales, jardines de lluvia, ríos renaturalizados, entre las más destacadas).

Indicadores B2: Identificación de la potencialidad de las escuelas para ser refugios climáticos

Los dos tipos de indicadores seleccionados toman como base el estudio de entornos escolares saludables[45] que analiza los Centros de Educación Infantil y Primaria e Institutos como equipamientos de proximidad con alto valor comunitario y alto potencial físico para transformarse en nuevos nodos eco-sociales para el bienestar social y desde un beneficio ambiental. Los primeros miden datos cuantitativos, específicamente en lo relacionado con los aspectos físico-espaciales que aportarán información clave que condicionarán y orientarán las futuras intervenciones: (1) Superficie total del patio escolar, (2) Número de alumnos. El segundo grupo de indicadores contenidos en la Superficie de Potencial Uso Familiar (SPUF)

Proposed indicators for assessing climate change adaptation and mitigation

B1 indicators: characterisation of the typologies of Nature-based Solutions (NbS)

For this characterisation, the 'Catalog of Nature-based Solutions for Urban Resilience' made by the World Bank[44] is taken as a reference. Classification is used according to spatial and geographical scales: the microscale and the mesoscale. Taking the mesoscale as a reference, this includes the NbS that act as the first line of defence against the effects of climate change intercepting or decreasing its intensity from early stages which contributes to reducing risk and pressure in urban areas (forests, floodplains, natural lakes and agricultural areas). The mesoscale includes the NbS implemented within urban areas that receive an already attenuated or reduced impact of the problem, have multiple approaches, and are influenced in their application by various factors such as relief, climate, hydrology, ecology and social aspects (artificial lakes, green areas, green corridors, urban forests, urban agriculture, vegetation covers, rain gardens, re-naturalised rivers, among the most prominent).

B2 indicators: identification of the potential of schools to be climate shelters

The two types of indicators selected take as a basis the study of healthy school environments[45] that analyse early childhood, primary and secondary schools as nearby facilities with significant community value and considerable physical potential to transform into new eco-social nodes for social well-being and for an environmental benefit. The first measures quantitative data, specifically related to the physical and spatial aspects that will provide key information that condition and guide future interventions: (1) total area of the school yard, (2) number of students. The second group of indicators are related to Potential Family Use (SPUF, as per the acronym in Spanish) and are

están enfocados a medir el potencial de proximidad de las escuelas: (1) Radio de influencia de 200m para determinar los espacios con un potencial de uso infantil, potencial y escolar, (2) Cartografía para identificar espacios como: plazas duras, parques, zonas ajardinadas, bulevares y espacios peatonales.

Indicadores B3: Evaluación del potencial agroalimentario (% población que puede ser abastecida con el suelo agrario en base a una dieta)

Se recurren a dos tipos de indicadores. Los primeros miden datos vinculados con el suelo agrario urbano y rural, que aportarán la cuantificación del soporte de la actividad agraria productiva real y potencial: (1) porcentaje de suelo agrario que está protegido dentro del ámbito de estudio (municipio, comarca, región),[46] (2) cantidad de suelo de agricultura urbana existente en el municipio, así como el potencial en espacios de oportunidad del mismo.[47] El segundo conjunto de indicadores medirá la relación urbano-rural a través de la alimentación, aportando a la identificación de la capacidad de abastecimiento: (1) la dotación alimentaria, o el suelo agrario del que dispone cada persona en el ámbito municipal,[48] (2) la autosuficiencia alimentaria, medirá la capacidad del suelo disponible para satisfacer una dieta saludable mediterránea en un año a la población y se expresa en el porcentaje de la población que puede ser abastecida.[49] Ambos bloques de indicadores son complementarios. Los primeros dan cuenta de la estabilidad del soporte productivo agrícola y los segundos muestran su relación con la población y salud urbana.

Indicadores propuestos de evaluación de ciudades y barrios saludables

Indicadores C1: Caminabilidad

Se ha demostrado que juega un papel clave la proximidad a distintos servicios urbanos, comerciales y otras actividades que generen convivencia.[50] Asimismo, la calidad de los espacios públicos en términos de confort, limpieza[51] y accesibilidad, son los factores

focused on measuring the proximity of schools: (1) radius of influence of 200 m to determine spaces with scope for child and school use, (2) mapping to identify spaces such as: hard squares, parks, landscaped areas, boulevards and pedestrian spaces.

B3 indicators: assessment of agri-food potential (% population that can be supplied with an agriculture-based diet)

In this section? two types of indicators are used; the first measures data related to urban and rural farmland, providing the quantification of the support of real and potential productive agricultural activity: (1) percentage of farmland that is protected within the scope of study (municipality, county, region),[46] (2) quantity of urban farmland existing in the municipality, in addition to the potential in opportunity spaces.[47] The second set of indicators measures the urban-rural relationship through food, contributing to the identification of supply capacity: (1) the food supply, or farmland available to each person at the municipal level,[48] (2) food self-sufficiency, measures the capacity of the available farmland to satisfy a healthy Mediterranean diet in one year to the population and is expressed as the percentage of the population that can be supplied.[49] Both blocks of indicators are complementary. The first report on the stability of productive agricultural support and the second show their relationship with the population and urban health.

Proposed indicators for assessing healthy cities and neighbourhoods

C1 indicators: walkability

The proximity to different urban and commercial services, and to other activities that generate coexistence, has been shown to play a key role.[50] Likewise, the quality of public spaces in terms of comfort, cleanliness[51] and accessibility are

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que incentivan y determinan la utilización del espacio público como espacio de tránsito peatonal. Los indicadores propuestos para evaluar la caminabilidad son:

- Existencia de actividades comerciales y servicios a pie de calle.
- Existencia de espacios peatonales con seguridad y confort térmico (invierno-verano).
- Buenas condiciones de mantenimiento con limpieza del espacio público.

Indicadores C2: Zonas verdes de proximidad

Los factores determinantes son la accesibilidad a estos espacios en términos de distancia y tiempo[52] y la cantidad de estos espacios y su distribución proporcional a la población.[53] Además, la calidad[54] de estos espacios también es decisiva para determinar su utilización y, en consecuencia, los efectos en la salud de las personas. Por ello, los indicadores propuestos son:

- Disponibilidad de espacios verdes en relación al porcentaje de población que vive a una distancia caminable de máximo 300 metros, y considerando espacios verdes de mínimo 2 ha.
- Diferencias en el acceso a espacios verdes entre barrios de distinto nivel socioeconómico (para buscar la equidad entre unos barrios y otros).
- Niveles de actividad física vinculados al uso de espacios verdes.

Indicadores C3: Espacios de convivencia

Los estudios revelan que la calidad, la proximidad, el mobiliario, la diversidad de usos y el acceso sin barreras a los espacios verdes y azules son cruciales para el bienestar físico y mental, especialmente en entornos mediterráneos. Algunos autores[55] destacan que la interacción intergeneracional en estos espacios mejora la calidad de vida, autoestima y crecimiento personal,

factors that encourage and determine the use of public space as a pedestrian transit space. The proposed indicators to evaluate walkability are:

- Existence of commercial activities and services at street level.
- Existence of pedestrian spaces with safety and thermal comfort (winter-summer).
- Good maintenance conditions with public space cleaning.

C2 indicators: green areas of proximity

The determining factors are the accessibility to these spaces in terms of distance and time[52] and the quantity of these spaces and their proportional distribution to the population.[53] In addition, the quality of these spaces[54] is also decisive in determining their use and, consequently, the effects on human health. Therefore, the proposed indicators are:

- Availability of green spaces in relation to the percentage of population living at a walking distance of a 300 m maximum and considering green spaces of minimum 2 ha.
- Differences in access to green spaces between neighbourhoods of different socioeconomic levels (to seek equity between some neighbourhoods and others).
- Levels of physical activity linked to the use of green spaces.

C3 indicators: spaces of coexistence

Studies reveal that the quality, proximity, street furniture, diversity of uses and barrier-free access to green and blue spaces are crucial for physical and mental well-being, especially in Mediterranean environments. Some authors[55] emphasise that intergenerational interaction in these spaces improves quality of life, self-esteem and personal growth,

especialmente en personas mayores, aliviando el calor y fomentando el disfrute. Además, factores socioeconómicos como densidad poblacional, desempleo e ingresos influyen en su uso.[56] Los indicadores propuestos para evaluar espacios de convivencia intergeneracional e intercultural son:

- Espacios sin barreras arquitectónicas: accesibilidad y con diseño universal (Mapeo geoespacial y cuantificación: km de aceras de ancho mínimo, porcentaje de pendientes menores de 10%, y porcentaje de intersecciones con rampas, semáforos con señales acústicas y táctiles).

- Complejidad de usos: diversidad de usos y actividades. (desde la existencia de juegos infantiles, ejercicios para mayores, zonas de descanso, y zonas deportivas).

- Diversidad de usuarios: Densidad de personas por edad, nivel socioeconómico, género, etc. (proporción de cada grupo / unidad espacial por ejemplo proporción de niños/ barrio).

Evaluación de los componentes de la infraestructura verde y su escala

La Figura 1 clasifica, por un lado, la potencial aplicación de los indicadores a los componentes de la infraestructura verde y azul para su análisis y diagnóstico y, por otro, según su potencial escala de aplicación.

En el ámbito de los servicios ecosistémicos los indicadores aportan principalmente a la evaluación de los espacios de amortiguación, en segundo lugar, a los nodos, siendo los corredores ecológicos en este grupo los menos representados. En términos de escala, los indicadores tienen un mayor potencial de ser aplicados a escala supra y municipal, sin embargo, los resultados muestran que también tienen un importante potencial de ser aplicados a escala local.

especially in the elderly, in addition to? relieving heat and encouraging enjoyment. Socioeconomic factors such as population density, unemployment and income also influence their use.[56] The proposed indicators to evaluate spaces of intergenerational and intercultural coexistence are:

- Spaces without architectural barriers: accessibility and universal design (geospatial mapping and quantification: km of minimum width sidewalks, percentage of slopes less than 10%, and percentage of intersections with ramps, traffic lights with acoustic and tactile signals).

- Complexity of uses: diversity of uses and activities (from the existence of children's games, exercise machines for the elderly, rest areas, and sports areas).

- Diversity of users: Population density by age, socioeconomic status, gender, etc. (proportion of each group / spatial unit e.g. proportion of children/neighbourhood).

Assessment of green infrastructure components and their scale

Figure 1 classifies, the indicators by their potential application to green and blue infrastructure components for analysis and diagnosis and by their potential scale of application.

In the area of ecosystem services, the indicators contribute mainly to the evaluation of buffer spaces, secondly to the nodes, with the ecological corridors in this group being the least represented. In terms of scale, the indicators have a greater potential to be applied at the supra and municipal scale, however, the results show that they also have significant potential to be applied at the local level.

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En el ámbito de la mitigación al cambio climático, los indicadores se distribuyen de forma equilibrada entre los tres componentes de la infraestructura verde. Este bloque se caracteriza por su potencial aplicación transescalar de los indicadores, salvo en el caso de las soluciones basadas en la naturaleza que, desde el principio, se clasificaron desde una perspectiva escalar.

En el ámbito de la ciudad y el barrio saludable los indicadores se concentran en su potencial aplicación a los nodos y corredores. En cuanto a la escala, su aplicación es directamente proporcional a ésta, cuanto más pequeña, más posibilidad de aplicación. En ambos sentidos, este bloque actúa como ámbito complementario al de servicios ecosistémicos, equilibrando su aplicabilidad a componentes y escalas territoriales.

DISCUSIÓN

La evaluación integral de la metodología propuesta ha sido construida con un conjunto de indicadores cuyo enfoque se centra en la promoción de la salud de la población que habita las ciudades y los territorios. El conjunto de indicadores seleccionados apunta a que la existencia de los tres ámbitos -servicios ecosistémicos, acción climática y barrios-ciudades saludables- compensan entre sí su potencial aplicación a los tres componentes de la infraestructura verde -nodos, corredores y espacios de amortiguación-, así como a las posibles escalas de trabajo, generando una aproximación equilibrada e integrada que articula componentes socio ecológicos.

El potencial que ofrece el análisis de la infraestructura verde a diferentes escalas debe ser reseñado.[57] En primer lugar, la escala supramunicipal es el marco de referencia adecuado para la ordenación de los territorios metropolitanos y otros sistemas urbanos complejos donde ciudad y territorio se entiendan como un proyecto único y donde la dimensión ambiental y la infraestructura verde sea la protagonista y el eje vertebrador territorial.[58] Sin embargo, la planificación a esta escala es la gran deuda de la planificación autonómica

With regards to climate change mitigation, indicators are distributed in a balanced manner among the three components of green infrastructure. This set of indicators is characterised by its potential cross-scale application of indicators, except in the case of nature-based solutions that were classified from a scalar perspective from the beginning.

Considering the city and the healthy neighbourhood, indicators are concentrated on their potential application to nodes and corridors. As for the scale, its application is directly proportional to it, the smaller the indicator, the easier it is to apply. In both ways, this set of indicators acts as a complementary area to that of ecosystem services, balancing its applicability to components and territorial scales.

DISCUSSION

The comprehensive evaluation of the proposed methodology has been built with a set of indicators whose focus is on promoting the health of the population that inhabits cities and territories. These indicators indicate that the existence of the three areas - ecosystem services, climate action and healthy neighbourhoods-cities -compensate each other for their potential application to the three components of green infrastructure- nodes, corridors and buffer spaces, and for the possible work scales, generating a balanced and integrated approach that articulates socio-ecological components.

The potential offered by the analysis of green infrastructure at different scales should be reviewed. [57] First, the supra-municipal scale is the appropriate reference framework for the planning of metropolitan territories and other complex urban systems where city and territory are understood as a single project and where the environmental dimension and green infrastructure are the protagonist and the territorial backbone.[58] However, planning on this scale is the great deficiency of Spanish regional

española. Es por ello que la aplicación de esta metodología integradora a una escala supramunicipal puede sentar las bases de una futura planificación supra o municipal, sujeta a miradas integradoras bajo el foco de la infraestructura verde.

Para evitar las incoherencias entre escalas supramunicipales geográficas (comarcas, cuenca hidrográfica, unidades del paisaje) y administrativas (comunidades autónomas, provincias o municipios) es necesario trabajar de forma transescalar,[59] desde la escala del gran paisaje, hasta la escala local del emplazamiento pequeño,[60] incluyendo la escala social denominada "comunitaria".[61]

En las escalas supramunicipal y municipal es importante considerar la dualidad urbano-rural que desde la infraestructura verde se quiere estructurar y conectar, poniendo énfasis en la morfología de los paisajes tradicionales y su potencialidad para las relaciones a plantear,[62] así como en los potenciales espacios de oportunidad para la conexión con el periurbano que ofrece la estructura urbana.[63] En ese sentido, esta mirada desde la dimensión ambiental que ofrece el enfoque de la infraestructura verde en las relaciones urbano-rurales, inversa a la usual de la planificación, permite estructurar el territorio desde los nodos, corredores y espacios de amortiguación adaptándose, por un lado, a las características socio-ecológicas de los territorios y, por otro, a la realidad y escala de los espacios urbanos que formen parte del territorio. [64]

Por otra parte, en el marco español la Guía Metodológica para la identificación de los elementos de infraestructura verde de España[65] aporta una primera metodología para avanzar en el trabajo transescalar que deben acoger las Comunidades Autónomas. Sin embargo, esta guía se centra en la dimensión ecológica, de la biodiversidad y de los servicios de los ecosistemas,[66] no entrando en las dimensiones de acción climática o de promoción de la salud. Además, si bien la guía integra elementos presentes en ecosistemas terrestres, esta reconoce la necesidad de desarrollar metodologías específicas para abordar las características propias

planning. Hence, the application of this integrated methodology on a supra-municipal scale can lay the foundations for future supra or municipal planning, subject to integrated perspectives under the focus of green infrastructure.

To avoid inconsistencies between geographical supra-municipal scales (districts, watersheds, landscape units) and administrative scales (autonomous communities, provinces or municipalities) it is necessary to work with cross-scale approach,[59] from the large landscape scale , to the small site,[60] including the social scale called 'community'.[61]

On the supra-municipal and municipal scales it is important to consider the urban-rural duality that is required to structure and connect the green infrastructure, emphasising the morphology of traditional landscapes and their potential to raise relationships.[62] Additionally, there are opportunities to connect to the peri-urban that offers an urban structure.[63] In this sense, the green infrastructure approach offers an environmental view in urban-rural relations, in contrast to traditional ? planning. It allows s territorial structuring through the nodes, corridors and buffer spaces adapting, on the one hand, to the socio-ecological characteristics of the territories and, on the other, to the reality and scale of the urban spaces that are part of the territory.[64]

The Spanish framework the *Guía Metodológica para la identificación de los elementos de infraestructura verde de España* [Methodological Guide for the Identification of the Elements of Green Infrastructure of Spain][65] provides an initial methodology to advance in the cross-scale work that the Spanish Autonomous Communities must host. However, this guide focuses on the ecological dimension, biodiversity and ecosystem services,[66] not addressing the dimensions of climate action or health promotion. In addition, while the guide integrates elements present in terrestrial ecosystems, it recognises the need to develop specific methodologies to address the

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de los ecosistemas agrarios y urbanos, su potencial como proveedores de servicios ecosistémicos,[67] así como su potencial como espacios de acción climática y promoción de la salud. En este sentido, la metodología propuesta en este artículo amplía y complementa la desarrollada por el Ministerio de Transición Ecológica Española.

CONCLUSIONES

La metodología propuesta integra de forma equilibrada indicadores extraídos y seleccionados de la literatura científica de los ámbitos de los servicios ecosistémicos, acción climática y ciudades saludables para analizar y diagnosticar el territorio desde el enfoque de la infraestructura verde y desde la perspectiva de la promoción de la salud, en base a los componentes establecidos por la Estrategia Nacional de Infraestructura Verde y Conectividad y Restauración Ecológicas. Esta metodología concreta y define indicadores para los ámbitos urbanos y agrarios no descritos en las guías del ministerio que se centran en la dimensión ambiental, así como plantea su uso transescalar. Sin embargo, esta aproximación teórica requiere aún de aplicación empírica para ajustar, replantear y validar los indicadores de forma interdependiente, tanto por la adecuación a las realidades territoriales como por la adecuación conceptual.

La novedad e innovación de la propuesta se manifiesta en dos aspectos clave: (1) el enfoque integral que considera simultáneamente la infraestructura verde-azul, la mitigación y adaptación al cambio climático y la promoción de la salud, integrando estas dimensiones en una única metodología fundamentada en los componentes estratégicos de la Estrategia de Biodiversidad e infraestructura española y, (2) la posibilidad de realizar un diagnóstico espacial integrado, que abarca lo urbano, lo rural agrícola y lo rural ganadero, permitiendo una visión transescalar que articula componentes socioeconómicos complejos y diversos.

characteristics of agricultural and urban ecosystems, their potential as providers of ecosystem services,[67] and their potential as spaces for climate action and health promotion. In this sense, the methodology proposed in this article extends and complements the approach developed by the Spanish Ministry of Ecological Transition.

CONCLUSIONS

The proposed methodology integrates indicators selected from the scientific literature in the areas of ecosystem services, climate action and healthy cities in a balanced way. It enables the analysis and diagnosis of the territory through the green infrastructure approach and from the perspective of health promotion, based on the components established by the Spanish National Strategy of Green Infrastructure and Ecological Connectivity and Restoration. This methodology specifies and defines indicators for urban and agrarian areas not described in the ministry guidelines that focus on the environmental dimension, as well as its cross-scale use. However, this theoretical approach still requires empirical application to adjust, rethink and validate the indicators in an interdependent way, both for the adequacy to territorial realities and for the conceptual adequacy.

The novelty and innovation of the proposal is manifested in two key aspects: (1) the comprehensive approach that simultaneously considers green-blue infrastructure, mitigation and adaptation to climate change and health promotion, integrating these dimensions into a single methodology based on the strategic components of the Spanish Biodiversity and Infrastructure Strategy and, (2) the possibility of carrying out an integrated spatial diagnosis, covering the urban, rural agricultural and rural livestock, allowing for a cross-scale vision that articulates complex and diverse socioeconomic components.

Este marco teórico requiere una implementación práctica para modificar y autenticar los indicadores de forma interdependiente, asegurando su alineación con la realidad regional y la coherencia conceptual. La inclusión explícita de la salud como eje central representa un avance conceptual respecto a enfoques previos que se centraban en servicios ecosistémicos y acción climática. Se reconoce la necesidad de investigar el papel de las zonas protegidas como nodos o corredores, especialmente en territorios con alto valor territorial, como complemento para futuras investigaciones.

Finalmente, el foco de la salud que aporta esta metodología frente a otras previas genera un avance conceptual en el constructo del enfoque de la infraestructura verde, integrando de forma explícita la salud como eje central al que contribuyen otros conceptos ya reconocidos en la literatura internacional, como los servicios ecosistémicos y la acción climática.

This theoretical framework requires practical implementation to modify and authenticate the indicators interdependently, ensuring their alignment with regional reality and conceptual consistency. Guaranteeing their adaptation to territorial realities and conceptual coherence. The explicit inclusion of health as a central axis represents a conceptual advance from previous approaches that focused on ecosystem services and climate action. The need to investigate the role of protected areas as nodes or corridors, especially in territories with high territorial value, is recognised as a complement to future research.

Finally, the focus on health provided by this methodology compared to previous ones generates a conceptual advance in the construct of the green infrastructure approach, explicitly incorporating health as a central axis to which other concepts that are already recognized in the international literature, such as ecosystem services and climate action, contribute.

Notas y Referencias

[1] J. Fariña, et al., *Guía para Planificar Ciudades Saludables* (Madrid: Ministerio de Sanidad, FEMP, 2022)

[2] Jun Ying et al., "Green Infrastructure: Systematic Literature Review," *Economic Research–Ekonomska Istraživanja* 35, no. 1 (abril, 2021): 343–66, https://doi.org/10.1080/1331677X.2021.1893202

[3] A. Salomaa et al., "Can Green Infrastructure Help to Conserve Biodiversity?" Environment and Planning C: *Politics and Space* 35, no. 2 (mayo 2016): 265–88. https://doi.org/10.1177/0263774X16649363

[4] K. Gashu y T. Gebre-Egziabher, "Public Assessment of Green Infrastructure Benefits and Associated Influencing Factors in Two Ethiopian Cities: Bahir Dar and Hawassa," *BMC Ecology* 19 (abril, 2019): 1–15, https://doi.org/10.1186/s12898-019-0232-1; Jun Ying et al., "Green infrastructure: systematic literature review," *Economic Research-Ekonomska Istraživanja*, (abril, 2021) 343–66. https://doi.org/10.1080/1331677X.2021.1893202

[5] J. Chae y M. Cho, "Changes in the Cultural Trend of Use by Type of Green Infrastructure before and after COVID-19 Using Blog Text Mining in Seoul," *Journal of People, Plants, and Environment* 24, no. 4 (agosto, 2021): 415–27. https://doi.org/10.11628/ksppe.2021.24.4.415

[6] Xifan Chen et al., "Changes and Characteristics of Green Infrastructure Network Based on Spatio-Temporal Priority," *Land* 11, no. 6 (junio, 2022). https://doi.org/10.3390/land11060901

[7] G. Jerome, et al., "A framework for assessing the quality of green infrastructure in the built environment in the UK," *Urban Forestry & Urban Greening* 40 (abril, 2019): 174–82. https://doi.org/10.1016/j.ufug.2019.04.001

Notes and References

[1] J. Fariña et al., *Guía para Planificar Ciudades Saludables* (Ministerio de Sanidad, FEMP, 2022)

[2] Jun Ying et al., "Green Infrastructure: Systematic Literature Review," *Economic Research–Ekonomska Istraživanja* 35, no. 1 (April, 2021): 343–66, https://doi.org/10.1080/1331677X.2021.1893202

[3] A. Salomaa et al., "Can Green Infrastructure Help to Conserve Biodiversity?" Environment and Planning C: *Politics and Space* 35, no. 2 (May 2016): 265–88. https://doi.org/10.1177/0263774X16649363

[4] K. Gashu and T. Gebre-Egziabher, "Public Assessment of Green Infrastructure Benefits and Associated Influencing Factors in Two Ethiopian Cities: Bahir Dar and Hawassa," *BMC Ecology* 19 (April, 2019): 1–15, https://doi.org/10.1186/s12898-019-0232-1; Jun Ying et al., "Green infrastructure: systematic literature review," *Economic Research-Ekonomska Istraživanja*, (April, 2021) 343–66. https://doi.org/10.1080/1331677X.2021.1893202

[5] J. Chae and M. Cho, "Changes in the Cultural Trend of Use by Type of Green Infrastructure before and after COVID-19 Using Blog Text Mining in Seoul," *Journal of People, Plants, and Environment* 24, no. 4 (August, 2021): 415–27. https://doi.org/10.11628/ksppe.2021.24.4.415

[6] Xifan Chen et al., "Changes and Characteristics of Green Infrastructure Network Based on Spatio-Temporal Priority," *Land* 11, no. 6 (June, 2022). https://doi.org/10.3390/land11060901

[7] G. Jerome, et al., "A framework for assessing the quality of green infrastructure in the built environment in the UK," *Urban Forestry & Urban Greening* 40 (April, 2019): 174–82. https://doi.org/10.1016/j.ufug.2019.04.001

Zazo Moratalla, Ana, Cristina del Pozo, Ester Higueras García, María Teresa Baquero Larriva, Carola Díaz de Lope-Díaz, Hugo Canahua, Silvia Ribot Gil, and Mireia Faus Bosh. "Green and blue infrastructure as a tool for health promotion." *VLC arquitectura* 12, no. 2 (October 2025): 179-213. ISSN: 2341-3050. https://doi.org/10.4995/vlc.2025.24097

Zazo Moratalla, Ana, Cristina del Pozo, Ester Higueras García, María Teresa Baquero Larriva, Carola Díaz de Lope-Díaz, Hugo Canahua, Silvia Ribot Gil, and Mireia Faus Bosh. "Green and blue infrastructure as a tool for health promotion." *VLC arquitectura* 12, no. 2 (October 2025): 179-213. ISSN: 2341-3050. https://doi.org/10.4995/vlc.2025.24097

[8] Anna Zaręba, "Multifunctional and Multiscale Aspects of Green Infrastructure in Contemporary Research," *Problemy Ekorozwoju* 9 no. 2 (junio, 2014): 149–56.

[9] Y. Wang, "The Research of Green Infrastructure Implementation System and Stakeholders Participation Mechanism," en *ICCREM* 2017, 364–69.

[10] F.A. Hoover et al., "Why Go Green? Comparing Rationales and Planning Criteria for Green Infrastructure in US City Plans," *Landscape and Urban Planning* 237 (septiembre, 2023), https://doi.org/10.1016/j.landurbplan.2023.104781; R. Lafortezza et al., "Green Infrastructure as a Tool to Support Spatial Planning in European Urban Regions," *©iForest – Biogeosciences and Forestry* 6, no. 3 (marzo, 2013): 102-08, https://doi.org/10.3832/ifor0723-006; I.C. Mell, "Green Infrastructure: Concepts, Perceptions and Its Use in Spatial Planning" (Tesis doctoral, Newcastle University, 2010). http://hdl.handle.net/10443/914

[11] E. Gelan y Y. Girma, "Sustainable Urban Green Infrastructure Development and Management System in Rapidly Urbanized Cities of Ethiopia," *Technologies* 9, no. 3 (septiembre, 2021). https://doi.org/10.3390/technologies9030066

[12] Z. Wang, et al., "Building Green Infrastructure for Mitigating Urban Flood Risk in Beijing, China," *Urban Forestry & Urban Greening* 93, (enero, 2024). https://doi.org/10.1016/j.ufug.2024.128218

[13] S. Jones y C. Somper, "The Role of Green Infrastructure in Climate Change Adaptation in London," *The Geographical Journal* 180, no. 2 (junio, 2014): 191–96. https://doi.org/10.1111/geoj.12059; A.M. García, et al., "Spatial Planning of Green Infrastructure for Mitigation and Adaptation to Climate Change at a Regional Scale," *Sustainability* 12, no. 24 (diciembre, 2020), https://doi.org/10.3390/su122410525

[14] K. Tzoulas et al., "Promoting Ecosystem and Human Health in Urban Areas Using Green Infrastructure: A Literature Review," *Landscape and Urban Planning* 81, no. 3 (junio, 2007): 167–78, https://doi.org/10.1016/j.landurbplan.2007.02.001; C. Coutts y M. Hahn, "Green Infrastructure, Ecosystem Services, and Human Health," *International Journal of Environmental Research and Public Health* 12, no. 8 (agosto, 2015): 9768–98. https://doi.org/10.3390/ijerph120809768

[15] B. Gills y J. Morgan, "Postscript, an End to the War on Nature: COP in or COP out?" in *Economics and Climate Emergency*, 241–52 (Routledge, 2022). https://doi.org/10.1080/14747731.2021.1973273

[16] Ministerio para la Transición Ecológica y el Reto Demográfico (MITECO), *Por un #FuturoSostenible* (2021). https://www.miteco.gob.es/content/dam/miteco/es/biodiversidad/temas/ecosistemas-y-conectividad/eniv_2021_tcm30-515864.pdf

[17] MITECO, *Por un #FuturoSostenible*, (2021).

[18] MITECO, *Guía Metodológica para la Identificación de los Elementos de Infraestructura Verde de España.* (2024). https://www.miteco.gob.es/content/dam/miteco/es/biodiversidad/temas/ecosistemas-y-conectividad/iv/guia-metodologica-iv-ii-edicion-2024.pdf

[19] N. Joshi et al., "Green Plants as a Sustainable Solution to Air Pollution," *International Journal of Plant and Environment* 9, no. 2 (agosto, 2023): 102–112, https://doi.org/10.18811/ijpen.v9i02.02; Katarzyna Wróblewska and Byoung Ryong Jeong, "Effectiveness of plants and green infrastructure utilization in ambient particulate matter removal," *Environmental Sciences Europe* 33 (2021). https://doi.org/10.1186/s12302-021-00547-2

[20] A. Russo y K.A. Holzer, "Biodiverse Cities: Exploring Multifunctional Green Infrastructure for Ecosystem Services and Human Well-Being," in *Urban Services to Ecosystems* 17, 491–507 (Springer, septiembre, 2021). https://doi.org/10.1007/978-3-030-75929-2_26

[21] Xifan Chen et al., "Changes and Characteristics," *Land* 11, no. 6.

[22] E. Cohen-Shacham et al., (Gland, Switzerland: IUCN, 2016); Comisión Europea, *Towards an EU Research and Innovation policy agenda for Nature-Based Solutions & Re-Naturing Cities*, (Publicaciones de la Oficina de la Unión Europea, 2015).

[23] Nadja Kabisch et al., *Nature-Based Solutions to Climate Change Adaptation in Urban Areas* (Springer Nature, 2017).

[8] Anna Zaręba, "Multifunctional and Multiscale Aspects of Green Infrastructure in Contemporary Research," *Problemy Ekorozwoju* 9 no. 2 (June, 2014): 149–56.

[9] Y. Wang, "The Research of Green Infrastructure Implementation System and Stakeholders Participation Mechanism," in *ICCREM* 2017, 364–69.

[10] F.A. Hoover et al., "Why Go Green? Comparing Rationales and Planning Criteria for Green Infrastructure in US City Plans," *Landscape and Urban Planning* 237 (September, 2023), https://doi.org/10.1016/j.landurbplan.2023.104781; R. Lafortezza et al., "Green Infrastructure as a Tool to Support Spatial Planning in European Urban Regions," *©iForest – Biogeosciences and Forestry* 6, no. 3 (March, 2013): 102-08, https://doi.org/10.3832/ifor0723-006; I.C. Mell, "Green Infrastructure: Concepts, Perceptions and Its Use in Spatial Planning" (PhD diss., Newcastle University, 2010). http://hdl.handle.net/10443/914

[11] E. Gelan and Y. Girma, "Sustainable Urban Green Infrastructure Development and Management System in Rapidly Urbanized Cities of Ethiopia," *Technologies* 9, no. 3 (September, 2021). https://doi.org/10.3390/technologies9030066

[12] Z. Wang, et al., "Building Green Infrastructure for Mitigating Urban Flood Risk in Beijing, China," *Urban Forestry & Urban Greening* 93, (January, 2024). https://doi.org/10.1016/j.ufug.2024.128218

[13] S. Jones and C. Somper, "The Role of Green Infrastructure in Climate Change Adaptation in London," *The Geographical Journal* 180, no. 2 (June, 2014): 191–96, https://doi.org/10.1111/geoj.12059; A.M. García, et al., "Spatial Planning of Green Infrastructure for Mitigation and Adaptation to Climate Change at a Regional Scale," *Sustainability* 12, no. 24 (December, 2020). https://doi.org/10.3390/su122410525

[14] K. Tzoulas et al., "Promoting Ecosystem and Human Health in Urban Areas Using Green Infrastructure: A Literature Review," *Landscape and Urban Planning* 81, no. 3 (June, 2007): 167–78, https://doi.org/10.1016/j.landurbplan.2007.02.001; C. Coutts and M. Hahn, "Green Infrastructure, Ecosystem Services, and Human Health," *International Journal of Environmental Research and Public Health* 12, no. 8 (August, 2015): 9768–98. https://doi.org/10.3390/ijerph120809768

[15] B. Gills and J. Morgan, "Postscript, an End to the War on Nature: COP in or COP out?" in *Economics and Climate Emergency*, 241–52 (Routledge, 2022). https://doi.org/10.1080/14747731.2021.1973273

[16] Ministerio para la Transición Ecológica y el Reto Demográfico (MITECO), *Por un #FuturoSostenible* (2021). https://www.miteco.gob.es/content/dam/miteco/es/biodiversidad/temas/ecosistemas-y-conectividad/eniv_2021_tcm30-515864.pdf

[17] MITECO, *Por un #FuturoSostenible*, (2021).

[18] MITECO, *Guía Metodológica para la Identificación de los Elementos de Infraestructura Verde de España.* (2024). https://www.miteco.gob.es/content/dam/miteco/es/biodiversidad/temas/ecosistemas-y-conectividad/iv/guia-metodologica-iv-ii-edicion-2024.pdf

[19] N. Joshi et al., "Green Plants as a Sustainable Solution to Air Pollution," *International Journal of Plant and Environment* 9, no. 2 (August, 2023): 102–112, https://doi.org/10.18811/ijpen.v9i02.02; Katarzyna Wróblewska and Byoung Ryong Jeong, "Effectiveness of plants and green infrastructure utilization in ambient particulate matter removal," *Environmental Sciences Europe* 33 (2021). https://doi.org/10.1186/s12302-021-00547-2

[20] A. Russo and K.A. Holzer, "Biodiverse Cities: Exploring Multifunctional Green Infrastructure for Ecosystem Services and Human Well-Being," in *Urban Services to Ecosystems* 17, 491–507 (Springer, September, 2021). https://doi.org/10.1007/978-3-030-75929-2_26

[21] Xifan Chen et al., "Changes and Characteristics," *Land* 11, no. 6.

[22] E. Cohen-Shacham et al., (Gland, Switzerland: IUCN, 2016); European Commission, *Towards an EU Research and Innovation policy agenda for Nature-Based Solutions & Re-Naturing Cities*, (Publications Office of the European Union, 2015).

[23] Nadja Kabisch et al., *Nature-Based Solutions to Climate Change Adaptation in Urban Areas* (Springer Nature, 2017).

[24] F. Aram et al., "Urban Green Space Cooling Effect en Cities," *Heliyon* 5, no. 4 (abril, 2019), https://doi.org/10.1016/j.heliyon.2019.e01339; K.R. Gunawardena, M.J. Wells, y T. Kershaw, "Utilising Green and Bluespace to Mitigate Urban Heat Island Intensity," *Science of the Total Environment* (abril, 2017): 584-85. https://doi.org/10.1016/j.scitotenv.2017.01.158

[25] E. Higueras, *Urbanismo Bioclimático* (Gustavo Gili, 2006).

[26] A.F. Morote y J. Olcina Cantos, "Cambio Climático y Educación: Una Revisión de la Documentación Oficial," *Documents d'Anàlisi Geogràfica* 69, no. 1 (2023): 107–34, https://doi.org/10.5565/rev/dag.749; N.L. Sevilla y A.A. Aguinaco, "Gobernanza, Cambio Climático y Soluciones Basadas en la Naturaleza en Vitoria-Gasteiz: La Naturalización de Patios Escolares," *Ciudad y Territorio: Estudios Territoriales* 57, no. 223 (abril, 2025): 103–26. https://doi.org/10.37230/CyTET.2025.223.5

[27] N. Rao et al., "Cultivating Sustainable and Healthy Cities: A Systematic Literature Review of the Outcomes of Urban and Peri-Urban Agriculture," *Sustainable Cities and Society* 85 (octubre, 2022). https://doi.org/10.1016/j.scs.2022.104063

[28] M. Dubbeling y H. De Zeeuw, "Urban Agriculture and Climate Change Adaptation: Ensuring Food Security through Adaptation," en *Resilient Cities: Cities and Adaptation to Climate Change – Proceedings of the Global Forum 2010*, ed. K. Otto-Zimmermann, 441–49 (Paises Bajos: Springer, 2011). https://doi.org/10.1007/978-94-007-0785-6

[29] S. Kriewald et al., "Hungry Cities: How Local Food Self-Sufficiency Relates to Climate Change, Diets, and Urbanisation," *Environmental Research Letters* 14, no. 9 (agosto, 2019), https://doi.org/10.1088/1748-9326/ab2d56

[30] Fariña et al., *Guía para Planificar Ciudades Saludables*.

[31] M. Hobbs et al., "Neighbourhood Typologies and Associations with Body Mass Index and Obesity: A Cross-Sectional Study," *Preventive Medicine* 111, (diciembre, 2017); 351-57, https://doi.org/10.1016/j.ypmed.2017.11.024; Z. Hu, J. Liebens, y K.R. Rao, "Linking Stroke Mortality with Air Pollution, Income, and Greenness in Northwest Florida: An Ecological Geographical Study," *International Journal of Health Geographics* 7 (mayo, 2008), https://doi.org/10.1186/1476-072X-7-20; J. Maas et al., "Green Space, Urbanity, and Health: How Strong Is the Relation?" *Journal of Epidemiology and Community Health* 60 (junio, 2006): 587–92, https://doi.org/10.1136/jech.2005.043125; J. Maas et al., "Morbidity Is Related to a Green Living Environment," Journal of Epidemiology & Community Health 63 (octubre, 2009): 967–73; https://doi.org/10.1136/jech.2008.079038; M.J. Nieuwenhuijsen et al, "Fifty Shades of Green," *Epidemiology* 27, no. 1 (enero, 2017): 63–71. https://doi.org/10.1097/EDE.0000000000000549

[32] F. Enssle y N. Kabisch, "Urban Green Spaces for the Social Interaction, Health and Well-Being of Older People—An Integrated View of Urban Ecosystem Services and Socio-Environmental Justice," *Environmental Science and Policy* 109 (marzo, 2020): 36–44, https://doi.org/10.1016/j.envsci.2020.04.008; J. Fariña y J.A. Corraliza, "Zonas Verdes de Proximidad en la Ciudad y Efectos sobre sus Habitantes," en *Agricultura Urbana en Altura*, ed. J. Briz, M. Köhler, y I. de Felipe, 283–95 (Editorial Agrícola Española, 2017); M. Gascon et al., "Mental Health Benefits of Long-Term Exposure to Residential Green and Blue Spaces: A Systematic Review," *International Journal of Environmental Research and Public Health* 12, no. 4 (abril, 2015): 4354–79. https://doi.org/10.3390/ijerph120404354

[33] U. Bilal et al., "Population Cardiovascular Health and Urban Environments: The Heart Healthy Hoods Exploratory Study in Madrid, Spain," *BMC Medical Research Methodology* 16, no. 104 (agosto, 2016): 1–12, https://doi.org/10.1186/s12874-016-0213-4; F. Enssle y N. Kabisch, "Urban green spaces for the social interaction, health and well-being of older people— An integrated view of urban ecosystem services and socioenvironmental just," *Environmental Science and Policy* 109 (jlui, 2020): 36–44, https://doi.org/10.1016/j.envsci.2020.04.008; M. Franco, U. Bilal, y A.V. Diez-Roux, "Preventing Non-Communicable Diseases through Structural Changes in Urban Environments," *Journal of Epidemiology and Community Health* 69, no. 6 (noviembre, 2014): 509–11, https://doi.org/10.1136/jech-2014-203865; M.S. Mujahid et al., "Relation between Neighborhood Environments and Obesity in the Multi-Ethnic Study of Atherosclerosis," *American Journal of Epidemiology* 167, no. 11 (junio, 2008): 1349–57. https://doi.org/10.1093/aje/kwn047

[24] F. Aram et al., "Urban Green Space Cooling Effect in Cities," *Heliyon* 5, no. 4 (April, 2019), https://doi.org/10.1016/j.heliyon.2019.e01339; K.R. Gunawardena, M.J. Wells, and T. Kershaw, "Utilising Green and Bluespace to Mitigate Urban Heat Island Intensity," *Science of the Total Environment* (April, 2017): 584-585. https://doi.org/10.1016/j.scitotenv.2017.01.158

[25] E. Higueras, *Urbanismo Bioclimático* (Gustavo Gili, 2006).

[26] A.F. Morote and J. Olcina Cantos, "Cambio Climático y Educación: Una Revisión de la Documentación Oficial," *Documents d'Anàlisi Geogràfica* 69, no. 1 (2023): 107–34, https://doi.org/10.5565/rev/dag.749; N.L. Sevilla and A.A. Aguinaco, "Gobernanza, Cambio Climático y Soluciones Basadas en la Naturaleza en Vitoria-Gasteiz: La Naturalización de Patios Escolares," *Ciudad y Territorio: Estudios Territoriales* 57, no. 223 (April, 2025): 103–26. https://doi.org/10.37230/CyTET.2025.223.5

[27] N. Rao et al., "Cultivating Sustainable and Healthy Cities: A Systematic Literature Review of the Outcomes of Urban and Peri-Urban Agriculture," *Sustainable Cities and Society* 85 (October, 2022). https://doi.org/10.1016/j.scs.2022.104063

[28] M. Dubbeling and H. De Zeeuw, "Urban Agriculture and Climate Change Adaptation: Ensuring Food Security through Adaptation," in *Resilient Cities: Cities and Adaptation to Climate Change – Proceedings of the Global Forum 2010*, ed. K. Otto-Zimmermann, 441–49 (Netherlands: Springer, 2011). https://doi.org/10.1007/978-94-007-0785-6

[29] S. Kriewald et al., "Hungry Cities: How Local Food Self-Sufficiency Relates to Climate Change, Diets, and Urbanisation," *Environmental Research Letters* 14, no. 9 (August, 2019). https://doi.org/10.1088/1748-9326/ab2d56

[30] Fariña et al., *Guía para Planificar Ciudades Saludables*.

[31] M. Hobbs et al., "Neighbourhood Typologies and Associations with Body Mass Index and Obesity: A Cross-Sectional Study," *Preventive Medicine* 111, (December, 2017); 351-57, https://doi.org/10.1016/j.ypmed.2017.11.024; Z. Hu, J. Liebens, and K.R. Rao, "Linking Stroke Mortality with Air Pollution, Income, and Greenness in Northwest Florida: An Ecological Geographical Study," *International Journal of Health Geographics* 7 (May, 2008), https://doi.org/10.1186/1476-072X-7-20; J. Maas et al., "Green Space, Urbanity, and Health: How Strong Is the Relation?" *Journal of Epidemiology and Community Health* 60 (June, 2006): 587–92, https://doi.org/10.1136/jech.2005.043125; J. Maas et al., "Morbidity Is Related to a Green Living Environment," Journal of Epidemiology & Community Health 63 (October, 2009): 967–73; https://doi.org/10.1136/jech.2008.079038; M.J. Nieuwenhuijsen et al, "Fifty Shades of Green," *Epidemiology* 27, no. 1 (Jaunary, 2017): 63–71. https://doi.org/10.1097/EDE.0000000000000549

[32] F. Enssle and N. Kabisch, "Urban Green Spaces for the Social Interaction, Health and Well-Being of Older People—An Integrated View of Urban Ecosystem Services and Socio-Environmental Justice," *Environmental Science and Policy* 109 (March, 2020): 36–44, https://doi.org/10.1016/j.envsci.2020.04.008; J. Fariña and J.A. Corraliza, "Zonas Verdes de Proximidad en la Ciudad y Efectos sobre sus Habitantes," in *Agricultura Urbana en Altura*, ed. J. Briz, M. Köhler, and I. de Felipe, 283–95 (Editorial Agrícola Española, 2017); M. Gascon et al., "Mental Health Benefits of Long-Term Exposure to Residential Green and Blue Spaces: A Systematic Review," *International Journal of Environmental Research and Public Health* 12, no. 4 (April, 2015): 4354–79. https://doi.org/10.3390/ijerph120404354

[33] U. Bilal et al., "Population Cardiovascular Health and Urban Environments: The Heart Healthy Hoods Exploratory Study in Madrid, Spain," *BMC Medical Research Methodology* 16, no. 104 (August, 2016): 1–12, https://doi.org/10.1186/s12874-016-0213-4; F. Enssle and N. Kabisch, "Urban green spaces for the social interaction, health and well-being of older people— An integrated view of urban ecosystem services and socioenvironmental just," *Environmental Science and Policy* 109 (July, 2020): 36–44, https://doi.org/10.1016/j.envsci.2020.04.008; M. Franco, U. Bilal, and A.V. Diez-Roux, "Preventing Non-Communicable Diseases through Structural Changes in Urban Environments," *Journal of Epidemiology and Community Health* 69, no. 6 (November, 2014): 509–11, https://doi.org/10.1136/jech-2014-203865; M.S. Mujahid et al., "Relation between Neighborhood Environments and Obesity in the Multi-Ethnic Study of Atherosclerosis," *American Journal of Epidemiology* 167, no. 11 (June, 2008): 1349–57. https://doi.org/10.1093/aje/kwn047

Zazo Moratalla, Ana, Cristina del Pozo, Ester Higueras García, María Teresa Baquero Larriva, Carola Díaz de Lope-Díaz, Hugo Canahua, Silvia Ribot Gil, and Mireia Faus Bosh. "Green and blue infrastructure as a tool for health promotion." *VLC arquitectura* 12, no. 2 (October 2025): 179-213. ISSN: 2341-3050. https://doi.org/10.4995/vlc.2025.24097

Zazo Moratalla, Ana, Cristina del Pozo, Ester Higueras García, María Teresa Baquero Larriva, Carola Díaz de Lope-Díaz, Hugo Canahua, Silvia Ribot Gil, and Mireia Faus Bosh. "Green and blue infrastructure as a tool for health promotion." *VLC arquitectura* 12, no. 2 (October 2025): 179-213. ISSN: 2341-3050. https://doi.org/10.4995/vlc.2025.24097

[34] C.S.S. Ferreira et al., "Soil Degradation in the European Mediterranean Region: Processes, Status and Consequences," *Science of the Total Environment* 805 (enero, 2022). https://doi.org/10.1016/j.scitotenv.2021.150106; MITECO, *Por un #Futuro-Sostenible*, 2021.

[35] J.S. Ramos y C. Hurtado Rodríguez, "Análisis de Servicios Ecosistémicos para la Configuración de una Infraestructura Verde en el Área Metropolitana de Sevilla," *ACE: Architecture, City and Environment* 16, no. 46 (junio, 2021). https://doi.org/10.5821/ace.16.46.9884

[36] M. De-Maya-Matallana, M. López-Martínez, y P.J. Riquelme-Perea, "Sostenibilidad, Resiliencia e Inteligencia en 63 ciudades medianas y grandes españolas," *Ciudad y Territorio. Estudios Territoriales* 57, no. 223 (Primavera, 2025): 143–62. https://doi.org/10.37230/CyTET.2025.223.7

[37] B.A. Farizo et al., "Valuing Drought Impact Mitigation on Ecosystem Services in a Mediterranean Country," *Journal of Arid Environments* 225, (diciembre, 2024). https://doi.org/10.1016/j.jaridenv.2024.105277

[38] F. Cánovas-García y J. Vargas Molina, "An Exploration of Exposure to River Flood Risk in Spain Using the National Floodplain Mapping System," *Geomatics, Natural Hazards and Risk* 16, no. 1 (noviembre, 2024), https://doi.org/10.1080/19475705.2024.2421405; F. Faccini et al., "Flash Flood Events along the West Mediterranean Coasts: Inundations of Urbanized Areas Conditioned by Anthropic Impacts," *Land* 10, no. 6 (junio, 2021). https://doi.org/10.3390/land10060620

[39] A. Zerega, N.E. Simões, y M.J. Feio, "How to Improve the Biological Quality of Urban Streams? Reviewing the Effect of Hydromorphological Alterations and Rehabilitation Measures on Benthic Invertebrates," *Water* 13 (julio, 2021). https://doi.org/10.3390/w13152087; Faccini et al., "Flash Flood Events," *Land* 10, no. 6

[40] F. Milazzo, et al., "The Resilience of Soil Erosion Rates under Historical Land Use Change in Agroecosystems of Southern Spain," *Science of the Total Environment* 822 (mayo, 2022). https://doi.org/10.1016/j.scitotenv.2022.153672

[41] Y. Panagopoulos, E. Dimitriou, y N. Skoulikidis, "Vulnerability of a Northeast Mediterranean Island to Soil Loss. Can Grazing Management Mitigate Erosion?" *Water* 11, no. 7 (julio, 2019). https://doi.org/10.3390/w11071491

[42] E. Corbelle-Rico y E. López-Iglesias, "Farmland Abandonment and Afforestation—Socioeconomic and Biophysical Patterns of Land Use Change at the Municipal Level in Galicia, Northwest Spain," *Land* 13, no. 9 (agosto, 2024), https://doi.org/10.3390/land13091394; S. Wang et al, "Urban Cultural Heritage Is Mentally Restorative: An Experimental Study Based on Multiple Psychophysiological Measures," *Frontiers in Psychology* 14 (mayo, 2023), https://doi.org/10.3389/fpsyg.2023.1132052; S. Stefanidis et al., "Wildfire Effects on Soil Erosion Dynamics: The Case of 2021 Megafires in Greece," *Agriculture and Forestry* 68, no. 2 (junio, 2022): 49–63. https://doi.org/10.17707/AgricultForest.68.2.04

[43] ShuSeng Wang et al., "Urban cultural heritage is mentally restorative," *Frontiers in Psychology* 14 (mayo, 2023). https://doi.org/10.3389/fpsyg.2023.1132052

[44] World Bank, *A Catalogue of Nature-Based Solutions for Urban Resilience* (World Bank, 2021). http://hdl.handle.net/10986/36507

[45] P. García-Serrano et al., *Proyecto MICOS: Entornos Escolares Saludables* (Madrid: Ayuntamiento de Madrid, Área de Gobierno de Desarrollo Urbano Sostenible, noviembre, 2016). https://madridsalud.es/wp-content/uploads/2016/04/MICOS-Regeneracion-urbana.pdf

[46] S. Callau, J. Montasell, y A. Roca, *Alimentem Barcelona: Guía Pràctica per Impulsar Estratègies Alimentàries Locals* (Barcelona: Diputació de Barcelona, 2022); M. Simón, *Planeamiento urbanístico de sistemas alimentarios agroecológicos* (Red de municipios por la agroecología, 2022).

[47] G. Lucertini y G. Di Giustino, "Urban and Peri-Urban Agriculture as a Tool for Food Security and Climate Change Mitigation and Adaptation: The Case of Mestre," *Sustainability* 13, no. 11 (mayo, 2021). https://doi.org/10.3390/su13115999

[34] C.S.S. Ferreira et al., "Soil Degradation in the European Mediterranean Region: Processes, Status and Consequences," *Science of the Total Environment* 805 (January, 2022). https://doi.org/10.1016/j.scitotenv.2021.150106; MITECO, *Por un #FuturoSostenible*, 2021.

[35] J.S. Ramos and C. Hurtado Rodríguez, "Análisis de Servicios Ecosistémicos para la Configuración de una Infraestructura Verde en el Área Metropolitana de Sevilla," *ACE: Architecture, City and Environment* 16, no. 46 (June, 2021). https://doi.org/10.5821/ace.16.46.9884

[36] M. De-Maya-Matallana, M. López-Martínez, and P.J. Riquelme-Perea, "Sostenibilidad, Resiliencia e Inteligencia en 63 ciudades medianas y grandes españolas," *Ciudad y Territorio. Estudios Territoriales* 57, no. 223 (Spring, 2025): 143–62. https://doi.org/10.37230/CyTET.2025.223.7

[37] B.A. Farizo et al., "Valuing Drought Impact Mitigation on Ecosystem Services in a Mediterranean Country," *Journal of Arid Environments* 225, (December, 2024). https://doi.org/10.1016/j.jaridenv.2024.105277

[38] F. Cánovas-García and J. Vargas Molina, "An Exploration of Exposure to River Flood Risk in Spain Using the National Floodplain Mapping System," *Geomatics, Natural Hazards and Risk* 16, no. 1 (November, 2024), https://doi.org/10.1080/19475705.2024.2421405; F. Faccini et al., "Flash Flood Events along the West Mediterranean Coasts: Inundations of Urbanized Areas Conditioned by Anthropic Impacts," *Land* 10, no. 6 (June, 2021). https://doi.org/10.3390/land10060620

[39] A. Zerega, N.E. Simões, and M.J. Feio, "How to Improve the Biological Quality of Urban Streams? Reviewing the Effect of Hydromorphological Alterations and Rehabilitation Measures on Benthic Invertebrates," *Water* 13 (July, 2021). https://doi.org/10.3390/w13152087; Faccini et al., "Flash Flood Events," *Land* 10, no. 6

[40] F. Milazzo, et al., "The Resilience of Soil Erosion Rates under Historical Land Use Change in Agroecosystems of Southern Spain," *Science of the Total Environment* 822 (May, 2022). https://doi.org/10.1016/j.scitotenv.2022.153672

[41] Y. Panagopoulos, E. Dimitriou, and N. Skoulikidis, "Vulnerability of a Northeast Mediterranean Island to Soil Loss. Can Grazing Management Mitigate Erosion?" *Water* 11, no. 7 (July, 2019). https://doi.org/10.3390/w11071491

[42] E. Corbelle-Rico and E. López-Iglesias, "Farmland Abandonment and Afforestation—Socioeconomic and Biophysical Patterns of Land Use Change at the Municipal Level in Galicia, Northwest Spain," *Land* 13, no. 9 (August, 2024), https://doi.org/10.3390/land13091394; S. Wang et al, "Urban Cultural Heritage Is Mentally Restorative: An Experimental Study Based on Multiple Psychophysiological Measures," *Frontiers in Psychology* 14 (May, 2023), https://doi.org/10.3389/fpsyg.2023.1132052; S. Stefanidis et al., "Wildfire Effects on Soil Erosion Dynamics: The Case of 2021 Megafires in Greece," *Agriculture and Forestry* 68, no. 2 (June, 2022): 49–63. https://doi.org/10.17707/AgricultForest.68.2.04

[43] ShuSeng Wang et al., "Urban cultural heritage is mentally restorative," *Frontiers in Psychology* 14 (May, 2023). https://doi.org/10.3389/fpsyg.2023.1132052

[44] World Bank, *A Catalogue of Nature-Based Solutions for Urban Resilience* (World Bank, 2021). http://hdl.handle.net/10986/36507

[45] P. García-Serrano et al., *Proyecto MICOS: Entornos Escolares Saludables* (Madrid: Ayuntamiento de Madrid, Área de Gobierno de Desarrollo Urbano Sostenible, November, 2016). https://madridsalud.es/wp-content/uploads/2016/04/MICOS-Regeneracion-urbana.pdf

[46] S. Callau, J. Montasell, and A. Roca, *Alimentem Barcelona: Guía Pràctica per Impulsar Estratègies Alimentàries Locals* (Barcelona: Diputació de Barcelona, 2022); M. Simón, *Planeamiento urbanístico de sistemas alimentarios agroecológicos* (Red de municipios por la agroecología, 2022).

[47] G. Lucertini and G. Di Giustino, "Urban and Peri-Urban Agriculture as a Tool for Food Security and Climate Change Mitigation and Adaptation: The Case of Mestre," *Sustainability* 13, no. 11 (May, 2021). https://doi.org/10.3390/su13115999

[48] K. Schreiber, et al., "Quantifying the Foodshed: A Systematic Review of Urban Food Flow and Local Food Self-Sufficiency Research," *Environmental Research Letters* 16, no. 2 (enero, 2021). https://doi.org/10.1088/1748-9326/abad59

[49] D. Godenau et al., "A Consumption-Oriented Approach to Measuring Regional Food Self-Sufficiency," *Food Security* 12, no. 5 (mayo, 2020): 1049–63; Y. Li, Z. Sun, y F. Accatino, "Spatial Distribution and Driving Factors Determining Local Food and Feed Self-Sufficiency in the Eastern Regions of China," *Food and Energy Security* 10, no. 3 (mayo, 2021). https://doi.org/10.1002/fes3.296

[50] R. D'Onofrio y E. Trusiani, "The Future of the City in the Name of Proximity: A New Perspective for the Urban Regeneration of Council Housing Suburbs in Italy after the Pandemic," *Sustainability* 14, no. 3 (enero, 2022). https://doi.org/10.3390/su14031252

[51] A. Baobeid, M. Koç, y S.G. Al-Ghamdi, "Walkability and Its Relationships With Health, Sustainability, and Livability: Elements of Physical Environment and Evaluation Frameworks," *Frontiers in Built Environment* 7, (septiembre, 2021). https://doi.org/10.3389/fbuil.2021.721218

[52] O. Psara, et al., "Evaluation of Urban Sustainability Based on Transportation and Green Spaces: The Case of Limassol, Cyprus," *Sustainability* 15 (julio, 2023), https://doi.org/10.3390/su151310563; E. Andersson et al., "Enabling Green and Blue Infrastructure to Improve Contributions to Human Well-Being and Equity in Urban Systems," *BioScience* 69, no. 7 (junio, 2019): 566–74, https://doi.org/10.1093/biosci/biz058;

S. González y M.R. Del Caz, "El verde urbano desde el punto de vista ambiental, social y de la salud: políticas urbanas convergentes," *ACE: Architecture, City and Environment* 19, no. 55 (junio, 2024): https://doi.org/10.5821/ace.19.55.12129;

M. Dennis et al, "Relationships between health outcomes in older populations and urban green infrastructure size, quality and proximity," *BMC Public Health* 20 (mayo, 2020), https://doi.org/10.1186/s12889-020-08762-x; B. Polo-Martín, "The Potential of Blue–Green Infrastructures (BGIs) to Boost Urban Resilience: Examples from Spain," *Urban Sci* 9, no. 4 (marzo, 2025). https://doi.org/10.3390/urbansci9040102

[53] Psara et al., "Evaluation of Urban Sustainability," *Sustainability* 15; Andersson et al., "Enabling Green and Blue Infrastructure", *BioScience* 69, no. 7: 566; González and Del Caz, "El verde urbano desde el punto de vista ambiental"; Dennis et al., "Relationships between Health Outcomes," *BMC Public Health* 20; Polo-Martín, "*The Potential of Blue–Green Infrastructures*." *Urban Sci* 9, no. 4.

[54] González y Del Caz, "El verde urbano desde el punto de vista ambiental"; Polo-Martín, "The Potential of Blue–Green Infrastructures," *Urban Sci* 9, no. 4; Andersson et al., "Enabling Green and Blue Infrastructure", *BioScience* 69, no. 7; Dennis et al., "Relationships between Health Outcomes." *BMC Public Health* 20.

[55] Higueras, Maria E. Román y J. Fariña, "Guidelines for Healthier Public Spaces for the Elderly Population: Recommendations in the Spanish Context," in *Handbook of Quality of Life and Sustainability*, (Springer, Switzerland, 2021): 35-51, https://doi.org/10.1007/978-3-030-50540-0_3; E. Pozo-Menéndez, "Greenery Urban Design for Good Mental Health. Analysis of a Vulnerable District of Madrid," en *Urban Design and Planning for Age-Friendly Environments Across Europe: North and South: Developing Healthy and Therapeutic Living Spaces for Local Contexts*," 291–309 (Springer, septiembre, 2022); M. Georgiou et al., "Mechanisms of Impact of Blue Spaces on Human Health: A Systematic Literature Review and Meta-Analysis," *International Journal of Environmental Research and Public Health* 18, no. 5 (marzo, 2021), https://doi.org/10.3390/ijerph18052486; C. Nelischer y A. Loukaitou-Sideris, "Intergenerational Public Space Design and Policy: A Review of the Literature," *Journal of Planning Literature* 38, no. 1 (2023): 19–32; Jennifer Gardner, Andrea Marpillero Colomina y Larissa Begault, *Inclusive Healthy Places: A Guide to Inclusion and Health in Public Space: Learning Globally to Transform Locally*, (Gehl Institute), https://www.unhabitat-urbanhealth.org/download/inclusive-healthy-places-a-guide-to-inclusion-health-in-public-space-learning-globally-to-transform-locally/; R. Whear et al., "What Is the Effect of Intergenerational Activities on the Wellbeing and Mental Health of Older People?: A Systematic Review," *Campbell Systematic Reviews* 19, no. 4 (octubre, 2023). https://doi.org/10.1002/cl2.1355

[48] K. Schreiber, et al., "Quantifying the Foodshed: A Systematic Review of Urban Food Flow and Local Food Self-Sufficiency Research," *Environmental Research Letters* 16, no. 2 (Jaunary, 2021). https://doi.org/10.1088/1748-9326/abad59

[49] D. Godenau et al., "A Consumption-Oriented Approach to Measuring Regional Food Self-Sufficiency," *Food Security* 12, no. 5 (May, 2020): 1049–63; Y. Li, Z. Sun, and F. Accatino, "Spatial Distribution and Driving Factors Determining Local Food and Feed Self-Sufficiency in the Eastern Regions of China," *Food and Energy Security* 10, no. 3 (May, 2021). https://doi.org/10.1002/fes3.296

[50] R. D'Onofrio and E. Trusiani, "The Future of the City in the Name of Proximity: A New Perspective for the Urban Regeneration of Council Housing Suburbs in Italy after the Pandemic," *Sustainability* 14, no. 3 (Jaunary, 2022). https://doi.org/10.3390/su14031252

[51] A. Baobeid, M. Koç, and S.G. Al-Ghamdi, "Walkability and Its Relationships With Health, Sustainability, and Livability: Elements of Physical Environment and Evaluation Frameworks," *Frontiers in Built Environment* 7, (September, 2021). https://doi.org/10.3389/fbuil.2021.721218

[52] O. Psara, et al., "Evaluation of Urban Sustainability Based on Transportation and Green Spaces: The Case of Limassol, Cyprus," *Sustainability* 15 (July, 2023), https://doi.org/10.3390/su151310563; E. Andersson et al., "Enabling Green and Blue Infrastructure to Improve Contributions to Human Well-Being and Equity in Urban Systems," *BioScience* 69, no. 7 (June, 2019): 566–74, https://doi.org/10.1093/biosci/biz058;

S. González and M.R. Del Caz, "El verde urbano desde el punto de vista ambiental, social y de la salud: políticas urbanas convergentes," *ACE: Architecture, City and Environment* 19, no. 55 (June, 2024): https://doi.org/10.5821/ace.19.55.12129;

M. Dennis et al, "Relationships between health outcomes in older populations and urban green infrastructure size, quality and proximity," *BMC Public Health* 20 (May, 2020), https://doi.org/10.1186/s12889-020-08762-x; B. Polo-Martín, "The Potential of Blue–Green Infrastructures (BGIs) to Boost Urban Resilience: Examples from Spain," *Urban Sci* 9, no. 4 (March, 2025), https://doi.org/10.3390/urbansci9040102.

[53] Psara et al., "Evaluation of Urban Sustainability," *Sustainability* 15; Andersson et al., "Enabling Green and Blue Infrastructure", *BioScience* 69, no. 7: 566; González and Del Caz, "El verde urbano desde el punto de vista ambiental"; Dennis et al., "Relationships between Health Outcomes," *BMC Public Health* 20; Polo-Martín, "*The Potential of Blue–Green Infrastructures*." *Urban Sci* 9, no. 4.

[54] González and Del Caz, "El verde urbano desde el punto de vista ambiental"; Polo-Martín, "The Potential of Blue–Green Infrastructures," *Urban Sci* 9, no. 4; Andersson et al., "Enabling Green and Blue Infrastructure", *BioScience* 69, no. 7; Dennis et al., "Relationships between Health Outcomes." *BMC Public Health* 20.

[55] Higueras, Maria E. Román and J. Fariña, "Guidelines for Healthier Public Spaces for the Elderly Population: Recommendations in the Spanish Context," in *Handbook of Quality of Life and Sustainability*, (Springer, Switzerland, 2021): 35-51, https://doi.org/10.1007/978-3-030-50540-0_3; E. Pozo-Menéndez, "Greenery Urban Design for Good Mental Health. Analysis of a Vulnerable District of Madrid," in *Urban Design and Planning for Age-Friendly Environments Across Europe: North and South: Developing Healthy and Therapeutic Living Spaces for Local Contexts*," 291–309 (Springer, September, 2022); M. Georgiou et al., "Mechanisms of Impact of Blue Spaces on Human Health: A Systematic Literature Review and Meta-Analysis," *International Journal of Environmental Research and Public Health* 18, no. 5 (March, 2021), https://doi.org/10.3390/ijerph18052486; C. Nelischer and A. Loukaitou-Sideris, "Intergenerational Public Space Design and Policy: A Review of the Literature," *Journal of Planning Literature* 38, no. 1 (2023): 19–32; Jennifer Gardner, Andrea Marpillero Colomina and Larissa Begault, *Inclusive Healthy Places: A Guide to Inclusion and Health in Public Space: Learning Globally to Transform Locally*, (Gehl Institute), https://www.unhabitat-urbanhealth.org/download/inclusive-healthy-places-a-guide-to-inclusion-health-in-public-space-learning-globally-to-transform-locally/; R. Whear et al., "What Is the Effect of Intergenerational Activities on the Wellbeing and Mental Health of Older People?: A Systematic Review," *Campbell Systematic Reviews* 19, no. 4 (October, 2023). https://doi.org/10.1002/cl2.1355

Zazo Moratalla, Ana, Cristina del Pozo, Ester Higueras García, María Teresa Baquero Larriva, Carola Díaz de Lope-Díaz, Hugo Canahua, Silvia Ribot Gil, and Mireia Faus Bosh. "Green and blue infrastructure as a tool for health promotion." *VLC arquitectura* 12, no. 2 (October 2025): 179-213. ISSN: 2341-3050. https://doi.org/10.4995/vlc.2025.24097

Zazo Moratalla, Ana, Cristina del Pozo, Ester Higueras García, María Teresa Baquero Larriva, Carola Díaz de Lope-Díaz, Hugo Canahua, Silvia Ribot Gil, and Mireia Faus Bosh. "Green and blue infrastructure as a tool for health promotion." *VLC arquitectura* 12, no. 2 (October 2025): 179-213. ISSN: 2341-3050. https://doi.org/10.4995/vlc.2025.24097

[56] Higueras, Román, y Fariña, "Guidelines for Healthier Public Spaces," in *Handbook of Quality of Life and Sustainability*; E. Orsetti et al, "Building Resilient Cities: Climate Change and Health Interlinkages in the Planning of Public Spaces," *International Journal of Environmental Research and Public Health* 19, no. 3 (enero, 2022). https://doi.org/10.3390/ijerph19031355; Gehl Institute, A Guide to Inclusion and Health in Public Space

[57] Anna Zaręba, "Multifunctional and Multiscale Aspects of Green Infrastructure in Contemporary Research," *Problemy Ekorozwoju* 9, no. 2 (enero, 2014): 149–56.

[58] A. Font, "Reclaiming Urbanism (Despite Everything...)," *VLC Arquitectura* 9, no. 2 (octubre, 2022): 203–16. https://doi.org/10.4995/vlc.2022.17871

[59] J. Gutiérrez, M. Oñorbe, y E. Campos, "Metodología para la Identificación de la Infraestructura Verde, en el Marco de la Estrategia Nacional de Infraestructura Verde y de la Conectividad y Restauración Ecológicas," *Ciudad y Territorio Estudios Territoriales* 57, no. 223 (abril, 2025). https://doi.org/10.37230/CyTET.2025.223.4

[60] W.L. Allen III, "Environmental Reviews and Case Studies: Advancing Green Infrastructure at All Scales: From Landscape to Site," *Environmental Practice* 14, no. 1 (enero, 2017): 17–2. https://doi.org/10.1017/S1466046611000469

[61] G. Jerome, "Defining Community-Scale Green Infrastructure," *Landscape Research* 42 (octubre, 2016): 223–29. https://doi.org/10.1080/01426397.2016.1229463

[62] J.L. De las Rivas, M. Castrillo, M. Fernández, y M. Jiménez, "Morfología de los Paisajes Tradicionales en la España Interior: Potencialidad de lo Rural Construido para un Futuro Más Sostenible," *Ciudad y Territorio-Estudios Territoriales* 54, (2022): 179–204. https://doi.org/10.37230/CyTET.2022.M22.8

[63] Rao et al., "Cultivating Sustainable and Healthy Cities,"

[64] A. Staccione, S. Candiago, y J. Mysiak, "Mapping a Green Infrastructure Network: A Framework for Spatial Connectivity Applied in Northern Italy," *Environmental Science & Policy* 131 (mayo, 2022): 57–67. https://doi.org/10.1016/j.envsci.2022.01.017

[65] MITECO, *Guía Metodológica para la Identificación de los Elementos de Infraestructura Verde, 2.ª ed*.

[66] J. Gutiérrez, M. Oñorbe, y E. Campos, "Metodología para la Identificación de la Infraestructura Verde, en el Marco de la Estrategia Nacional de Infraestructura Verde y de la Conectividad y Restauración Ecológicas," *Ciudad y Territorio Estudios Territoriales* 57, no. 223 (Primavera, 2025). https://doi.org/10.37230/CyTET.2025.223.4

[67] Gutiérrez, Oñorbe, y Campos, *Metodología para la Identificación de la Infraestructura Verde.*

[56] Higueras, Román, and Fariña, "Guidelines for Healthier Public Spaces," in *Handbook of Quality of Life and Sustainability*; E. Orsetti et al, "Building Resilient Cities: Climate Change and Health Interlinkages in the Planning of Public Spaces," *International Journal of Environmental Research and Public Health* 19, no. 3 (Jaunary, 2022). https://doi.org/10.3390/ijerph19031355; Gehl Institute, A Guide to Inclusion and Health in Public Space

[57] Anna Zaręba, "Multifunctional and Multiscale Aspects of Green Infrastructure in Contemporary Research," *Problemy Ekorozwoju* 9, no. 2 (Jaunary, 2014): 149–56.

[58] A. Font, "Reclaiming Urbanism (Despite Everything...)," *VLC Arquitectura* 9, no. 2 (October, 2022): 203–16. https://doi.org/10.4995/vlc.2022.17871

[59] J. Gutiérrez, M. Oñorbe, and E. Campos, "Metodología para la Identificación de la Infraestructura Verde, en el Marco de la Estrategia Nacional de Infraestructura Verde y de la Conectividad y Restauración Ecológicas," *Ciudad y Territorio Estudios Territoriales* 57, no. 223 (April, 2025). https://doi.org/10.37230/CyTET.2025.223.4

[60] W.L. Allen III, "Environmental Reviews and Case Studies: Advancing Green Infrastructure at All Scales: From Landscape to Site," *Environmental Practice* 14, no. 1 (Jaunary, 2017): 17–25. https://doi.org/10.1017/S1466046611000469

[61] G. Jerome, "Defining Community-Scale Green Infrastructure," *Landscape Research* 42 (October, 2016): 223–29. https://doi.org/10.1080/01426397.2016.1229463

[62] J.L. De las Rivas, M. Castrillo, M. Fernández, and M. Jiménez, "Morfología de los Paisajes Tradicionales en la España Interior: Potencialidad de lo Rural Construido para un Futuro Más Sostenible," *Ciudad y Territorio-Estudios Territoriales* 54, (2022): 179–204, https://doi.org/10.37230/CyTET.2022.M22.8.

[63] Rao et al., "Cultivating Sustainable and Healthy Cities,"

[64] A. Staccione, S. Candiago, and J. Mysiak, "Mapping a Green Infrastructure Network: A Framework for Spatial Connectivity Applied in Northern Italy," *Environmental Science & Policy* 131 (May, 2022): 57–67. https://doi.org/10.1016/j.envsci.2022.01.017

[65] MITECO, *Guía Metodológica para la Identificación de los Elementos de Infraestructura Verde, 2.ª ed*.

[66] J. Gutiérrez, M. Oñorbe, and E. Campos, "Metodología para la Identificación de la Infraestructura Verde, en el Marco de la Estrategia Nacional de Infraestructura Verde y de la Conectividad y Restauración Ecológicas," *Ciudad y Territorio Estudios Territoriales* 57, no. 223 (Spring, 2025). https://doi.org/10.37230/CyTET.2025.223.4

[67] Gutiérrez, Oñorbe, and Campos, *Metodología para la Identificación de la Infraestructura Verde.*

BIBLIOGRAPHY

Allen III, William L. "Environmental Reviews and Case Studies: Advancing Green Infrastructure at All Scales: From Landscape to Site." *Environmental Practice* 14, no. 1 (March, 2012): 17–25. https://doi.org/10.1017/S1466046611000469

Andersson, Erik, Johannes Langemeyer, Sara Borgström, Timon McPhearson, Dagmar Haase, Jakub Kronenberg, David N. Barton, McKenna Davis, Sandra Naumann, Lina Röschel, and Francesc Baró. "Enabling Green and Blue Infrastructure to Improve Contributions to Human Well-Being and Equity in Urban Systems." *BioScience* 69, no. 7 (July, 2019): 566–74. https://doi.org/10.1093/biosci/biz058

Aram, Farshid, Ester Higueras García, Ebrahim Solgi, and Sarah Mansournia. "Urban Green Space Cooling Effect in Cities." *Heliyon* 5, no. 4 (2019). https://doi.org/10.1016/j.heliyon.2019.e01339

Baobeid, Abdulla, Muammer Koç, and Sami G. Al-Ghamdi. "Walkability and Its Relationships With Health, Sustainability, and Livability: Elements of Physical Environment and Evaluation Frameworks." *Frontiers in Built Environment*. (September, 2021). https://doi.org/10.3389/fbuil.2021.721218

Beltrán Peña, Juan Carlos, Ricardo Ulises Ruvalcaba López, and Carlos Alberto Cebreros Bustamante. "Análisis Socioespacial de la Proximidad y Accesibilidad Peatonal a Áreas Verdes de Culiacán Rosales." *Topofilia* 30 (April, 2025): 82–111. https://topofilia.buap.mx/index.php/topofilia/article/view/616

Bilal, Usama, Julia Díez, Silvia Alfayate, Pedro Gullón, Isabel del Cura, Francisco Escobar, María Sandín, Manuel Franco, and the HHH Research Group. "Population Cardiovascular Health and Urban Environments: The Heart Healthy Hoods Exploratory Study in Madrid, Spain." *BMC Medical Research Methodology* 16, no. 104 (August, 2016): 1–12. https://doi.org/10.1186/s12874-016-0213-4

Callau, Sonia, Josep Montasell, and Anna Roca. "Alimentem Barcelona: Guía Pràctica per Impulsar Estratègies Alimentàries Locals." *BCN Smart Rural* (Barcelona: Diputació de Barcelona) 2022. https://llibreria.diba.cat/cat/ebook/alimentem-barcelona_67960

Cánovas-García, Fulgencio, and Jesús Vargas Molina. "An Exploration of Exposure to River Flood Risk in Spain Using the National Floodplain Mapping System." Geomatics, Natural Hazards and Risk 15, no. 1 (November, 2024). https://doi.org/10.1080/19475705.2024.2421405

Casadei, Stefano, Francesco Peppoloni, and Arnaldo Pierleoni. "A New Approach to Calculate the Water Exploitation Index (WEI+)." *Water* 12, no. 11 (November, 2020). https://doi.org/10.3390/w12113227

Chae, Jinhae, and MinJoon Cho. "Changes in the Cultural Trend of Use by Type of Green Infrastructure before and after COVID-19 Using Blog Text Mining in Seoul." *Journal of People, Plants, and Environment* 24, no. 4 (August, 2021): 415–27. https://doi.org/10.11628/ksppe.2021.24.4.415

Chen, Xifan, Lihua Xu, Rusong Zhu, Qiwei Ma, Yijun Shi and Zhangwei Lu. "Changes and Characteristics of Green Infrastructure Network Based on Spatio-Temporal Priority." *Land* 11, no. 6 (June, 2022). https://doi.org/10.3390/land11060901

Cohen-Shacham, E., G. Walters, C. Janzen, and S. Maginnis. *Nature-Based Solutions to Address Global Societal Challenges. Gland*, Switzerland: IUCN. August, 2016. https://doi.org/10.2305/IUCN.CH.2016.13.en European Commission. *Towards an EU Research and Innovation Policy Agenda for Nature-Based Solutions & Re-Naturing Cities: Final Report of the Horizon 2020 Expert Group on 'Nature-Based Solutions and Re-Naturing Cities'*. Publications Office of the European Union. (2015).

Corbelle-Rico, Eduardo, and Edelmiro López-Iglesias. "Farmland Abandonment and Afforestation—Socioeconomic and Biophysical Patterns of Land Use Change at the Municipal Level in Galicia, Northwest Spain." *Land* 13, no. 9 (2024). https://doi.org/10.3390/land13091394

Coutts, Christopher, and Micah Hahn. "Green Infrastructure, Ecosystem Services, and Human Health." *International Journal of Environmental Research and Public Health* 12, no. 8 (August, 2015): 9768–98. https://doi.org/10.3390/ijerph120809768

D'Onofrio, Rosalba, and Elio Trusiani. "The Future of the City in the Name of Proximity: A New Perspective for the Urban Regeneration of Council Housing Suburbs in Italy after the Pandemic." *Sustainability* 14 (Jaunary, 2022): 1252. https://doi.org/10.3390/su14031252

De las Rivas, Juan Luis, Maria A. Castrillo-Román, Miguel Fernández, and Marina Jiménez. "Morfología de los Paisajes Tradicionales en la España Interior: Potencialidad de lo Rural Construido para un Futuro Más Sostenible." *Ciudad y Territorio-Estudios Territoriales* 54 (February, 2022): 179–204. https://doi.org/10.37230/CyTET.2022.M22.8

De-Maya-Matallana, Manuel, María López-Martínez, and Prudencio José Riquelme-Perea. 2025. "Sostenibilidad, Resiliencia e Inteligencia en 63 Ciudades Medianas y Grandes Españolas." *Ciudad y Territorio. Estudios Territoriales* 57, no. 223 (April, 2025): 143–62. https://doi.org/10.37230/CyTET.2025.223.7

Dennis, Matthew, Penny A. Cook, Philip James, C. Philip Wheater, and Sarah J. Lindley. "Relationships between Health Outcomes in Older Populations and Urban Green Infrastructure Size, Quality and Proximity." BMC Public Health 20 (May, 2020), https://doi.org/10.1186/s12889-020-08762-x

Dubbeling, Marielle, and Henk de Zeeuw. "Urban Agriculture and Climate Change Adaptation: Ensuring Food Security through Adaptation." In *Resilient Cities: Cities and Adaptation to Climate Change – Proceedings of the Global Forum 2010*, edited by K. Otto-Zimmermann, 441–49. Dordrecht: Springer Netherlands. https://doi.org/10.1007/978-94-007-0785-6_44

Zazo Moratalla, Ana, Cristina del Pozo, Ester Higueras García, María Teresa Baquero Larriva, Carola Díaz de Lope-Díaz, Hugo Canahua, Silvia Ribot Gil, and Mireia Faus Bosh. "Green and blue infrastructure as a tool for health promotion." *VLC arquitectura* 12, no. 2 (October 2025): 179-213. ISSN: 2341-3050. https://doi.org/10.4995/vlc.2025.24097

Enssle, Friederike, and Nadja Kabisch. "Urban Green Spaces for the Social Interaction, Health and Well-Being of Older People—An Integrated View of Urban Ecosystem Services and Socio-Environmental Justice." *Environmental Science and Policy* 109 (July, 2020): 36–44. https://doi.org/10.1016/j.envsci.2020.04.008

Faccini, Francesco, Fabio Luino, Guido Paliaga, Anna Roccati, and Laura Turconi. "Flash Flood Events along the West Mediterranean Coasts: Inundations of Urbanized Areas Conditioned by Anthropic Impacts." *Land* 10, no. 6 (June, 2021). https://doi.org/10.3390/land10060620

Fariña, J., E. Higueras, E. Román, and E. Pozo. *Guía para Planificar Ciudades Saludables*. Ministerio de Sanidad, FEMP. 2022.

Fariña, J., and J.A. Corraliza. "Zonas Verdes de Proximidad en la Ciudad y Efectos sobre sus Habitantes." In *Agricultura Urbana en Altura*, edited by J. Briz, M. Köhler, and I. de Felipe, 283–95. Editorial Agrícola Española. 2017.

Farizo, Begoña A., Miguel Sevilla-Callejo, Mario Soliño, Sergio M. Vicente-Serrano, Juan I. López-Moreno, Angelina Lázaro-Alquézar, Conor Murphy, Sam Grainger, Tobias Conradt, Hongxiao Jin and, Boris Boincean. "Valuing Drought Impact Mitigation on Ecosystem Services in a Mediterranean Country." *Journal of Arid Environments* 225 (December, 2024), https://doi.org/10.1016/j.jaridenv.2024.105277

S.S. Ferreira, Carla, Samaneh. Seifollahi-Aghmiuni, Georgia Destouni, Navid Ghajarnia, and Zarah Kalantari. "Soil Degradation in the European Mediterranean Region: Processes, Status and Consequences." *Science of the Total Environment* 805 (Jaunary, 2022). https://doi.org/10.1016/j.scitotenv.2021.150106

Font Arellano, Antonio. "Reclaiming Urbanism (Despite Everything...)." *VLC Arquitectura* 9, no. 2 (October, 2022): 203–16. https://doi.org/10.4995/vlc.2022.17871

Franco, Manuel, Usarna Bilal, and Ana V. Diez-Roux. "Preventing Non-Communicable Diseases through Structural Changes in Urban Environments." *Journal of Epidemiology and Community Health* 69, no. 6 (2015): 509–11. https://doi.org/10.1136/jech-2014-203865

García, Andrés M., Inés Santé, Xurxo Loureiro, and David Miranda. "Spatial Planning of Green Infrastructure for Mitigation and Adaptation to Climate Change at a Regional Scale." *Sustainability* 12, no. 24 (2020). https://doi.org/10.3390/su122410525

García-Serrano, Pablo, Patricia Leal Laredo, Lucila Urda Peña, and Cristina Hernández Vicario. *Proyecto MICOS: Entornos Escolares Saludables*. Ayuntamiento de Madrid, Madrid Salud. 2016. https://hdl.handle.net/10115/71017

Gascon, Mireia, Margarita Triguero-Mas, David Martínez, Payam Dadvand, Joan Forns, Antoni Plasència and, Mark J. Nieuwenhuijsen. "Mental Health Benefits of Long-Term Exposure to Residential Green and Blue Spaces: A Systematic Review." *International Journal of Environmental Research and Public Health* 12, no. 4 (April, 2015): 4354–79. https://doi.org/10.3390/ijerph120404354

Gashu, Kassahun, and Tegegne Gebre-Egziabher. "Public Assessment of Green Infrastructure Benefits and Associated Influencing Factors in Two Ethiopian Cities: Bahir Dar and Hawassa." *BMC Ecology* 19, no. 1 (April, 2019): 1–15. https://doi.org/10.1186/s12898-019-0232-1

Gelan, Eshetu, and Yared Girma. "Sustainable Urban Green Infrastructure Development and Management System in Rapidly Urbanized Cities of Ethiopia." *Technologies* 9, no. 3 (September, 2021). https://doi.org/10.3390/technologies9030066

Georgiou, Michail, Gordon Morison, Niam Smith, Zoe Tieges, and Sebastien Chastin. "Mechanisms of Impact of Blue Spaces on Human Health: A Systematic Literature Review and Meta-Analysis." *International Journal of Environmental Research and Public Health* 18, no 5 (March, 2021). https://doi.org/10.3390/ijerph18052486

Gehl Institute. *A Guide to Inclusion and Health in Public Space: Learning Globally to Transform Locally*. Gehl Institute. s.f.

Gills, Barry, and Jamie Morgan. "Postscript, an End to the War on Nature: COP in or COP out?" In *Economics and Climate Emergency* 18, London: Routledge. 2022: 241–52. https://doi.org/10.1080/14747731.2021.1973273

Godenau, Dirk, José Juan Cáceres-Hernández, Gloria Martín-Rodríguez, and José Ignacio González-Gómez. "A consumption-oriented approach to measuring regional rood self-Sufficiency." *Food Security* 12, no. 5 (May, 2020): 1049–63. https://doi.org/10.1007/s12571-020-01033-y

Zazo Moratalla, Ana, Cristina del Pozo, Ester Higueras García, María Teresa Baquero Larriva, Carola Díaz de Lope-Díaz, Hugo Canahua, Silvia Ribot Gil, and Mireia Faus Bosh. "Green and blue infrastructure as a tool for health promotion." *VLC arquitectura* 12, no. 2 (October 2025): 179-213. ISSN: 2341-3050. https://doi.org/10.4995/vlc.2025.24097

González Álvarez, Sara, and M. Rosario del Caz Enjuto. "El verde urbano desde el punto de vista ambiental, social y de la salud: políticas urbanas convergentes." *ACE: Architecture, City and Environment* 19, no. 55 (June, 2024). https://doi.org/10.5821/ace.19.55.12129

Gunawardena, K.R., M.J. Wells, and T. Kershaw. "Utilising Green and Bluespace to Mitigate Urban Heat Island Intensity." *Science of the Total Environment* 584–85 (April, 2017): 1040–55. https://doi.org/10.1016/j.scitotenv.2017.01.158

Gutiérrez, Jorgelina, Manuel Oñorbe, and Eduardo Campos Gómez. "Metodología para la identificación de la infraestructura Verde, en el marco de la Estrategia Nacional de Infraestructura Verde y de la Conectividad y Restauración Ecológicas." *Ciudad y Territorio Estudios Territoriales* 57, no. 223 (Spring, 2025). https://doi.org/10.37230/CyTET.2025.223.4

Higueras, Ester, Emilia Román, and José Fariña. "Guidelines for Healthier Public Spaces for the Elderly Population: Recommendations in the Spanish Context." In *Handbook of Quality of Life and Sustainability*, edited by Javier Martinez, Claudia Andrea Mikkelsen, and Rhonda Philips, 35-51. Springer, 2021. https://doi.org/10.1007/978-3-030-50540-0_3

Higueras, Ester. *Urbanismo Bioclimático*. Gustavo Gili. 2006.

Hobbs, M., C. Griffithsa, M.A. Greenc, H. Jordand, J. Saunderse, and J. McKennaa. "Neighbourhood Typologies and Associations with Body Mass Index and Obesity: A Cross-Sectional Study." *Preventive Medicine, in press,* 111 (June, 2018). https://doi.org/10.1016/j.ypmed.2017.11.024

Hoover, Fuschia-Ann, Sara Meerow, Emma Coleman, Zbigniew Grabowski, and Timon McPhearson. "Why Go Green? Comparing Rationales and Planning Criteria for Green Infrastructure in US City Plans." *Landscape and Urban Planning* 237 (September, 2023). https://doi.org/10.1016/j.landurbplan.2023.104781

Hu, Zhiyong, Johan Liebens, and K Ranga Rao. "Linking Stroke Mortality with Air Pollution, Income, and Greenness in Northwest Florida: An Ecological Geographical Study." International Journal of Health Geographics 7 (2008): 20. https://doi.org/10.1186/1476-072X-7-20

Jerome, Gemma, Danielle Sinnett, Sarah Burgess, Thomas Calvert, and Roger Mortlock. "A Framework for Assessing the Quality of Green Infrastructure in the Built Environment in the UK." *Urban Forestry & Urban Greening* 40 (April, 2019): 174–82. https://doi.org/10.1016/j.ufug.2019.04.001

Jerome, Gemma. "Defining Community-Scale Green Infrastructure." *Landscape Research* 42 (October, 2018): 223–29. https://doi.org/10.1080/01426397.2016.1229463

Jones, Sarah, and Carol Somper. "The Role of Green Infrastructure in Climate Change Adaptation in London." *The Geographical Journal* 180, no. 2 (June, 2014): 191–96. https://doi.org/10.1111/geoj.12059

Joshi, Nitin, Charu Khosla Gupta, Yash Mangla and, Arijit Chowdhuri. "Green Plants as a Sustainable Solution to Air Pollution." *International Journal of Plant and Environment* 9, no. 2 (2023): 102–112. https://doi.org/10.18811/ijpen.v9i02.02

Jumani, Suman, Matthew J. Deitch, Denis Valle, Siddarth Machado, Vincent Lecours, David Kaplan, Jagdish Krishnaswamy, and Jeanette Howard . "A New Index to Quantify Longitudinal River Fragmentation: Conservation and Management Implications." *Ecological Indicators* 136 (March, 2022). https://doi.org/10.1016/j.ecolind.2022.108680

Kabisch, Nadja, Hans Korn, Jutta Stadler, and Aletta Bonn. *Nature-Based Solutions to Climate Change Adaptation in Urban Areas: Linkages between Science, Policy and Practice*. Springer Nature, 2017. https://doi.org/10.1007/978-3-319-56091-5

Kriewald, Steffen, Prajal Pradhan, Luis Costa, Anselmo García Cantú Ros and, Juergen P Kropp. "Hungry Cities: How Local Food Self-Sufficiency Relates to Climate Change, Diets, and Urbanisation." *Environmental Research Letters* 14, no. 9 (August, 2019). https://doi.org/10.1088/1748-9326/ab2d56

Krsnik, G., and E.J. Illán-Fernández. "Assessing Indicators and Preferences of Cultural Ecosystem Services in Urban Areas: A Case Study of Murcia, Spain." *Landscape Ecology* 39 (November, 2024). http://dx.doi.org/10.1007/s10980-024-01996-9

Lafortezza, Raffaelle, Clive Davies, Giovanni Sanesi, and Cecil Konijnendijk. "Green Infrastructure as a Tool to Support Spatial Planning in European Urban Regions." *iForest-Biogeosciences and Forestry* 6, no. 3 (March, 2013): 102. https://doi.org/10.3832/ifor0723-006

Li, Yang, Zhigang Sun, and Francesco Accatino. "Spatial Distribution and Driving Factors Determining Local Food and Feed Self-Sufficiency in the Eastern Regions of China." *Food and Energy Security* 10, no. 3 (May, 2021). https://doi.org/10.1002/fes3.296

Lucertini, Giulia, and GGianmarco Di Giustino. "Urban and Peri-Urban Agriculture as a Tool for Food Security and Climate Change Mitigation and Adaptation: The Case of Mestre." *Sustainability* 13, no. 11 (May, 2021). https://doi.org/10.3390/su13115999

Maas, Jolanda, Robert A Verheij, Peter P Groenewegen, Sjerp de Vries, Peter Spreeuwenberg. "Green Space, Urbanity, and Health: How Strong Is the Relation?" *Journal of Epidemiology and Community Health* 60 (June, 2006): 587–92. https://doi.org/10.1136/jech.2005.043125

Maas, J., R.A. Verheij, S. de Vries, P Spreeuwenberg, F G Schellevis and, P P Groenewegen. "Morbidity Is Related to a Green Living Environment." *Journal of Epidemiology & Community Health* 63 (October, 2009): 967–73. https://doi.org/10.1136/jech.2008.079038

Mao, Qizheng, Luyu Wang, Qinghai Guo, Yuanzheng Li, Min Liu, and Guanghua Xu. "Evaluating Cultural Ecosystem Services of Urban Residential Green Spaces from the Perspective of Residents' Satisfaction with Green Space." *Frontiers in Public Health* 8 (2020). https://doi.org/10.3389/fpubh.2020.00226

Mell, Ian C. "Green Infrastructure: Concepts, Perceptions and Its Use in Spatial Planning." PhD diss., Newcastle University, June, 2010.

Imam, Menna M., Ali F. Bakr, and Zeyad El-Sayad. "Walkable Cities in Mediterranean Countries: City of Alexandria, Egypt." *WIT Transactions on The Built Environment* 186, *Urban Transport XXV* (September, 2019): 109-19. https://doi.org/10.2495/UT190101

Milazzo, F., P. Fernández, A. Peña, and T. Vanwalleghem. "The Resilience of Soil Erosion Rates under Historical Land Use Change in Agroecosystems of Southern Spain." *Science of the Total Environment* 822 (May, 2022). https://doi.org/10.1016/j.scitotenv.2022.153672

MITECO. *Estrategia Nacional de Infraestructura Verde y de la Conectividad y Restauración Ecológicas. 2021.* https://www.miteco.gob.es/content/dam/miteco/es/biodiversidad/temas/ecosistemas-y-conectividad/eniv_2021_tcm30-515864.pdf

MITECO. *Guía Metodológica para la Identificación de los Elementos de Infraestructura Verde de España. 2ª edición. 2024*. https://www.miteco.gob.es/content/dam/miteco/es/biodiversidad/temas/ecosistemas-y-conectividad/iv/guia-metodologica-iv-ii-edicion-2024.pdf

Morote, Álvaro-Francisco, and Jorge Olcina Cantos. "Cambio Climático y Educación: Una Revisión de la Documentación Oficial." *Documents d'Anàlisi Geogràfica* 69, no. 1 (November, 2022): 107–34. https://doi.org/10.5565/rev/dag.749

Mujahid, Mahasin S., Ana V Diez Roux, Mingwu Shen, Deepthiman Gowda, Brisa Sánchez, Steven Shea, David R Jacobs Jr, and Sharon A Jackson. "Relation between Neighborhood Environments and Obesity in the Multi-Ethnic Study of Atherosclerosis." *American Journal of Epidemiology* 167, no. 11 (March, 2008): 1349–57. https://doi.org/10.1093/aje/kwn047

Nelischer, Claire, and Anastasia Loukaitou-Sideris. "Intergenerational Public Space Design and Policy: A Review of the Literature." *Journal of Planning Literature* 38, no. 1 (April, 2022): 19–32. https://doi.org/10.1177/08854122221092175

Nickayin, Samaneh Sadat, Francesca Perrone, Barbara Ermini, Giovanni Quaranta, Rosanna Salvia, Filippo Gambella and, Gianluca Egidi. "Soil Quality and Peri-Urban Expansion of Cities: A Mediterranean Experience (Athens, Greece)." *Sustainability* 13, no. 4 (February, 2021). https://doi.org/10.3390/su13042042

Nieto, Carlos E, Antonio Miguel Martínez-Graña, and Leticia Merchán. "Soil Erosion Risk Analysis in the Ría de Arosa (Pontevedra, Spain) Using the RUSLE and GIS Techniques." *Forests* 15, no. 9 (August, 2024). https://doi.org/10.3390/f15091481

Nieuwenhuijsen, Mark J., and Haneen Khreis. "Car free cities: Pathway to healthy urban living." *Environment International* 94 (September, 2016): 251–62. https://doi.org/10.1016/j.envint.2016.05.032

Zazo Moratalla, Ana, Cristina del Pozo, Ester Higueras García, María Teresa Baquero Larriva, Carola Díaz de Lope-Díaz, Hugo Canahua, Silvia Ribot Gil, and Mireia Faus Bosh. "Green and blue infrastructure as a tool for health promotion." *VLC arquitectura* 12, no. 2 (October 2025): 179-213. ISSN: 2341-3050. https://doi.org/10.4995/vlc.2025.24097

Olcina Campos, Jorge, y Andrés Díez. «Inundaciones en España: El Papel de la Planificación Territorial.» *Ciudad y Territorio: Estudios Territoriales* 57, no. 223 (Spring, 2025): 7–46. https://doi.org/10.37230/CyTET.2025.223.1

Orsetti, Eleonora, Nicola Tollin, Martin Lehmann, Vanessa Agudelo Valderrama, and Jordi Morató. "Building Resilient Cities: Climate Change and Health Interlinkages in the Planning of Public Spaces." *International Journal of Environmental Research and Public Health* 19, no. 3 (Jaunary, 2022). https://doi.org/10.3390/ijerph19031355

Panagopoulos, Yiannis, Elias Dimitriou and, Nikolaos Skoulikidis. "Vulnerability of a Northeast Mediterranean Island to Soil Loss. Can Grazing Management Mitigate Erosion?" *Water* 11, no. 7 (July, 2019). https://doi.org/10.3390/w11071491

Papagiannaki, Katerina, Vassiliki Kotroni, Konstantinos Lagouvardos, Michalis Diakakis, and Petros Kyriakou. "Rainfall patterns and their association with flood fatalities across diverse Euro-Mediterranean regions over 41 years." *NPJ Natural Hazards* 2 (May, 2025): 39. https://doi.org/10.1038/s44304-025-00095-2

Polo-Martín, Bárbara, "The Potential of Blue–Green Infrastructures (BGIs) to Boost Urban Resilience: Examples from Spain." *Urban Sci* 9, no. 4 (2025). https://doi.org/10.3390/urbansci9040102

Pouya, Sima, and Majid Aghlmand. "Evaluation of urban green space per capita with new remote sensing and geographic information system techniques and the importance of urban green space during the COVID-19 pandemic." *Environmental Monitoring and Assessment* 194 (August, 2022): 711. https://doi.org/10.1007/s10661-022-10298-z

Pozo-Menéndez, Elisa. "Greenery Urban Design for Good Mental Health. Analysis of a Vulnerable District of Madrid." In *Urban Design and Planning for Age-Friendly Environments Across Europe: North and South: Developing Healthy and Therapeutic Living Spaces for Local Contexts*, 291–309. Springer, September, 2022.

Psara, Olivia, Fernando Pereira da Fonseca, Olympia Nisiforou, and Rui AR Ramos. "Evaluation of Urban Sustainability Based on Transportation and Green Spaces: The Case of Limassol, Cyprus." *Sustainability* 15, no.13 (July, 2023). https://doi.org/10.3390/su151310563

Ramos, Jesús Santiago, and Claudia Hurtado Rodríguez. "Análisis de Servicios Ecosistémicos para la Configuración de una Infraestructura Verde en el Área Metropolitana de Sevilla." *ACE: Architecture, City and Environment* 16, no. 46 (June, 2021). https://doi.org/10.5821/ace.16.46.9884

Ranta, E., M.R. Vidal-Abarca, A.R. Calapez, and M.J. Feio. "Urban Stream Assessment System (UsAs): An Integrative Tool to Assess Biodiversity, Ecosystem Functions and Services." *Ecological Indicators* 121 (Febraury, 2021). https://doi.org/10.1016/j.ecolind.2020.106980

Rao, Nitya, Sheetal Patil, Chandni Singh, Parama Roy, Charles Pryor, Prathigna Poonacha, and Mariam Genes. "Cultivating Sustainable and Healthy Cities: A Systematic Literature Review of the Outcomes of Urban and Peri-Urban Agriculture." *Sustainable Cities and Society* 85 (2022). https://doi.org/10.1016/j.scs.2022.104063

Russo, Alessio, and Katie Ann Holzer. "Biodiverse Cities: Exploring Multifunctional Green Infrastructure for Ecosystem Services and Human Well-Being." In *Urban Services to Ecosystems: Green Infrastructure Benefits from the Landscape to the Urban Scale*, September, 2021. 491–507. https://doi.org/10.1007/978-3-030-75929-2_26

Salomaa, Anna, Riikka Paloniemi, Janne S. Kotiaho, Marianne Kettunen, Evangelia Apostolopoulou, and Joanna Cent. "Can Green Infrastructure Help to Conserve Biodiversity?" *Environment and Planning C: Politics and Space* 35, no. 2 (May, 2016): 265–88. https://doi.org/10.1177/0263774X16649363

Santiago-Ramos, Jesús, and Claudia Hurtado-Rodríguez. "Assessing Ecosystem Services Provision as a Support for Metropolitan Green Infrastructure Planning: The Case of Three Spanish Metropolitan Areas." *Applied Spatial Analysis and Policy* 15 (April, 2022): 1115-41. https://doi.org/10.1007/s12061-022-09441-7

Schreiber, Kerstin, Gordon M. Hickey, Geneviève S. Metson, Brian E Robinson, and Graham K. MacDonald. "Quantifying the Foodshed: A Systematic Review of Urban Food Flow and Local Food Self-Sufficiency Research." *Environmental Research Letters* 16, no. 2 (Febraury, 2021). https://doi.org/10.1088/1748-9326/abad59

López-Sevilla, Naiara and, Amaia Albizua Aguinaco. "Gobernanza, cambio climático y soluciones basadas en la naturaleza en Vitoria-Gasteiz: La naturalización de patios escolares." *Ciudad y Territorio: Estudios Territoriales* 57, no. 223 (Spring, 2025): 103–26. https://doi.org/10.37230/CyTET.2025.223.5

Zazo Moratalla, Ana, Cristina del Pozo, Ester Higueras García, María Teresa Baquero Larriva, Carola Díaz de Lope-Díaz, Hugo Canahua, Silvia Ribot Gil, and Mireia Faus Bosh. "Green and blue infrastructure as a tool for health promotion." *VLC arquitectura* 12, no. 2 (October 2025): 179-213. ISSN: 2341-3050. https://doi.org/10.4995/vlc.2025.24097

Simón, M. *Planeamiento urbanístico de sistemas alimentarios agroecológicos*. Red de municipios por la agroecología. 2022.

Staccione, Andrea, Sebastian Candiago, and Jaroslav Mysiak. "Mapping a Green Infrastructure Network: A Framework for Spatial Connectivity Applied in Northern Italy." *Environmental Science & Policy* 131 (May, 2022): 57–67. https://doi.org/10.1016/j.envsci.2022.01.017

Stefanidis, Stefanos, Vasileios Alexandridis, Velibor Spalevic, and Ronaldo Luiz Mincato. "Wildfire Effects on Soil Erosion Dynamics: The Case of 2021 Megafires in Greece." *Agriculture and Forestry* 68, no. 2 (2022): 49–63. https://doi.org/10.17707/AgricultForest.68.2.04

Tzoulas, Konstantinos, Kalevi Korpela, Stephen Venn, Vesa Yli-Pelkonen, Aleksandra Kaźmierczak, Jari Niemela, and Philip James. "Promoting Ecosystem and Human Health in Urban Areas Using Green Infrastructure: A Literature Review." *Landscape and Urban Planning* 81, no. 3 (2007): 167–78. https://doi.org/10.1016/j.landurbplan.2007.02.001

Wang, ShuSheng, Wang, Yuqian Xu, Xinyi Yang, Yuan, Zhang Yuan, Pei Yan, Yuan Jiang, and Kai Wang. "Urban Cultural Heritage Is Mentally Restorative: An Experimental Study Based on Multiple Psychophysiological Measures." *Frontiers in Psychology* 14 (May, 2023). https://doi.org/10.3389/fpsyg.2023.1132052

Wang, Zehao, Zhihui Li, Yifei Wang, Xinqi Zheng, and Xiangzheng Deng. "Building Green Infrastructure for Mitigating Urban Flood Risk in Beijing, China." *Urban Forestry & Urban Greening* 93 (March, 2024). https://doi.org/10.1016/j.ufug.2024.128218

Wang, Yan. "The Research of Green Infrastructure Implementation System and Stakeholders Participation Mechanism." In ICCREM 2017, November, 2017. 364–69. https://doi.org/10.1061/9780784481073.039

Whear, Rebecca, Fiona Campbell, Morwenna Rogers, Anthea Sutton, Ellie Robinson-Carter, Richard Sharpe, Stuart Cohen, Ronald Fergy, Ruth Garside, Dylan Kneale, G.J. Melendez-Torres and Joanna Thompson-Coon. "What Is the Effect of Intergenerational Activities on the Wellbeing and Mental Health of Older People?: A Systematic Review." *Campbell Systematic Reviews* 19, no. 4 (October, 2023). https://doi.org/10.1002/cl2.1355

World Bank. *A Catalogue of Nature-Based Solutions for Urban Resilience*. Washington, DC World Bank, September, 2021. http://hdl.handle.net/10986/36507

Wróblewska, Katarzyna, and Byoung Ryong Jeong. "Effectiveness of Plants and Green Infrastructure Utilization in Ambient Particulate Matter Removal." *Environmental Sciences Europe* 33, no. 110 (September, 2021). https://doi.org/10.1186/s12302-021-00547-2

Ying, Jun, Xiaojing Zhang, Yiqi Zhang, and Svitlana Bilan. "Green Infrastructure: Systematic Literature Review." *Economic Research-Ekonomska Istraživanja* 35, no. 1 (April, 2021): 343–66. https://doi.org/10.1080/1331677X.2021.1893202

Zaręba, Anna. "Multifunctional and Multiscale Aspects of Green Infrastructure in Contemporary Research." *Problemy Ekorozwoju* 9, no. 2 (Jaunary, 2014): 149–56.

Zerega, A., N.E. Simões, and M.J. Feio. "How to Improve the Biological Quality of Urban Streams? Reviewing the Effect of Hydromorphological Alterations and Rehabilitation Measures on Benthic Invertebrates." *Water* 13, no. 15 (July, 2021): 2087. https://doi.org/10.3390/w13152087

Zazo Moratalla, Ana, Cristina del Pozo, Ester Higueras García, María Teresa Baquero Larriva, Carola Díaz de Lope-Díaz, Hugo Canahua, Silvia Ribot Gil, and Mireia Faus Bosh. "Green and blue infrastructure as a tool for health promotion." *VLC arquitectura* 12, no. 2 (October 2025): 179-213. ISSN: 2341-3050. https://doi.org/10.4995/vlc.2025.24097