

Key Performance Indicators

The team of the UrbanGaia project develop an inclusive **Key Performance Indicator (KPI) framework** for the evaluation of the performance of **urban green and blue infrastructure (U-GBI)**.

The development of the framework was done considering the

performativity of **ecological, social, economical and justice** aspects.

The IPBES Nature Contributions for People framework was used as starting point. Through discussions among researchers and comparing indicators the frame-

work was modified to fit an **U-GBI** context.

The **KPI framework** is comprised of three main dimensions - **nature**, **contributions** and **people**, each one embracing several **values**, which on their turn include the different **KPI**.

nature

Maintaining and strengthening nature and biodiversity

The maintenance or strengthening of nature or ecological quality. This can refer to maintaining or strengthening individual organisms, biophysical assemblages, biophysical processes or biodiversity.

Quantity and quality of GBI

The design of Green and Blue Infrastructure (GBI) in terms of its quantity and quality. Aspects related to the quantity of GBI can be hectares of urban green space or amount of green space per capita. Quality can refer to ecological quality, in function of human utilization and benefits, or the quality of the design of GBI such as connectivity (e.g. walking/cycling paths), accessibility (e.g. opening hours, fences, gates), facilities (e.g. benches, picnic areas, sport areas) and the location.

contributions

regulation contributions

Beneficial nature contributions to people obtained from the regulation of ecosystem processes, such as regulation of air quality, climate, freshwater quantity, flow and timing, etc.

material contributions

Provision of materials from ecosystems, such as food, water, timber, etc.

non-material contributions

The (non-material) physical and psychological experiences that nature provides, such as recreational experiences. This includes experiences that stimulate learning and inspiration. Furthermore, non-material contributions also include the supporting role of nature to identities of regions, cities, neighborhoods or social groups.

people

Cultural relations

Cultural relations includes aspects such as heritage (historical elements), sense of place (meeting place for (sub)communities, organization of events) and stewardship (nature management activities by citizens, adopted trees).

health & wellbeing aspects

Health & wellbeing includes aspects such as physical health, mental health, safety, social relations and education and knowledge.

economic aspects

The effects of surrounding GBI on the local economy such as attractiveness to new businesses, tourism, (new) inhabitants and new jobs created related to green.

governance aspects

This category focuses on decision-making and implementation processes of urban GI. Relevant aspects related to urban GI governance are inclusion of stakeholders, aiming multifunctionality to achieve multiple objectives, etc.

justice aspects

This category focuses on two justice aspects namely procedural justice (inclusion of vulnerable groups in governance) and distributional justice (fair social and spatial division of GBI).

Key Performance Indicators

nature

contributions

people

Maintaining and strengthening nature and biodiversity

Quantity and quality of GBI

individual organisms GBI contribution towards living beings (biocentrism), sentient beings (animal welfare/rights), individuals...



ecological connectivity GBI contribution towards the creation of biological connectivity between green areas



biophysical processes GBI contribution towards Evolution, ecosystem functions and processes, ecological resilience...



biodiversity GBI contribution towards genetic, functional, taxonomic and phylogenetic diversity, uniqueness, vulnerability...



"nature itself" GBI contribution towards Populations, communities, ecosystems, biomes, the biosphere.



connectivity of paths and roads GBI contribution towards connectivity between GBI for users.



accessibility GBI contribution towards the availability of green areas & accessibility to users.



facilities GBI contribution towards perception of availability of conveniences such as park benches, drinking fountains, etc...



location GBI contribution towards Location of the GBI related to population distribution.



Key Performance Indicators

nature

contributions

people

regulation contributions

habitat creation and maintenance GBI contribution towards habitats creation / improvement / maintenance.



pollination and dispersal of seeds and other propagules GBI contribution for pollination, through the availability and promotion of habitat & pollination species.



regulation of air quality GBI contribution to regulate air quality.



regulation of climate GBI contribution to the regulation of local & regional climate (temperature, air circulation, etc...).



regulation of ocean acidification GBI qualitative & quantitative contribution towards the control of ocean discharges affecting acidification.



regulation of freshwater and coastal water quality GBI contribution towards the regulation of freshwater resources (quantitative).



formation, protection and decontamination of soils GBI contribution for soil formation and bioremediation.



regulation of hazards and extreme events GBI contribution for the control of flash floods, wild fires, etc...



regulation of organisms detrimental to humans GBI contribution for the regulation of pests such as mosquitoes, flies, wild dogs, etc...



material contributions

energy supply of energy sources such as gas from waste management facilities, wood for stoves, etc...



food & feed GBI contribution for the supply of fruits, vegetables, eggs, poultry, etc...



materials GBI contribution for the supply of materials such as wood for construction or fire, rubber, wicker, etc...



medicinal, biochemical & genetic resources GBI contribution for the availability of species with medicinal properties, and specific genetic resources.

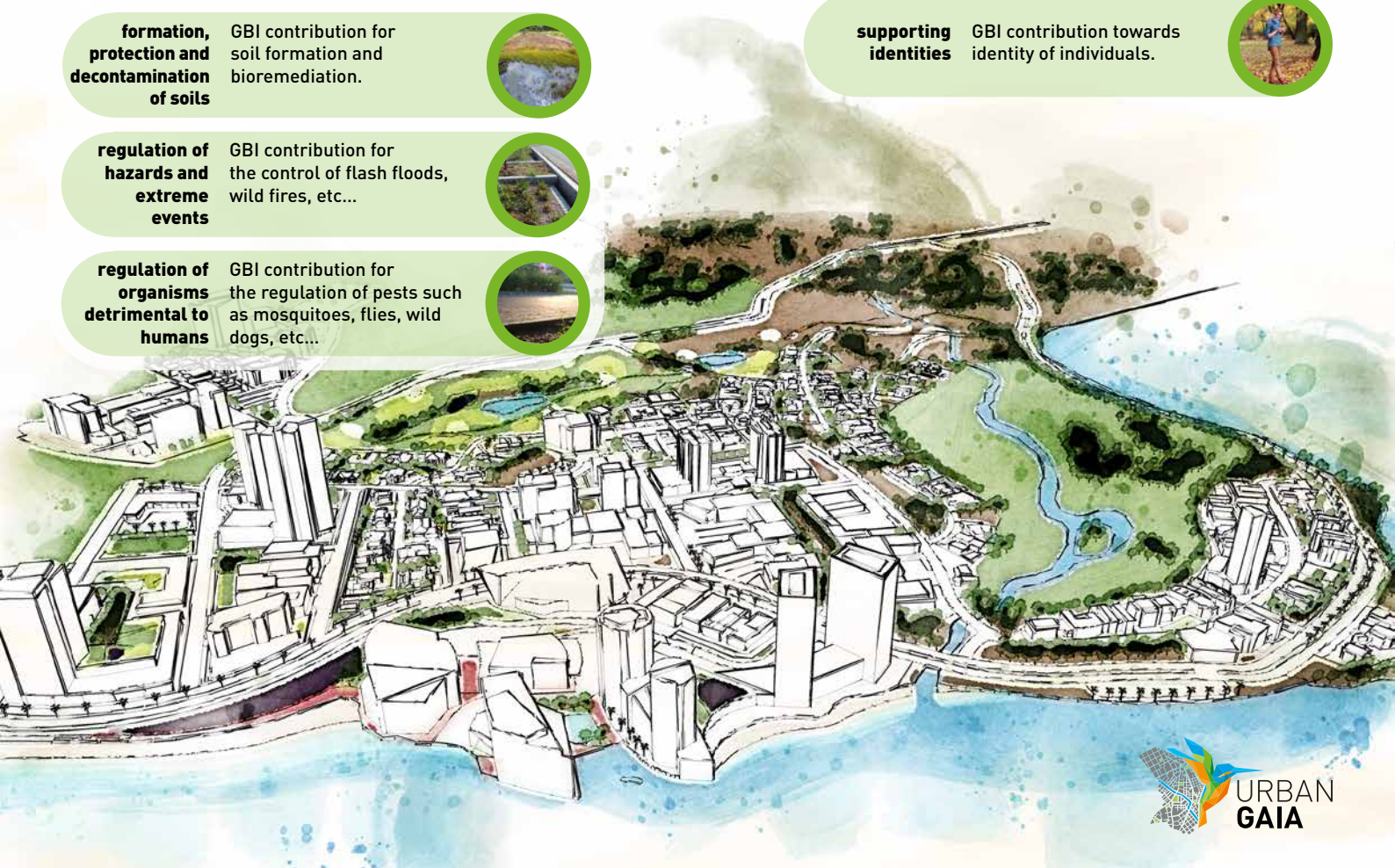


non-material contributions

physical & psychological experiences GBI contribution towards physical, mental, holistic health, biophilia, Inspiration, education, learning space.



supporting identities GBI contribution towards identity of individuals.



Key Performance Indicators

nature

contributions

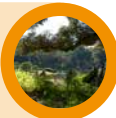
people

cultural relations

stewardship relationships & interactions between people and nature, time spent for managing ecosystems, conservation activities, contemplation of nature



identity, sense of place promotion of a sense of autonomy sense of community, historical values, agency, self-determination



heritage values inspiration, artistic creation through heritage values



health & wellbeing aspects

social relations healthy and pacific racial diversity & social interactions between different social & racial groups.



physical & mental health physical, mental and holistic health and wellbeing, biophilia...



education & knowledge Inspiration, education, experience, learning space...



safety & security physical security, political stability, food and water security, energy security, livelihood security...



economic aspects

jobs created creation of direct and indirect jobs related to GBI creation & management.



profits for businesses affecting positively local businesses economic growth.



value of properties affecting housing prices in surrounding area.



city attractiveness affecting attractiveness of the surrounding areas.



governance aspects

local context understanding the complexity of the issues and local context.



engagement and coherence achieving collaboration, engagement and coherence.



multi-functionality designing and implementing innovative multifunctional solutions.



justice aspects

procedural justice inclusion of vulnerable groups in governance.



distributional justice availability of green parks, questions related to Gentrification.



Key Performance Indicators

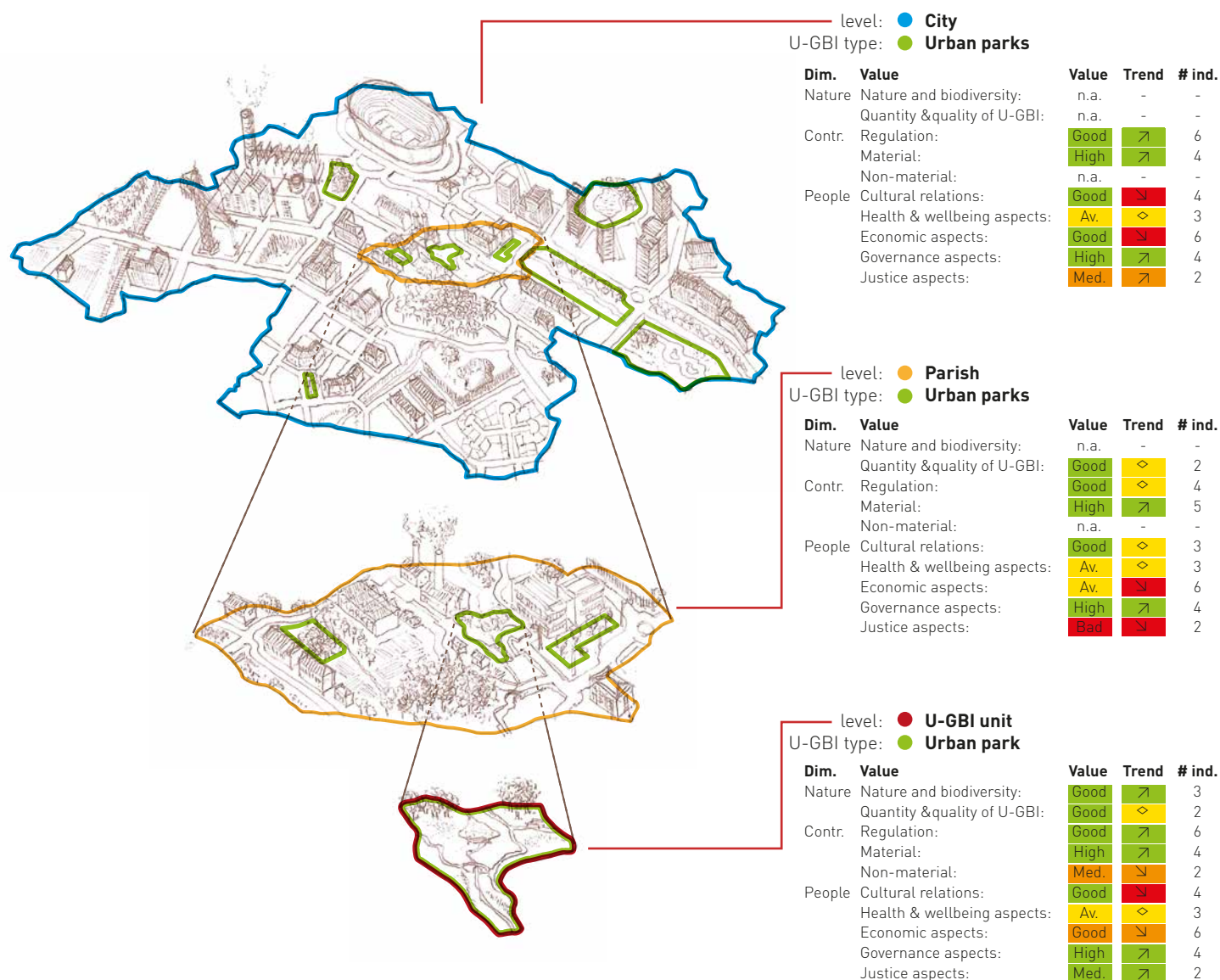
The **KPI framework** can be applied for the evaluation of the performance of **U-GBI** both at different spatial levels and for different regions.

Given the fact that different countries, regions and cultures

have different degrees of access to information, and that local conditions differ regarding what is valued and relevant at the U-GBI level, the KPI framework was designed with flexibility in mind.

Different indicators can be used to

inform each KPI, adjusting to the most relevant issues for each reality, while allowing for the comparison of KPI scores. For indicators choice, check the publication by Carmen et al. (2020)¹.



1. Carmen R., Jacobs S., Leone M., Palliwoda J., Pinto L., Misiune I., Priess J.A., Pereira P., Wanner S., Ferreira C.S., Ferreira A. 2020. Keep it real: Selecting realistic sets of urban green space indicators. Environmental Research Letters, 2020, 15(9), 095001 DOI <https://doi.org/10.1088/1748-9326/ab9465>

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