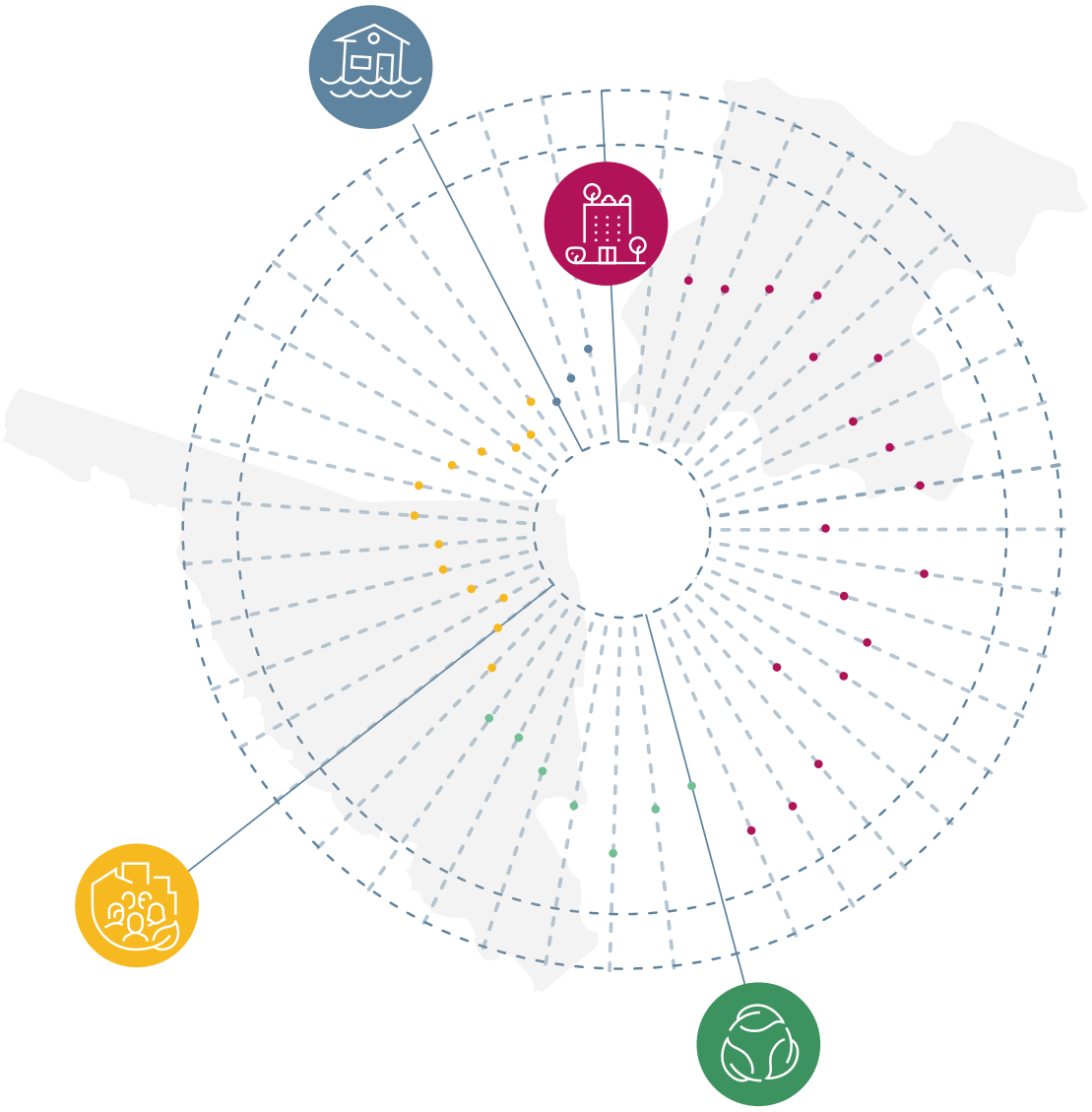
EcoZonas

An approach for co-designing, scaling up and replicating climate action at the neighbourhood level



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CALLE DEL GERMANO
SECCIÓN DE JARDÍN DE MICROCUENCA - sin contención
INFRAESTRUCTURA VERDE
SECCIÓN DE JARDÍN DE MICROCUENCA - opción contenido
INFRAESTRUCTURA VERDE
PROYECTO DE INFRAESTRUCTURA VERDE

Abbreviations

A-S-I
Avoid-Shift-Improve

STOD
Sustainable Transport Oriented Development

GHG
Greenhouse gases

IMPLAN
Municipal Planning Institute

NUA
New Urban Agenda

ULLs
Urban Living Labs

SDGs
Sustainable Development Goals

NGOs
Non-Governmental Organisations

SUS
Sustainable Urban Solutions

NBS
Nature-based solutions

ULLC
Urban Living Lab Center

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EcoZonas

Introduction

Cities occupy just two per cent of the earth's land surface, yet are home to 55 per cent of the world's population. At the same time, urban areas are responsible for 70 per cent of greenhouse gas (GHG) emissions and 75 per cent of the planet's material resource consumption. By 2050, urban dwellers will account for 80 per cent of the world's population, with developing countries leading this trend (Mukim and Roberts, 2023; WEF, 2022). Moreover, cities are particularly vulnerable to the effects of climate change, as they are the places where the greatest economic and human losses will occur. Significant increases in the number of extreme weather events such as floods, droughts, storms and the spread of tropical diseases, caused by rising temperatures, are already a reality in many cities. This has significant impacts on basic services, infrastructure, housing, livelihoods and health in cities (UNEP, 2022). In addition, in developing countries, climate change is often combined with contexts of poverty, inequality, informality, unplanned urban sprawl and degradation of natural ecosystems, which can result in worsening urban problems.

Thus, the role of cities in implementing measures to mitigate and adapt to climate change is crucial. In an increasingly urban world, the planning and management of cities is essential to move towards inclusive and sustainable development that "leaves no one behind" in order to achieve the goals of the Paris Agreement, the 2030 Agenda (SDGs) and the New Urban Agenda (NUA). This, however, requires innovative approaches and bold actions at the local level that contribute to the gradual transformation of cities towards low-carbon, resource-efficient growth, compact, resilient and inclusive cities, both through the implementation of sustainable urban infrastructure and by promoting a change in citizens' behaviour. In its sixth report, the Intergovernmental Panel on Climate Change (IPCC, 2023) states that, despite the challenges that climate change brings to cities, urbanisation represents a unique opportunity to move towards climate-resilient development. Integrated and inclusive planning and investment in urban infrastructure, including social, green and grey infrastructure, can significantly increase the adaptive capacity of urban and rural settlements.

It is in this context that the concepts of experimentation and urban laboratories emerge as tools to design evidence-based policies through the piloting of innovative ideas that contribute to the transition towards sustainable urban development. The main objective of these spaces is to create a place for experimentation and learning based on participatory urban design that improves the quality of urban space, strengthens relationships between stakeholders and allows for replication, scaling and integration into public policy (Martin et al., 2023; Steen & van Bueren, 2017; von Wirth et al., 2019; Waes et al., 2021).

The EcoZones approach is based on the concept of Urban Living Labs and is conceived as a practical tool for implementing small-scale, low-cost sustainable urban solutions that focus on neighbourhoods as a geographical scale. At this scale, a cross-sectoral and participatory approach is easily integrated by simultaneously applying different neighbourhood domains, such as the urban environment, environmental quality, socio-economic well-being and disaster risk.

With an understanding of this issue, the project "EcoZones: An approach to pilot, co-design, scale up and replicate inclusive climate action at the neighbourhood level" focuses on developing a methodology, a comprehensive assessment framework and a toolkit to facilitate the implementation and replication of this approach in different contexts and regions, with a focus on vulnerable communities in developing countries. These instruments were tested, validated and improved with the direct participation of the communities of the two selected vulnerable neighbourhoods in two medium-sized cities in Mexico, namely Leon, Guanajuato and Hermosillo, Sonora, as well as by experts and organisations working on the issue. The EcoZones project (October 2022 - December 2024) is funded by the International Climate Protection Initiative (IKI) of the Federal Ministry of Economics and Climate Protection (BMWK) from Germany and implemented by the Wuppertal Institute for Climate, Environment and Energy (WI), through the Research Unit Urban Living Lab Center (ULLC)[1] and the World Resources Institute Mexico (WRI Mexico).

This paper discusses in detail the EcoZones approach, its step-by-step implementation methodology and the composition of the toolbox, in order to make the developed instruments available to different target groups for widespread use in the urban community. Additionally, in order to put theory into practice, a summary of the application of the methodology in Leon and Hermosillo is presented, as well as lessons learned.

1. The Urban Living Lab Center (ULLC) is a UN-Habitat collaborative centre implemented by the Wuppertal Institute for Climate, Environment and Energy (WI), the Technical University of Berlin (TUB) and the Massachusetts Institute of Technology (MIT). Further information: https://www.living-lab.center/

Who is this document for?

EcoZones are best implemented in the context of a multi-stakeholder partnership. In this sense, the target groups of this document are the following:

Neighbourhood associations organised to improve the sustainability, liveability and resilience of their neighbourhood.

Municipalities and municipal agencies that intend to test sustainability methodologies and projects in an urban laboratory-type environment in order to be able to replicate it on a larger scale based on the results obtained.

Non-governmental and civil society organisations (NGOs/CSOs) working with neighbourhood communities in the implementation of sustainable urban development projects.

Universities and research centres that conduct applied research on related topics or carry out design studies to provide their students with field experience in the planning and implementation of urban interventions, with a focus on those at the neighbourhood scale.

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EcoZonas

What are EcoZones?

Urban Living Labs (ULLs)

Urban Living Labs (ULLs) represent a collaborative, participatory and experimental approach that seeks to promote co-development processes to test and validate innovative solutions with broad community participation. Innovative solutions involve the introduction of products, services, technologies, applications, processes or policies that are new to the local context and whose implementation seeks to generate a positive impact on the community. This is why the need for iteration and localisation of solutions becomes relevant, with the ultimate goal of being able to scale and replicate the solutions implemented in pilot projects (Martin et al., 2022).

The Urban Living Lab Center (ULLC) has consolidated an approach to the implementation of urban laboratories based on an exhaustive review of the literature on the subject and practical experience in the implementation of urban laboratories in Africa, Asia, Latin America and Europe. Figure 1 summarises the aspects that an Urban Lab should consider in its implementation (Martin et al., 2023).

Figure 1: Factors for the implementation of an Urban Living Lab

Evaluation and improvement
These are fundamental steps to generate knowledge, evaluate the innovation and disseminate it when successful, to enable its replication and scaling up in other geographical areas. This iterative process facilitates learning, adaptation and continuous improvement of solutions, ensuring that they are appropriate to the complex and dynamic nature of urban challenges

Neighbourhood scale
It understands neighbourhoods as organised geographical units that can serve as catalysts and demonstrators of sustainable urban planning, policy and design measures.

Adaptation to the local context
It is implemented in a defined urban space, to which the solution fits.

Participatory and multi-stakeholder approach
It usually includes four main groups: the community, public entities, research centres or universities and private sector. The participatory nature of urban laboratories allows stakeholders to be actively involved in the design, development and implementation of the urban living lab, implementation of solutions, thus ensuring that interventions are contextually relevant, effective and sustainable.

Experimentation and learning
This is carried out on the innovative solution before testing it to check its adaptation. to the local context or identify the need for iterations.

Leadership and appropriation
Processes are implemented that foster a sense of empowerment and commitment to the urban development process.

Cross-sectoral articulation
It integrates different sectors to achieve greater impact and understanding of what climate change adaptation and mitigation means.

Source: own elaboration based on Martin et al. (2023).

To effectively integrate the various elements, ULLC proposes a systematic approach to developing and co-creating Urban Living Labs through the framework of the five i's: inform, inspire, initiate, implement and impact. This framework provides a structured process for Urban Living Labs, ensuring that all aspects are addressed and integrated in a coherent way (Martin et al., 2023), as shown in the ULLC's 5 I's box.

The 5 I's of ULLC

Inform: Build capacity, provide tools for planing, evaluation and implementation.

Inspire: Encourage adoption through peer-to-peer exchange.

Initiate: Strengthen collaboration by fostering partnerships.

Implement: Create reference models when implementing demonstration actions.

Impact: Scale, replicate and transfer.

Martin et al. (2023)

EcoZones

The EcoZones concept, which builds on the Urban Living Labs approach, refers to sustainable, resilient and liveable neighbourhoods that promote inclusion, collaboration and well-being for all their inhabitants, while being prepared for the impacts of climate change. Unlike urban laboratories that can vary significantly in terms of objective, sector, scope and scale, EcoZones always have a basic neighbourhood scale and a cross-sectoral approach.

The selection of the neighbourhood as the scale of implementation is because it has gained importance in the urban field as a key scale for driving a shift towards a more sustainable lifestyle. These are seen as spaces that can serve as catalysts and demonstrators of sustainable planning, policy and design measures in cities (Holden et al., 2015; Zhang et al., 2018). Additionally, Islas Vargas (2020) points out that community-based adaptation, by focusing on the scale and population most vulnerable to the impacts of climate change, allows for the identification of the specific dynamics and needs operating in the territories. Finally, with the understanding that the transition to sustainable urban development goes beyond infrastructure, and that a change of mindset plays a huge role, it is key to increase collective knowledge and raise awareness about sustainable urban development, the effects of climate change and the ways in which neighbourhood residents can influence change in their community.

It is worth noting that in the last two decades, the number of EcoZone-like approaches has increased significantly. Among the most prominent are ecodistricts, écoquartiers, eco-cities, eco-neighbourhoods and ecopolises (Holdem et al., 2015). The EcoZones concept seeks to systematise all these approaches by using the ULLs umbrella and generate concrete implementation tools that are replicable and adaptable to different contexts.

In addition, EcoZones are based on a bottom-up urban planning approach, so that the sector to which the Sustainable Urban Solution (SUS) to be implemented corresponds is not predefined, but rather it is established on the basis of the collaborative assessment in which the situation of the four dimensions that were determined to be relevant for the neighbourhood scale are evaluated: urban environment, environmental quality, socio-economic well-being and disaster risk.

In this context, EcoZones propose participatory methodologies and offer a scale of experimentation to increase understanding and strengthen the links between, for example, sustainable mobility, quality public spaces, safe and clean streets and waste management with local development and resilience. The EcoZones approach aims to empower communities to influence the improvement of their neighbourhoods by raising awareness and increasing collective knowledge about sustainable urban development and socio-environmental issues.

Assessment framework

The comprehensive assessment framework of the EcoZones methodology was developed after an exhaustive literature review conceptually framed by the Sustainable Development Goals (SDGs), the 15-minute city, the A-S-I approach (Avoid, Shift, Improve), Sustainable Transport Oriented Development (STOD), sustainable neighbourhoods, sustainable urban mobility, integrated waste management, circular economy, climate adaptation and disaster risk management, Sustainable Nature-Based Solutions (SBN), inclusive and gender-sensitive urban planning, as well as participatory community-based approaches. Details of these concepts and references can be found in Annex 2.

The assessment framework is the basis from which the neighbourhood survey and collaborative mapping tools, which are part of the EcoZones toolbox, were created. In addition, the SUS proposed for each neighbourhood respond directly to the subcategories defined in the assessment framework and are selected and prioritised based on the results of the survey and mapping. As such, the assessment framework is the backbone of the EcoZones methodology. The structure of the assessment framework is summarised below. Sustainable Urban Solutions (SUS) are measures that can be implemented in the short, medium and long term to address the main challenges identified in a neighbourhood while contributing to reducing emissions, increasing resilience and strengthening the social fabric.

Assessment framework

The EcoZones comprehensive assessment framework generates a baseline assessment that identifies the most relevant problems at the neighbourhood level to which the SUS will respond.

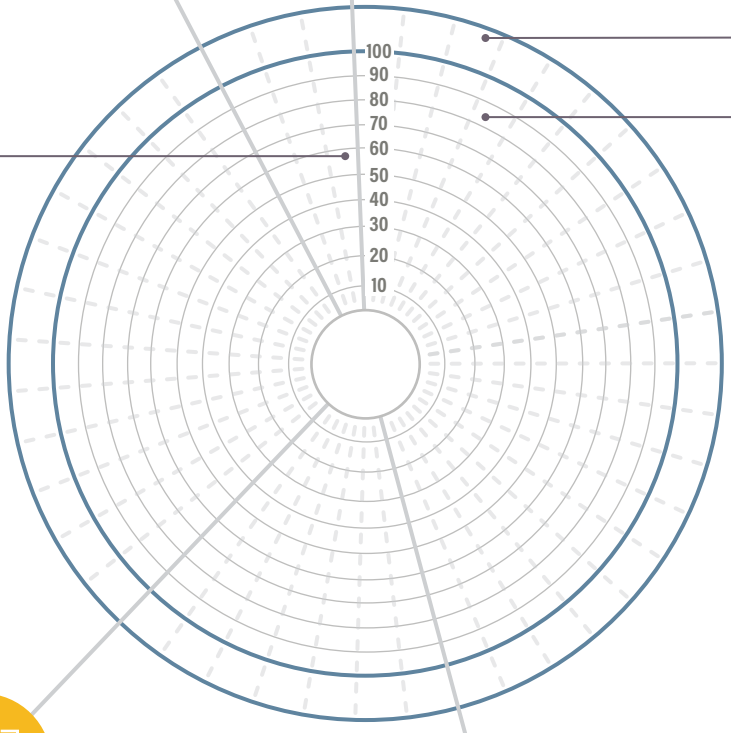
It considers both the physical and environmental qualities of the urban environment, as well as the socio-economic characteristics of communities and their risk preparedness, that a neighbourhood should have in order to become an EcoZone, i.e. a sustainable, liveable and resilient neighbourhood.

Urban environment

8 categories
15 subcategories

Disaster risk

3 categories
7 subcategories



Evaluation score

The assessment of neighbourhoods is carried out at the sub-category level. Each subcategory is assigned a score based on indicators, which are evaluated from 0 to 100, with 100 being the maximum desired score.

Socioeconomic wellbeing

6 categories
15 subcategories

Environmental quality

4 categories
7 subcategories

4 21 44

Dimensions

The assessment framework consists of 4 dimensions: urban environment, environmental quality, socio-economic well-being and disaster risk.

Categories

The categories correspond to the general and most relevant themes for each dimension. Each category groups together the specific subcategories under which the assessment is conducted.

Subcategories

The evaluation is carried out at the level of subcategory, through the measurement of indicators (57 in total).

.

Urban environment

The urban environment dimension considers the conditions of the infrastructure and physical elements that are part of a neighbourhood. This dimension includes the existence of facilities and services such as shops, schools, and health centres that promote a compact, mixed-use urban form, the availability of sustainable transport options, the quality and energy efficiency of housing and the presence of green areas and public spaces that promote social interaction. community and where people feel safe and comfortable.

Environmental quality

EcoZones aim to generate neighbourhoods free of pollution and emissions and with a low impact on climate change. In particular, this dimension addresses issues such as air pollution and rubbish accumulation in the neighbourhood, waste management, availability of basic services and natural water sources, as well as the effects and impacts of climate change.

Socioeconomic wellbeing

Socioeconomic wellbeing refers to the opportunities and conditions of employment, education and health that people in a neighbourhood have access to. It also includes participation in community activities and events that foster identity building and promote community cohesion, along with the idea of inclusive neighbourhoods with a focus on integration, equal access to opportunities and gender equity.

Disaster risk

The disaster risk dimension identifies the effects and impacts on people, housing, equipment and infrastructure that a neighbourhood may face in the face of possible natural phenomena and disasters such as floods, heat waves or fires. A community that is prepared for the possibility of these risks can protect itself and recover more easily, which is why the dimension also takes into account the capacity for response and preparedness.

Source: Own elaboration

SUS have a bottom-up approach, aiming for solutions that inspire communities to collaboratively prioritise, co-design and implement them based on the specific context and needs of the neighbourhood. Taking into account that the challenges of a community and its neighbourhoods are subject to its socio-economic, climatic and urban conditions, the purpose of SUS is to generate a positive social and environmental impact, improve environments, perceptions of safety, preparedness and adaptability to the effects of climate change, and overall quality of life for people.

In this sense, a catalogue of 160 SUS was elaborated that can serve as a tool to empower communities to initiate actions in their neighbourhoods. The SUS catalogue brings together a variety of measures that respond to different issues and are adapted to different contexts, as it considers physical interventions, policies and programmes, cultural and recreational activities, awareness-raising campaigns, among others. These SUS were compiled after an exhaustive literature review process and based on concepts of circular economy, integrated waste management, tactical urbanism, public space design criteria, sustainable mobility, sustainable neighbourhoods, nature-based solutions (NBS), integrated disaster risk reduction management, community preparedness, climate adaptation and resilience, among other concepts related to the evaluation framework. In addition, references were taken from international experiences and resources such as guides, manuals and examples of interventions in Latin America, North America and Europe were integrated.

Categories and Subcategories

The following tables describe the categories and list the subcategories for each dimension.

Urban environment

Categorie	Description	Subcategories
Urban form	Population density, presence of mixed uses (shops, schools, etc.) and connection to the city.	Compact neighbourhood Mixed uses Connectivity
Built-up environment	Housing conditions and adoption of energy efficiency measures at home.	Energy efficiency Housing
Public transport	Accesibility and offer of transport services, quality of stops, and frequency of services.	Transport accessibility Public transport stops Frequency of service
Cyclability	Availability and quality of infrastructure for cycling as a means of transport (Bicycle lanes, bicycle parking).	Cyclability
Mobility patterns	Characteristics of people's trips, such as modes of transport used, travel times and reasons for traveling, as well as people they travel with.	Sustainable mobility
Walkability	Availability and quality of infrastructure for walking (pavements, crossings)	Walkability
Public space	Availability, quality, use and distribution of public open spaces and green areas.	Open spaces and green areas Space use and distribution
Safety and security	Road safety and public safety, considering both incidents and people's perception.	Road safety Security

Environmental quality

Categorie	Description	Subcategories
Water and services	Availability and quality of drinking water, electricity and sewerage services, as well as the state of natural water sources in the neighbourhood.	Water and electricity Sanitation and hygiene
Air	Air quality in the neighbourhood (air pollution perceived through the presence of particulate pollutants is taken into account).	Air quality
Climate	Impact of climate change, both through emissions generated by the activities in the neighbourhood as well as the perceived effects and changes in climate and weather.	Climate change
Waste	Integrated waste management (considering waste generation, separation, recycling, collection and disposal)	Waste generation Waste sorting and recycling Waste collection and disposal

Disaster risk

Categorie	Description	Subcategories
Hazards	All the risks that a community and a neighbourhood can face. Considers environmental risks (fires, deforestation, loss of biodiversity), geological (earthquakes, tsunamis, landslides), hydrometeorological (heat waves, floods, storms, droughts), biological (diseases, pests) and anthropogenic (contamination by hazardous waste or human activities).	Environmental Geological Hydrometeorological Biological Anthropogenic
Impacts	Interaction between a hazard and the characteristics that make people and neighbourhoods vulnerable and exposed to harm.	Exposure, vulnerability y damage
Capacity	Perception of hazard preparedness and availability of elements to respond and reduce potential impacts.	Responsiveness and preparedness

Socioeconomic wellbeing

Category	Description	Subcategories
Economic conditions and opportunities	Employment conditions of people of the neighbourhood and their capacity to afford basic goods and services.	Employment Affordability
Education and digitalisation	Level of education of people in the neighbourhood and access to smartphones and internet connection that allows them to communicate and access sources of information.	Education Digital connectivity
Development and inclusion	Quality of available social assistance services and levels of poverty present in the neighbourhood.	Social assistance Poverty
Health and wellbeing	People's health condition in the neighbourhood, as well as healthy eating practices and access to healthy food in households.	Health Food systems
Community and participation	Participation in cultural, social and decision-making activities that build community cohesion and strengthen neighbourhood identity.	Culture and identity Community participation
Gender equality	Equity between men and women in their household and care responsibilities, in their socio-economic conditions, in their participation in community activities, as well as in their perception of security and the impact of climate change.	Care distribution Socioeconomic conditions Safety perception Participation Cllimate change impacts

The EcoZones toolbox

In order to facilitate the implementation of EcoZones in different contexts, and with the support of Codeando Mexico[2], a series of digital tools were developed for the participatory assessment of neighbourhoods and to obtain solutions to address their most urgent problems. These tools correspond to:

- **The mobile application "EcoZones", available on Google Play and App Store,** which consists of a digital neighbourhood survey and a collaborative mapping module (Figure 2). The user manual of the application is provided in the Annex.

- **The web application,** which hosts the results dashboard and the Sustainable Urban Solutions (SUS) catalogue (Figure 3). It contains information on the project, its methodology and additional resources to download.

All of these are collaborative, open source, free and open access tools, which have an accessible design so that they can be used by different actors, whether they are communities, neighbour-

Figure 2: App EcoZones

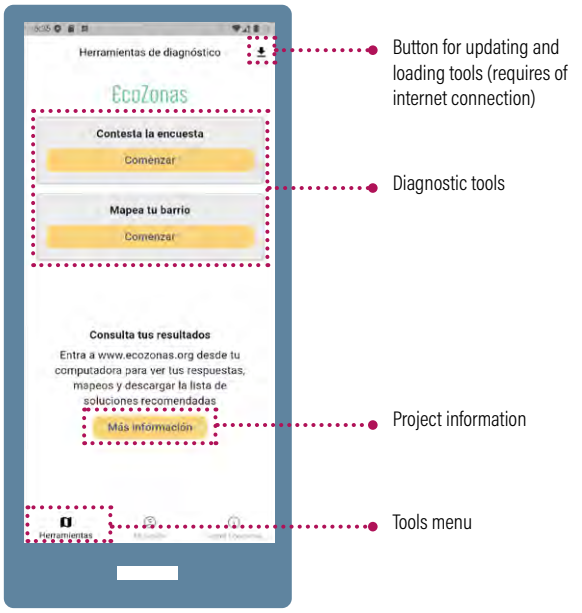
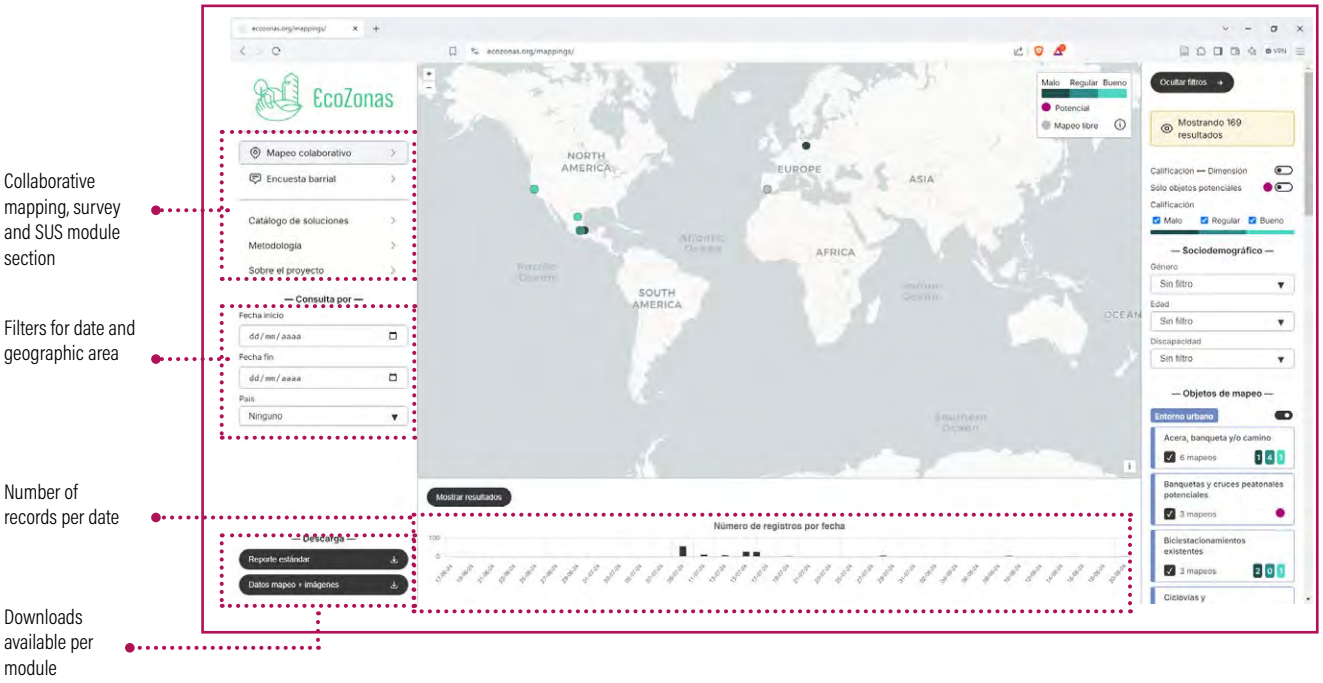


Figure 3: Web site EcoZones



2. https://www.codeandomexico.org/

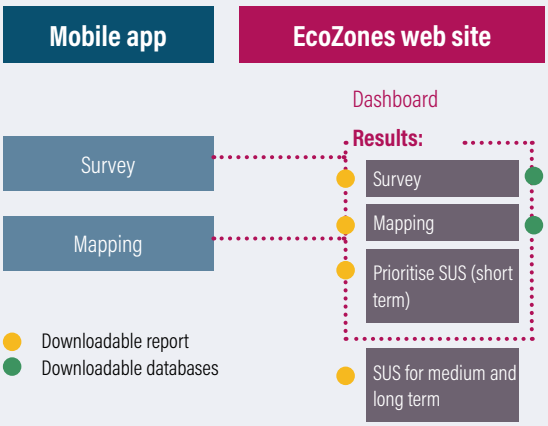
hood leaders, decision-makers, professionals, researchers or independent individuals. Since the digital divide is still a relevant issue in vulnerable neighbourhoods targeted by this methodology, several functionalities of the applications were designed with the possibility of being used without internet access (offline), as can be seen in Table 1.

These tools are interconnected and can be used systematically when applying the methodology, which is intended to structure and facilitate the implementation processes of EcoZones. However, their design also allows them to be used in a flexible way, so that they can be adapted to the interests and needs of the different stakeholders and users. In this way, its modularity allows the survey to be used independently, as well as using only the mobile application to conduct surveys. All the results of these exercises can be consulted individually on the EcoZonas website, which aims to facilitate the processing of information to support the elaboration of diagnoses and decision-making processes. It is also possible to consult the SUS catalogue independently.

It is important to mention that, despite the enormous effort made in the context of the EcoZones project to generate a comprehensive toolbox that reflects urban complexity, we are aware that we are making available version 1.0 of the toolbox. We are aware that, as in any process of urban experimentation, as the project develops, it will become more and more complex, new needs and requirements for fine-tuning and iteration of the tools will emerge. In this sense, we invite the urban community to join in and continue to collaboratively build the toolbox, thinking of it as a living element.

The following box shows the structure and connection of the tools according to the EcoZones methodology.

Tools connection



Stand-alone tools:

1. Complete SUS catalogue (online and downloadable)
2. Perception wheel
3. Monitoring survey

Source: own elaboration

Tabla 1: Summary of EcoZones tools

	Availability	
Tools	**Mobile app**	**Web site**
Neighbourhood survey	Registration of responses (*offline* and *online*)	Results dashboard (*online*)
Collaborative mapping	Registration of mappings (*offline* and *online*)	Results dashboard (*online*)
Sustainable Urban Solutions (SUS)		Catalogue and search engine (*online*)

The 6 EcoZones tools

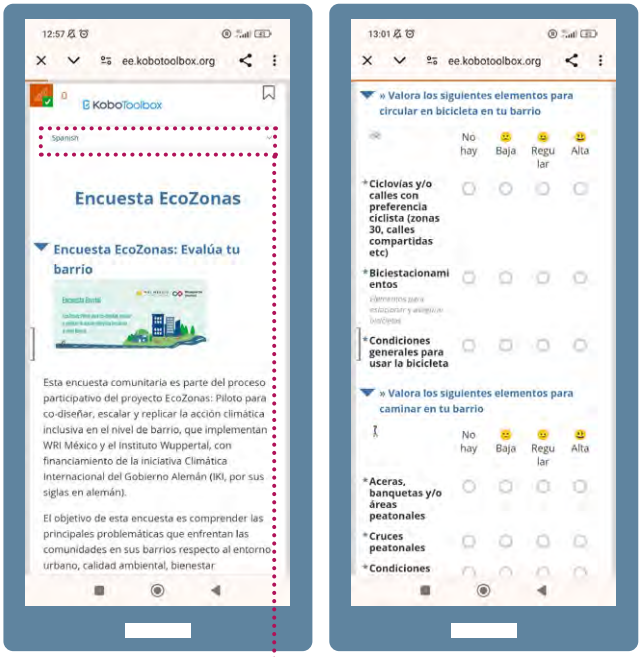
a) App EcoZones

a.1. Neighbourhood survey

This section summarises the objectives, features and uses of each tool. Screen shots are included to allow for a more illustrative visualisation of each.

Objective: Diagnostic tool to identify the main challenges and opportunities present in a neighbourhood, through the perception of its own communities. It can be applied individually and can be answered autonomously (duration of approximately 30 minutes) or with the support of surveyors in guided exercises.

Screenshot: Fill out of survey



Characteristics: The questionnaire contains around 60 questions based on the 44 subcategories of the assessment framework that address the four dimensions, their categories, subcategories and indicators. In order to assess the status of each subcategory, each response is processed by indicators, which allows a score to be assigned to it and evaluated on a scale from 0 to 100 (where 100 is the maximum score given). Qualitative and quantitative indicators are considered, and aspects of infrastructure and perception are considered in line with the evaluation framework.

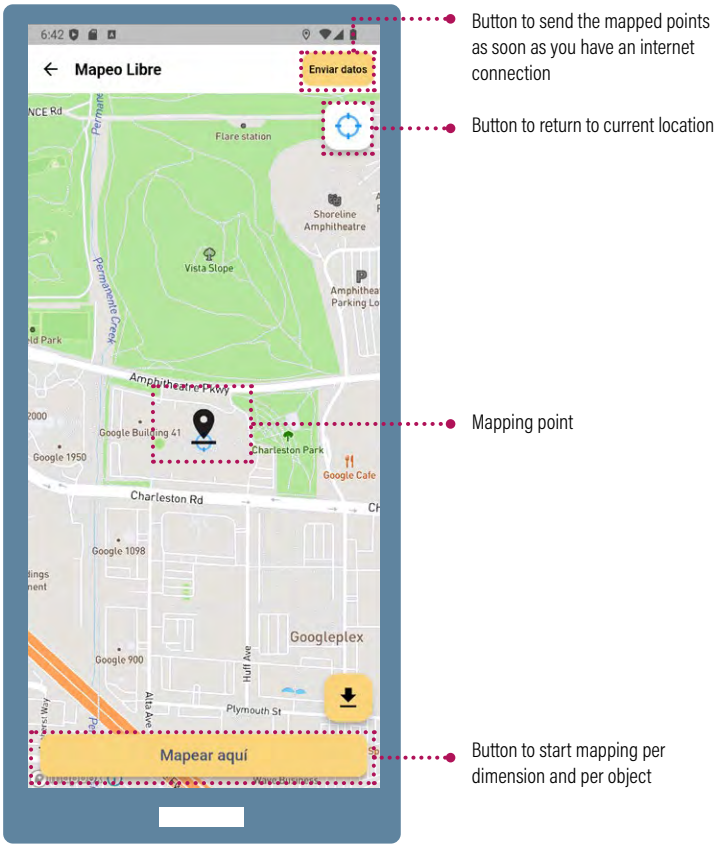
Access and use

- Access via app "EcoZones" and *Kobotoolbox*.
- *Offline* use to register responses and *online* to upload data
- Results in dashboard of website www.ecozonas.org

a.2. Collaborative mapping

Objective: Diagnostic tool to carry out participatory mapping exercises and identify the areas where the main challenges and opportunities in a neighbourhood are located.

Screenshot: Location of points



Acces and use

- Access via app "EcoZones"
- *Offline* use to register mappings and *online* to upload data
- Results in dashboard of website www.ecozonas.org

Characteristics: The application is composed of 28 mapping objects, based on the evaluation framework. There are three types of objects that can be mapped

- Objects to assess as bad/fair/good and compliance with criteria. These are physical infrastructures, activities and events, pollution hotspots and areas prone to disaster risks.
- Potential objects to suggest elements such as recycling points or public transport stops.
- Free mapping to add objects outside the available list.

Extra functionalities:

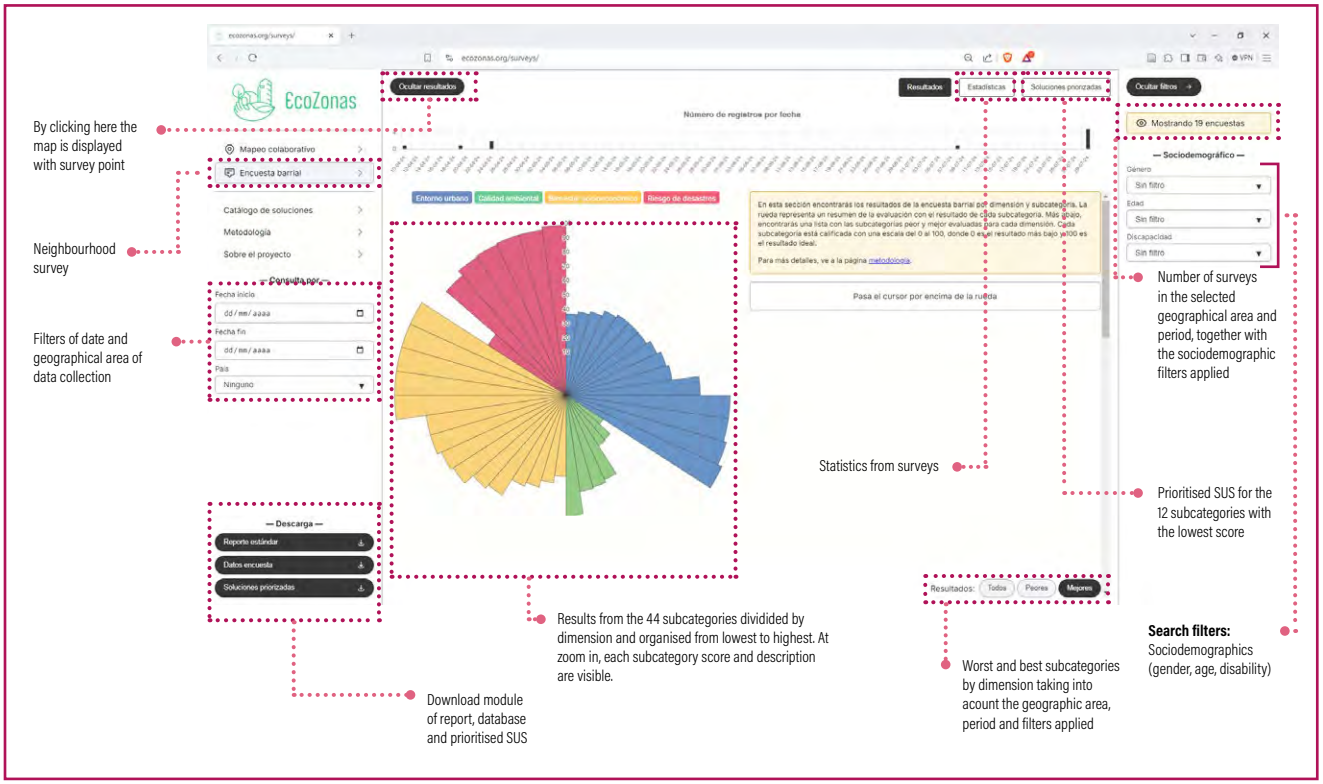
- To complement the information on each object, photographs can be taken and comments can be added.

b) EcoZones website Results dashboard

b.1. Neighbourhood survey module

Objective: Visualisation tool of the results of the neighbourhood survey to identify opportunities and challenges for the thematic areas of the evaluation framework. It allows to obtain the most urgent problems together with the SUS prioritised to address them.

Screenshot: Description of the interface



Functionalities:

- Map of surveys conducted
- Results by subcategories, in which the 12 worst and best evaluated by dimension are highlighted.
- Sociodemographic statistics of the participants
- Prioritised solutions for the worst evaluated subcategories
- Search filters (sociodemographic)

Downloads:

- Standard report with results summarised
- Survey database

Downloadable standard report:

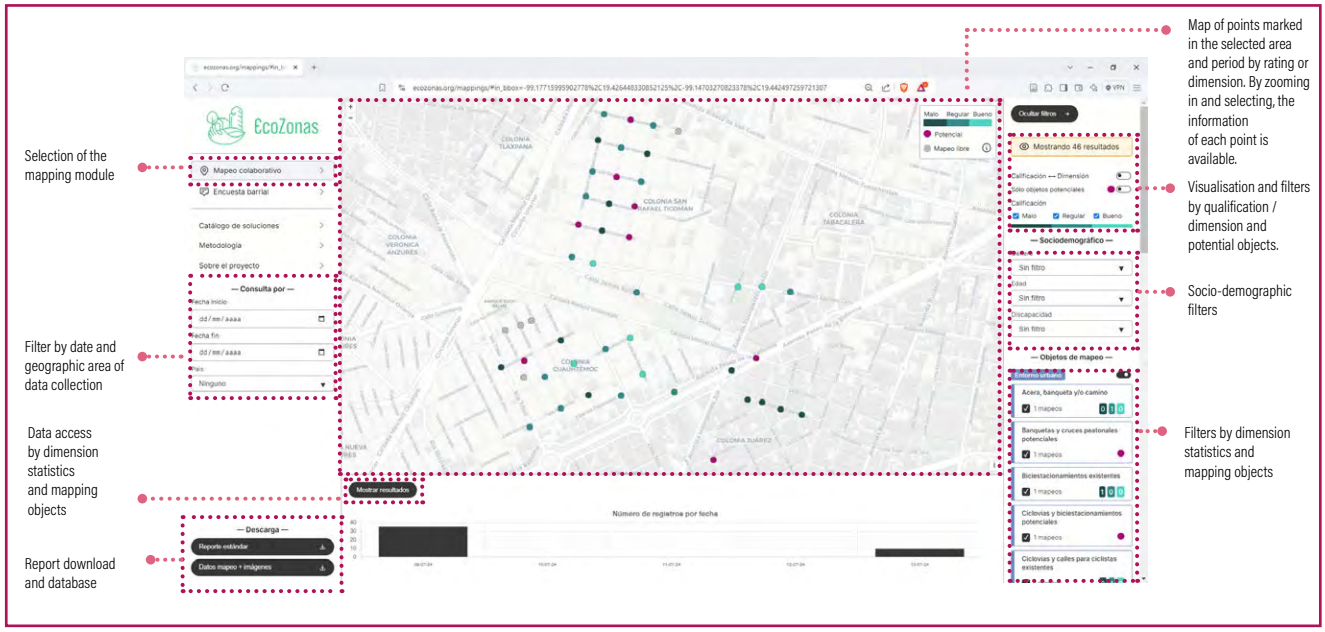
- Wheel with results for all subcategories
- Worst and best rated subcategories per dimension
- List of recommended objects to map

Results dashboard

b.2. Collaborative mapping module

Objective: Collaborative mapping results visualisation tool to identify the geographical areas where the main challenges and opportunities of the neighbourhood are located. It allows mapped objects and their ratings to be explored on a map.

Screenshot: Description of the interface



Functionalities:

- Map of mapped objects with respective ratings, criteria evaluation and supporting photos
- Results by dimensions
- Sociodemographic statistics of the participants
- Search filters (qualification, dimension, socio-demographic, object type)

Downloads

- Standard report with summarised results
- Databases (geo-referenced points and photos)

Downloadable standard report:

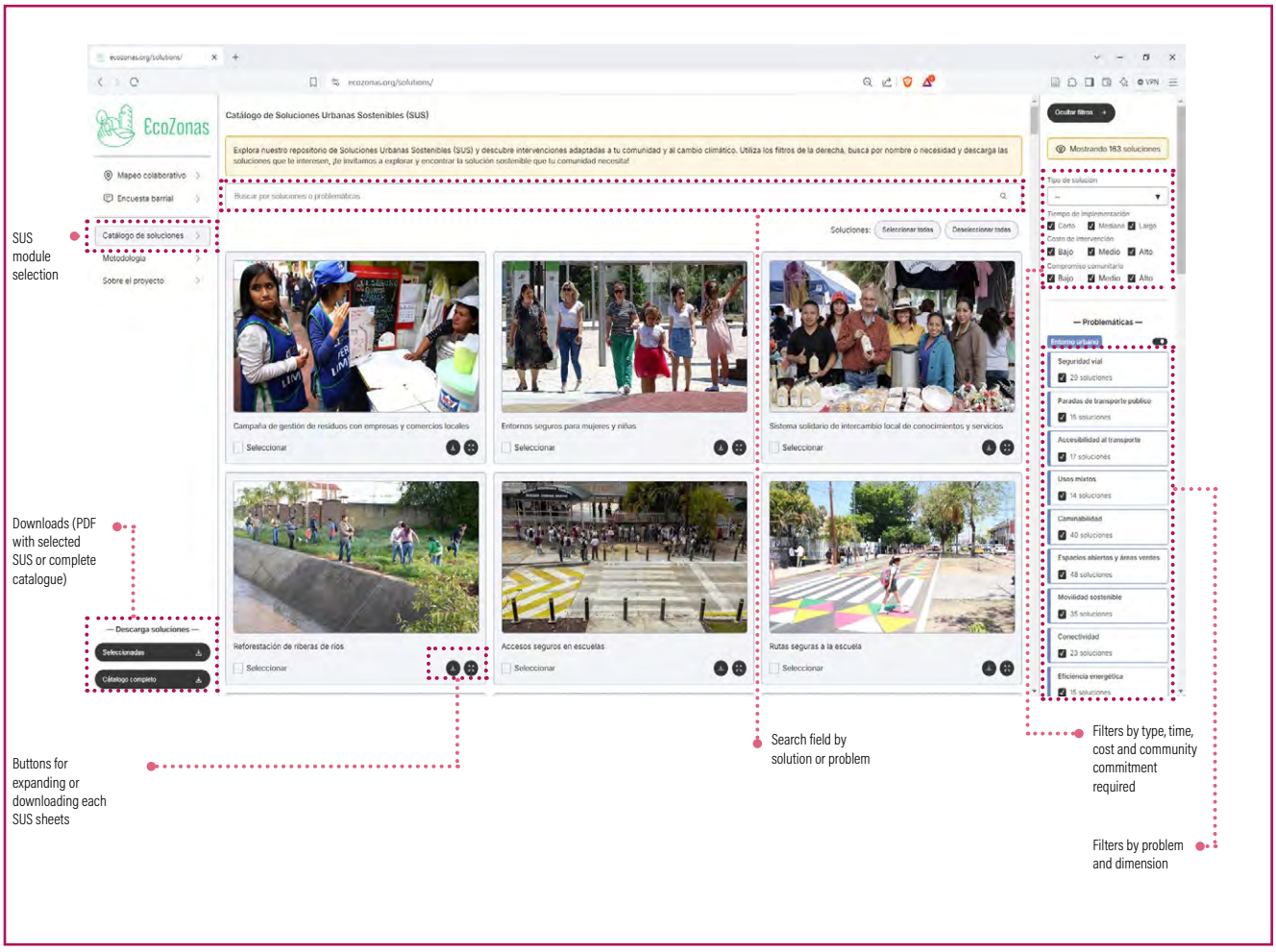
- Map and results by dimension
- Results by object

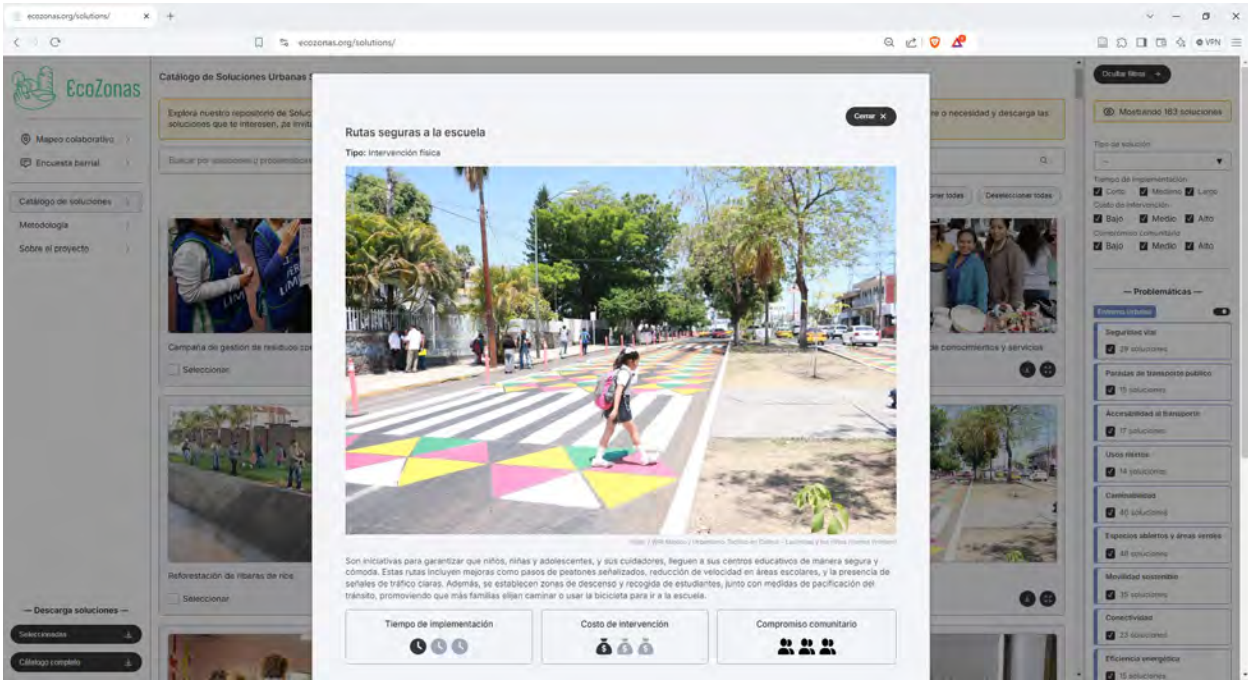
Sustainable Urban Solutions (SUS)
b.3 SUS catalogue module

Objective: A tool that compiles 160 SUS in the format of individual cards with the most relevant information, in order to facilitate the search and choice of SUS. The catalogue focuses on low-cost SUS that can be implemented in the short term and with high community participation. It also includes medium- and long-term SUS that require more time and resources. SUS are multidimensional and are related to at least one sub-category of the evaluation framework. This relationship is indicated by a list of issues, which refers to the challenges addressed by each SUS. Depending on the progress, replication and implementation of EcoZones, the catalogue can be updated to add more SUS in the future. In connection with the survey, the catalogue allows to obtain lists of prioritised short-term SUS and medium- and long-term SUS.

Website www.ecozonas.org, online use only. A digital version of this catalogue can be found in Figure A1 in the Annex.

Screenshot: Description of the interface





Search filters:

- Type of solution
- Implementation time
- Cost of intervention
- Community engagement
- Dimensions and issues to which SUS provides a response

Downloads:

- Individual sheets or PDF packages
- Complete catalogue in PDF

Downloadable standard report:

- Prioritised SUS (15)
- Total medium- and long-term SUS to develop a neighbourhood action plan

The *online* catalogue allows the search, reading, selection and downloading of SUS in the form of index cards containing:

- Image
- Short description
- Classification by type
- Issues it addresses
- Implementation time
- Cost of intervention
- Community engagement required

Other tools available

c.1. Perception wheel

Objective: Exercise to measure community perceptions of each of the 44 subcategories of the assessment framework. Can be applied as an alternative or complementary to the survey.

Implementation of the perception wheel in the pilot of EcoZones in Leon, Mexico

Each participant evaluates each subcategory according to their perception. The values score from 1 to 10, where 1 is the lowest score and 10 is the highest.

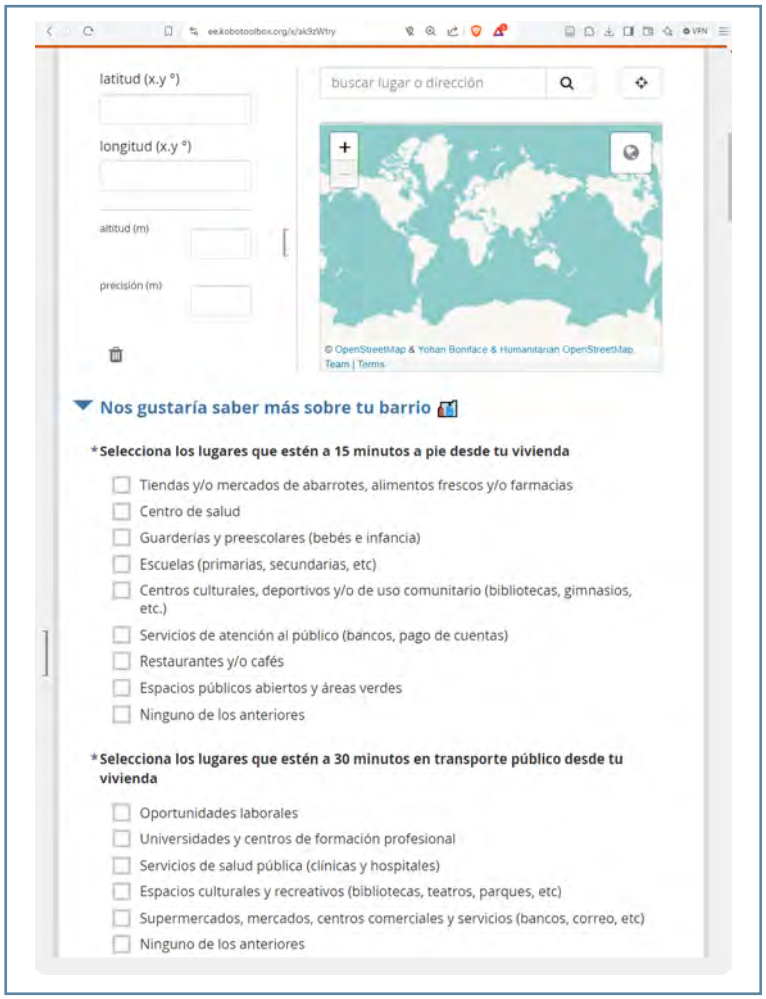
Other tools available

c.2. Monitoring survey

Objective: Tool to measure the post-intervention impact and the level of satisfaction once the interventions have ended, based on the perception of the communities. This step allows for feedback data to enhance the replicability and scaling up of actions.

The survey contains perception questions about perceived improvements. It is based on the issues addressed and the questions from the neighbourhood survey.

Screenshot: Example of perception monitoring in KoboToolbox




03

EcoZonas

EcoZones step by step

The methodology of the EcoZones project combines online and offline steps. The online steps refer to the application of the digital tools in the toolbox while the offline steps refer to the participatory activities that are developed in the field together with the communities.

The implementation of the methodology consists of the application of the tools in 6 steps, based on the pilots carried out in Hermosillo and Leon, where the process was tested and adjusted. Each of these steps is explained in detail below.

EcoZones Methodology

All steps of the EcoZones methodology involve constant community fieldwork, which must be maintained throughout the intervention, and the use of the EcoZones toolbox. Steps 1 and 2 use the technological tools most intensively. The process is synthesised on the following pages with factsheets and snapshots of the tools and fieldwork.

Assessment and diagnosis

- **Neighbourhood survey**
  Identification of the main challenges and opportunities in the neighbourhood.
- **Collaborative mapping**
  Identification of the areas where the main challenges and opportunities resulting from the survey are located.

Results

Neighbourhood survey: List of subcategories by dimension in which challenges and opportunities are identified in the neighbourhood.

Collaborative mapping: Maps of problem areas and potential for intervention in the neighbourhood.

Identifying SUS for the neighbourhood

- **SUS suggested for the neighbourhood**
  List of SUS to respond to the most problematic subcategories according to the neighbourhood survey, filtered by implementation time and intervention cost.

Results

Automatic report with:
Short list of SUS that are low cost and quick to implement. Focus on solutions that solve the most challenging subcategories, so that opportunities are utilised.

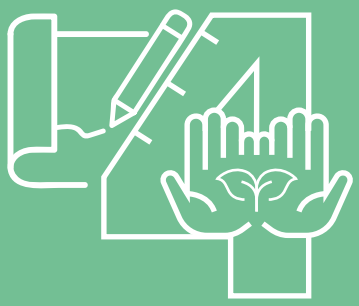
Medium and long term Neighbourhood Action Plan to respond to the main challenges.

Prioritisation of SUS with the community

- **Selection of interventions**
  SUS selection at this step is based on the results of the sub-category survey, mapping of areas and prioritisation with the community.

Results

List of low-cost and rapidly implemented SUS and prioritised intervention areas.

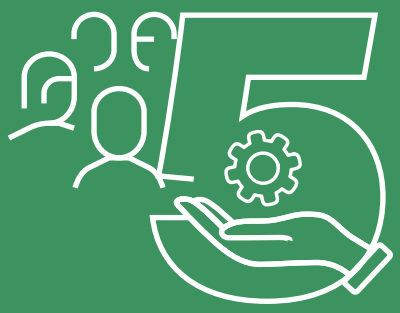


Co-design

- **Collaborative design of interventions**
  The design of the low-cost and fast-implementing interventions is worked out together with the people in the community.

Results

Intervention designs developed with the community.



Implementation

- **Collaborative implementation of interventions**
  With the participation of volunteers from the community, a correct execution of the actions defined in the collaborative design is achieved.

Results

Physical interventions in neighbourhoods implemented with the community.

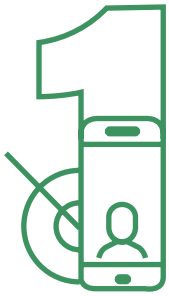
Monitoring

- **Perception survey**
  The survey assesses community members' perceptions of the interventions implemented.

Results

Post-intervention impact assessment.

EcoZonas



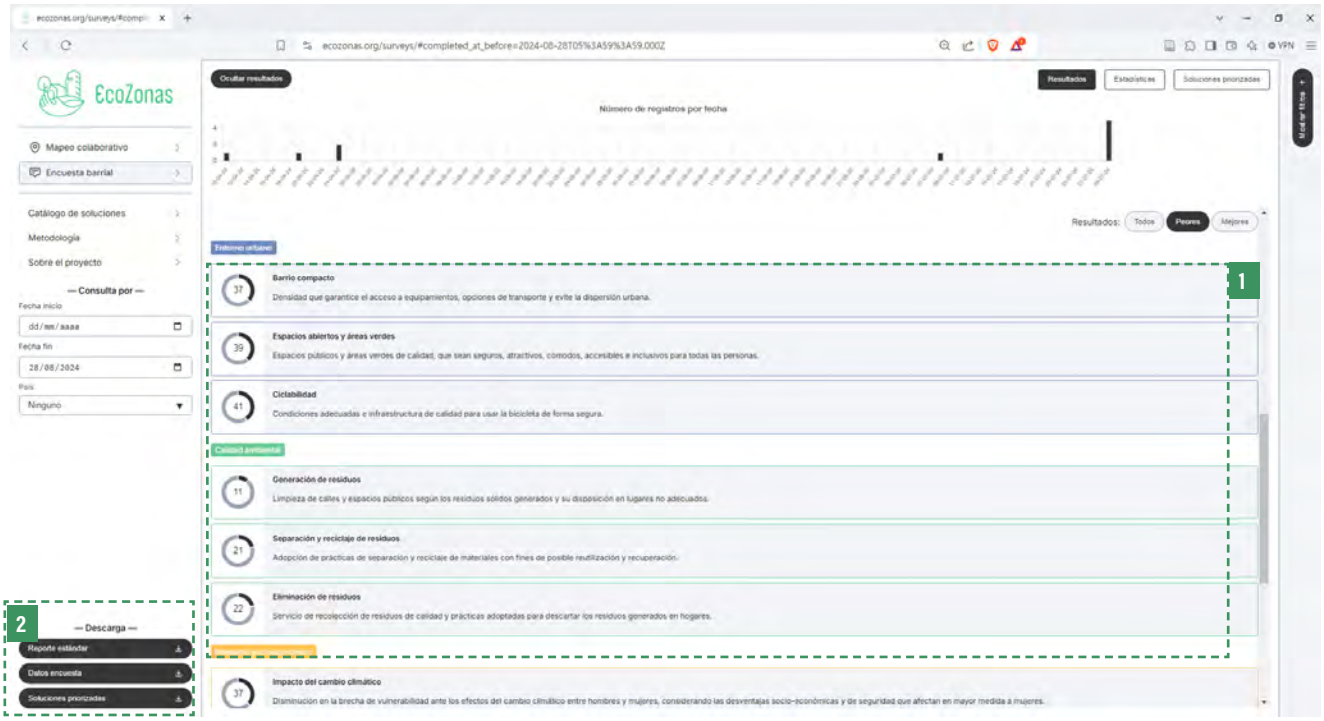
Assessment

Assessment is the first step in implementing the EcoZones methodology, as prior to any intervention in a neighbourhood it is necessary to understand the current situation and problems in order to then formulate proposals in line with the challenges identified. The objective of this step is the collection of information and data led by the community through the neighbourhood survey and collaborative mapping, in order to generate a comprehensive assessment according to the dimensions and subcategories of the assessment framework and to understand the problems of the neighbourhood. In guided exercises, it is recommended that the survey be statistically representative.

According to the project implementation experience, it is recommended to divide into groups by dimension or by zone in order to cover more objects and areas of the neighbourhood. The results of the survey and mapping carried out through the application can be viewed and downloaded from the EcoZones website.

Step 1 sheet	
Elements used from the toolbox	**EcoZones mobile application** ▪ Neighbourhood survey ▪ Collaborative mapping **Website EcoZones** ▪ Mapping and survey results dashboard ▪ Downloadable standard report with results ▪ Downloadable databases for specialised analysis
Result	Results by subcategories: 12 worst evaluated and 12 best evaluated. They reflect the most urgent problems. Recommended objects for prioritising collaborative mapping. Maps with the most problematic points to prioritise the areas of intervention in the neighbourhood.

Screenshot: List of results by subcategories



1. Worst and best subcategories per dimension taking into account geographical area, period and filters applied.
2. Download of standard report, databases and prioritised SUS of the selected geographical area and period.

Identifying SUS for the neighbourhood

The SUS are measures that seek to address the main challenges present in a neighbourhood. They are obtained through the results of the survey and the evaluation of each of the 44 subcategories, from which the 12 worst evaluated subcategories that reflect the most urgent problems are highlighted. Subsequently, an automatic linkage of SUS is generated that addresses the issues in the 12 subcategories with the lowest scores. This process is possible because each SUS includes the subcategories to which it responds, which are indicated as problems in the SUS sheets. In order to facilitate the choice of SUS for users, the website allows the visualisation of two SUS lists: a list of prioritised SUS and a list of SUS in the medium and long term, which consists of a portfolio of actions that will serve as input to generate a neighbourhood action plan.

Short-term prioritised SUS

The prioritised SUS focus on short-term, low-cost, high community engagement physical interventions, which facilitate responses to most of the problems associated with the worst-rated subcategories. The aim of this prioritisation is to inspire communities and users with more concrete measures, easy and quick to implement, to intervene in their neighbourhoods in the short term and with few resources. These SUS are presented in the 'Prioritised solutions' tab in the survey module and can also be downloaded in a single PDF document.

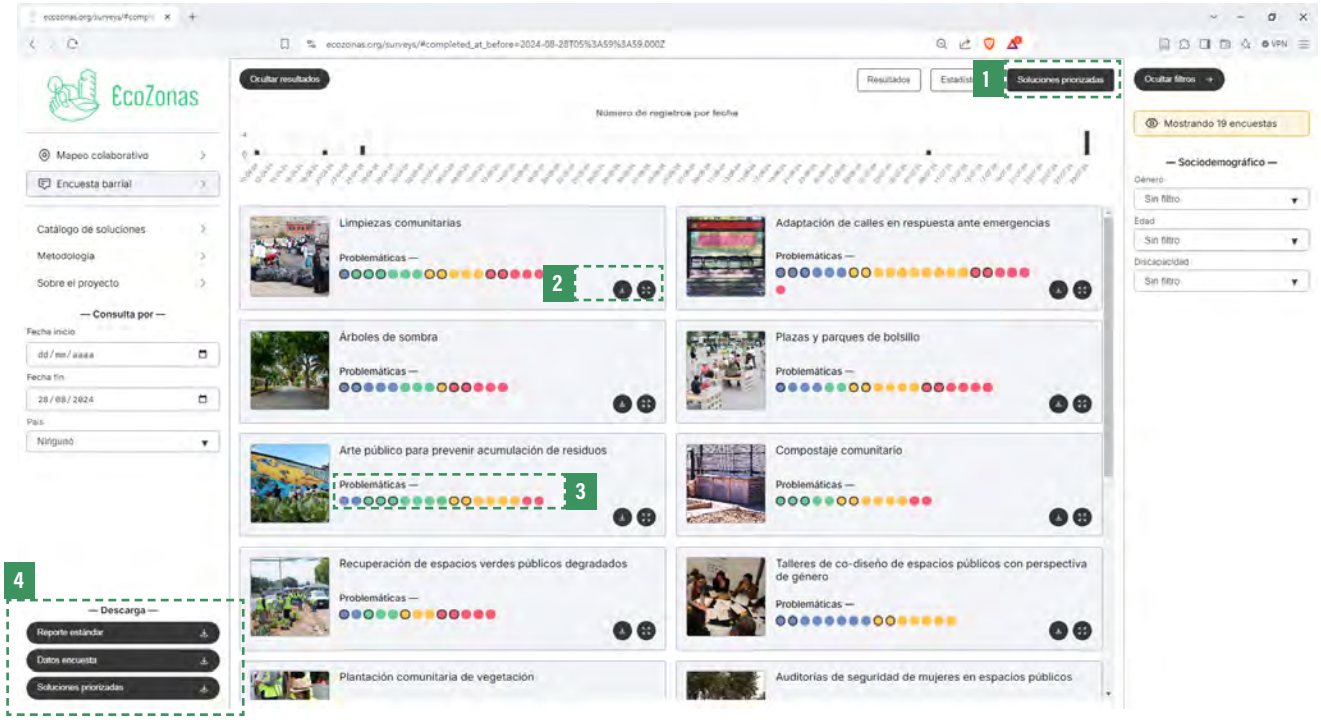
In community exercises, this list of SUS serves as a basis for participatory prioritisation with the community to choose the specific SUS that will inspire physical interventions in the neighbourhoods.

Medium and long-term SUS for the neighbourhood action plan

The SUS catalogue includes solutions that may require more time for implementation, more resources and greater involvement of actors outside the neighbourhood, such as authorities and decision-makers. Although these actions are not included in the prioritisation due to their complexity, it is important that they are recorded in order to guide the development of the territories in the medium and long term. Thus, these medium and long-term solutions are presented in a portfolio of actions that includes the complete list of SUS for the worst evaluated subcategories, which can be found in the 'Standard Report' downloadable from the website. This medium and long-term SUS portfolio serves as an input to generate a neighbourhood action plan with next steps.

Step 2 sheet	
Elements used from the toolbox	• Survey results dashboard available in web application. • SUS available in neighbourhood survey results module and downloadable reports in web application.
Result	Short-term prioritised SUS. Ideas for short-term, low-cost, community-engaged, physical interventions capable of solving a large majority of issues. They serve to inspire communities with easy-to-implement measures to intervene in their neighbourhoods. In community exercises, these SUS can be discussed in participatory workshops. Medium and long-term SUS, which consists of a portfolio of actions that require more time, availability of resources and greater involvement of authorities and decision-makers. It serves as an input to generate a neighbourhood action plan.

Screenshot: Standard report



1. Button to display the solutions according to the results of the tools.
2. Buttons for expanding or downloading the sheets of each prioritised SUS.
3. Problems to which the SUS responds. Those that are among the worst evaluated for the selected area are marked with black borders.
4. Download the prioritised SUS for the selected geographical area and period.

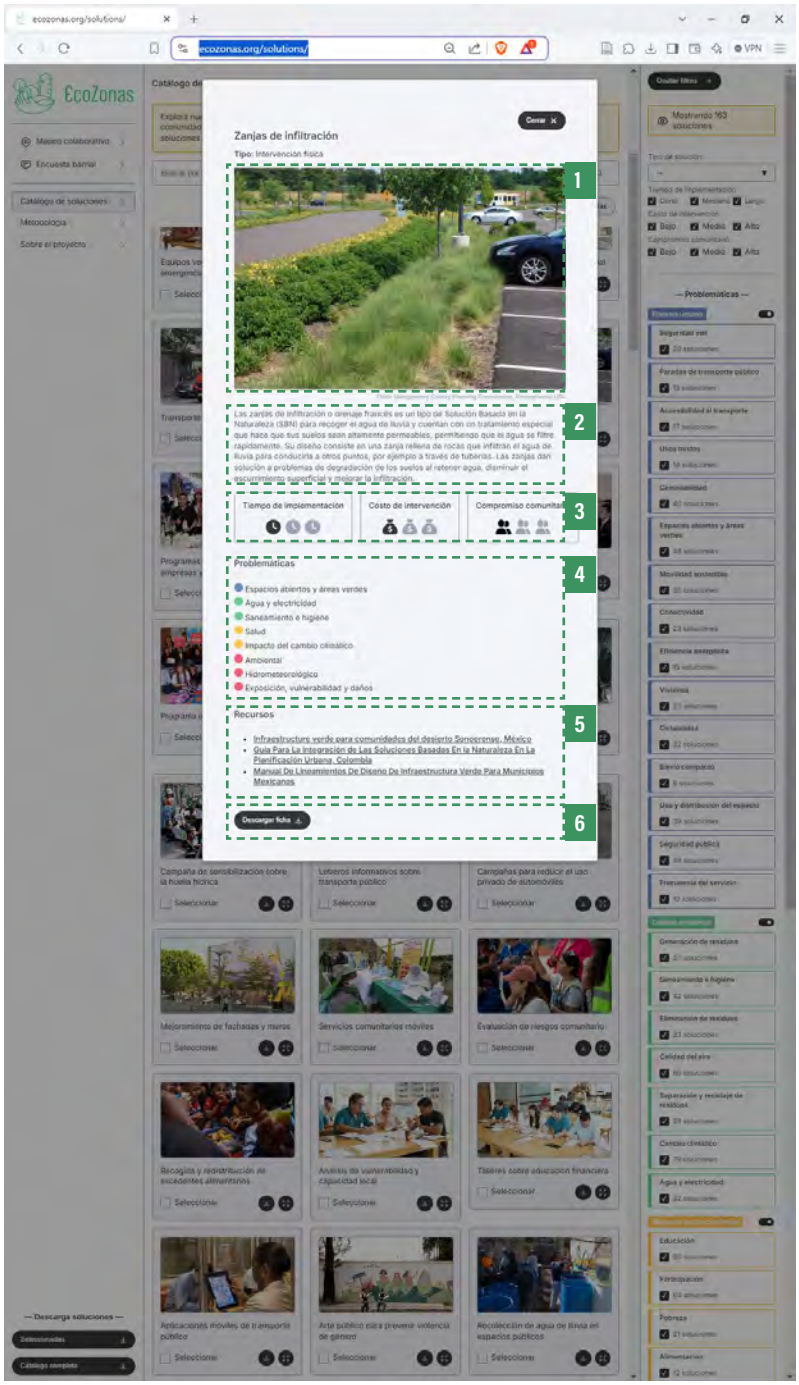
Prioritisation of SUS with the community

After obtaining the list of prioritised SUS and the results of the mapping with the most problematic areas, a new prioritisation must be made to decide the specific interventions to be implemented in the neighbourhoods. This is an offline step, which is recommended to be carried out in participatory workshops with the communities.

The idea of these activities is to be able to present the prioritised SUS to the community, discuss together the advantages and disadvantages of each of them, select the SUS that are most relevant and will have the greatest impact on the neighbourhood, and evaluate the areas of the neighbourhood that require priority intervention and where the selected SUS could be implemented.

Step 3 sheet	
Elements used from the toolbox	• SUS prioritised, obtained from web application. • Dashboard with results in web application.
Result	1. Low-cost, short-term SUS to be implemented, selected by the community. 2. Intervention areas prioritised by the community.

Screenshot: Prioritisation of SUS



1. Illustrative photo of SUS.
2. Description of SUS.
3. Time, cost and community commitment for its implementation.
4. Problems addressed by SUS, marked with the colours of each dimension.
5. Additional downloadable resources such as manuals and guides to guide the implementation of SUS.
6. Download button of the SUS sheet.

Co-design

Co-design refers to the process of generating a design in which the people of a community actively participate in its process and decision-making. The design of interventions is based on the solutions previously selected in the prioritisation of SUS. This is an offline step, which is recommended to be carried out in participatory workshops with the communities. It is possible to hold a series of sessions according to the size and complexity of the interventions.

The aim of these activities is to adapt the chosen interventions to the particular context of the intervention area, in order to provide spaces to encourage creativity and expression and for people to propose ideas. Activities such as drawing, collage, development of prototypes and models, among others, can be implemented. Some themes that can be co-designed are the definition of materials, colours, species of vegetation, type of furniture, sizes, among other design elements. Finally, it is important that the co-design has technical support to ensure that the ideas that emerge are interventions that can be implemented.

Step 4 sheet	
Elements used from the toolbox	**EcoZones website** • Fact sheets of solutions prioritised in the neighbourhood survey module, available online and for download. They include reference resources to guide design and implementation.
Result	Intervention designs developed with the community. Definition of design elements such as materials, colours, species of vegetation, type of furniture, sizes, among others.

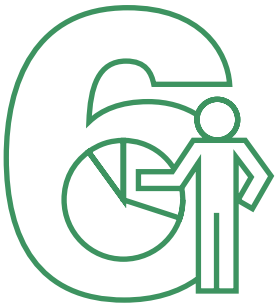
Implementation

Implementation refers to the collaborative execution of the interventions designed in the co-design sessions and supported by volunteers from the community. This is an offline step, which consists of the construction of the works to materialise the SUS.

Implementation will require some planning according to the type of intervention. For this, construction schedules for the works, budget, materials, permission from the authorities to intervene in public spaces and manpower must be considered. Depending on the type of intervention, some of the elements and works to be carried out can be built jointly with the community. In this sense, it is key to bear in mind

The resources, skills and knowledge available in each community should be taken into account, as it is likely that the local people and neighbours have techniques or materials at their disposal that can make a valuable contribution to the intervention. For example, if the intervention requires street furniture, it can be made by the people themselves with recycled materials such as wood or tyres. Another good example is the case of the pilot project carried out in La Metalera in Hermosillo, where multiple people from the community knitted mandalas to build a shade structure, thus taking advantage of the knowledge available in the community about crochet weaving.

Step 5 sheet	
Elements used from the toolbox	**EcoZones website** • Fact sheets of solutions prioritised in the neighbourhood survey module, available online and for download. They include reference resources to guide design and implementation.
Result	Low-cost, rapidly implemented physical interventions built in the neighbourhood, in conjunction with the community, as well as cultural and recreational activities carried out on the basis of prioritisation and co-design.



Monitoring

Monitoring refers to the post-intervention impact assessment limited to the critical areas that were addressed by the implementation of interventions and identified in the assessment. To carry out this evaluation, a monitoring survey is applied, which contains questions directed to the community to find out if they perceived any positive changes or improvements after the interventions.

This is an online step, which consists of a digital survey created in the Kobotoolbox tool. The survey should be customised for each intervention and should aim to include questions for all dimensions relevant to the intervention (Table 2).

Step 6 sheet	
Elements used from the toolbox	Customisable monitoring survey according to intervention, available on web application. Should aim to include questions for all relevant dimensions.
Result	**EcoZones website** Downloadable survey example for customisation according to the scope of the intervention.

Table 2: Minimum elements to include in a monitoring survey

Section	Description
Socio-demographic data	Questions about respondents' gender, age and disability.
Knowledge of the project and interventions carried out	Questions to find out if the respondent is aware of the project and the interventions implemented and what their level of involvement in them was.
Impact of the interventions	Specific questions about the impact of the interventions, i.e. the SUS implemented to improve the issue in question.
Overall impact of the project on the neighbourhood	Questions focused on understanding people's perception and satisfaction with the interventions, as well as their interest in participating in similar actions in the future.
Potential for scaling up and replication	Questions to understand whether, based on the results obtained, people would be interested in having the interventions replicated or scaled up.


04
MANDALAS OCTOGONALES

EcoZonas

Methodology in action: the pilots in Leon and Hermosillo

Structure of the process

Selection of cities and neighbourhoods

The implementation of the project in Mexico started with the selection of the two cities and the liaison with the respective local governments. The cities of Leon, Guanajuato and Hermosillo, Sonora, were chosen based on three criteria: a) evidence of a climate agenda in their government programmes and planning framework; b) the possibility of generating synergies with other initiatives of the project funder or implementing partner; and, c) the prevalence of climate vulnerabilities. In both pilots, the link with the municipal government was made through the Municipal Planning Institutes (Implanes), which are organisations that have experience in participatory planning processes and have an articulating role between different municipal agencies.

The selection of the community was made through an open call to which neighbourhood representatives nominated their neighbourhoods. The Sustainable Neighbourhood Design Competition was prepared with the Implanes and four selection criteria were determined for both cities:

1. social and climate vulnerability of the neighbourhoods;
2. organisational power of the community;
3. support from neighbours to be part of the project; and
4. description of the risks and opportunities for neighbourhood transformation.

The competition was aimed at neighbourhood representation figures in the cities with the objective of initiating links with the communities through recognised leadership within the neighbourhood. In Hermosillo, representatives of CRECES[3] Committees were invited, and in Leon, representatives of neighbourhood committees[4]. In both cities, the selected neighbourhoods have a female leadership that demonstrated a high level of convening and mobilisation in their communities.

In addition to linking the community with the local government, the implementation of the pilot projects included the accompaniment of a team of local experts to guide the communities in the participatory process, the application of the EcoZones methodology and the implementation of the SUS. The role of the local experts, Bek Consultores[5] in Leon and Hermosillo ¿Cómo vamos?[6] in Hermosillo, was key in the process of day-to-day engagement with the community, the design and execution of the prioritised solutions, as well as in the implementation and linkage with other organisations and initiatives that contributed to the execution of the SUS.

Application of the methodology

The participatory process was structured based on the EcoZones methodology over seven community workshops. The first three workshops focused on the identification and mapping of the main problems in the neighbourhoods. This first block also included two capacity building sessions: one on climate change and the other on the use of the mobile collaborative mapping tool.

In the fourth session, the communities reviewed the results of the previous sessions and identified and prioritised some actions that address the main vulnerabilities, with support from the SUS catalogue. The next two meetings were oriented towards integrating quick implementation and low-cost actions. In these workshops, the collaborative design and validation of SUS architectural drafts was carried out, as well as the organisation of community participation in the development of the solutions. Finally, communities identified and validated medium- and long-term actions to make their neighbourhoods more resilient to the effects of climate change. This was the basis for the definition of neighbourhood action plans.

In addition to these community workshops, the project included a focus group session to test the neighbourhood survey and a first version of the mobile tool. The neighbourhood survey was applied prior to the two-day collaborative mapping exercise, which was conducted with a version of the mobile app incorporating the results of the piloting in both cities. During these activities, the app development team (Codeando Mexico[7]) and the EcoZones methodology team (Wuppertal Institute and WRI Mexico) accompanied the communities and local experts (Bek Consultores in Leon and Hermosillo ¿Cómo vamos? in Hermosillo).

In both cities, between five and six months were dedicated to the execution of the SUS and the necessary steps for its implementation. In this process, the communities had different activities linked to their involvement in the implementation of the SUS, the nature of the SUS, and the activities that the technical teams promoted to maintain community interest and support for the project.

3. The CRECES (Corresponsabilidad Ciudadana para la Equidad Social) committees are bodies of citizen and neighbourhood representation whose main function is to link the inhabitants of Hermosillo with the municipal authorities in order to achieve community benefits.
4. A neighbourhood committee is an organ of citizen representation that participates and collaborates to manage demands and proposals of general interest for its neighbourhood. The committees are formally constituted and recognised by the municipal authorities.
5. https://bekconsult.com/
6. https://hermosillocomovamos.org/
7. https://www.codeandomexico.org/

Neighbourhood context

The two pilot neighbourhoods that participated in the Eco-Zones initiative have different characteristics, both in terms of their historical evolution, their location and integration with the city, as well as the problems they face.

The colonia de la Metalera, the pilot neighbourhood in Hermosillo, is a peripheral neighbourhood located in the east of the city whose name comes from the existence of an old metal mill. Like other peripheral neighbourhoods, it was consolidated through a process of irregular land occupation in 1973. The neighbourhood has serious deficiencies in services and basic urban infrastructure: water and electricity services in the houses through unregulated connections, lack of urban drainage infrastructure, dirt roads, lack of pavements, etc. These deficiencies also affect the neighbourhood's urban infrastructure. These deficiencies are also transferred to the public space domain, as the inhabitants have no playgrounds, recreation areas or vegetation, which poses an enormous challenge for habitability in the face of the high temperatures registered by the city's desert climate. The initiative's 43-hectare action polygon has a surface area of 43 hectares, and its main challenge is to community-based and institutional actions in a context of legal uncertainty for the tenure of property.

The Jardines de San Miguel neighbourhood is located in the south of the city of Leon, within the official polygon defined as the Historic Centre. It is a consolidated neighbourhood, where the first shoe manufacturing workshops were located, which gave way to the gestation of Leon's powerful leather industry. With the passage of time, this industrial activity declined, so that the economic dynamism of the neighbourhood collapsed, the built-up environment deteriorated and community cohesion gradually broke down, until reaching the current situation in which the problem of insecurity is a major concern. The action area, at the request of the community, also encompassed the surrounding neighbourhoods, with a surface area of 85 hectares, and its fundamental challenge is to implement community actions in an urban environment that is highly regulated by its inclusion as part of the action area of the Historic Centre of Leon.

Socio-demographic characteristics and delimitation
La Metalera, Hermosillo, Sonora

Population detail

1,173 Women ♀ **1,227** Men ♂

20.4%
Children under 12 years of age

5.5%
With disabilities

0.0%
Indigenous

Education

Average level of schooling **8.8**

Percentage of people who cannot read or write **1.2%**

0.7% Woman ♀ **0.8%** Men ♂

Household ownership

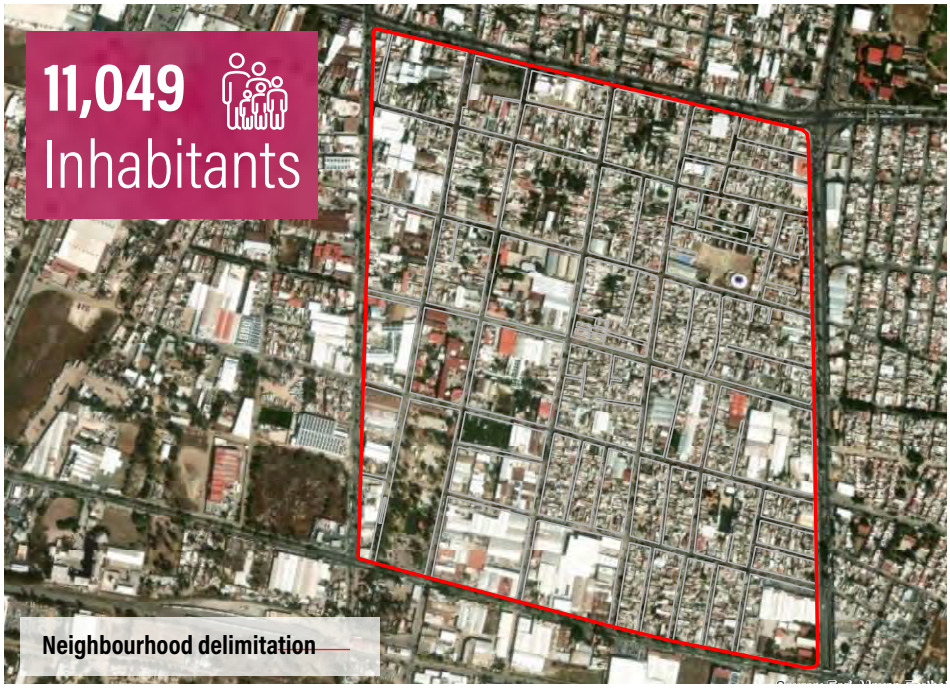
32.1% Woman ♀ **62.9%** Men ♂

Indicator	Percentage (%)
Percentage of population without health insurance	19.7
Employment rate	99.6
Female employment rate	98.9
Male employment rate	97.8
Percentage of economically inactive population	38.8
Percentage of female population economically inactive	52.2
Percentage of male population economically inactive	24.4
Age dependency ratio	49.8
Percentage of Afro-descendant population	0.3
Percentage of dwellings without a water storage tank	80.0
Percentage of households without a washing machine	31.8
Percentage of households without a refrigerator	7.2
Percentage of households without a car or van, motorbike or moped	55.3
Percentage of households without internet	58.6
Percentage of households with piped water and public water supply	97.4

Source: Census 2020, INEGI

Socio-demographic characteristics and delimitation

Jardines de San Miguel, Leon, Guanajuato



Indicator	Percentage (%)
Percentage of population without health insurance	21.2
Employment rate	98.1
Female employment rate	99
Male employment rate	96.9
Percentage of economically inactive population	34.4
Percentage of female population economically inactive	45.9
Percentage of male population economically inactive	21.5
Age dependency ratio	50.4
Percentage of Afro-descendant population	1.6
Percentage of dwellings without a water storage tank	24.9
Percentage of households without a washing machine	15.9
Percentage of households without a refrigerator	10.0
Percentage of households without a car or van, motorbike or moped	58.9
Percentage of households without internet	47.9
Percentage of households with piped water and public water supply	98.8

Source: Census 2020, INEGI

Population detail

5,762 Women ♀ **5,287** Men ♂

18.6%
Children under 12 years of age

6.3%
With disabilities

0.3%
Indigenous

Education

Average level of schooling **8.5**

Percentage of people who cannot read or write **3.7%**

5.1% Women ♀ **1.6%** Men ♂

Household ownership

34.4% Women ♀ **65%** Men ♂

Participants

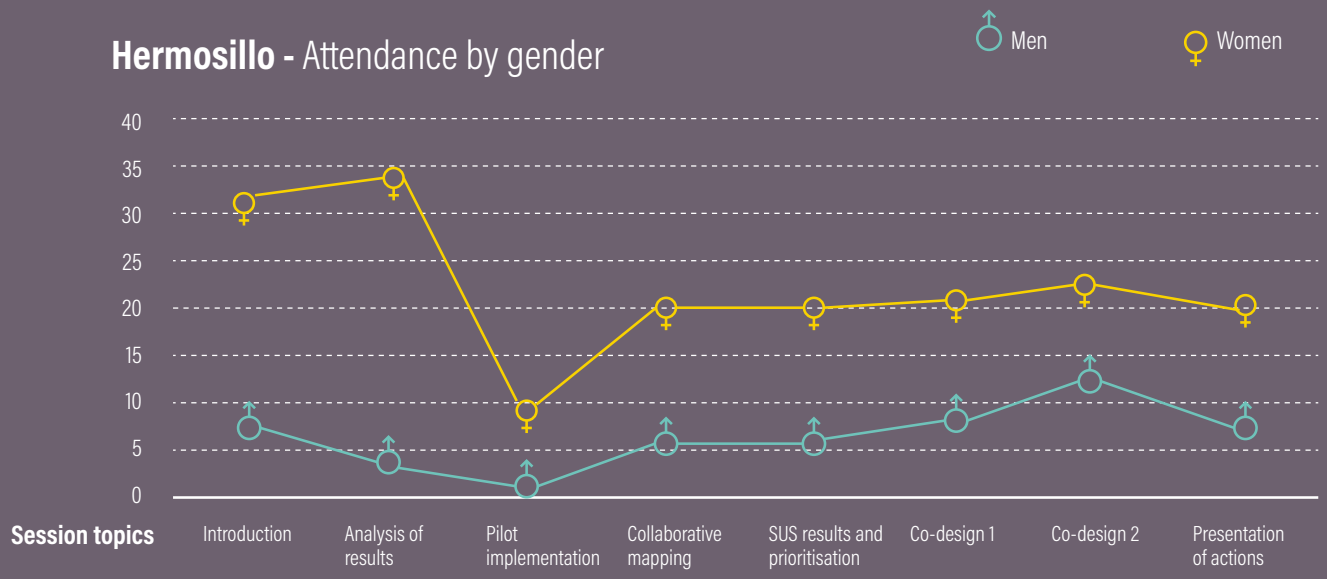
Community participation in the two pilot neighbourhoods has shown similarities, but also significant differences. In absolute terms, in Hermosillo the average number of participants is 28 people (22 women and 6 men), and in Leon it is slightly higher, 40 people (31 women and 9 men). Thus, women have led the process of change in both communities, as 78 percent of the participants in each city are women. According to the experience of the participating organisations, this is not an unusual situation in Mexico, as a large part of the community processes are led by women. The reasons may be multiple, ranging from a greater concern for improving the built environment of their communities, increasing the safety of their neighbourhoods, greater time dedicated to childcare activities, less participation in paid activities or the desire to reclaim the female role as an active agent of change, among others.

The temporality of participation also shows a similar trend. After two initial sessions in which there was high participation in the two neighbourhoods, there was a sharp drop in the testing and training session of the application pilot, which then progressively recovered in the case of Leon, and stabilised in the case of Hermosillo.

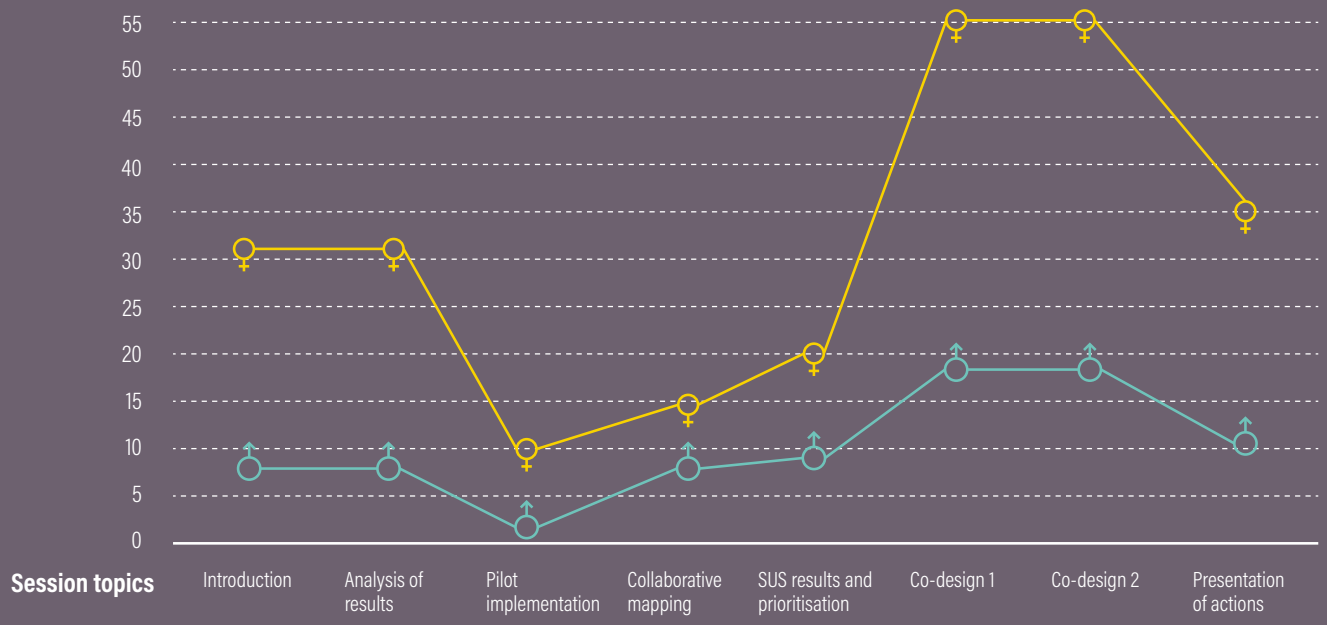
This phenomenon is also common in community processes, where there is high participation in the first few sessions and then declines to recover to a stable figure. In the particular case of EcoZones, it is worth noting that the third session was of restricted participation, as it was a pilot test. However, it is also possible that the subsequent drop in participation is due to the use of technological tools being perceived as a barrier to access for some people. This hypothesis could be considered in future community initiatives where there is a technological component, leading to the inclusion of strategies adapted to different socio-demographic profiles to facilitate inclusion and adoption.

In any case, the collaborative mapping workshop shows how the negative trend in participation was reversed. The data from Leon clearly shows the community's desire to generate real physical change in their neighbourhood, as participation in the collaborative action design sessions is the highest in the whole series. In Hermosillo, the collaborative mapping workshop reflects the creation of a cohesive action group, as participation is unchanged in the rest of the time series.

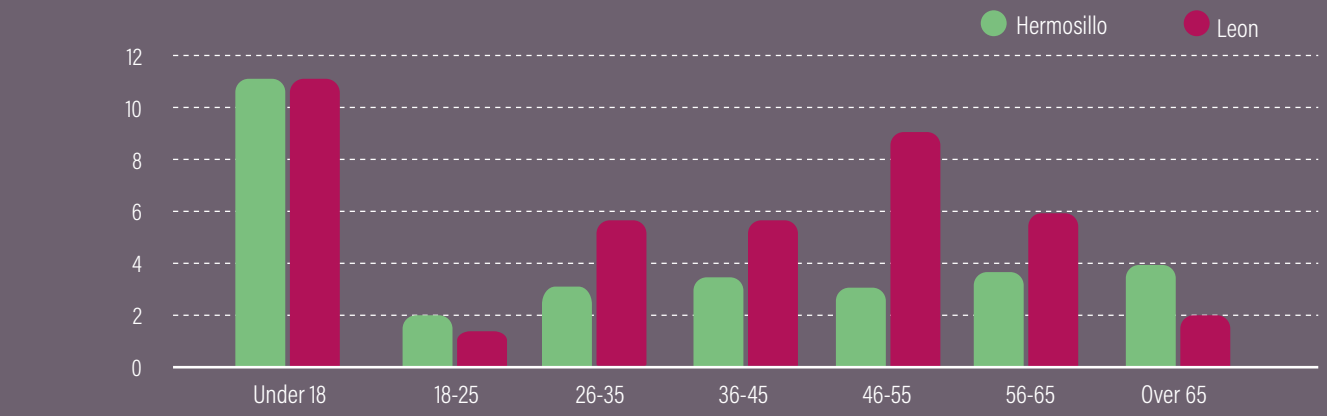
Hermosillo - Attendance by gender



Leon - Attendance by gender



Hermosillo and Leon - Average attendance by age range



Problems identified

The identification of neighbourhood problems was done by adapting and complementing the EcoZones methodology in the communities of the two neighbourhoods. In both places, the two critical elements of the methodology, individual surveys and collaborative mapping, were applied with preliminary versions of the tool, which were used to modify and refine the two instruments.

Conducting individual surveys

This instrument was used to collect and analyse the responses of workshop participants and other residents of the neighbourhood about their perception of the main neighbourhood problems. The surveys are individual and do not collect geo-localised information, so their systematisation allows for the identification of general challenges and demands that can help focus and direct the mapping and geolocation process.

Collaborative problem and opportunity mapping

This module made it possible to identify and geolocate tangible points in the territory that could be transformed through a physical intervention, a community activation process or an awareness-raising campaign. The mapping process in both communities was guided by local consultants, after prior training on the use of the application.

In a complementary way, the teams of local consultants (Bek Consultores in Leon and Hermosillo ¿Cómo vamos? in Hermosillo) implemented support methodologies in the problem identification and prioritisation workshops to facilitate community negotiation. The process in both pilots was as follows:

La Metalera, Hermosillo

The results of the collaborative mapping were synthesised and validated with information from official secondary databases (Inegi, Implan), which allowed the results to be aligned at a micro spatial scale with the general urban dynamics of Hermosillo. In addition, informal conversations with neighbours served to understand and qualitatively assess the spatial configuration of the results.

Jardines de San Miguel, Leon

The mapping was validated a posteriori after dividing the community into four groups (one for each dimension of analysis). Each group was provided with a large-format map with the printed results of the corresponding dimension, and through a process of discussion facilitated by the consultants, the areas with the highest concentration of problems, as well as the highest severity, were delineated. If the group identified elements of their dimension of analysis not captured in the mapping, they were manually incorporated into the printed map.

Survey results and mapping
La Metalera, Hermosillo, Sonora

Details
Collaborative mapping
Hermosillo, Sonora
La Metalera

Urban actions

1 Mural of voices
2 Rain alley
3 Pedestrian crossing
4 Sculptural sky
5 Micro-watershed garden
6 Tree planting
Social polygon boundary

Mapping points

Dimension	Challenges and opportunities identified	
Urban environment	**Lack of pedestrian and public transport infrastructure** ▪ Public transport stops with shade and furniture ▪ Sidewalks ▪ Pedestrian crossings	**Quality of public spaces and green areas** ▪ Lack of street furniture ▪ Poor lighting ▪ Lack of shaded areas
Environmental quality	**Waste accumulation points** ▪ Exposed drains ▪ Leaking drains	**Air pollution** ▪ Illegal burning of rubbish ▪ Illegal disposal of industrial waste ▪ Unpaved roads
Socio-economic wellbeing	**Opportunities** ▪ High level of local commercial activity	**Challenges** ▪ Diversification of cultural and sporting activities
Disaster risk	**Frequency of risks** ▪ Heat waves ▪ Floods ▪ Landslides **Low community responsiveness**	

Survey results and mapping
Jardines de San Miguel, Leon, Guanajuato

Details
Collaborative mapping
Leon, Guanajuato
Jardines de San Miguel

Urban actions
1. Shade netting and base bioclimatic
2. Informative environmental signs
3. Bikeway installation
4. Community clean-up
5. Community mural

Tree planting
Social polygon boundary
Mapping points

Dimension	Challenges and opportunities identified	
Urban environment	**Quality of pedestrian infrastructure** • Insufficient width of sidewalks • Shaded spaces • Insufficient lighting	**Lack of public transport infrastructure** • No signposted stops • Absence of furnished stops
Environmental quality	**Air pollution** • Mobile sources (cars, trucks • Illegal burning of waste • Emissions from commercial activities	**Quality of drainage and sewerage**
Socio-economic wellbeing	**Challenges** • Increase the range of cultural activities on offer • Diversify leisure and recreational activities for people of all ages.	
Disaster risk	**Frequency of risks** • Floods • Heat waves	

Prioritised solutions and co-design

Community workshops to prioritise the problems gave way to a process of working with people to design short-term solutions that could respond to the identified needs, according to locally available means. Analogous solutions were found in both pilots. For example, the need to design facilities to increase shade in public spaces, but also singular actions, such as the installation of signs to prevent waste disposal in a specific site in Leon. This variability reflects the need to consider different scales when solving problems present in communities.

As in the identification of problems, local consultants implemented support methodologies adapted to each community to facilitate the selection and design of solutions, using the list of prioritised SUS as a reference to familiarise people with interventions potentially adaptable to their needs. In each pilot, the prioritisation and design of actions took place in two separate working sessions.

La Metalera, Hermosillo

Prioritisation of actions: A dinamic methodology was used using a Monopoly-type board game. The community was divided into working tables. Each was assigned a finite budget and provided with solution tokens with four characteristics: cost, implementation time, community commitment and maintenance. At random, participants could purchase the tokens according to their budget and after analysis of the solution characteristics. The purchase of the tokens was made after a process of discussion and consensus with the participants at the working table. Once the process was completed, the scores were added to the most demanded solutions in order to prioritise the final solutions.

Collaborative design of actions: Activities were carried out on two scales. In the first type, drawings, sketches and sketches were generated to capture the ideas of the community and define the formal and functional characteristics of the actions. In the second type, the limits of each action were drawn to real scale on the public space to be intervened, in order to adjust and integrate it into the terrain.

Jardines de San Miguel, Leon

Prioritisation of actions: The community, divided into four working tables (one per dimension), selected from the battery of available generic solutions those that met four criteria: small scale, low cost, rapid implementation, and maximisation of climate and social impact. During the activity, community members proposed the integration of some solutions that were not originally considered but were integrated into the final SUS catalogue. After a facilitated discussion, the proposed solutions were presented in plenary and selected by a vote of all workshop participants.

Collaborative design of actions: The community collectively developed conceptual physical models of the interventions to be developed with low-cost school materials to serve as a starting point for the implementation stage.

In this way, the two communities developed solutions adapted to the local context that went beyond the catalogue solutions (see Table 3). In the last stage of the implementation process, for the more complex solutions that required a physical intervention in the public space, local consultants developed the technical and administrative documentation required for approval by the local authorities.

Table 3: Linking the catalogue of sustainable urban solutions to the prioritised solutions

City	Catalogue solution	Local solution
Hermosillo	Safe access zones at schools and playgrounds	Rainfall alley
		Sidewalk delimitation
	Painting murals with awareness-raising messages	Mural of voices
	SBN - Micro-watershed or rain garden	Micro-watershed gardens
	Install shade infrastructure	Sculptural sky
Leon	Install shade infrastructure	Shade mesh and bioclimatic base for children's plaground
	Construct bus shelters and bus shelters	Bus stop with green roof
	Pop-up cycle lanes (recreational cycleways)	Implementation of a cycle lane with vertical and horizontal signage
	Bicycle parking areas	Installation of cycle racks
	Install signs to prevent informal waste dumping	Informative posters on waste management and cleaning of common areas.
	Community planting of native species	Urban reforestation

Prioritised actions
La Metalera, Hermosillo, Sonora

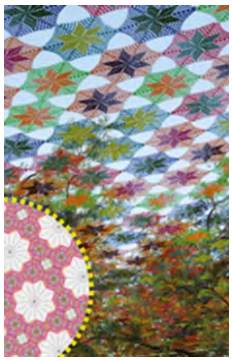
Rainfall alley

Proposal	• Safe corridor • Ground levelling with hydrological analysis • Lighting installation • Floor design using reuse of stonework • Inclusion of vegetation • Connection to park via 'woven sky"
Social benefits	• Minimise water seepage into dwellings • Increased safety for walkers • Improved perception of space
Climate benefits	• Generation of microclimate with vegetation and shade • Reuse of waste and materials

Micro-watershed gardens

Proposal	• Rainwater infiltration gardens • Planting of trees and native vegetation
Social benefits	• Reducing insecurity • Increased surveillance of illegal waste disposal
Climate benefits	• Improved microclimate • Water table recharge • Increased thermal comfort • Regional vegetation planting

Sculptural sky



Proposal	• Installation of a community-collaboratively woven canopy
Social benefits	• Improved meeting and recreational space • Beautification and colour in public space • Strengthening of community bonding
Climate benefits	• Provision of shade • Improved thermal comfort • Transmission of local knowledge

Sidewalk delimitation

Proposal	▪ Creation of a safe pedestrian crossing ▪ Incorporation of mobile furniture made by the community: planters with vegetation and recycled benches. ▪ Delimitation of the access to the park with benches made from recycled materials and local clay. ▪ Connection of rainwater alley with sculptural ceiling.
Social benefits	▪ Improved safety for pedestrians ▪ Reduce vehicular speed ▪ Generate micro-spaces for rest and play
Climate benefits	▪ Improving the microclimate with increased vegetation ▪ Reuse of waste and materials

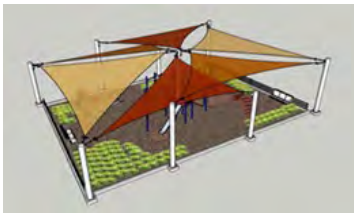
Mural of voices

Proposal	▪ Creation of a mural with recycled materials reflecting the voices of the children's community.
Social benefits	▪ Increased perception of safety and security ▪ Strengthening community cohesion
Climate benefits	▪ Reuse of waste and materials

Source: Own elaboration with images from Hermosillo ¿Cómo vamos?

Prioritised actions
Jardines de San Miguel, Leon, Guanajuato

Shade mesh and bioclimatic base for children's plaground



Proposal	• Installation of a shade net in the playground • Replacement of the current sand base with a bioclimatic base.
Social benefits	• Effective use of the children's playground • Increased safety for children
Climate benefits	• Increased thermal comfort • Reduction of the heat island effect

Urban reforestation

Proposal	• Planting of 50 medium trees, 50 small trees and 50 shrubs in empty boxes, with species adapted to the local climate.
Social benefits	• Increased social cohesion through community organisation for planting and maintenance
Climate benefits	• Local temperature regulation • Increased thermal comfort • Improved air quality

Implementation of a cycling lane and installation of cycle racks.

Proposal	• Implementation of a pilot cycle lane and installation of three cycle racks at high traffic points.
Social benefits	• Increased population health and public space management
Climate benefits	• Mitigation of emissions from increased active mobility

Bus stop with green roof		
	**Proposal**	▪ Installation of pilot bus stop with green roof ▪ Concrete benches under the bus shelter ▪ Installation of vertical signage ▪ Installation of medium sized potted trees
	Social benefits	▪ Promotion of public transport ▪ Increased safety and security ▪ Reduction of health risks due to heat stroke
	Climate benefits	▪ Improved thermal comfort ▪ Capture of emissions

Informative posters on waste management and cleaning of common areas.		
	**Proposal**	▪ Installation of ten community-designed information signs on waste management in problem areas (La Cartonera and Parque Tamesi)
	Social benefits	▪ Awareness-raising on waste management ▪ Community ownership of spaces
	Climate benefits	▪ Appropriate management of urban waste

Source: Own elaboration with images from Bek Consultores

Implemented actions

Once the community had prioritised the low-cost and fast-implementing actions to be developed with the EcoZones project's seed money, work began on their implementation. In the first instance, formal approval was sought from the municipal planning institutes. Implementation work then began in four main areas: 1. preliminary technical studies and development of architectural projects; 2. community coordination for implementation; 3. identification of synergies and donations; and 4. management of the corresponding authorisations and permits. Finally, with varying degrees of community involvement, the sustainable urban solutions were implemented with support from both local governments. In both pilots, obstacles were encountered that required negotiation and creativity on the part of the implementing teams, as well as flexibility on the part of the communities.

La Metalera, Hermosillo

In Hermosillo, the five actions prioritised by the community were implemented between April and September 2024. Implan led the management of permits and authorisations, as well as the identification of synergies and donations to municipal agencies with constant support from local consultants. Also, coordinated by the team of local consultants, donations from local businesses, participation of civil society organisations and participation of volunteers from outside the community of La Metalera.

The main obstacles during implementation are related to the irregular nature of land occupation in the colony. The implementation of the SUS made it possible to identify the ownership of the property used as a park, as well as the validation of its land use. Likewise, the connection to the drinking water network of some houses in the colony was formalised.

Complementary activities: In addition to the four areas of activities common to both pilots, in Hermosillo, constant community outreach activities were developed through the 'community cafés'. In these meeting spaces, constant communication was maintained with the community to review the work plans and the executive projects of the interventions, exchange ideas and adjust the actions according to the needs and wishes of the neighbours. There were also spaces in which the community came together to weave part of the shade structure, guided by a neighbour who was an expert in weaving. It is worth highlighting the call to the community of weavers in the city of Hermosillo, which brought together an average of 40 people in seven sessions during which they enthusiastically contributed to the weaving of mandalas to build the shade structure.

In addition, during the implementation process, three clean-up days and three waste collection sessions were organised in the neighbourhood for proper disposal and reuse.

Jardines de San Miguel, Leon

In Leon, three of the six SUS prioritised by the community in the workshops were implemented, as well as three other actions agreed with the community and Implan during the implementation stage, to replace those that were not installed. Faced with possible controversy from traders and other stakeholders, the municipal agencies and Implan requested not to continue with the implementation of the cycle priority lane and the green-roofed parabus. Due to its greater technical complexity due to the low bearing capacity of the soil, the implementation of the shade netting was delayed and is expected to be implemented after the date of publication of this document.

Liaison with municipal agencies was led by Implan, while permit and authorisation procedures were led by the implementation team with the support of local consultants and Implan officials. In addition to the seed money from the EcoZones project, the municipal agencies made some in-kind donations and worked with the community to strengthen and generate local capacities.

Complementary activities: In Leon, some actions were carried out to complement the implementation of the SUS. For example, a clean-up day was held at the private property known as 'La cartonera'; a tree adoption scheme was developed in conjunction with the General Directorate for the Environment and some workshops were held to raise community awareness on some topics of interest.

Given the request to suspend the implementation of the two SUS with a mobility component, and given that there was already progress in the development of the projects, the executive projects for the cycle priority lane and the parabus with green roof were delivered to the community. In addition, cycling gauges were carried out in some streets of the colony and a survey was conducted on the street where the cycling infrastructure would be implemented as elements to complement the case for subsequent implementation.

Table 4: Actions implemented in Hermosillo

Name	Community participation	External contribution
Rainfall Alley	· Contribution of reusable waste · Decoration of the alley floor	· Municipal energy and climate change agency: lighting installations · Kuroda (IP): tile stonework
Micro-watershed gardens	· Cleaning and preparing the ground · Planting of trees and plants	· Municipal public services: trees and plants · Caminantes del desierto A.C.: training and labour in planting · Buenos vecinos A.C.: trees · CAFFENIO: coffee grounds waste · Aquafim (IP): drip irrigation system
Sculptural sky	· Knowledge transfer to community members and external volunteers · Mandala weaving	· Municipal public services: labour · La familiar (IP): discount on yarns · Weavers from Hermosillo: labour
Sidewalk delimitation	· Participation in construction of benches · Participation in planting trees and plants	· CAFFENIO: volunteers · Caminantes del desierto A.C.: training and labour
Mural of voices	· Participation in the design and creation of the mural	· Kuroda (IP): tile stonework
Clean-up and waste collection days	· Participation and contribution of waste	· Municipal public services: vehicles and personnel
Clean-up and waste collection days		

Table 5: Actions implemented in Leon

Name	Community participation	External contribution
Shade mesh and bioclimatic base for children's playground	• Laying of the bioclimatic base • Cleaning of playground area • Participation and planting	• Directorate of Environment: plants
Urban reforestation	• Participation in tree clearing, planting and tree adoption programme	• Directorate of Environment: cleaning, lending of materials • Donation of labour. trees and soil • Implan: vehicles
Placement of cycle racks	• Identification of locations	• Directorate of Mobility: Cycle rack
Informative posters on waste management and cleaning of common areas.	• Designing the posters • Participation in the installation	
Awareness-raising workshops	• Participation in workshops	• Directorate of Mobility: training • Directorate of Environment: training
Community mural	• Participation in the design and creation of the mural	• Municipal Youth Institute: linking with local artists
Clean-up day	• Collection of signatures	• Integrated Public Waste Management System: waste collection
Crafts workshops	• Attendance at workshops	

Neighbourhood Action Plan

In accordance with the EcoZones methodology, once the actions to be executed in the framework of the implementation of the pilots were defined, both communities participated in the elaboration of a sustainability plan for their neighbourhoods. The local consultants, supported by the list of SUS prioritised after the identification of challenges and opportunities in the neighbourhood from the survey and mapping, guided the communities to identify and prioritise those actions in the short, medium and long term that address the main vulnerabilities in the neighbourhoods. At the same time, local consultants identified synergies with municipal programmes and initiatives in the private sector and civil society organisations that will present possible sources of funding or other contributions for the implementation of the selected SUS.

In addition, the planning instruments in which such actions have a place were identified. A common factor between the pilots is that both cities have participatory budget programmes to which citizens submit intervention proposals at the neighbourhood level to be implemented with public resources. The neighbourhood action plans identify these programmes as potential sources of funding for SUS implementation in the short and medium term.

La Metalera, Hermosillo

The SUS to be implemented in the medium and long term address some of the issues that were not addressed by the quick implementation and low-cost actions of the EcoZones project. For example, actions are included that respond more comprehensively to the issue of urban solid waste, as well as to the lack of infrastructure for public transport mobility. Also, the actions considered in the action plan address a wider area of the neighbourhood, as opposed to the short-term actions that concentrated on the park area. The neighbourhood sustainability plan identifies the participatory budget programme as well as the operational programmes of the municipal departments as sources of funding. In addition, it proposes a strategy to continue linking with the private sector and civil society organisations that have already dedicated resources to improving La Metalera.

Jardines de San Miguel, Leon

The SUS included in the Jardines de San Miguel neighbourhood action plan respond to neighbourhood problems. Through a playful dynamic, the community was able to validate, prioritise and propose the location of the SUS. The plan includes short-term actions and takes up the executive projects of the prioritised SUS that were not implemented: a green roof pavilion and the installation of a priority cycling lane. In both cases, it suggests applying to the participatory budget programme and identifies a possible adaptation of the bus shelter model to the existing outdoor advertising compensation scheme. Likewise, the municipal government initiative "Historic City" is identified as a relevant programme for the implementation of some of the projects and actions in the short, medium and long term integrated into the action plan.

Assessment and diagnosis

Leon

August 10th to December 7th, 2023

The perception wheel exercise in August 2023 marked the beginning of the identification of neighbourhood problems, which was fine-tuned in October with the pilot survey, and in December with the community mapping app.

Hermosillo

August 2nd to December 14th, 2023

The process ran parallel to Leon. After the perception round and the pilot survey, efforts focused on the community mapping of five routes in December 2023.

Sustainable Urban Solutions

Hermosillo

January 30th, 2024

The 368 mapped objects were distributed across the four dimensions of the methodology, and ordered by frequency and impact. In thematic roundtables, the community discussed possible solutions to the identified problems.

Leon

January 25th, 2024

The validation of the mapped actions provided a common basis for the community to start the discussion on the type of actions needed in the neighbourhood.

Prioritisation

Leon January 25 th, 2024

Four criteria were used to prioritise actions: small scale, low cost, rapid implementation, and high climate and social impact. The group discussion was validated in a plenary session, defining the priority actions for the following sessions.

Hermosillo January 30th, 2024

To prioritise solutions, a Monopoly-style game board dynamic was used, in which participants had finite resources at their disposal. Thus, an agreement was reached to prioritise low-cost actions that could be implemented in the short term.

Co-design

Leon
March 19th to May 7th, 2024

The community, divided into thematic tables, conceptualised the design of the actions using mock-ups, sketches, and collages.

To adapt the design to the needs defined in the prioritisation, trigger questions were used to narrow down the proposals and enable their feasibility.

Hermosillo
March 5th to May 2nd, 2024

The collaborative design was supported by manual design activities and the elaboration of full-scale traces in the street, which allowed the initial proposals to be adjusted.

Actions such as the sculptural sky favoured the transfer of knowledge within the community.

Implementation

Leon
June 15 th to September, 2024

The community participated actively and consistently in the implementation sessions, as well as in workshops for complementary activities.

The implementation implied an additional administrative effort, due to the historic protection status of the community's surroundings. Liaison with institutions such as IMPLAN made it possible to limit the actions, depending on their technical feasibility.

Hermosillo
May 20th to September, 2024

The community participated continuously in the implementation sessions, and spent a great deal of time making materials needed for implementation.

The involvement of government institutions, such as IMPLAN, was key to coordinating institutional support and solving legal problems.

Monitoring

Leon
From October 2024 on

Post-intervention evaluation will identify which actions have had the greatest impact on the community, and direct future efforts.

Hermosillo
From October 2024 on

The last stage will be executed once the implementation of the five actions has been completed. Subsequent evaluation will be essential to identify opportunities for improvement.

EcoZonas

Lessons learned

As in any participatory process that involves a process of community creation, but where institutional norms govern, the implementation of solutions requires continuous processes of negotiation between the parties involved and flexibility to reach agreements, as well as an effort to adapt to situations that were not initially envisaged. For this reason, this type of process provides an enormous amount of learning that can be used to implement similar processes in other contexts. In summary, the main lessons learned have been systematised in the four categories presented below.

Community engagement

The methodology developed is designed for the community and the solutions are prioritised by the community, which is why the participation and appropriation of the process by the participants is necessary. Thus, three strategies are identified to achieve these objectives:

Early identification of community leadership

It is highly recommended to indentify key actors within each community from the first sessions in order to facilitate the processes of linking and appropriation of the process, as well as to identify community interlocutors with the local authorities. Leadership also allows for the dissemination and scaling up of participation with neighbours. However, leadership may be partial and linked to a specific timeframe (some may lead the dissemination process and others may feel more comfortable in this role when the activities are carried out in the public space, for example).

Continuous linkage

Community ownership requires continuous communication, in which people can participate, propose and disagree throughout the process. For this reason, it is necessary to establish a linkage process that adapts to the different profiles of the people. Thus, face-to-face workshops are essential to establish strong links with the community and advance in the implementation process, but they need to be complemented with other strategies that favour the constant flow of information, such as the creation of chats in social networks or other more flexible spaces that allow for the adjustment and refinement of the community strategy, such as the establishment of community cafés (a strategy for less formal meetings) in the period between workshops.

Transparent and contextually appropriate communication

Any drawbacks or obstacles that arise during the implementation process must be clearly and accurately communicated to the community, as the nature of the participatory creation process means that there is a high level of uncertainty in the outcomes. Communication should clearly show the reasons for obstacles and propose alternatives to overcome them.

Likewise, in areas with high levels of insecurity, whether circumstantial or structural, the openness of the community to the collection of information is significantly reduced. In these situations, it is necessary to consider additional efforts prior to the survey. In these cases, strategies such as workshops open to the public, door-to-door communication, campaigns in local businesses and other similar strategies can generate a higher level of trust not only for the people participating in the workshops, but for all the inhabitants of the neighbourhood.

Coordination with local authorities

Local authorities play a key role in the community process, as they can multiply the positive impacts of interventions by facilitating coordination with different agencies, through technical accompaniment and by providing additional resources. The main lessons learned here are:

• Integration of the process into local programmes

The exchange sessions with local agencies allow for the identification of existing programmes and plans and the identification of synergies between short- and long-term government priorities, as well as the objectives of the collaborative mapping methodology. Identifying these priorities allows the timing of implementation of the community process to be coordinated with municipal programmes and thus generate multiplier effects from the interventions of both.

•• Negotiating with the community

The local administration is responsible for ensuring that the proposed solutions comply with current regulations and legality. Therefore, some solutions prioritised and intended to be implemented in the short term may take longer than expected and therefore may not be feasible within a limited timeframe. To minimise these problems, ongoing communication with local government focal points is necessary at each stage of the process and, in particular, once the information from each community workshop has been synthesised, to identify implementation challenges not previously considered. These challenges may involve a process of negotiation with the community and, if deemed necessary, even raising the option of alternative action.

••• Replicability and scalability of the process

As a community-led process, solutions will respond to specific neighbourhood problems. However, the essence of the EcoZones methodology lies in the replicability and scalability of the results. Knowledge transfer to local authorities, as well as evidence of results in the field, can allow the methodology to be adapted to particular information needs. (e.g., the use of modules for the specific to the implementation in other neighbourhoods of the city). In this way, public resources are spent on interventions with a greater positive impact on the different communities.

Design and implementation of the solutions

Starting from the local context (technical and human resources, budget, integration of different perspectives, etc.), the adaptation of urban solutions to community priorities is the critical process to generate transformative and effective change in the long term. This design and implementation process yielded five lessons for future action:

• Integrating climate change into everyday needs

Climate change is a global, multi-scale phenomenon that affects everyone. However, working on a neighbourhood scale implies adapting the language and consequences of climate change to a scale of everyday impacts on people's lives. Therefore, the solutions adopted must consider actions that improve people's quality of life and also contribute to adapting the urban environment to climate impacts from the local context. As an example, both the Leon and Hermosillo pilots considered increasing shaded areas in frequently used public spaces, but the solutions were adapted to the built environment and the needs of each community.

•• Solutions designed from multiple perspectives

The EcoZones tools provide a gallery of solutions that can serve as inspiration or a basis for the community to design its interventions, but it must be borne in mind that the solutions will come from the needs and wants of the agents of change, from those who wish to overcome the current state and transform the community to improve the living conditions of the population. Thus, the prioritisation of problems and the design of solutions must take into account the perspective of the people who are most vulnerable. The experience in Leon and Hermosillo showed that the process was mostly led by women, who prioritised and incorporated their vital perspective in the solutions implemented, but also incorporated the vision of other people, such as children and youth. Incorporating an intersectional perspective in the actions is vital for community appopiation.

●●● Spatial scale and integration of interventions

The experience of the pilots showed that it is necessary to find a balance between the location of the actions spread throughout the neighbourhood and the concentration of solutions in a very delimited area. The first approach makes it possible to spread the impacts of interventions over a larger population, but the coherence of the actions may be limited if the actions are perceived in isolation. The second approach may allow a more coherent integration of actions, but the impact will be more spatially focused. The conditions of each community must be assessed to decide which strategy is the most appropriate.

●●●● Assessment of resources and capacities for implementation

The type and scale of the actions to be implemented are conditioned by the existing resources in each community: community cohesion (to motivate and mobilise people), logistical (organisation of time and tasks), material (equipment, tools) and budgetary. Workshop leaders and participants must evaluate the actions according to these criteria in order to define the feasibility of implementation within a given timeframe.

●●●●● Creativity and innovation

The community must internalise that they are the agents of change in their own environment and that they have the deepest knowledge of the challenges, but also of the possible solutions to the problems. Thus, actions can take risks by being designed from unconventional perspectives, and above all, they must serve to inspire and convince the rest of the community that change designed from the ground up is possible. Solutions such as community murals or community blindness fabrics are good examples of creativity, inspiration and change.

Use of technological tools

One of the most relevant components of the EcoZones methodology is the systematisation of community information through technological tools that allow for the centralisation and processing of information for simpler and more transparent decision-making for users. The community's relationship with the tools can be summarised in these two lessons learned:

Incremental training

People in each community have different biographies and degrees of familiarity with the use of technology. Therefore, the training process should be gradual and, as far as possible, adapted to the different profiles of the people. Thus, it is recommended that the first community mappings be guided and that people be divided into small groups in order to provide personalised attention and training. In order to favour technological integration, as the training process progresses, it is possible to transfer training responsibilities to the people in the community who are more familiar with the tools.

Simplicity in language and design

The methodology's application and data dashboard should clearly define who the end-user is and adapt the design and language accordingly. Therefore, if the end-user is a person unfamiliar with climate change, it is preferable to minimise technical language as much as possible and to plan questions as directly and unambiguously as possible. However, the different components of the methodology do not necessarily have to be oriented towards the same user (e.g. the EcoZones data dashboard has options that are more focused on more advanced IT users).

06

EcoZonas

Conclusions and recommendations

The EcoZones Project was designed with the objective of developing digital tools that facilitate the consolidation of sustainable, resilient and liveable neighbourhoods through broad community participation.

Its implementation in the Mexican context has served as a test and example of technology-mediated collaboration between neighbourhood organisations and government institutions. Such facilitation is implemented by local, national and international technical teams to put into practice a transformative vision of urban space. The benefits of the project are visible in the communities themselves, in the form of the actions implemented, which have only been possible through the sustained efforts of individuals and neighbourhood organisations, as well as the search for dialogue based on visions that are not always shared.

However, it is important to highlight that, despite the overall positive balance of the project, the tension between theory and practice has served to expose barriers and limitations to implementing bottom-up urban planning approaches with a strong co-creation component in the Mexican case. Among these limitations we highlight the following.

Community engagement and aligned interests

It is not easy to find communities that have strong cohesive ties to successfully sustain a participatory process over a long period of time. Community participation processes require a clear and common goal in the medium and long term, as the process wears out as it progresses. Short-term actions serve to maintain interest and reinforce commitment and a sense of participation, but they are a means to achieving goals, not an end in themselves.

In addition, internal rivalries and conflicts are expressed in the participatory process, which can hinder the community process of neighbourhood transformation and make it difficult to reach a consensus. This is compounded by low community participation, which generates contexts of insecurity and lack of confidence in political processes. In practice, it is necessary to redefine concepts such as "consensus" or "representation", as there will always be people who do not agree, and transformational processes are led by minority groups, not by a large majority. At the same time, it is important to recognise that for these same reasons, vulnerable neighbourhoods with significant urban deficiencies, often neglected by the public administration, tend towards community organisation, as they see it as the only way to improve the conditions of the urban space in which they live.

In this context, efforts should be directed at strengthening the role of change agents (be they individuals or collectives) who seek to improve collective community conditions, and who are also aligned with climate objectives at a local scale. In the case of Hermosillo and Leon, the role of women neighbourhood leaders was fundamental throughout the process. They were the ones who applied for the neighbourhood competition and brought the call to the neighbours, thus ensuring their participation. In general, they are the ones who actively seek resources to continue improving their neighbourhoods.

Multi-institutional coordination in the implementation of actions in public space

The approach of the community as an autonomous agent of decision-making, planning and execution of interventions on public space is a powerful idea, but it can be simplified erroneously into a binary logic of formality-informality. In this duality, it would seem that government institutions do not exercise their mandate in informal communities, so that residents should subsidiarily assume the role of government in the urbanisation process. Reality contradicts this view, as informality is expressed to varying degrees even within the same community, and therefore coordination and support from local planning institutions is always necessary.

Understanding the local starting point and pragmatism

Despite sharing common characteristics, each community presents particular problems and barriers that cannot be addressed in the same way, as well as structural challenges that cannot be changed with community support alone. In the case of Mexico, the presence of organised crime is a constant in most of the country's cities and the pilot communities of the initiative are not exempt from this problem.

Therefore, community groups acting as agents of change do not have complete freedom to intervene in public spaces in their neighbourhoods, as they may face coercion or intimidation with serious consequences. Community processes need to take this context into account and consider the scope for action to design a programme of potential actions that meets the criteria for social and climate improvement and ensures the safety of community members.

In practice, this means that trans- formation actions cannot be planned to be executed in a short period of time, and that the short term necessarily implies a minimum of 12 months. It is this time horizon that must be taken into account in the community discussion processes, the conceptual design process by the community, the permanent liaison with the public bodies responsible for acting on the public space, the development of documentation in accordance with the applicable regulations for obtaining permits, and the time required for the execution of the action itself.

As noted above, community interest and support must be maintained during this process in the face of any potential problems that may arise in the process. Constant and transparent communication, as well as socialisation from the outset and the establishment of a clear and realistic timeline, will help the community to internalise the process and not see every setback as an obstacle. Similarly, involving institutional partners from the start and making them co-authors of the process will help to identify potential implementation challenges and enable alternative measures to be taken to mitigate potential obstacles.

Mediation of technology in the community processes

The technological tools used in the community process have proven to be extremely useful for the community to identify both the issues and the most conflictive physical spaces within their neighbourhood, as well as to systematise the information in a coherent and consistent way.

However, there is a risk that needs to be minimised to increase the likelihood of success of a community process. Under an erroneous view, it could be assumed that technological mediation could replace personal interaction and face-to-face work in vulnerable communities. This approach would exclude from the results the relevant population of the communities, for example, all those who do not have access to information technologies, which would lead to an error of bias in the process. It would also make it impossible to generate strong cohesive ties between community members, thus invalidating the assumptions of the participatory and co-creative approach.

Technological means should therefore be seen merely as tools that can greatly facilitate the collection and processing of information and assist in participatory processes, but they are

not a substitute for fieldwork, which is the core of a community process that maintains cohesion. As such, a mixed quantitative and qualitative approach multiplies the possibilities to correctly process and understand the real needs of the community and to correctly design a future course of action. It is for this reason that the methodological framework developed by the project includes both technology-mediated and analogous steps. In all cases these are collective processes, not individual ones.

In conclusion, the methodology developed and its implementation in the two pilot communities has served to show the benefits and limitations of technology-mediated co-creation approaches in the complex Latin American context. It is an approach that allows for the replication, improvement and scaling up of experiences in other communities to improve their quality of life and adapt them to climate change.

07


Delimitación de banquetas y áreas peatonales
Primero se realiza la dinámica del carrito circulando sobre la
Al mostrar y repasar los ejemplos.
Recordar: ¿Qué problema debemos resolver?
La delimitación de áreas para caminar, áreas seguras y el
distintas maneras como las que mostramos.
accidentes.
Sharpie
Permanent Marker
ACCESO
ACCESO

EcoZonas

Annexes

Figure A1: EcoZones toolbox QR codes

Ecozones App

Neighbourhood survey

User manual

SUS Catalogue

Table A1: References and concepts

Reference	Concept
Sustainable Development Goals (SDGs) (UN, 2018)	The SDGs are a set of 17 global goals adopted by the United Nations General Assembly in 2015, designed to address the major social, economic and environmental challenges facing society. These goals seek to eradicate poverty, protect the planet and ensure prosperity for all people, with an inclusive vision that encompasses gender equality, access to education and combating climate change, among other issues. The SDGs promote a collaborative approach between countries and sectors to ensure sustainable and equitable development for present and future generations.
Sustainable Transport Oriented Development (STOD) (Sarmiento and Clerc, 2016)	STOD is an urban planning approach that seeks to integrate urban development with sustainable transport systems to create more compact, connected and sustainable cities. This model promotes densification in urban areas close to public transport corridors, which reduces car dependency and encourages the use of more sustainable alternatives such as walking, cycling and public transport. DOTS aims to improve urban quality of life, reduce greenhouse gas emissions and promote more equitable and accessible urban development.
A-S-I approach (GIZ-SUTP and TUMI, 2019)	The A-S-I (Avoid Shift Improve) approach is a strategy to promote sustainable mobility and reduce the negative impacts of transport. "Avoid" seeks to minimise the need for travel through better planning and planning. urbanisation. "Shift" encourages a shift towards more sustainable modes of transport. The "Improve" focuses on increasing efficiency and reducing emissions of existing transport modes through technological and operational improvements. "Improve" focuses on increasing the efficiency and reducing the emissions of existing transport modes
The 15-minute city (Moreno, 2021)	It is an urban model that proposes to plan cities in such a way that all basic needs of residents, such as education, health, commerce and recreation, are accessible within a 15-minute walking or cycling radius from their homes. This concept seeks to reduce car dependency, reduce carbon emissions and improve quality of life by creating more compact, diverse and connected communities. This approach promotes proximity urbanism, where time and quality of travel are central to both urban sustainability and people's well-being and quality of life.
Climate adaptation and resilience (United Nations Climate Change, n.d.)	These are actions and strategies implemented to adjust human and natural systems to the current or expected effects of climate change, in order to reduce their vulnerability, increase their resilience and minimise negative impacts. Adaptation includes measures such as infrastructure modification, changes in agricultural practices and water resource management, while resilience focuses on the capacity to resist, absorb and recover from extreme climate events.

Reference	Concept
Urbanism with a Gender Perspective (Sánchez de Madariaga, 2009)	It is an approach to urban planning and design that seeks to promote cities that respond to the different needs and experiences of people according to their gender, with a special emphasis on women who have often been excluded from decision-making and planning spaces. This approach recognises that women, due to the division of labour, traditional gender roles and stereotypes, often face specific challenges in their mobility and in the urban environment, for example with regard to safety and care tasks. Adopting a gender-responsive approach promotes more inclusive and equitable cities, where the design of public spaces, transport and access to services and facilities are planned to ensure accessibility, safety and well-being for all people regardless of gender.
New Urban Agenda (UN-Habitat, 2020)	It is a global framework adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) that sets out a vision and principles to guide sustainable urban development in the coming decades. It promotes inclusive, safe, resilient and sustainable cities and emphasises the need for integrated urban planning that addresses poverty, inequality, accessibility to basic services and environmental protection. It also stresses the importance of participatory governance, multi-level cooperation and the implementation of urban policies that ensure equitable and sustainable development for all inhabitants.
Circular Economy (European Parliament, 2023)	It is a model of production and consumption that seeks to minimise waste and maximise the efficient use of resources by sharing, renting, reusing, repairing, renewing and recycling materials, products and materials, which also extends their life cycle. In contrast to the traditional linear 'use and throw away' model, the circular economy promotes a closed cycle in which waste is converted into new resources, thereby reducing environmental impact and promoting sustainability. This approach seeks to preserve the value of products and materials for as long as possible, drive innovation and create economic opportunities while protecting the environment and reducing dependence on raw materials.
Nature-based solutions (SBN) (Figueroa-Arango, 2020)	Es una estrategia que utiliza los procesos y elementos de la naturaleza para alcanzar objetivos de biodiversidad, desarrollo sostenible y bienestar humano, y a la vez adaptarse a desafíos ambientales, sociales y económicos como el cambio climático, la gestión del agua y la biodiversidad. Algunas SBN incluyen la restauración de ecosistemas, la creación de infraestructuras verdes y la gestión sostenible de los recursos naturales, lo que implica la integración de la naturaleza para mejorar la resiliencia. En entornos urbanos las SBN se pueden entender como las coberturas naturales previas al desarrollo urbano o que son planeadas y diseñadas y que albergan algún tipo de ecosistema. Las SBN promueven la mejora de la calidad del aire y el agua, la reducción de riesgos de desastres y el fomento de la biodiversidad.

Reference	Concept
Integrated waste management (CARE International-Avina, 2012).	It is an approach that encompasses the planning, implementation and monitoring of activities related to the collection, treatment, recycling and disposal of waste. This strategy seeks to optimise the management of waste from generation to disposal, prioritises source reduction, reuse and recycling, and ensures that waste that cannot be recovered is managed safely. Integrated management also involves the active participation of different actors such as governments, businesses and communities to create efficient and sustainable systems that minimise the negative impact of waste, promote the growth of human and economic capital in communities and improve people's quality of life.
Tactical urbanism (Lydon et al., 2012)	It is an approach to urban planning and design that relies on rapid implementation and low-cost interventions to improve public spaces and promote community participation. This strategy seeks to engage communities in transforming their urban environment by facilitating experimentation with ideas that can improve mobility, safety and quality of life in cities, while testing changes before implementing them permanently. Some of these interventions include pop-up plazas, parks and bikeways, or improving pedestrian spaces and intersections, which can be quickly adapted using pavement paint or mobile street furniture, among others.
Sustainable neighbourhoods (EcoDistricts, 2014; Glasgow City Council, 2024)	Es un enfoque de barrios diseñados para ser ambientalmente responsables, socialmente inclusivos y económicamente viables. También definidos como "Ecobarrios" o barrios habitables (o en inglés *Livable neighborhoods*), se centran en la integración de prácticas sostenibles como la eficiencia energética, la gestión de residuos, la movilidad sustentable, la conservación de recursos naturales y la adaptación climática, junto con disponer de servicios y equipamientos, áreas verdes y transporte público. El fin es generar barrios que sean seguros, atractivos y que fomenten la calidad de vida, la salud y el bienestar de sus habitantes, al mismo tiempo que son sostenibles, resilientes y preparados frente al cambio climático.
Sustainable urban mobility (UN-Habitat, 2013; Walk21, 2024)	It is an approach to neighbourhoods designed to be environmentally responsible, socially inclusive and economically viable. Also defined as 'Eco-neighbourhoods' or Livable neighbourhoods, they focus on integrating sustainable practices such as energy efficiency, waste management, sustainable mobility, natural resource conservation and climate adaptation, along with the provision of services and amenities, green spaces and public transport. The aim is to create neighbourhoods that are safe, attractive and promote the quality of life, health and well-being of their inhabitants, while being sustainable, resilient and prepared for climate change.
Public space and placemaking (NACTO, 2013; Project for Public Spaces, 2022)	Good public space design focuses on creating places that promote people's health, happiness and well-being by considering criteria of accessibility, safety, sustainability and flexibility, among others. In this sense, placemaking goes beyond traditional design and requires the active participation of the community to take into account their needs and promote a sense of belonging. Designing spaces with this approach promotes walkability, active mobility, flexible use of public spaces, commercial activities, community and cultural events, among other uses that bring public spaces to life.

Reference	Concept
Comprehensive disaster risk management (UNDP, 2015; UNDRR, 2023).	It is an approach that encompasses all phases of the disaster cycle - prevention, preparedness, response and recovery - with the aim of reducing vulnerability and increasing the resilience of communities. Based on the Sendai Framework Theory, risk management considers governance, risk reduction and preparedness for effective response and recovery. An essential part of this approach is community preparedness, which involves communities in identifying risks, training them and implementing strategies tailored to their specific context. Some of its activities and strategies include community education and training, developing local emergency plans and building support networks.
Inclusive urban planning (Partnership for Southern Equity, n.d.; Urban Inequality Index, 2020)	It is an approach that seeks to design and plan cities so that all people, especially vulnerable groups, have equitable access to urban opportunities and services. It involves assessing and addressing inequalities in access to basic services, infrastructure and economic opportunities in cities. This includes implementing strategies that promote equity in the distribution of resources and opportunities and the active participation of communities in the decision-making process.

Figure A2: Perception wheel template

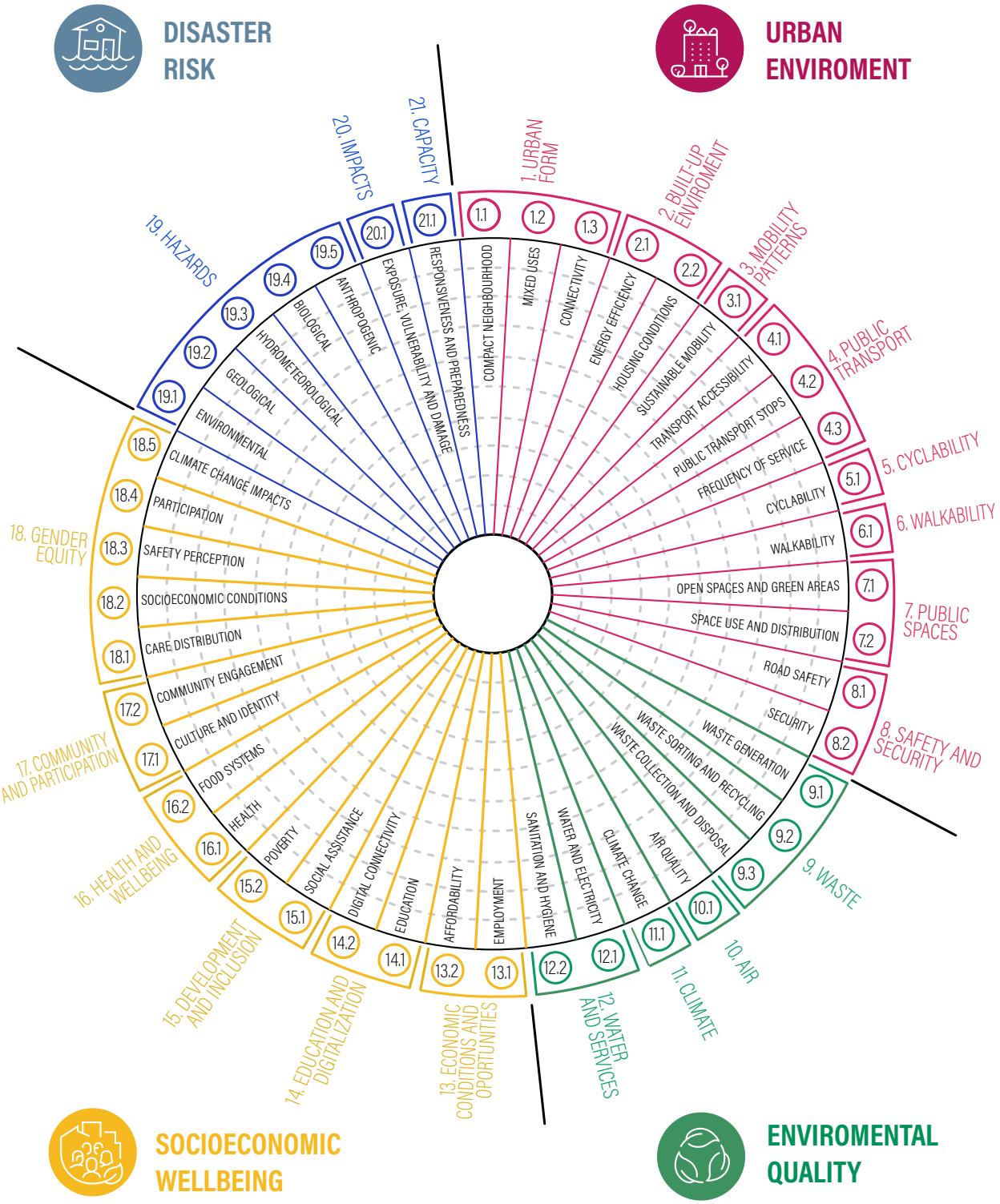


Figure A3: Monitoring surveys in Hermosillo and Leon

Encuesta sobre intervenciones proyecto EcoZona - Hermosillo

Datos sociodemográficos Género: Edad: Discapacidad:

Preguntas introductorias

1. ¿Sabes de las intervenciones del proyecto EcoZonas que se están desarrollando en el barrio?
   a) Sí
   b) Algo he escuchado
   c) No

2. ¿Cuál fue tu nivel de involucramiento en el proyecto EcoZonas?

   a) Participé en todas las actividades.
   b) Participé en algunas actividades.
   c) No participé en ninguna actividad.

Preguntas - intervenciones

¿Qué tan de acuerdo estás con las siguientes afirmaciones sobre las intervenciones en el callejón pluvial hasta el parque de La Metalera?

	En desacuerdo	Ni de acuerdo ni en desacuerdo	De acuerdo
Después de las intervenciones en el callejón mejoró la comodidad para caminar.			
Después de las intervenciones en el callejón mejoró la seguridad al caminar.			
Después de las intervenciones en el callejón mejoró la iluminación .			
Después de las intervenciones en el callejón mejoró el mantenimiento y limpieza de la calle.			
Después de las intervenciones en el callejón mejoró el aspecto y atractivo de la calle.			
Después de la intervención en el callejón disminuyó la afectación por lluvias en la zona (inundaciones).			

¿Qué tan de acuerdo estás con las siguientes afirmaciones sobre las intervenciones en el parque de La Metalera (el cielo escultórico, el jardín microcuenca y las delimitaciones de banquetas)?

	En desacuerdo	Ni de acuerdo ni en desacuerdo	De acuerdo
Después de las intervenciones en el parque disfruto más estar aquí.			
Después de las intervenciones en el parque ha disminuido la exposición al calor y al sol.			
Después de las intervenciones en el parque uso este espacio más seguido.			
Después de la intervención en el parque disminuyeron las afectaciones por lluvias en la zona (inundaciones).			
Después de la intervención es más seguro el cruce para peatones entre el callejón y el parque .			
Después de la intervención aumentaron las áreas verdes y vegetación.			
Después de la intervención mejoró el mantenimiento y limpieza.			
Después de la intervención mejoró la seguridad.			

Preguntas – generales *Outcome*

¿En qué medida las acciones del proyecto EcoZonas han mejorado las condiciones de tu barrio?
☹ Poco; 😐 Regular; 😃 Mucho

¿En qué medida consideras que el proyecto te aportó nuevos conocimientos o herramientas para mejorar la sostenibilidad y las condiciones medioambientales de tu barrio?
☹ Nada; 😐 Algo; 😃 Mucho

Después de haber participado en el proyecto EcoZonas, ¿qué tan probable es que continues involucrada/o en actividades para mejorar la sostenibilidad y las condiciones medioambientales de tu barrio?
☹ Poco probable; 😐 Probable; 😃 Muy probable

Después de haber participado en el proyecto EcoZonas, ¿qué tan probable es que continúes utilizando la aplicación móvil EcoZonas y el sitio web?
☹ Poco probable; 😐 Probable; 😃 Muy probable

¿Qué tan satisfecha/o estás con las acciones del proyecto EcoZonas?
☹ Nada satisfecha; 😐 Satisfecha; 😃 Muy satisfecha

Preguntas – potencial de réplica y escalamiento

¿Te gustaría que las intervenciones que se implementaron en el contexto del Proyecto EcoZonas se escalen y repliquen en otras zonas del barrio?
☹ Nada; 😐 Algo; 😃 Mucho

¿Qué otras Soluciones urbanas sostenibles (SUS) te gustaría que se implementen en el barrio?
Pregunta abierta

Encuesta sobre intervenciones proyecto EcoZona - León

Datos sociodemográficos Género: Edad: Discapacidad:

Preguntas introductorias

1. ¿Sabes de las intervenciones del proyecto EcoZonas que se están desarrollando en el barrio?
   a) Sí
   b) Algo he escuchado
   c) No

2. ¿Cuál fue tu nivel de involucramiento en el proyecto EcoZonas?

   a) Participé en todas las actividades.
   b) Participé en algunas actividades.
   c) No participé en ninguna actividad.

Preguntas – intervenciones

Valora los siguientes aspectos del parque de Jardín de San Miguel:

Mantenimiento y limpieza: ☹ Malos; 😐 Regulares; 😃 Buenos.
Equipamiento y mobiliario: ☹ Malos; 😐 Regulares; 😃 Buenos.
Áreas verdes y vegetación: ☹ Malos; 😐 Regulares; 😃 Buenos.
Seguridad: ☹ Mal; 😐 Regular; 😃 Buena.

¿Qué tan de acuerdo estás con las siguientes afirmaciones sobre las intervenciones en el parque de Jardín de San Miguel (malla sombra y suelo bioclimático*):

	En desacuerdo	Ni de acuerdo ni en desacuerdo	De acuerdo
Después de las intervenciones en el parque mi familia y yo disfrutamos más estar aquí.			
Después de las intervenciones en el parque ha disminuido la exposición al sol y al calor.			
Después de las intervenciones en el parque visito este espacio más seguido.			

A partir de la plantación de árboles, ¿qué tan capaz te sientes para participar en una siguiente jornada de reforestación?
☹ Nada capaz; 😐 Algo capaz; 😃 Muy capaz.

Valora los siguientes aspectos de las calles y áreas verdes de tu barrio:

Mantenimiento y limpieza: ☹ Malos; 😐 Regulares; 😃 Buenos.
Equipamiento y mobiliario: ☹ Malos; 😐 Regulares; 😃 Buenos.
Áreas verdes y vegetación: ☹ Malos; 😐 Regulares; 😃 Buenos.
Seguridad: ☹ Malos; 😐 Regulares; 😃 Buenos.

Preguntas – generales *Outcome*

¿En qué medida las acciones del proyecto EcoZonas han mejorado las condiciones de tu barrio?
☹ Poco; 😐 Regular; 😃 Mucho

¿En qué medida consideras que el proyecto te aportó nuevos conocimientos o herramientas para mejorar la sostenibilidad y las condiciones medioambientales de tu barrio?
Nada; 😐 Algo; 😃 Mucho

Después de haber participado en el proyecto EcoZonas, ¿qué tan probable es que continúes involucrada/o en actividades para mejorar la sostenibilidad y las condiciones medioambientales de tu barrio?
☹ Poco probable; 😐 Probable; 😃 Muy probable

Después de haber participado en el proyecto EcoZonas, ¿qué tan probable es que continúes utilizando la aplicación móvil EcoZonas y el sitio web?
☹ Poco probable; 😐 Probable; 😃 Muy probable

¿Qué tan satisfecha/o estás con las acciones del proyecto EcoZonas?
☹ Nada satisfecha; 😐 Satisfecha; 😃 Muy satisfecha

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EcoZonas

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