THE VALUE OF METRO-POLITAN SOLU-TIONS

AMB

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This publication contains the study *The Value of Metropolitan Solutions*, commissioned by the Barcelona Metropolitan Area (AMB) from the Metròpoli Institute.

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Presentation

In the uncertain and changing global and geopolitical context of recent years, metropolises need to find new solutions to face the global challenges of sustainable development in the 2030 Agenda and the New Urban Agenda. By their very nature, there require solutions that go beyond municipal administrative boundaries. It is because of this need to innovate and find answers that the Area for International Relations and Digital Metropolis has been working for some time on conceptualising and promoting metropolitan solutions.

The international congress *MetroSolutions: looking at innovation for the metropolises of tomorrow*, organised by the AMB at Citilab in Cornellà de Llobregat, was held on 17 and 18 October 2022. The congress provided an international space for presentations, reflections and debate on innovative metropolitan solutions in relation to governance, inclusion, equality and resilience. In addition, as part of the congress, the United Nations Human Settlements Programme (UN-Habitat) organised a specific workshop on the conceptualisation and characterisation of metropolitan solutions as a means of strengthening the concept.

On 8 and 9 May 2023, the AMB organised the expert group meeting on metropolitan solutions, with the presence of more than 45 metropolitan representatives, representatives of urban and metropolitan networks, experts and representatives of UN-Habitat, academia and think tanks. This meeting resulted in the adoption of the *Barcelona Statement on the Metropolitan Agenda*, recognising the relevance of metropolitan phenomena for sustainable urban and territorial development and the need to promote metropolitan solutions that permit rapid action to meet the 2030 Agenda Sustainable Development Goals (SDGs). The declaration contains specific proposals for the metropolitan agenda and concludes that there is a need to recognise and promote metropolitan solutions, realities and actions in local and global policy-making.

Subsequently, in June 2023, at the UN-Habitat General Assembly held in Nairobi, metropolitan solutions were again discussed and a resolution was approved that included recognition of the metropolitan reality in the localisation of the SDGs. In particular, it specifies: "*e.* Supporting national Governments, upon request, to strengthen effective local and metropolitan multilevel governance to advance the Sustainable Development Goals through stronger policy coherence, cross-sectoral alignment, and multi-stakeholder engagement and participation."

Within this framework of continuity in international advocacy, which aims to position the metropolitan scale as a leading political stakeholder, the AMB Area for International Relations and Digital Metropolis commissioned the Metròpoli Institute (IM) to prepare a study contributing to knowledge on the concept of *metropolitan solutions* in order to describe the global spectrum of solutions implemented by local and metropolitan governments worldwide in response to the global challenges they face today and to become more innovative, sustainable and resilient metropolises.

We hope this document will serve to further enrich the wealth of arguments and evidence showing that metropolitan areas a major player in future uncertainties and adversities, with a clear objective: meeting the challenges posed by the global agendas.

Elisenda Alamany

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Introduction

The aim of this work is to identify efficient solutions tailored to the needs of metropolises. Thus, the initial objective is to advance the conceptualisation of metropolitan solutions, based on the characteristics defined at the MetroSolutions congress. A metropolitan solution is understood as an effective response to a metropolitan problem, issue, need, challenge or demand. Such solutions have different dimensions (social, economic, community, among others) and are associated with metropolitan policy and plans. They are responses that in turn involve a multitude of actors (e.g. private sector, public sector, non-profit sector) at different administrative and governmental levels (not only metropolitan). According to this study, a particular distinguishing features of metropolitan solutions is that they are innovative in nature and contribute to urban construction, combining different types of actions, assessable for the whole population and territory. Such solutions often involve citizen participation and are scalable to other metropolises and challenges (Illa and Colombo, 2023).

From this base, the initial definition is complemented and further developed through academic contributions from economics, political science, sociology, geography and science, among other fields. The questions the study sets out to answer are: Why do we talk about solutions (instead of policies)? What does this perspective on solutions offer? What are metropolitan problems and what are the strengths of addressing these problems at the metropolitan level (not always formally through a metropolitan body)?

To this end, this document is structured in two main sections. The first one deals with the concept of *solutions* through a critique of *solutionism* and the emergence of the concept of *nature-based solutions*. Contrasting these two perspectives allows us to assess the potential of the concept of *solutions* and its strengths and weaknesses. The relevance and specificity of metropolitan solutions is then addressed. When does a metropolitan-scale solution really add value? This chapter proposes five criteria that link problems to metropolitan challenges and serve to assess metropolitan solutions. For each criterion, the conceptual definition is discussed and examples of public policies applicable in each area are introduced based on a review of the literature.

1. Objectives and methodology

The general objective of the research is to advance in conceptualising and problematising the concept of *metropolitan solutions*, based on the characteristics defined at the MetroSolutions congress. The specific objectives stemming from this are to:

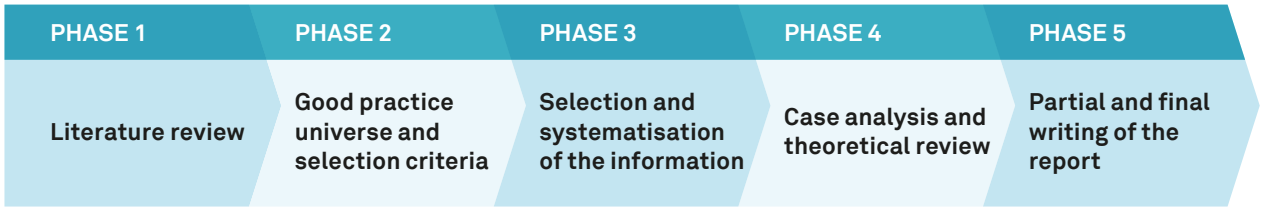
— Advance in conceptualising and problematising the concept of *solutions*.
— Describe and analyse the metropolitan area as a field of intervention.
— Collect, classify and document best practice cases among metropolitan solutions.
— Analyse the cases in the compilation.

In line with these specific objectives, the study research questions are:

— Why do we talk about solutions (instead of policies)?
— What does this perspective on solutions offer?
— What are metropolitan problems?
— What are the strengths of addressing these problems at the metropolitan level (not always formally through a metropolitan body)?

The methodology includes, firstly, a theoretical analysis of the concept of *metropolitan solutions*. The methodology used for this section of the study was a review of the literature in the field. Secondly, the construction of a repository of 11 relevant examples of metropolitan solutions based on the collection and analysis of secondary information.

Specifically, the phases of the research were:



1.1. REVIEW OF THE ACADEMIC LITERATURE

Review of the academic literature by consulting databases such as Scopus and Google Scholar, and AI software such as Research Rabbit, and a review of documents produced by international organisations, especially UN-Habitat. To this end, a search for key words and bibliographic connections between the literature was carried out, and experts from the different areas of the IM were consulted. This analysis aims to answer the following questions: What is the academic basis for the concept? What contributions are found in the academic literature on concepts such as *metropolitan solutions* and *metropolitan policies*? What differentiates them from local or state solutions? When does it make sense to talk about metropolitan issues or problems requiring intervention?

With regard to the academic literature, it should be noted that academic knowledge is predominantly influenced by contributions from the West. The academic literature on issues related to metropolitan areas is therefore inspired by this predominant view. However, it is worth noting that searches also included sources of knowledge beyond these dominant currents, in order to incorporate approaches from other areas, such as countries in the Global South. However, there are fewer such contributions. Despite this effort, the study may still have an inherent reporting bias.

1.2. GOOD PRACTICE UNIVERSE AND CASE SELECTION

Based on the conceptual review, a search for illustrative cases of metropolitan solutions was carried out in more than 15 existing repositories (see the table in the appendix for more detailed information on the repositories). Finally, the universe of cases comes is the sum of selected cases in the Metropolis repository, as well as cases presented at the MetroSolutions congress, others that are part of the AMB's international and cooperation projects, and other international benchmark cases. The criteria for case selection were: *a*) geographical diversity; and *b*) thematic diversity of the solutions.

Thus, there is a total of 11 cases, which may be distributed geographically and thematically as follows:

Table 1. Distribution of cases based on geographical and thematic criteria

Region	No. of cases
Africa	3
America	3
Asia	3
Europe	2
TOTAL	11

Topic	No. of cases
Informal settlements and poverty alleviation	2
Climate change	1
Economic development	1
Metropolitan governance	3
Transport and mobility	2
Urban and territorial planning	2
TOTAL	11

Source: the authors.

The geographical distribution of cases allowed the study to include the perspective of the Global South in implementing metropolitan solutions. This perspective is fundamental to shedding light on the literature on metropolitan politics in territories that are under-represented in the academic context.

1.3. DATA COLLECTION

Analysis of the selected cases comes mainly from primary and secondary sources. The sources for data collection were:

— **Review of information contained in the USE (Urban Sustainability Exchange) repository of Metropolis:** an online platform for promoting sustainable urban development. It presents successful programmes, projects and policies and facilitates contact with the decision-makers in the cities driving the projects.

— **Documentary review of other sources:** where necessary, information was supplemented by a search of academic literature, official sources, stakeholder positioning and the media.

— **Interviews:** a total of 11 semi-structured interviews were conducted with the persons responsible for the selected cases. The aim of the interviews was to gain deeper insight into the selected cases, to obtain an in-depth view of the evolution of each case, considering the different actors who participated in the project, with a special focus on the metropolitan dimension and actions to consolidate the metropolitanisation of the different cities. The interviewees were the people responsible for the projects, either in the field or the promoting organisations.

The Metròpoli Institute technical team was responsible for identifying and inviting interviewees from the projects' websites or from the AMB contacts, through the Area for International Relations and Digital Metropolis, or Metropolis. This technical team was also in responsible for conducting the interviews and systematising and analysing the results.

Table 2. List of interviewees

Case name	Name of the interviewee	Post
Community-driven housing and informal settlement upgrading in Gobabis (Namibia)	Anna Muller	Namibia Housing Action Group national coordinator
Mobility and gender in Maputo: a dialogue of cooperation	Maria Peix	Head of the AMB International Cooperation Service
A'SIMA Tunis	Konstantia Nikopoulou	Project manager - MedCities

Case name	Name of the interviewee	Post
COAMSS/OPAMSS	Ana Yanci Ortiz	COAMSS head of Metropolitan Strategic Management and Executive Assistance
Bay Area Regional Collaborative (BARC)	Allison Brooks	Executive director, Bay Area Regional Collaborative (BARC)
Nidos de Lluvia (Guadalajara)	María Macías	IMEPLAN director of strategic management
	Jacobo Reinoso	IMEPLAN technical secretary
Citizen-led urban regeneration policy in Seoul	Sang Hyeok Jeong[1]	Director of the Seoul Institute
Jaga Mission	Mathi Vathanan	Principal secretary, Government of Odisha Housing and Urban Development Department
Guangzhou Ecological Belt Master Plan	Shen Ziqian	Senior engineer, Guangzhou Urban Design and Planning Survey Research Institute
	Ye Zhilin	Senior engineer, Guangzhou Water Authority
Bicivia (Barcelona)	Ruth Lamas	Head of the Metropolitan Cycle Office (AMB)
The Rotterdam Business Case	Rob Gringhuis	Project manager, Municipality of Rotterdam

1. This interview was conducted in writing.

Source: the authors.

A number of language considerations in relation to the interviews should be mentioned. Most were conducted in English, with some in Spanish and some in Catalan. In the specific case of Guangzhou, simultaneous Chinese-English and English-Chinese interpretation was provided to ensure smooth communication between the parties.

1.4. INFORMATION SYSTEMATISATION AND ANALYSIS

Information was collected from the selected cases on, firstly, the city or metropolis and, secondly, the specific metropolitan solution, in line with the following areas (see figures 1 and 2).

Figure 1. Dimensions and criteria of the database on the selected metropolises

Population (according to UN-Habitat)	Regional groups (according to Metropolis)	Metropolitan governance	Main city
• 300,000 to 1 million • 1 to 5 million • 5 to 10 million • More than 10 million	• Africa • America • Asia • Europe • Australia and New Zealand		

Source: the authors.

Figure 2. Dimensions of the database on the selected metropolitan solutions

Type	Oriented to metropolitan management or metropolitan action
Challenge, demand or problem	What does the solution provide a response to?
Objectives	Specific objectives
Themed areas	What policy areas are involved?
Promoting institution	What is the promoting institution?
Beneficiary and target groups	Who are the main beneficiaries? What actors are targeted?
Multilevel governance	What other public institutions (state, regional, etc.) are involved?
Legal or regulatory framework	Is there a specific legal or regulatory framework?
Participants involved	Municipalities, other public bodies, private sector, third sector, organisations, universities, research centres, etc.
Municipalities involved	Number of municipalities involved in the solution
Elements of citizen participation	Spaces, processes and instruments. In which phases?
Solution methodology	Main instruments and steps
Innovative elements	New policy; new implementation strategy; new business or funding model; new forms of association, engagement and collaboration; new approaches to governance; harnessing of technology

Source: the authors.

Chapter 5, Metropolitan Solutions, is based on the collected results and information, linking the case analyses with the conceptual review. The aim is to contribute to knowledge on the concept of *metropolitan solutions*, with the first part of the report theoretically and conceptually addressing the definition, characteristics and types of metropolitan solutions. The second part presents a compilation of 11 solutions implemented in metropolitan areas around the world. The information on these cases and the metropolises where the metropolitan solutions were implemented was also further systematised in fact sheets, one for each case (see annexes). The compiled information was systematised using the dimensions identified in the figures above.

2. Solutionism, policies or solutions?

According to the *Oxford English Dictionary*, *solution* is "the action or process of solving". The following sections reflect on the growing importance of the *solution* concept from different perspectives and explore its regulatory and practical implications. This help us to structure a number of reflections on the strengths and weaknesses of the concept.

2.1. THE CRITIQUE OF 'TECHNOLOGICAL SOLUTIONISM'

Weinberg used the term "technological fix" in 1966 (Johnston, 2018), which establishes the idea that technological innovation could solve any social problem. This was a call to arms for engineers, technologists and designers, especially those who saw themselves as responsible for improving society and human well-being. Its attractiveness involves a constellation of beliefs and values, such as trust in innovation and progress, in the impact and efficacy of new technologies, and in technical experts as general problem solvers (Johnston, 2018).

People's relationship with technology has reshaped our "problem-solving infrastructure" (Easterbrook, 2014). Computer scientists, for example, tend to approach problems in a particular way. Since programming is fundamental to learning computer science, computer scientists tend to think like programmers. In other words, they seek algorithmic solutions to problems, in terms of data processing and process control. In a widely cited article in 2006, Jeannette Wing called this thinking "computational". Computational thinking tends to see the world in terms of a series of problems (or types of problems) that have computational solutions. Specifically, according to Easterbrook (2014), computational thinking is characterised by:

— Formulating problems in a way that allows us to use a computer to help solve them.
— Organising and analysing data logically.
— Representing data through abstractions such as models and simulations.
— Automating solutions through algorithmic thinking.
— Identifying, analysing and implementing possible solutions with the aim of achieving a more efficient and effective combination of steps and resources.
— Generalising and transferring this problem-solving process to a wide variety of problems.

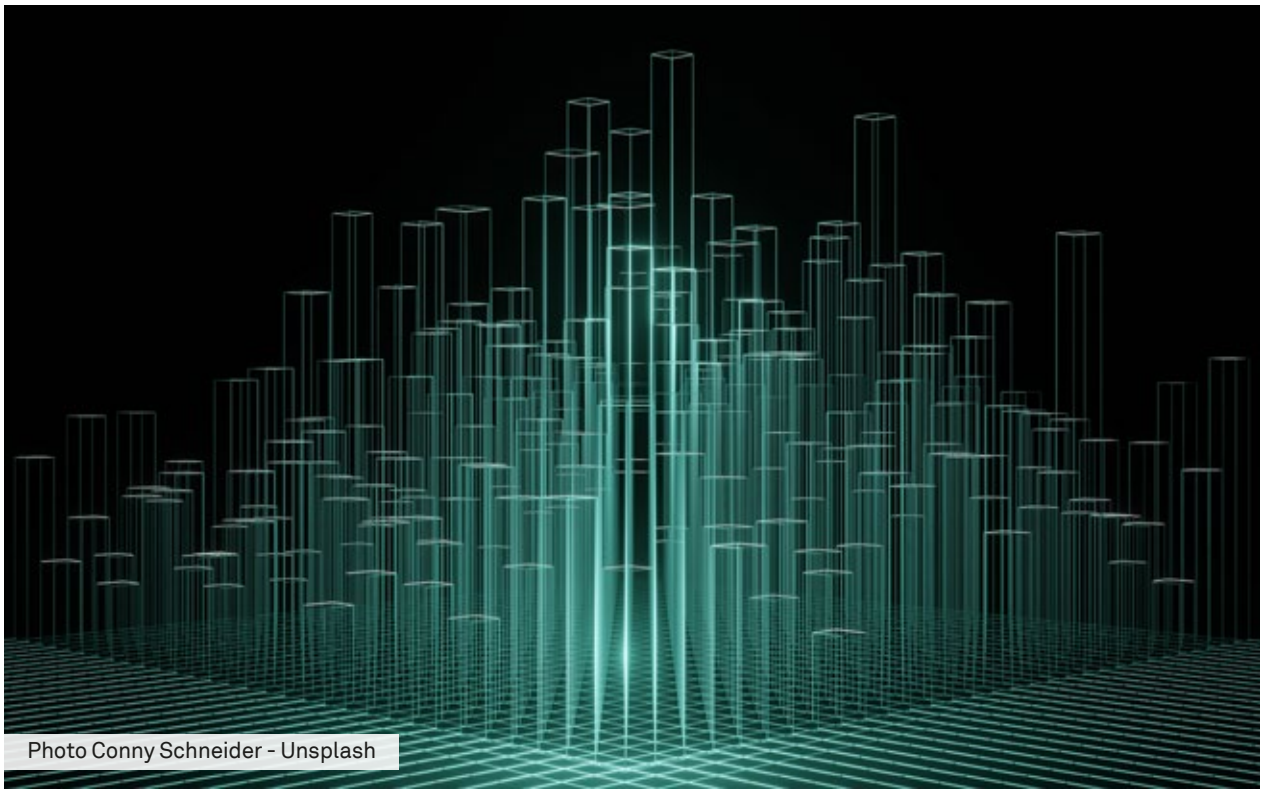
In short, the computational thinker looks for problems that can be tackled with computers. This immediately provides a selective prism through which to view the world (Easterbrook, 2014), as frames for solving problems combine mental models of cause and effect with value-laden positions (Nowell, 2010, cited in Dennis and Brondizio, 2020). Cognitive frame theory defines cognitive frames as "mental structures that facilitate the organisation and interpretation of information in learned schemas or frameworks about reality". Consequently, when certain problems cannot easily by associated with computational (e.g. ethical dilemmas, value judgements, problems related to complex social changes, etc.), they are either ignored or reduced to a simpler computational proxy (Johnston, 2018).

The search for solutions that claim to innovate through technology, often solving problems that do not exist or ignoring the social, political and environmental problems in which the solution is inserted (Blythe *et al.*, 2016; Dennis and Brondizio, 2020; Easterbrook, 2014; Johnston, 2018) has been described as *solutionism*. The term *solutionism* emerged in 2009 in Michael Dobbins's book *Urban Design and People* (Blythe *et al.*, 2016), which argues that

"solution-based design" generally provides answers before the questions have been fully asked. In addition, Evgeny Morozov (2013), in his book *To Save Everything, Click Here*, criticises the products of Silicon Valley and many academic research labs for offering solutions to problems that do not exist or for prototyping simplistic solutions to complex social, political and environmental problems. This school of thought criticises *smart city* ideas as solutionist, as they insist that the public space be dictated by the needs of technological efficiency, opportunity and infrastructure. In such cases, technology is presented as a neutral tool that innovates for the benefit of users (Blythe *et al*., 2016). These computer-based solutions are technological solutions in precisely the form defined by Weinberg (Johnston, 2018).

One problem area that attracts technology-dominated responses is the environment. As environmental concerns grew from the 1960s onwards (air and river pollution, oil spills, fears about nuclear waste, etc.), technological quick fixes began to be proposed as timely and reassuring solutions. A second area is terrorism. Technological solutions, such as material detection systems or body scanning, were suggested in response to various threats identified after the attack on the Twin Towers in New York (Johnston, 2018).

As discussed above, the relationship with technology reshapes our "problem-solving infrastructure", and this has consequences. Thus, for example, the idea of gamification (changing social behaviour by offering rewards and incentives, turning them into a game) leads to thinking in terms of regulating individual citizens, rather than regulating the wider systems in which we live; the idea of big data might suggest that solutions can be found by automated pattern matching; while the idea of crowdsourcing tends to undermine our belief in the value of expertise. This can be dangerous in areas where specific expertise is required,



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such as medical advice. The success of these approaches in smaller, more limited problems, in turn, tends to increase confidence in the success of technological solutionism, thus reducing our ability to address more fundamental challenges.

In general, a tendency towards technological solutionism is evident in computer science thinking, which tends to deal with complex social problems in an overly simplistic and individualising way. Such solutions to these problems might involve selling a new application, a new web service or a new device, thereby tending to automate and optimise existing solutions, without exploring the wider social and environmental consequences. According to Noveck (2021: 124), too many discarded apps are failed solutions to problems too complex to be solved by a software platform.

According to the literature, the alternative to technological solutionism is to think of ingenious solutions from different domains and recognise the complexity of the problems being addressed and the fragility of our ideas and approaches (Blythe *et al*., 2016). This approach stresses the search for new ways of thinking about the interdependencies between public problems. Solutions should be offered from a systemic and holistic perspective, addressing interconnections between major challenges and thinking of these challenges as dilemmas we should respond to rather than problems we can solve. And that any attempt to solve them will lead to new, unexpected problems (Easterbrook, 2014).

All this does not exclude the need to redefine and reformulate problems in a different way, but there is no needs to consider everything in terms of computational thinking. Approaches from different disciplines and perspectives, through the filter of collective deliberation, while not losing sight of the great challenges to civilisation, also allow us to come up of innovative solutions. Let us now explore the concept of *nature-based solutions* as a different way of addressing some of the social, economic and environmental problems we face today.

2.2. NATURE-BASED SOLUTIONS

The concept of *nature-based solutions* was first mentioned in 2008 by the World Bank[1] and the first research programme on this concept was launched five years later (Sowińska-Świerkosz and Garcia, 2022). In the European Union, this concept has been introduced in the framework programmes for research and innovation with a potential opening for transformative pathways towards sustainable societal development (Nesshöver *et al.*, 2017). Beyond Europe, nature-based solutions have been advocated by international environmental organisations worldwide (such as the International Union for Conservation of Nature and World Wide Fund for Nature) as an alternative to conventional engineering to solve human problems (MacKinnon *et al.*, 2008); Dudley, 2010; Cohen-Shacham *et al.*, 2016, cited in Osaka *et al.*, 2021). Thus, the concept of *nature-based solutions* signifies a transition from traditional *grey* and *hard* approaches to *green* and *soft* solutions and transition to a more resource-efficient, inclusive and sustainable growth model (Davies *et al.*, 2021).

1. In the study *Biodiversity, Climate Change and Adaptation. Nature-Based Solutions from the World Bank Portfolio*, World Bank Document.

According to Osaka *et al.* (2021), it originates from the interface of science, policy and practice, and the incorporation of this environmental management lexicon arose from the search for innovative solutions to manage natural systems in a way that balanced the benefits to both nature and society. These types of solutions involve the protection, conservation, restoration, management, enhancement and mimicking of natural ecosystems and may include forest conservation and management, wetland restoration, and peatland conservation and restoration, among other measures. (Osaka *et al.*, 2021).

However, several attempts have been made over the last 10 years to define and clarify the term more precisely (Sowińska-Świerkosz and García, 2022). Definitions are often somewhat general and fuzzy and do not clearly indicate which solutions should be considered as such (Sowińska-Świerkosz and García, 2022). Indeed, they have been considered an umbrella concept that includes different approaches, *such as urban ecosystem services, blue-green infrastructure, ecological engineering* and *natural capital* (Kabisch *et al.*, 2022), highlighting the potential of implementing elements from nature in urban areas with the specific aim of mitigating climate change and adapt (Kabisch *et al.*, 2022). As a result, there is an ongoing debate about the scope and types of interventions that can be classified as nature-based solutions (Sowińska-Świerkosz and García, 2022).

Whatever the definition, the literature makes it clear that nature-based solutions introduce a conceptual shift towards ecosystems: they not only provide services, but also serve as a "significant contribution to addressing major societal challenges" (Eggermont *et al.*, 2015; Cohen-Shacham *et al.*, 2016, cited in Osaka *et al.*, 2021); such as climate resilience, water management, natural and climate hazards, green space management, biodiversity, air quality and social justice. (Dumitru and Wendling, 2021). Beyond the implications of its definition, the concept of *nature-based solutions* has also been *per se* the subject of theoretical debate (Osaka *et al.*, 2021).

Firstly, it is argued that, logically, this concept aims to explicitly link positive outcomes for society (solutions) with a notion of nature as useful for these goals (Nesshöver *et al.*, 2017). Secondly, "defining and presenting a particular course of action or policy as 'natural' can itself be a political act, with consequences for how such policies are interpreted and leveraged in the public sphere" (Osaka *et al.*, 2021: 5). Thus, actions or policies that are considered natural are often met with greater public approval, as opposed to those that "threaten" nature, which are considered less desirable or more risky (Sjöberg, 2000); Hansen, 2006; Corner *et al.*, 2013, cited in Osaka *et al.*, 2021). For the same reason, as they enter the political debate, they can also be subject to "greenwashing", and not truly meet all the sustainability criteria.

Ultimately, according to the academic literature, the strength of the concept of *nature-based solutions* is that it challenges the traditional approach to the problem and proposes an integrating and systemic approach, which has so far prevented it from becoming just another "green communication tool" (Nesshöver *et al.*, 2017). The underlying assumption of the concept incorporates not only the ecological vision, but also the circular perspective and interdependence between the different elements coexisting in metropolitan contexts: society and nature. Therefore, we need to look at the character of nature, which implies principles such as cooperation, mutual benefit and times. It is a conceptual shift that seeks, as mentioned above, to manage biophysical systems in a way that balances the benefits for both nature and society (Osaka *et al.*, 2021).

2.3. IMPLICATIONS OF THE CONCEPT 'SOLUTIONS'

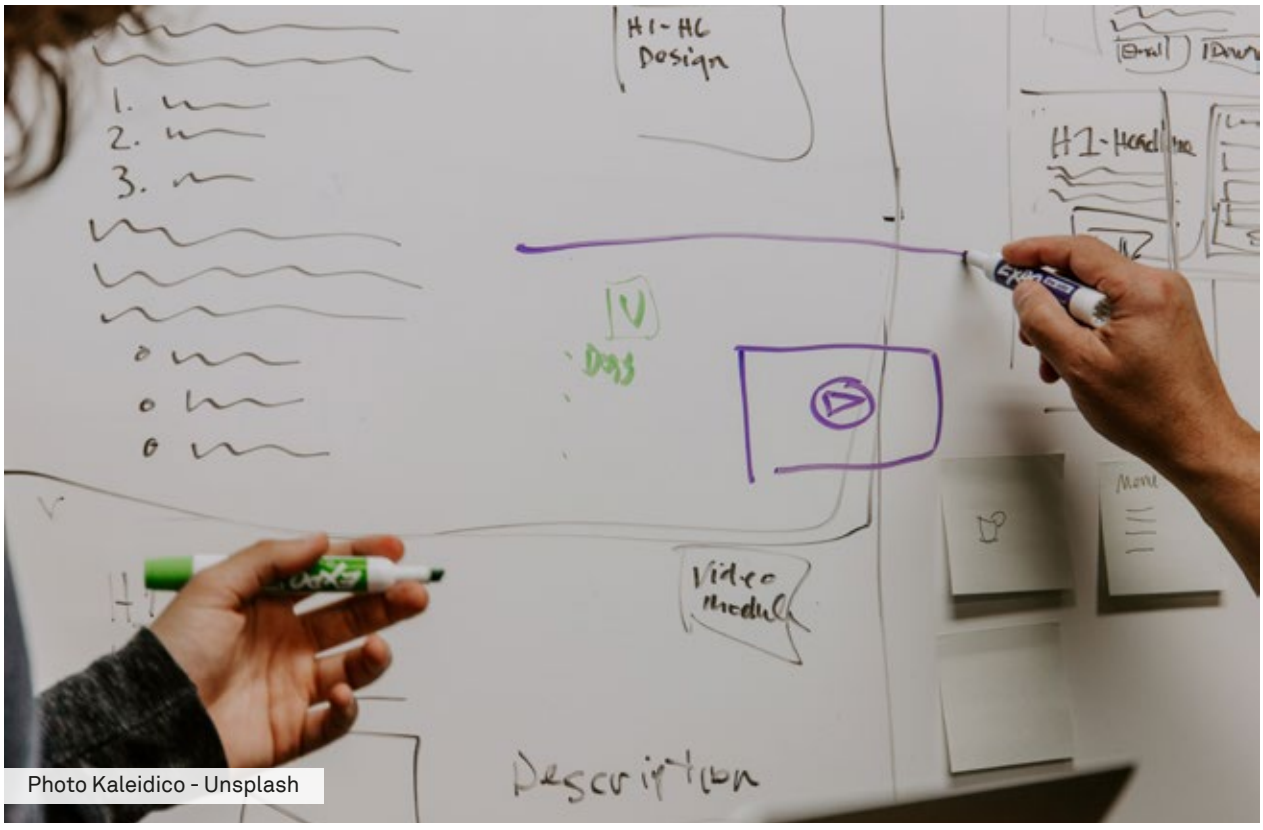
The characteristics of urban solutions are discussed below, considering the implications of the term *solutions* in the above-mentioned areas.

The solutions are ad hoc in response to specific problems

Solutions are conceived as specific actions or interventions designed to address a particular problem or challenge, which can be technological, social, economic or environmental, among others. Solutions are based on possibilism and adopt a pragmatic and utilitarian approach to specific problems.

Solutions can be promoted from different spheres and by different stakeholders (state, civil society, academia, private sector). When a solution is driven and implemented by government institutions, in collaboration with other actors or otherwise, we use the term *public policy*. By *public policy* we mean a set of guidelines, laws or regulations and intervention mechanisms that government institutions draw up and implement to address public problems.

Thus, when government institutions play a central role in promoting, regulating or implementing solutions, these solutions remain part of public policy. However, the concept of *public policy* is more all-encompassing than that of *solutions*, as it includes all phases of policy (defining the problem, setting the agenda, design, implementation, evaluation, etc.), while the concept of *solutions* places greater stress on the design and implementation of a public policy.



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Generally, in the contemporary context full of uncertainty, change and volatility, citizens expect public institutions to find *the solution* rather than spending time defining a problem, as no one wants to give the impression they have no answers (Noveck, 2021). However, rather than being natural, the vast majority of problems are the result of a social construct. Their inclusion in the government agenda also depends on their inclusion in the media agenda or the community of the corresponding policy. In this process, there are stakeholders or groups of stakeholders who promote solutions to problems, solutions that directly or indirectly benefit them. This is what often happens with technology companies and their solutions for turning cities into *smart cities*, without being very clear about what the underlying problems are that these solutions aim to solve or what new problems they generate (e.g. reinforcing racial discrimination, infringing privacy, etc.).

At the metropolitan level, this more specific design and implementation-oriented character of solutions can be an advantage, since talking about metropolitan policies in certain contexts is difficult, given the existing "global metropolitan management gap". Management of most metropolises is not differentiated, i.e. they do not have a metropolitan plan or institution (UN-Habitat, 2022). Therefore, the concept of solutions fits better into a metropolitan context, whether or not a metropolitan body has been formalised. It can also be useful for contexts where there are specialised or more technical action-oriented institutions behind them, leaving little room for policy debate, such as sectoral agencies for transport, water or waste services. However, in all cases there will also be a more or less explicit definition of the problem and political positioning to guide the action.

The solution-oriented culture draws on experience

The solution-oriented culture is adopted "based on decades of experience and understanding of what works effectively in cities and human settlements", according to the United Nations Strategic Plan 2020-2023 (UN-Habitat, 2020: 10). In other words, this implies "a project-focused approach to a broader culture of supporting cities and countries in delivering systematized and locally adapted solutions [...] and which apply and leverage the knowledge gained from its own experience, as well as from the experience of others" (UN-Habitat, 2020: 10).

Drawing on other cases to implement policies has become a highly commonplace practice to improve regional and city-implemented strategies and policies (Dąbrowski *et al.*, 2018). Consequently, it is important to consider the literature on what is known as *policy transfer* (Dolowitz and Marsh, 2000), which explores how "policies, administrative arrangements, institutions and ideas in one political setting (past or present) is used in the development of policies, administrative arrangements, institutions and ideas in another political setting" (Dolowitz and Marsh, 2000: 5).

According to this literature, policy transfer is presented as a simple linear process of copying and pasting from site X to site B, which can produce suboptimal solutions when there is a lack of structural conditions, knowledge or resources to make it work (Dąbrowski *et al.*, 2018, 2021; Varjú, 2022). Given this outcome, knowledge transfer is considered (Dąbrowski *et al.*, 2021), as it not only copies policy, but also tackles a process fraught with uncertainty and difficulties, where it encounters cognitive, environmental and public opinion obstacles (Evans, 2009) and causes the content of knowledge to change as it "travels" (Dąbrowski *et al.*, 2021).

What happens along the way as policies are transferred from one place to another has been explored in geography (Dąbrowski *et al.*, 2021), where it is termed *policy mobility* (e.g. McCann,

2011). Such studies emphasise policy mobility networks, such as forums promoted by international organisations, the work of major consultancies, or the awards and good practice banks promoted by city networks, among others.

Ultimately, the search for solutions encourages knowledge transfer between metropolises that underpin the circulation of new ideas and ways of tackling certain problems. It also involves a boost to creativity, real learning from difficulties in implementation and adaptation to the specific context. In other words, it requires good understanding of the local environmental, social and economic conditions of urban contexts (Babí Almenar *et al.*, 2021).

The positive connotation of the term 'solutions'

The concept of *solutions* is appealing because it carries an implicit connotation of problem solving and positive outcomes for society (solutions) (Nesshöver *et al.*, 2017). In general, society expects bureaucrats and politicians to find *the solution* rather than spending time defining a problem, as no one wants to give the impression that they have no answers (Noveck, 2021). It might also be thought that this connotation of positive outcomes for society has greater public understanding and approval, as opposed to other concepts such as *public policy*, which may be seen as less straightforward or self-evident. This identity can attract a great deal of attention from the media and international organisations.

The strengths and weaknesses of the characteristics and implications underlying the term *solutions* are set out below:

Table 1. Strengths and weaknesses of the features and underlying implications of the term *solutions*

Characteristics	Strengths	Weaknesses
Regarding the response	• Possibilism and pragmatism • Agility in the response • Visible and incremental gains	• Lack of reflection on structural causes of the problem and links to other problems and solutions • Resistance to more disruptive innovation that needs more experimentation time
Regarding experience	• Known solutions that create certainty • Scalable and replicable to other metropolises and challenges	• Need for a process of adaptation and accommodation to the context with possible deviations • Little attention to implementation problems and the results of subsequent assessment
Regarding the concept	• Comprehension, practicality and possible higher public approval • Focused more on profit than process	• Umbrella concept • It does not pay sufficient attention to: a) potential new problems generated by the solutions; b) the fact that public problems are rarely fully resolved

Source: the authors.

3. Criteria for implementing metropolitan solutions

The term *metropolitan* has been used since cities began to expand beyond their administrative boundaries, but is often used interchangeably with other terms such as *metropolis, agglomeration, city region, area* or *metropolitan region.* This flexibility in the concept may well be why the term is so popular.

The *field of geography* adopted a morphological perspective that delimited the extension of the physical continuity of the city based on *land use.* However, more recent definitions take a functional approach, limiting the extent of the city's economic relations to citizens' commuting between their place of residence and their workplace (Galland and Harrison, 2020; Zornoza, 2021, cited in Tomàs, 2023). According to UN-Habitat (2022: 3), metropolises "are not defined neither by their population, territorial extension nor by the number of their local jurisdictions, but by their functional geography".

On a global scale, in March 2020, the UN Statistical Commission endorsed a global definition of cities to facilitate international comparison, which sees a metropolitan area as "a city and its commuting zone, consisting of economically and socially linked suburban, periurban and rural areas".

At the European level, the concept of the city as a pole of economic attraction is the main reason why the metropolitan area has tended to be defined as a functional urban area (FUA) (OECD, 2012). In 2017, the European Regulation on Territorial Units for Statistics was amended (Regulation (EU) 2017/2391), and the European Commission's statistical office (Eurostat) adopted the definition of FUA proposed by the OECD.

However, there remains controversy and debate over the delimitation of metropolitan boundaries, and thus ambivalence over the nature of the concept. Tomàs (2023) argues that this definition of the functional extent of the city favours the economic perspective over the morphological perspective linked to land use (as in the European Environment Agency methodology) or population density (as in the Eurostat methodology on the level of urbanisation).

It could be said, therefore, that the study of metropolises and their governance has been strongly anthropocentric and has failed to consider the biophysical matrix that sustains them. In other words, the mismatch between the ecosystems that make life possible in these urban areas and the institutions that govern them has not received as much attention. However, there are approaches to the metropolitan phenomenon, such as the bioregion, which differ from the more traditional approaches based on the degree of urbanisation, population size or mobility-based functional links (Gisotti, 2022).

Whatever the case, metropolises are characterised by strong economic, social and environmental interdependencies requiring integrated management, based on functional territories, crossing jurisdictional boundaries and the urban-rural continuum (UN-Habitat, 2022).

The presence of metropolises in the world is increasing. According to forecasts in UN-Habitat's *Global State of Metropolis report* (2022), the metropolitan population will grow rapidly: the number of people living in metropolises will increase to 3.47 billion by 2035, making up 39% of the global population. This growth in millions of people over the next decade will have a major impact on the economy (high levels of socio-economic activity, steep price rises in the housing market, higher levels of poverty and inequality), society (high

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demographic concentration of the population), the environment (sustainability and waste management), governance and infrastructure and services in all types of cities and regions of the world (UN-Habitat, 2022). However, the management capacity of metropolises is not the same the world over. As mentioned above, there is a "global metropolitan management gap" (UN-Habitat, 2022: 5) between functional realities and their political and institutional management, which limits their capacity to solve metropolitan problems.

But what are the policies and services that add value when carried out at the metropolitan level or from a metropolitan perspective? The levels of government closest to citizens should be responsible for providing services that generate more spatially bounded benefits (Bird and Slack, 2007), such as street lighting, municipal street maintenance, local urban planning, public parks, leisure facilities or libraries (Salinas and Vilalta, 2018: 63). Typically, the criteria of local knowledge, proximity to service users and accountability are associated with smaller government units, such as municipalities, while, as we will see below, the criteria of economies of scale, management of externalities and equality are more closely related to the advantages of metropolitan approaches (Andersson, 2017).

During the 1990s, a general belief began to spread that a metropolitan area was the most appropriate jurisdictional unit for managing infrastructure, the urban environment and urban finance, particularly public investment. According to Cohen (2017: 168), the metropolis is "big

enough to capture spillovers, yet small enough not to be a province or state within federal or unitary countries". However, this idea is strongly contested by proponents of the public choice school, which emphasises the benefits of competition between local governments to attract people and businesses. Finally, the new regionalism school stresses above all the combination of more flexible cooperation structures based on the idea of multilevel governance, inter-municipal cooperation and citizen participation.

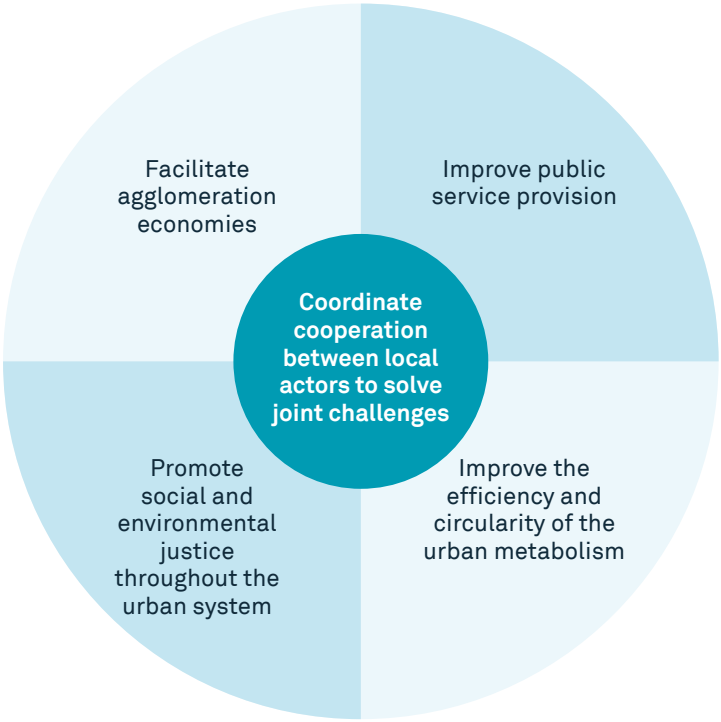
Beyond the "how", further reflection is needed on what policies and services are more relevant at the metropolitan scale, a scale that has recently been recognised by UN-Habitat in the resolution on localisation of the SDGs adopted at the June 2023 assembly, with the inclusion of a paragraph on the metropolitan reality. In particular, point *e* of the resolution specifies: "Supporting, upon request, national governments to strengthen effective local and metropolitan multi-level governance to advance the Sustainable Development Goals through stronger policy coherence, cross-sectoral alignment, and multi-stakeholder engagement and participation".

A review of the political science, geography, urban sociology, regional economics and environmental science literature dealing with these issues was carried out in this study to help define the areas of metropolitan action. Based on this review, five non-exclusive criteria are identified that may help determine when the solution has value at the metropolitan scale. They are:

— When solutions promote cooperation between actors from different local jurisdictions to solve joint challenges:
  - Do they address some of the existing problems of institutional fragmentation in the urban area?
  - Do they foster trust between urban municipalities and other actors?
  - Do they strengthen existing metropolitan cooperation structures?
— When solutions facilitate agglomeration economies:
  - Do they recognise the benefits of and encourage agglomeration economies?
  - Do they take into account and limit possible diseconomies of agglomeration?
— When solutions lead to improvements in public service delivery:
  - At the metropolitan level, are economies of scale or coordination of different municipal services improved?
— When solutions promote social and environmental justice in the urban system as a whole:
  - Do they take into account their effects in terms of social and environmental justice?
  - Do they develop mechanisms to limit the processes of segregation, gentrification, urban inequality and environmental injustice?
— When solutions improve the efficiency and circularity of urban metabolism:
  - Do they incorporate a metabolic vision of the metropolitan area?
  - Do they help lower the need for resources and improve their circularity within the urban system itself?

The first of these criteria is the element through which metropolitan solutions are structured and managed. The other four are the joint challenges facing metropolitan areas. This interrelationship can be represented as follows:

Figure 1. Criteria to help determine when the solution has value at metropolitan level



Source: the authors.

Each of the criteria is discussed below. First, a conceptual approach and its relation to metropolises is presented, followed by an exploration of formulas for advancing in each of the areas, which can also serve to better operationalise each of the criteria.

3.1. COORDINATING COOPERATION BETWEEN LOCAL ACTORS TO SOLVE JOINT CHALLENGES

Institutional fragmentation as a problem, cooperation as a solution

The relevance of this criterion is based on the fact that metropolitan regions are, by definition, fragmented spaces. Metropolitanisation is characterised by urbanisation processes that cross defined institutional and territorial boundaries. "Governmental fragmentation leads to difficulties in formulation and implementation of adequate policy responses to metropolitan problems" (Kübler and Schwab, 2007: 473). Thus, institutional fragmentation at the metropolitan level hinders solutions to certain urban issues where different public authorities at local, regional and national levels have the responsibilities and powers to solve them (Bulkeley and Luque-Ayala, 2017; Feiock, 2009; Heinelt and Kübler, 2009).

The alternative to fragmentation involves a wide range of mechanisms and strategies that range from cooperation to metropolitan institutionalisation. As will be noted below, a number of mechanisms exist, including establishing metropolitan bodies aimed at improving coordination and delivery of metropolitan services. Although most organisations have few powers and small budgets, correlations between their existence and desirable outcomes can be found in various

fields. Positive associations have been found between the existence of metropolitan bodies in institutionally fragmented functional urban areas and higher per capita GDP, and between less urban sprawl and higher citizen satisfaction with the respective transport systems, compared to areas lacking such metropolitan cooperation instruments (Ahrend *et al.*, 2014).

Beyond joint planning and service provision, cooperation is also necessary to define priorities, prioritise alternatives and develop projects that fall under the competence of supra-municipal authorities or need to be planned and implemented in agreement with these authorities (Andersson, 2017). For example, cooperation between jurisdictions is necessary to shape joint strategies for the location or expansion of major infrastructure, such as ports and airports, required by the metropolitan area as a whole (Nel·lo, 2023).

Metropolitan solutions to institutional fragmentation

The literature on metropolitan governance identifies a variety of cooperation mechanisms found in contemporary metropolises (Andersson, 2017; Tomàs, 2016; Geroházi and Tosics, 2018; Warner, 2012; UN-Habitat, 2020), as a result of cooperation, institutionalisation and merging of local bodies. The type of mechanism and its characteristics depend on different factors related to the organisation of territorial power, the history of cooperation between local bodies in the metropolitan area and the projects and institutional reforms promoted by supra-local governments (Barres and Martí-Costa, 2023). Urban areas often combine different mechanisms simultaneously and these evolve over time (Bird and Slack, 2007). The most common ones are listed below:

— **Specific inter-municipal cooperation agreements.** They may be of temporary or more permanent. They may have a specific mission (thematic or service-related) or be multi-sectoral. They are characterised by their flexibility and by being a first step in building trust between local governments and subsequently moving towards enhanced cooperation, but also by their fragility and limited impact on more substantial or structural problems.

— **Permanent structures of inter-municipal cooperation**, e.g. associations of municipalities, with the aim of coordinating particular municipal strategies or to act as a lobby group at other levels of government. They are useful as a forum for discussing common issues among local governments, and local governments can easily join and leave them, as well as maintain their autonomy. However, they have little financial and executive capacity to implement agreements and common issues.

— **Metropolitan service agencies.** Legally independent agencies oriented to the management of a specific service. They usually take the form of consortia or partnerships with specific territorial scopes according to the characteristics of the service (water, transport, education, etc.). A common example is regional planning agencies, which require this broader vision and high technical expertise, although they may have difficulties in implementing their work without the support of a metropolitan authority or government.

— **Metropolitan/regional authority.** Independent bodies, established legally, at least initially, by voluntary agreement between their member municipalities. Their political leadership is dependent on local governments, although they are often indirectly elected through municipal elections. They usually integrate different services with a multi-purpose character and a strong

element of service delivery, whereby the latter are able to achieve economies of scale in certain services, better establish interdependencies between them and better control spillover effects in the metropolitan area. When metropolitan authorities accumulate a range of important functions and services, but remain largely technical in nature, there can be a lack of transparency and participation in decision-making, as well as a lack of accountability.

— **Directly elected metropolitan government.** Strengthening democratic political representation becomes advisable when multi-purpose metropolitan authorities acquire a level of competencies and their own funding. It is also easier to move towards more harmonising regulations and more redistributive policies for all the municipalities in the area. Government can be single-tier, for example as a result of a merger of municipalities in the metropolitan area, or two-tier, when direct municipal elections are combined with metropolitan elections. In this case, tensions may arise between local autonomy and the powers of the metropolitan body and higher government, if there is no institutional design to clarify competencies and specify the appropriate instruments of vertical and horizontal cooperation.

— **Regional government (with a metropolitan focus).** When the functional urban area matches the scope of already established regional or provincial government, the latter can act as a driver for metropolitan cooperation and providing the delegated services of the municipalities within it. However, sometimes lack of vertical cooperation with local governments and existing divisions of competencies may mean that, despite the territorial fit of the urban area with the boundaries of the regional governments, these governments do not take on these functions and only implement certain metropolitan services through specific agencies.

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While having proper metropolitan institutions such as metropolitan authorities or regional or metropolitan governments helps to lessen the negative effects of institutional fragmentation, it does not guarantee more effective metropolitan policy development. These will depend, above all, on the capacity for collaboration between the institutions present in the metropolitan territory.

Most of these institutional formulas require cooperation between local authorities, either initially or on an ongoing basis. Thus, a systematic assessment of the factors that favour cooperation between local governments is essential to advance any metropolitan cooperation scheme.

Criteria and solutions to promote inter-municipal cooperation

On the one hand, metropolitan institutionalisation is conditioned by processes (sometimes top-down, sometimes bottom-up) influenced by the institutional and political context. In Europe, where some of the most advanced cases of metropolitan institutionalisation can be observed, these processes have often occurred as part of broad institutional reforms and territorial reorganisation, framed within processes of state decentralisation, improvements to the efficiency of public services or rationalisation through austerity policies (Barres and Martí-Costa, 2023). But, as we have seen, they may also be based on economic justifications, associated with promoting and improving the competitiveness of urban regions in contexts of globalisation and Europeanisation (Le Galès, 2011), or on the very need for the metropolitan area to function: the need to plan and organise urban growth, improve and integrate transport systems, manage urban waste management and so on (Álvarez, 2005).

Because of their institutional nature, metropolitan reforms are determined by legislative processes. In this sense, the legislative initiative for metropolitan reforms is conditioned, among others, by the institutional context and territorial model (Zimmermann and Feiertag, 2018): in decentralised states they may be more dependent on regional and local politics, while state institutions play a central role in more centralised states. Between the two, more multi-level processes of joint construction between local actors and the state may also be generated.

On the other hand, the theory of institutional collective action (Feiock, 2013; Hawkins, 2017; Tavares and Feiock, 2018) identifies a number of factors that favour voluntary cooperation, such as between municipalities in an urban area. They are: *a*) incentives or limits to intergovernmental cooperation as defined in the legal framework or in local institutions and rules; *b*) the homogeneity of preferences within the community and between cooperating communities; *c*) the nature of the services and goods that are the subject of cooperation; *d*) geographical proximity between cooperating actors and intergovernmental density. Let us take a closer look.

Firstly, local governance models and the regulatory framework condition collaboration decisions, as they determine the degree of local autonomy and set out its conditions and limits (Gomis, 2018; Loughlin and Peters, 1997; Tavares and Feiock, 2018). Thus, the constraints and interferences that the regulatory framework can place on inter-municipal cooperation increase transaction costs, which discourages cooperation.

Secondly, in relation to the specific characteristics of the municipalities involved in the cooperation agreements, the social, demographic and economic similarity of populations in the municipalities and homogeneity of preferences may play a role. Institutional

characteristics (management structures, size of government authorities, available resources, departmental fragmentation) of local governments also affect the degree of cooperation (Bel and Warner, 2015; Feiock, 2007; Tavares and Camões, 2007; Thurmaier and Wood, 2002). These factors may complicate voluntary cooperation when there are major differences between municipalities, and such cooperation needs to be encouraged and promoted by higher authorities. This is also the case when there is a gap between the central city and the other municipalities in a metropolitan urban area. In this case, inclusive and generous leadership from the central city is needed to reduce mistrust.

Thirdly, the nature of the goods and services to be pooled can also explain cooperation between municipalities: the specificity (specific goods and services, which cannot be relocalised or reused) and measurability of public goods and services explain why some are more likely to be produced through cooperation instruments while others are produced internally (Feiock, 2008, 2007; Tavares and Camões, 2007; Williamson, 1981). Therefore, a cooperation agreement that includes investment in very specific assets makes it difficult to modify the agreements in the future and ultimately creates disincentives to cooperation. One example is the production of social housing, which requires significant investment (which may require cooperation), but generates benefits that are highly concentrated in the place where it is built, which serves as a disincentive. In these cases, cooperation is more likely to take place through metropolitan or higher-level authorities or governments. On the other hand, cooperation between local authorities is more likely to occur for non-specific assets that can be relocated or reused for a variety of purposes.

Cooperation would also be more likely for goods and services with easily identifiable and measurable outcomes. In this sense, tangible and measurable services (such as waste management and water supply) for which the benefits of cooperation can be localised reduce transaction costs (Feiock, 2007; Tavares and Camões, 2007).

Finally, geographical proximity and the density and tradition of relations are also identified as facilitating factors for cooperation between municipalities. These two factors may make certain areas within urban areas more conducive to cooperation and sharing services than others. Neighbouring municipalities sharing territorial boundaries have incentives to cooperate, as well as those in environments with a high density of relationships and a consolidated tradition of cooperation between actors, as interaction between mechanisms and a dense institutional fabric favour trust between actors.

Before concluding, it is also worth noting that, in the case of Africa, there is specialised literature that points to the need to establish democratic governance based on the values and principles of indigenous African philosophies, such as Gada (in the case of sub-Saharan Africa) or Ubuntu (in the case of South Africa) (Aliye, 2020), which are communitarian, collectivist, value-based, participatory and humanistic (Basheka, 2015; Edwards, 2015; Eyong, 2017, cited in Aliye, 2020). Despite the fact that colonialism marginalised (or eliminated) African indigenous institutions, there are a number of scholars who call for indigenous solutions to African leadership and governance problems (Bolden, 2014; Bolden and Kirk, 2005; Gumede, 2017; Punnet, 2017, cited in Aliye, 2020). Institutionally, Salie (2018) explores how Ubuntu can promote responsibility among public officials to shape a just and caring nation state, fostering a deep awareness of the primacy of community obligations and accountability.

3.2. FACILITATING AGGLOMERATION ECONOMIES

What are agglomeration economies and why are they important for metropolises?

Agglomeration economies refer to cost benefits (production, transaction) or qualitative factors resulting from the spatial concentration of resources and productive agents (population, companies, institutions, public services, etc.) (Galletto *et al.*, 2019; Pichardo and Otoya, 2012). In other words, spatial concentration of economic activity and productive factors induces a cumulative process of concentration of other markets and activities, such as the labour market, education and public services, which all produce economic feedback.

A distinction can be made in agglomeration economies between those related to diversity and those related to localisation (Galletto *et al.*, 2019; Goerlich *et al*., 2020). The former are the economies of urbanisation arising from interaction with other sectors and the urban environment. They are explained by market size, productive diversity, social diversity and cross-fertility between sectors: innovations in some sectors can also be useful for others and for the existence of public goods (such as transport hubs). The latter are those arising from concentrating the location of companies in the same productive sector, explained by the existence of a trained and specialised labour market, specialised suppliers, knowledge (of technologies and market trends) and social capital and trust. Porter (1998, 2000) developed the concept of *cluster*, which refers to "geographical concentrations of a critical mass of interconnected companies and institutions in a particular field". Clusters are concentrations of companies and other institutions engaged in the same business, i.e. they share the same market and therefore produce complementarities and similarities (Del Palacio and Engel, 2011). In a cluster, companies benefit from external economies of scale, ease of access to information, proximity to customers and specialised suppliers, and lower transaction costs, among other factors (Del Palacio and Engel, 2011). These advantages better position companies in clusters to compete globally (Del Palacio and Engel, 2011).

More recently, the concept of innovation clusters has emerged, which refers to the "an agglomeration of individuals and organizations that are specialized in the different stages of the entrepreneurial process rather than in an specific industry" (Del Palacio and Engel, 2011). This global innovation cluster model (Del Palacio and Engel, 2011) focuses on innovation clusters that favour the creation and development of high-growth companies and not just the concentration of organisations in a specific industry.

Duranton and Puga (2004) point to three microeconomic foundations of urban agglomeration economies based on three simultaneously operating mechanisms: sharing, matching and learning. The first refers to the possibility of sharing public use infrastructure that are indivisible in size and therefore require a relatively large number of users to be efficient. Thus, for example, cities that exceed a certain size can incorporate more advanced transport systems such as underground railways, airports, etc. The second mechanism, matching, refers to the fact that urban agglomerations improve the quality of the match between companies' labour demands and workers' skills and interests. Finally, the third mechanism, learning, refers to the capacity of urban agglomerations to generate, accumulate and disseminate expertise.

Giuliano *et al*. (2019) point out that agglomeration economies can also stem from a fourth factor: the quality of services and amenities (value of amenities). It is also argued that human capital demands high-amenity places to live: places with cultural attractions, night life, high-quality public

services, and a variety of consumer alternatives. Therefore, companies will follow these workers and locate in high-amenity places (e.g. Florida, 2002, 2014; Kotkin, 2000, cited in Giuliano *et al.*, 2019). However, agglomeration can also have negative effects by increasing the private and social costs of agglomeration (Manrique, 2006; Pichardo and Otoya, 2012). In other words, agglomeration has a constant growth inertia, which reaches its limit when production and use of certain factors grow, due to the increase in total costs. According to Polèse *et al*. (1998), these costs include factor prices (e.g. travel), factor scarcity (such as land and labour) and transport-related costs (traffic, stress, crime, etc.). In short, agglomeration economies can diminish, disappear or even become diseconomies or negative externalities (Manrique, 2006; Pichardo and Otoya, 2012). Examples of urban diseconomies or negative externalities include: traffic congestion (affecting stress, time use, people's leisure time); traffic accidents (with implications for social, economic and human costs); air pollution; public safety and other problems associated with urban sprawl (with associated environmental impacts due to rising demand for land and public services); and the worsening of unregulated growth lacking adequate planning and regulation (Pichardo and Otoya, 2012).

It has recently been argued that agglomeration economies operate on two levels: the metropolitan level and the sub-metropolitan level (Giuliano *et al.*, 2019). In relation to the former, it is argued that the theoretical literature does not address the geographical scale of agglomeration economies, but that "it is implicit that agglomeration economies operate at the 'city' level, meaning at the metropolitan scale" (Giuliano *et al.*, 2019: 382). However, large metropolitan areas are polycentric rather than monocentric, suggesting that agglomeration economies are not uniform within metropolitan areas.

Solutions to facilitate agglomeration economies

Facilitating agglomeration economies requires boosting three areas linked to skills which, at the metropolitan scale, often have the longest track record and the most resources: urban planning and land use; mobility and public transport; and economic development.

In relation to the first area, Pichardo and Otoya (2012) point out that adequate urban and territorial planning is needed to generate diverse economies from agglomeration. However, the recipes differ depending on the point of view. On the one hand, neoclassical economists, with their primary focus on generating economic growth through the market, generally offer, for example, the policy recommendation of lifting planning regulations that restrict growth to encourage urban growth and accommodate the rise of large megacities (Alonso, 1970, 1971; Mera, 1973; Glaeser *et al.*, 2016, cited in Boussauw *et al.*, 2018). By contrast, spatial planners traditionally focus on the negative consequences of urban growth, and one of their recommendations over the past century has been to move towards polycentric and regulated urban development models (Boussauw *et al.*, 2018). From this point of view, urban and territorial planning should facilitate synergies of different land uses and, at the same time, avoid negative externalities (Goytia, 2017).

These polycentric development models have been proposed as a specific form of metropolitanisation that allows for both agglomeration economies and higher levels of liveability and sustainability (Boussauw *et al.*, 2018). For example, in the central metropolitan area in Flanders (Belgium), Boussauw *et al.* (2018) propose the use of "potential agglomeration maps" that visualise potential locations in a polycentric metropolitan area where positive agglomeration externalities can be optimised. The spatial vision aims to determine where future population growth expected in the central metropolitan area could

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best be located, while optimising the positive externalities of agglomeration and maintaining its small-scale morphological character.

Fragmented land use management and planning processes can have several consequences. First, according to Goytia (2017), it can affect the economic sustainability of metropolises by minimising the possibilities of achieving agglomeration economies, increasing congestion costs and productivity losses associated with insufficient coordination between places of residence and income-generating jobs. Secondly, institutional fragmentation can lead to uncontrolled urban sprawl, which in turn can increase congestion costs. In this sense, it is notable that land regulations in metropolitan areas are often implemented at the local level to maximise local well-being. Goytia (2017) exemplifies this with two scenarios: if congestion is largely municipal, while agglomeration effects are more diffuse, local planners – who do not fully internalise the positive effects of metropolitan agglomeration – may unduly restrict development; on the other hand, if congestion is a metropolitan phenomenon and agglomeration economies are perceived within municipalities, local planners will induce too much development. Local planning (without sufficient consideration for supra-local dynamics) is therefore generally inefficient, as it either promotes too much or too little development, hindering agglomeration economies or significantly increasing urban costs.

However, in this regard, it should be noted that patterns of urban morphology in the Global North are different to those in the Global South, where urbanisation has occurred in the absence of industrialisation (Jacobs and Cilliers, 2017). Cities in the Global North typically refer to the concentric circle model, the sectoral and multi-core model, all with a central business district, surrounded by residential and other neighbourhoods. While cities in the Global South may follow some of these capitalist patterns, the greater importance of informal dynamics (labour, residential), accelerated growth and institutional weaknesses, together

with the intersection of specific patterns of segregation along ethnic or religious lines, give rise to distinct urban geographies that require specific planning and intervention strategies.

In any case, there is consensus in the literature on the need to promote coordinated action on land use planning and interurban mobility and public transport planning. This is, in fact, the second policy area to facilitate agglomeration economies: mobility and public transport planning, to improve efficiency in terms of travel time, avoiding congestion and, more recently, as a climate adaptation strategy.

Mobility infrastructure and services produce multi-sectoral externalities or spillovers in areas such as labour productivity, health, environment and housing, which add a level of institutional and disciplinary complexity (Zegras, 2017). Municipalities often have little incentive to properly address the negative or positive side effects associated with mobility. Therefore, an administrative authority is required below the national and provincial levels, but above the municipal level, balancing the benefits and costs of transport and driving cross-jurisdictional coordination and integration of transport and land-use systems (Zegras, 2017). Otherwise, it could negatively impact on transport investment and land use planning, increasing congestion and reducing the overall attractiveness of a site (Andersson, 2017).

Metropolitan authorities can play a key role in coordinating, planning and harnessing the benefits of agglomeration while minimising the negative effects of institutional fragmentation. Government action is necessary to create the right environment for enterprise development, as there are exogenous factors beyond the control of enterprises, but which have an influence on their development. This is therefore the third area mentioned above. Some of the tools governments have at their disposal to support economic activity are: investment in technologies, support for the creation of service centres; and strategic market information, among others (Chevallard and Duch, 2011). Apart from national levels, work on regional innovation systems has recently been encouraged to boost innovation systems, so that innovative firms have access to a number of local actors who, in one way or another, are related to the innovation process of local firms and other actors (Del Palacio and Engel, 2011). To foster agglomeration economies, they can also encourage investment and the internationalisation of the productive apparatus (e.g. creating specialised agencies for this purpose), boost services to strengthen entrepreneurs and businessmen in the territory, boot employment management and job training (e.g. with the implementation of labour market observatories to find out which sectors are more dynamic, show the most growth, etc.) and promote the circular economy (Isaza and Forero, 2023).

Industrial estate planning was carried out within the paradigm of the functional city, which sought to separate productive and residential activities, to create economies of location. The problem is often that they have been planned at a local scale and with a dynamic of expulsion partly due to land prices, with little consideration of how to plan to take advantage of the economies of urbanisation and location in the metropolitan area as a whole. Roa (2015) considers that metropolitan-scale land use policy for industrial estates should avoid territorial disorder and facilitate raising the value of industrial proximity. An analysis of industrial policy in metropolitan areas in France (Levratto, 2013) and Japan (Nishijima, 2009), identifies a number of positive actions: Promoting a virtuous coordination between research, innovation and industrial activity; Promoting the agreed design for incentives to help develop

and specialise strategic territories; and the design for territory-based strategies which not only foster new poles and systems of production but also seek to enhance the value of local relations.

Finally, coordinated land use regulation also provides a predictable frame of reference for investors. The main benefit of this regulation is that metropolitan land use coordination protects against perverse incentives for municipalities to compete for the same investment, without considering spatial efficiency or possible negative externalities (Goytia, 2017).

3.3. IMPROVING PUBLIC SERVICE PROVISION

A way to measure improvements in the delivery of metropolitan public services: economies of scale

Municipalities aim to deliver public services efficiently. Achieving economies of scale is the main theoretical basis for cost savings in shared services (Allers and De Greef, 2018; Bel and Warner, 2016; Elston and MacCarthaigh, 2016; Holzer and Fry, 2011, cited in Aldag *et al.*, 2020; Tavares and Feiock, 2018). However, municipal boundaries are often sub-optimal for providing certain public services and, therefore, leading to the proposal back in the 1960s of joint and shared service provision with other authorities to address the problems (Ostrom, Tiebout and Warren, 1961, cited in Aldag *et al.*, 2020).

Analysis of gains in scale often focusses on comparing the (average) cost of organisations, such as local governments, with the size of the population to which the organisation provides the service, in order to determine the optimal levels of public service provision in terms of costs and outcomes. Economies of scale may arise due to such factors as indivisibility of capital, fixed costs, increased usage of fixed assets and labour specialisation (Blom-Hansen *et al.*, 2016; Boyne, 1995; Hirsch, 1959, cited in Niaounakis, 2021). However, diseconomies of scale can also occur, such as when the long-term average total cost increases as production increases (Mankiw, 2012). In other words, the negative effects begin to offset the positive returns to scale. The tipping point between economies of scale and diseconomies of scale varies between services, products and organisations and ultimately depends on the technology behind it (Niaounakis, 2021).

Solutions for assessing improvements in economies of scale at the metropolitan level

Merging municipalities or establishing joint services has often been motivated by arguments of economic efficiency: larger municipalities would be able to provide local public services at lower unit costs due to economies of scale (Aldag *et al.*, 2020). However, the literature on economies of scale in public service prevision is presented as inconclusive and inconsistent in certain areas and services (Aldag *et al.*, 2020; Niaounakis, 2021; Reingewertz and Serritzlew, 2019; Tavares and Feiock, 2018).

Thus, studies have shown that economies of scale for shared services are highly variable (Boyne 1992; 1996; Dollery and Fleming 2006; Dollery *et al.* 2008, cited in Tavares, 2018). Tavares (2018) identifies three reasons why this is the case. First, economies of scale are not uniform across all types of local government services. In capital- and infrastructure-intensive

services (e.g. treatment plants and bus fleets), there are potential gains from a larger population, because fixed costs can be spread over more residents. By contrast, these gains are non-existent with labour-intensive services, because offering more services means hiring more workers to meet demand.

Secondly, management costs tend to increase significantly after a certain population threshold has been reached, so diseconomies of scale may occur in large municipalities. Coordination and communication costs, for example, increase with the scale of the activity, due to greater administrative requirements (Aldag *et al.*, 2020). Consequently, it has been shown that economies of scale may be more attractive for smaller municipalities (Bel *et al.*, 2014; Warner and Hefetz, 2002), whereas municipalities already operating at optimal scales may perceive fewer benefits from sharing services (Aldag *et al.*, 2020; Reingewertz and Serritzlew, 2019).

Thirdly, population size is not the only variable influencing production costs, as costs also depend on other site-related factors. Climate, topography, age of residents, local income, quality of service and seasonal variations in population, such as those caused by tourism or migration, are also significant (Tavares and Feiock, 2018; Warner and Hefetz, 2002; Zeemering, 2018). Another factor related to this has also been noted: density. cost savings may be more likely when population density, rather than population size, increases (Tran, Kortt and Dollery, 2019, cited in Reingewertz and Serritzlew, 2019). In conclusion, agglomeration economies vary according to the service and the urban and population characteristics of the territory where the service is provided, as demonstrated in the following examples.

In relation to public health, according to Mays *et al*. (2006), economies of scale in implementing activities such as disease surveillance and health education can be achieved by spreading the fixed costs of public health infrastructure across populations ranging from 20,000 to 100,000 inhabitants. Public health systems can also benefit from larger groups of community organisations, such as healthcare providers, community organisations, educational institutions, local media, businesses and government agencies, which can participate in public health activities (Mays *et al.*, 2006). However, given that the provision of public health services is labour-intensive, it is not yet clear whether public health expenditure adjusts in response to population change. Indeed, Santerre (2009) notes that the theoretical relationship between population size and public health spending is unclear and depends on the net influence of congestibility, externality and the scale and scope of the economic effect. Specifically, he finds that the minimum efficient scale for a local US health system is approximately 100,000 people, i.e. this population size may be associated with cost savings.

For water supply and wastewater treatment services, Marques and De Witte (2011) found significant economies of scale, with the optimal scale of utilities found in Portuguese cities with between 160,000 and 180,000 inhabitants.

In the solid waste management sector, Bel (2005), in Catalonia, and Álvarez *et al.* (2003) find that the waste collection and treatment service in Galicia achieves significant savings in production costs in large populations (over 15,000 inhabitants).

In the case of New York State, Aldag *et al.* (2020) conclude that economies of scale are also found in this sector.

For waste collection, strong evidence of economies of scale is found in the Saint Louis metropolitan area (United States) (Hirsch, 1959). However, Stevens (1978) and later Bel (2013) conclude that this effect is diluted when the population exceeds a threshold of between 20,000 and 50,000 inhabitants.

The field of urban transport shows contradictory results, depending on the size of the cities. It is argued that geographical conditions are a relevant factor in this type of service.

Similarly, an extended analysis of the determinants for cost and cost-efficiency in road maintenance in Dutch municipalities shows that environmental factors (soil type, waterway length, urbanisation, traffic intensity) are important determinants of road maintenance costs (Niaounakis, 2021). It is therefore argued that environmental factors must be studied to analyse cost efficiency between municipalities. Aldag *et al.* (2020), in the US case study, also conclude that road services show economies of scale.

In the same study, Aldag *et al*. (2020) find economies of scale in library and sewerage services, due to shared collections, delivery, facilities and equipment. Finally, economies of scale are also found in fire prevention and police services in the United States (Aldag *et al.*, 2020; Hirsch, 1959).

Finally, it is also worth noting that the literature on optimal public service provision levels addresses an emerging conflict between efficiency and democracy: while the conventional argument states that service delivery is more efficient in larger jurisdictions, due to economies of scale, political participation and representation are easier in smaller jurisdictions, due to proximity between politicians and citizens (Reingewertz and Serritzlew, 2019).

Thus, different mechanisms should be available to take advantage of economies of scale when they are possible, taking into account the necessary balance between efficiency, differences between territories, the capacity for citizen advocacy and democratic accountability. The following procedures may be highlighted, based on the classification in Niaounakis (2021):

— **Consolidation:** two or more previously independent organisations consolidate or merge into a larger unit and similar services previously provided independently are now performed as a single unit.
— **Joint production:** public organisations can seek improvements through joint service provision using cooperative arrangements to achieve economies of scale, e.g. consortia or joint purchasing.
— **Joint subcontracting:** economies of scale can also be sought through joint outsourcing of activities to private companies.
— **Delegation of powers:** delegating powers to other public bodies with wider territorial scope.

Before concluding, it is worth noting that other elements besides economies of scale should also be taken into account when assessing efficiency in public service provision by public authorities, such as service delivery capacity, expertise of technical staff and institutional capacity.

3.4. PROMOTING SOCIAL AND ENVIRONMENTAL JUSTICE THROUGHOUT THE METROPOLITAN AREA

What is spatial justice and how does it relate to metropolises?

Metropolitanisation, residential segregation and administrative fragmentation are key factors in understanding unequal urban development. The first metropolitanisation dynamics began to emerge after the Second World War involving the overflow of municipal boundaries and new dynamics in socio-residential structuring (Porcel, 2016). In the case of the United States, a process of suburbanisation took place: mass construction of single-family houses on the outskirts of urban centres which reinforced socio-residential differentiation in new urban ghettos: compact communities of the African American population. In the case of European metropolises there was the rise of suburbs: housing on the outskirts of large cities populated mostly by working classes from renovated inner city areas and by immigrants. These areas were usually poorly connected to the rest of the city (White, 1984, cited in Porcel, 2016). At the same time, suburbanisation processes were also taking place and, more recently, new urban forms have emerged that contribute to socio-residential differentiation, such as the gentrification of neighbourhoods (Marcuse, 1993; Marcuse and Kempen, 2008). Metropolises of the Global South, although they have their own characteristics, also produce low-density urban sprawl, notable segregation dynamics and expulsion processes in revalued spaces.

Spatial and environmental justice are two concepts linked to social justice that involve a spatial dimension (Campos-Vargas *et al.*, 2015). Firstly, spatial justice is concerned with relations between the socio-economic conditions of social groups and the territory where these conditions arise (Harvey, 1973; Lefebvre, 1968). Differentiated location of social groups in the city responds to hierarchical domination and power logics (Castells, 2004). In other words, the social production of space generates advantages for some groups and disadvantages for others, and has both a municipal and a metropolitan dimension. Spatial concentration of households by income or other socio-economic or cultural characteristics can affect people's opportunities (Boulant *et al.*, 2016) in terms of educational achievement, work opportunities and even health.

Residential segregation corresponds to the spatial agglomeration of a population with the same social status (Sabatini, 2006: 7) based on their ability to choose where to live and how to use the urban space (Boulant *et al.*, 2016; Goytia, 2017). Such segregation can occur in relation to economic and socio-demographic attributes such as income, ethnicity, migrant origin or age, among others (Porcel, 2016). Residential segregation of the most vulnerable populations is largely due to the housing market, through public housing policies (Nel·lo, 2023), the profit motive in private developments and operators in the informal housing market.

In the Global South, when the public sector fails to intervene and facilitate accessibility and affordability, people, particularly those with low incomes, resort to over-occupancy, informal land development, informal housing and other forms of informality. Lack of affordable housing is one of the root causes of slum creation, which excludes people from the benefits of urbanisation and agglomeration. Today, almost one third of the world's urban population lives in slums (Bredenoord *et al.*, 2014).

Evidence also suggests that institutional fragmentation, lacking adequate corrective mechanisms, is a factor in promoting residential segregation in metropolitan areas. It occurs

when some municipalities in metropolitan areas have a disproportionate share of deprived populations, while others have more affluent populations (Freemark *et al.*, 2020; Pagano, 1999, Altshuler *et al.,* 1999; Powell, 2002, cited in Goytia, 2017). In addition, municipalities with low-income populations frequently have a lower tax base to meet the needs of such populations (Bird, 1993; Slack, 2006; Hollenbach and Silva, 2019). Boulant *et al.* (2016) highlight significant differences in both income levels and inequality across metropolitan areas in 18 OECD countries, even within the same country. Larger metropolitan areas have, on average, higher household disposable income levels, but also higher income inequality. In terms of governance, the study finds a positive correlation between the level of administrative fragmentation of metropolitan areas and the level of socio-economic residential segregation.

Secondly, the concept of environmental justice arose in the last third of the 20th century, in a context marked by a growing awareness of spatial distribution in certain human activities (such as the hazardous waste generation, handling and storage and the territorial distribution of polluting industries). Environmental justice studies suggest ethnic minorities or low-income families are much more exposed to environmental problems and risks than higher socio-economic profiles.

The concept is based on the distribution of environmental benefits and damage and the need to establish participatory decision-making mechanisms "that can distribute those benefits and damages equitably among a justice community made up of located entities (subjects and objects), both current and future, who may have unequal rights and obligations" (Moreno, 2009, cited in Alberich *et al.*, 2021).

The study of environmental justice traditionally focusses on analysing the distribution of facilities with toxic emissions, landfills and other environmental hazards close to socially disadvantaged groups. Statistical research in metropolitan regions (Schweitzer and Stephenson, 2007, cited in Shokry and Anguelovski, 2021) shows that minorities and low-income citizens are more affected by environmental damage and are less protected from such facilities (landfills, waste disposal facilities, incinerators, refineries and other polluting industries) than white and affluent communities.

Recent work has broadened the scope of this concept of social justice to include terms such as equitable access to green spaces and other natural resources (Anguelovski *et al.*, 2020). This new interest stems from the fact that urban parks and green spaces help improve the quality of life for city dwellers (Alberich *et al.*, 2021).

The effects of climate change (Schlosberg and Collins, 2014) also affect metropolitan dwellers in different ways, not only in terms of biophysical threats, but also through a set of historical inequalities and social and political vulnerabilities. There is evidence of a direct relationship between urban poverty and climate change vulnerability (Bicknell, Dodman and Satterthwaite, 2009; Satterthwaite, 2009, cited in Bulkeley and Luque-Ayala, 2017). Vulnerable or poor communities are exposed to higher levels of risk and have limited capacity to respond and adapt because of their low resource base (Bulkeley and Luque-Ayala, 2017; Dinshaw *et al.*, 2017). This has been defined as social vulnerability to climate change (Domene *et al.*, 2022).

In such cases, it is argued that public authorities must ensure all communities have the same protection from these risks in terms of health and quality of life, and also guarantee their right

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to live in a safe environment, regardless of their ethnicity, gender, age or income level. In other words, it is necessary to promote a redistribution of the benefits and costs generated by anthropic activities in different places and social sectors (Campos-Vargas *et al.*, 2015).

Metropolitan solutions to promote social justice at the metropolitan scale

Freemark *et al.* (2020) explore the link between municipal fragmentation and greater residential segregation in metropolitan areas in the United States, United Kingdom, Canada and France. In particular, they note the tendency of wealthier areas to want to create new jurisdictional units and, secondly, the mechanisms used by some wealthier municipalities to avoid becoming more socially diverse. Specifically, these are: *a*) exclusion of new, lower-income residents by introducing barriers to entry through urban planning and housing policy; *b*) school zoning and increased school funding; *c*) fiscal competition by offering tax rebates. Reliance on locally generated taxes also means that wealthy municipalities with high-value properties can tax these properties at a lower rate.

Against this backdrop, action and cooperation at a supra-local level is necessary and in order to promote social justice. Some of the proposals for metropolitan social cohesion policies revolve around the following areas: urban planning, housing, education, care and income redistribution, fiscal policy and comprehensive neighbourhood programmes.

Harmonising land-use planning and regulation at the metropolitan scale is essential for mitigating the consequences of spatial concentrations of poverty and wealth, which lead to unequal access to jobs, schools and safe neighbourhoods. Roa (2015) proposes that land use policy should pursue the following basic aims: *a*) active production of building land for low-income households in all areas; *b*) regulation and limitation of suburban residential and industrial employment.

A number of general socio-spatial criteria for urban planning to ensure greater urban equality have been identified (IERMB, 2016). Encouraging residential diversification at the metropolitan level is proposed to ensure accessible, liveable and inclusive housing, by facilitating efficient and integrated housing policy based on urban planning, and promoting energy savings and renewable energy. In addition, ensuring equitable access to public facilities and services and generating fair access to green spaces and recreational areas is proposed to guarantee the quality of the residential environment. Establishing an accessible and efficient public transport network is proposed to ensure territorial integration and urban continuity while avoiding residential isolation. And finally, the following actions are considered essential to promoting peaceful coexistence: promoting a multifunctional public space and seeking models of coexistence and citizen interaction; and improving public space based on situational prevention. Other, more cross-cutting criteria are indicated, such as prioritising rehabilitation and integration of disadvantaged neighbourhoods, establishing population density criteria linked to the existing housing supply and adapting residential areas to changes in forms of coexistence and social diversity.

With regard to housing policy, a number of proposals aiming to promote social justice are identified. In particular, French law allows the national government to override local zoning, develop subsidised units and impose fines on cities that do not meet certain targets. Similarly, low-income households are entitled to vouchers that can be used in privately owned units.

Housing policy in regional plans must also be reflected in local land-use policy and, in some cases, supra-local regulations incorporate urban solidarity goals.

Local differences in the supply of and access to public services can be a major source of inequality, as in the field of education. For metropolitan areas in the UK, Canada and France, Freemark *et al.* (2020) point out that national and provincial funds are available to match municipalities according to educational needs. In France, there are various policies that redistribute resources in education both vertically (a significant part of the national budget is allocated through subsidies, especially to low-income areas) and horizontally (through compulsory transfers to municipalities and regions based on their fiscal capacity). This unequal heterogeneity is also found in relation to childcare in Spain (Navarro-Varas, 2019) and in home care services for dependent persons. This heterogeneity is not a response to the need to adapt to diverse reality within the metropolis, rather it depends on the budgetary capacity of each council, the difficult balance between this capacity and the needs of the population, and also on the political will and priorities of each municipal government (Navarro-Varas *et al.*, 2020). The same is true of social emergency welfare benefits, which, due to various socio-economic crises, are no longer one-off and extraordinary payments but have come to play an increasingly structural role in social protection (Navarro-Varas *et al.*, 2017).

In general, in all these areas, the underlying issue is that municipalities with larger populations and greater needs have fewer resources of their own to meet those needs, thus reinforcing inequalities. This unequal capacity affects metropolitan areas, as their most common sources of funding are municipal contributions, along with transfers from central government (Isaza, 2023). Therefore, moving towards a more diverse funding base (e.g. property and car taxes, consumption taxes, fuel taxes, corporate taxes, dividends and returns from public enterprises, debt, bonds) would reduce reliance on these resources by metropolitan areas.

In metropolitan areas, this unequal capacity can be corrected either through harmonisation schemes or revenue redistribution, between municipalities in the metropolitan area or through transfers from higher levels of government (Slack, 2006).

Where there is tax competition between municipalities, metropolises have different models of tax harmonisation at their disposal that allow them to avoid the consequences of intra-metropolitan tax competition and also broaden and update local tax bases so that they have a corresponding effect on spending on local and supra-local public goods (Roa, 2015). These mechanisms make sense when they include both poor and rich communities within the metropolitan area. The harmonisation model may include agreements that vary in institutional scope and call for various efforts to produce changes. In the short term, cross-jurisdictional agreements that do not need to be incorporated into local legislation would be included; in the medium term, there would be metropolitan agreements already incorporated into local legislation in the metropolitan area; and the long term would include agreements requiring the creation of metropolitan areas (when not already formally constituted), as well as the implementation of region-wide supra-local programmes.

Finally, it should be noted that urban inequalities do not only occur between municipalities, but above all between different neighbourhoods within metropolises. The concentration of high and low-income residents in specific neighbourhoods, normally referred to as residential segregation by income, is another type of spatial inequality (Hu and Liang, 2022). Supra-municipal and metropolitan bodies can promote comprehensive improvement policies focused on neighbourhoods that are more vulnerable than others in the metropolitan area. These policies require intensive and territorially focused intervention plans based on comprehensiveness (combining social, occupational, educational and urban policies), community participation and multilevel cooperation between administrations. Due to their nature, such policies requires an effort in multilevel governance to guarantee the budget allocation that ensures viability and effectiveness, while providing a strategic and redistributive perspective (Porcel *et al.*, 2021).

Metropolitan solutions to promote environmental justice at the metropolitan scale

In cases of discriminatory spatial distribution in certain human activities, particularly affecting disadvantaged sectors of society, it is argued that public authorities are responsible for ensuring all communities have the same protection against such risks, in terms of health and quality of life, and also ensuring their right to live in a safe environment, regardless of their ethnicity, gender, age or income. In other words, redistribution of the costs and benefits generated by anthropogenic activities must be promoted in different places and social sectors (Campos-Vargas *et al.*, 2015).

Ensuring equal redistribution requires a spatial planning and development policy at the metropolitan level, which ensures comprehensive coverage and that costs and benefits are shared across the territory, since, as noted above, municipalities often have little incentive to appropriately address the negative or positive side effects associated with mobility and certain types of facilities. Territorial planning refers to the optimal use of territorial potentialities, as well as to political, economic, social, cultural and environmental organisation to achieve the desired future that includes spatial justice (Ghaderi and Hfeznia, 2020; Karimi and Roshani, 2018). The objective of spatial planning is optimal distribution of the population and usage of space, so that each territory enjoys an adequate spectrum of social and economic activities. In other words, spatial planning aims to ensure logical and balanced organisation of a geographical space (Ghaderi and Hfeznia, 2020); otherwise, lack of homogeneous distribution of goods, services, infrastructure and facilities in the urban space feeds back into processes of residential segregation and environmental injustice, deepening socio-spatial inequality.

Therefore, spatial distribution of services or facilities must analyse location and solve its problems (Feitosa *et al.,* 2021), such as those related to facilities causing NIMBY (not in my back yard) reactions. Redistributing facilities that generate such reactions is an essential issue in promoting environmental justice and social harmony. A study from Guangzhou (Dixiang *et al.*, 2023) shows how NIMBY facilities are mainly distributed in low-income neighbourhoods, where housing prices are lower. Indeed, it shows that the impact of NIMBY facilities on housing prices in these suburbs is related to the type and location of such facilities and amenities.

Ensuring environmental justice also requires coordinated and joint supra-local action to ensure equitable access to green spaces, such as urban parks, and other natural resources, which help raise the quality of life for city dwellers (Alberich *et al.,* 2021). Shokry and Anguelovski (2021) compile several studies conducted in six Chinese cities (Shanghai, Beijing, Zhongshan, Shenzhen, Wuhan and Macao), which show that wealthier populations tends to live closer to green spaces than low-income populations. Studies in other Asian cities (Sheikhupura, Tehran, Hamadan) also find inequalities in terms of the amount of green space, especially at the metropolitan level in the case of Tehran. In addition, three studies on Latin American cities (Santiago de Chile, Hermosillo and Bogotá) and others in Africa (Cairo and Cape Town) found that wealthier people live closer to parks than people with a lower socio-economic status (Rigolon *et al.*, 2018). This is therefore an area that also requires a metropolitan approach to ensure equal access to green spaces.

Another important and related area for metropolitan institutions and cooperation on environmental sustainability issues is the planning, recovery, conservation and management of green and blue infrastructure that runs through different local jurisdictions and have complex multilevel governance, such as beaches, rivers, streams, forest areas and agricultural areas. Metropolitan intervention is especially critical in open spaces on the outskirts of municipal boundaries, as well as in undeveloped peri-urban areas that often have an important role as ecological connectors between natural spaces (Goytia, 2017; Nel·lo, 2023). In addition to being key areas for improving biodiversity and supporting natural cycles, in the last decade, value has also been given to the ecosystem services to society provided by this type of infrastructure (provisioning, regulation, leisure, etc.) and which improve the economy, as well as people's health and quality of life (UN-Habitat, 2019).

Last, the metropolitan sphere can also be responsible for promoting policies to mitigate the effects of climate change, which are felt most by vulnerable and poor communities, exposed to higher levels of risk and with limited capacity to respond and adapt due to their low resource base (Bulkeley and Luque-Ayala, 2017; Dinshaw *et al.*, 2017). In this regard, it is important to note that metropolitan adaptation and resilience plans can exacerbate existing vulnerabilities and social inequalities (Dinshaw, 2017). According to Anguelovski *et al.* (2016), there are two forms of injustice: acts of commission, i.e. projects or adaptation measures that disproportionately affect or displace disadvantaged groups; and acts of omission, i.e. projects that protect and favour economically advantaged groups over minorities or low-income residents (Dinshaw, 2017).

Finally, a number of studies provide formulas for analysing whether the distribution of these elements among the different groups is fair. In general terms, environmental justice or discrimination can be measured by calculating the overall (social, territorial and temporal) environmental costs and benefits generated by a given activity or project[2] (Alberich *et al.*, 2021).

3.5. IMPROVING THE EFFICIENCY AND CIRCULARITY OF THE URBAN METABOLISM

The bioregion, a metabolic vision of metropolises

The study of metropolises and their governance has largely been anthropocentric and has failed to consider the biophysical matrix that sustains them. Typically, the focus is on the mismatch between the scope of mobility flows of residents of an urban space and the scope of its governing institutions, but rarely on the mismatch between the ecosystems that make life possible in these urban areas and the institutions that govern them.

In this sense, approaches to the metropolitan phenomenon such as the bioregion are particularly worth noting, as they differ from more traditional approaches based on the degree of urbanisation, population size or mobility-based functional links. The *urban bioregion* concept (Geddes, 1915) promotes an integrated approach to the territory, understanding it as a complex system in which physiographic, population, economic and social aspects are intertwined (Gisotti, 2022). The urban bioregion model approach is based on the interrelation between the anthropic and natural components of the territory. Analysis is not so much concerned with delimiting a territory, but with examining the metabolic functioning (flows of energy, water, waste, traffic, materials, food, goods and other resources (Díaz, 2014)) which, through transformation, allows the bioregion to function. The challenge is to move towards more circular and self-sufficient economies (in terms of production, consumption and reuse).

Currently, urban areas are estimated to consume 75% of global energy (International Energy Agency, 2021) and generate 67-72% of global emissions (Feiferytė-Skirienė and Stasiškienė, 2021). In short, urban areas are the most important consumers of global resources and the main producers of waste (Lucertini and Musco, 2020), but due to their high concentration of knowledge, resources and technology (Currie *et al.*, 2017, cited in Feiferytė-Skirienė and Stasiškienė, 2021), they also play a key role as promoters and facilitators of a metabolic and circular functioning of the territory, and not exceeding the biophysical limits of the planet.

2. According to Alberich *et al.* (2021), some other authors include non-economic elements in the analysis and opt to use indicators and variables of a different level of measurement, by applying multi-criteria analysis.

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The International Resource Panel (2018) frames urban metabolism as a prism through which cities can be studied, to understand key resource and energy flows and identify infrastructure investments (and regulatory and cultural changes) that might enable cities to shift from a linear (i.e. wasteful) to an efficient metabolism. Recently, a new analysis framework has emerged called *circular urban metabolism* (CUM), which aims to unify the circular economy framework and the idea of urban metabolism. This new way of thinking aims to help understand how urban flows interact with spaces over time and therefore rethink and redesign them in a more sustainable way (Feiferytė-Skirienė and Stasiškienė, 2021; Lucertini and Musco, 2020). In short, the metabolic vision of cities emerges in the face of the risk of cities' exceeding their carrying capacity, homeostasis and adaptability limits, with the aim of preventing a collapse due to accelerating urbanisation and the consequent environmental and ecological effects of pressure on natural resources and systems (Lucertini and Musco, 2020).

Thus, this vision of metropolises is that of territories as complex systems, full of uncertainty and change, dominated by the dynamic nature of urban systems and management systems that include multiple scales and levels of government for issues that cut across municipal and jurisdictional boundaries. In this regard, UN-Habitat's *Urban-rural Linkages: Guiding Principles* (2019) stresses the need for continuous sharing of knowledge, platforms, dialogue and capacity development between urban and rural sectors to strengthen linkages and foster sustainable and inclusive growth (respecting the carrying capacity of the territory) (UN-Habitat, 2019).

Furthermore, studies such as Okoliko and David (2021) advocate for the inclusion of non-Western epistemologies to address the challenges of urban systems, and in particular to deal with climate change and other environmental sustainability issues. As many countries in the Global South are characterised by high levels of biodiversity and culture, they are considered to be well positioned to offer solutions along these lines (Jacobs and Cilliers, 2017). Indigenous peoples, for example, are key constituencies in the sustainability agenda, especially in environmental policy, as they occupy more than a quarter of the world's conservation-relevant land area (Garnett *et al.* 2018, cited in Buenavista *et al.*, 2019) and their indigenous knowledge systems are a widely recognised tool in natural resource management (Ban *et al.*, 2018; Ens *et al.,* 2016; Tengö *et al.*, 2014; Maldonado *et al.*, 2016, cited in Buenavista *et al.*, 2019). Indeed, there are numerous studies demonstrating the applicability of indigenous knowledge to issues such as ecosystem degradation, climate change and climate-related hazards, food security, human well-being and biodiversity conservation (Buenavista *et al.*, 2019).

Solutions to improve metropolitan metabolic functioning

Each metropolitan area has a distinct metabolism more or less dependent on other systems that provide food, water, energy and materials. A large part of these flows comes from other systems outside the functional urban area. The bioregional approach aims to incorporate these interdependencies and the need for urban areas and their institutions to take co-responsibility for the good conservation of these other provider systems, while also trying to reduce the quantity of input flows, by improving the efficiency of metabolism through internalising and reducing consumption, avoiding losses and waste or through reuse. Some of the possible areas of intervention are outlined below.[3]

While municipal waste collection is usually a municipal responsibility, some metropolitan authorities are responsible for waste treatment. This is because treatment plants require investment municipalities might not be able to afford and, at the same time, are fed by waste from different jurisdictions, thus requiring inter-municipal cooperation and coordination (Andersson, 2017). In terms of the linear economy, waste management is conducted more or less controlled accumulation in landfills or, at best, incineration. However, the circular economy implies transforming landfills into plants for the separation, treatment, recovery and reuse of different waste materials, or for energy. This, in turn, implies changes in waste collection systems or the involvement of producers in areas such as improving the design of products, both to extend their useful life and to facilitate recovery and reuse of different components. Thus, in circular urban metabolism, urban waste management involves not only taking responsibility for end waste treatment, but also engaging different stakeholders (producers, consumers, collection and treatment agents, recyclers, etc.) in the cycle in order to improve efficiency and circularity in urban metabolism.

The case of water management is similar to that of waste. Urban systems exert great pressure on water ecosystems, sometimes thousands of kilometres away from metropolitan areas. While the main use of freshwater is for agriculture, in urban areas the main uses are domestic, commercial and industrial consumption. Metropolitan water management systems have traditionally focused, firstly, on guaranteeing drinking water treatment and distribution in urban areas and, secondly, on guaranteeing wastewater treatment through

3. Many of these recommendations come from Cirera *et al.* (2020).

specific networks and wastewater treatment plants. In some urban areas, the wastewater distribution, purification and treatment is a metropolitan responsibility.

Understanding the metropolitan area in terms of circular urban metabolism implies important changes in the linear vision of the water resource, including: *a*) incorporating the vision of the complete water cycle, with a greater commitment to quality and the aquatic ecosystems that provide it, maintaining a balance between human water needs and optimal conservation of aquatic ecosystems; *b*) the need to introduce savings systems, especially at the domestic and industrial level, and to avoid waste through losses in the distribution system; *c*) prioritising more compact and dense forms of urbanisation that require less domestic water consumption, as well as advancing in increasing the permeability of urban soils to mitigate flood risks and improve aquifer recharging capacity; *d*) increasing the water circularity by improving the quality of treated water so it can be reused in the same metropolitan area for ecological uses (such as maintaining ecological flows) or other agricultural, industrial and urban cleaning uses; *e*) making good use of water resources close to the metropolitan area, such as using groundwater, or desalination for drinking water in coastal urban areas, while also taking into account the energy consumption and waste generated by these processes.

Matsa (2020) presents a collection of indigenous community-driven water management solutions, which also have this circular character: the Warabandi system, which is a common water allocation practice to cope with droughts in India, Pakistan and Nepal; the rehabilitation of degraded land through *tassa* planting pits in the Niger Tahoua region and using the indigenous *zaï* method of water harvesting by farmers in Burkina Faso; the traditional Bolivian Aymara people's practices of water harvesting in the mountains and pampas; and the Bethma practice in Sri Lanka, which promotes temporary land redistribution during periods of drought to share water resources.

As noted above, urban areas are major energy consumers, especially for uses associated with mobility, air-conditioning in buildings and heating sanitary water. Most of this energy still comes from fossil fuels, through a highly centralised production and transformation model outside the boundaries of the metropolitan area and with consumption highly concentrated within them. Renewable energies, especially thermal solar and photovoltaic energy, facilitate the applications of a more redistributed energy production system and internalise part of its production in the metropolitan area in spaces already urbanised and artificial. At the same time, they are more efficient than traditional systems and avoid distribution losses, as well as making production more democratic. Internalising part of the energy production (with solar installations and energy recovery from waste), reducing energy consumption through greater efficiency in use (reducing mobility caused by mixed uses in the city, improving energy efficiency in buildings or centralised air-conditioning systems, among others), and replacing fossil fuels in transport and air-conditioning with renewable energies through electrification are ways of reducing polluting emissions, i.e. an important proportion of the negative externalities generated by urban metabolism in the field of energy.

A similar situation occurs with another metabolic flow: food. Metropolitan areas have transformed land use by prioritising residential, tertiary, industrial and infrastructure uses over agricultural activities. Distant food production and transport generate significant emissions, energy costs and loss of nutritional quality. Again, it is a question of switching

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from a linear to a circular and systemic vision, which takes into account impacts and territorial interdependencies in production, distribution, processing, marketing and consumption, as well as managing waste as a new resource. This has led to a new public policy area, urban food, driven by statements and covenants such as the 2015 Milan Pact. In these policies, metropolitan bodies and cooperative arrangements between local bodies play a key role because of their capacity to generate rural-urban linkages and, where possible, integrate them into traditional practices and indigenous knowledge systems regarding, for example, wild food resources, which are essential for the subsistence and livelihood of many ethnic communities (Buenavista *et al.*, 2019).

The following actions in this area are worth stressing:[4] *a*) protecting, recovering and revitalising agricultural land in urban and peri-urban areas as part of territorial and urban planning, while supporting producers; *b*) promoting local market circuits that strengthen direct links between producers, the market network, small businesses and consumers, recognising the contribution of the informal sector and ensuring the supply of fresh local products in all neighbourhoods of the metropolitan area, especially the most vulnerable ones; *c*) increasing the demand for seasonal, organic and local products by disseminating the planetary health

4. See, for example, the Milan Urban Food Policy Pact, available at https://www.milanurbanfoodpolicypact. org/wp-content/uploads/2020/12/Milan-Urban-Food-Policy-Pact-and-Framework-for-Action_SPA.pdf, and "Empowering cities for the development of sustainable food system policies", available at https://www.metropolis.org/sites/default/files/resources/Empowering-Cities-Food-System-Policies.pdf.

diet and implementing it in school, hospital, residential and university canteens; *d*) preventing food waste throughout the food chain (production, distribution and consumption) with the cooperation of different food stakeholders and other social organisations; *e*) selectively collecting and reusing food and organic waste for treatment, reuse and energy recovery.

In the case of ethnic communities in Asia, other actions include extensive transplanting of species by farmers into their gardens and fields, thereby ensuring the availability and stability of a supply of wild food plants for household consumption as a crucial element of local food security (Buenavista *et al.,* 2019). Women are often the custodians of traditional knowledge of indigenous plants and seeds (Karl, 2010, cited in Matsa, 2020). As providers of food and care for their families, they have a special understanding of the value and diverse uses of plants for nutrition, health and income. They often experiment with and adapt indigenous species, with important implications for the conservation of plant genetic resources (Matsa, 2020).

Finally, as noted above, another important area for metropolitan institutions and cooperation in terms of environmental sustainability is the planning, recovery, conservation and management of green infrastructure (Barcelona Institute of Regional and Metropolitan Studies, 2022) that run through different local jurisdictions and have complex multilevel governance, such as in the management of spaces like beaches, rivers, streams, forest areas and fields. In addition to being key areas for improving biodiversity and supporting natural cycles, in the last decade, value has also been given to the ecosystem services to society provided by this type of infrastructure (provisioning, regulation, leisure, etc.) and which improve the economy, as well as people's health and quality of life (UN-Habitat, 2019). Metropolitan policies must therefore be established that allow for the planning of the development of highly anthropised territories, combining population growth with their metabolic demands, the conservation of ecosystems and the protection of biodiversity, focusing on human well-being (Marull *et al.,* 2022).

In deploying solutions in these areas of intervention, *Urban-rural Linkages: Guiding Principles* (UN-Habitat, 2019) calls for the development of participatory models and methods to map and describe complex urban systems and their relationships with surrounding rural areas at the territorial scale, based on the urban metabolism approach.

4. International exploration of metropolitan solutions

More than 15 existing international repositories, with illustrative cases of good practices in the metropolitan area, were reviewed in order to explore metropolitan solutions. After an initial selection of 30 cases, 11 solutions were finally chosen, prioritising ones with a more clearly metropolitan dimension (see table 4). The main criterion for selecting the cases was heterogeneity, based on the geographical and thematic diversity of the solutions. These cases were analysed using both primary sources (interviews with decision-makers) and secondary sources (information from repositories, academic literature, official sources and the media). However, it should be noted that the governmental or promoters' views prevail in the collection of case information. A more pluralistic and critical analysis of these cases would require a more in-depth study of each.

Table 4. List of metropolitan solutions analysed

	Region	Country	City	Case name
1	Africa	Namibia	Gobabis	**Community-driven housing and informal settlement upgrading**
2	Africa	Mozambique	Maputo	**Mobility and gender: a dialogue of cooperation**
3	Africa	Tunisia	Tunis	**A'SIMA Tunis**
4	America	El Salvador	San Salvador	**COAMSS/OPAMSS**
5	America	United States	San Francisco	**Bay Area Regional Collaborative (BARC)**
6	America	Mexico	Guadalajara	**Nidos de Lluvia**
7	Asia	South Korea	Seoul	**Citizen-led urban regeneration policy**
8	Asia	India	Bhubaneshwar	**Jaga Mission**
9	Asia	China	Guangzhou	**Guangzhou Ecological Belt Master Plan**
10	Europe	Spain	Barcelona	**Bicivia**
11	Europe	The Netherlands	Rotterdam	**The Rotterdam Business Case**

Source: the authors.

Each of these cases is explored in detail in the following chapters, based on the dimensions and criteria of the Metropolitan Solutions Database (see chapter 2.4). Case-specific fact sheets can be found in the appendices.

4.1. METROPOLITANISATION THROUGH SOLUTIONS

This sub-section explores how the international solutions interrelate with the five criteria of metropolitan reality discussed in chapter 3. An initial reflection based on the cases studied is provided, without the intention of generalising. In the process of cross-referencing criteria and cases, we select cases that most clearly and obviously illustrate their interrelation with the criterion, based on statements from the interviews (one for each case) and data collected from the documentation. This does not means that other cases explored in the study are not related.

Criterion 1. Coordinating cooperation between local actors to solve joint challenges

A wide range of inter-municipal cooperation mechanisms and strategies were identified in the solutions, with the aim of addressing institutional fragmentation in tackling problems that go beyond established institutional and territorial boundaries. Some focus on improving joint planning and delivery of metropolitan services; others on defining priorities, prioritising alternatives and developing projects that are the responsibility of supra-municipal authorities. The nature of these mechanisms range from ad hoc inter-municipal cooperation mechanisms to institutionalised metropolitan bodies, as shown in Table 5.

Table 5. Inter-municipal cooperation mechanisms in international solutions

	Specific inter-municipal cooperation agreements	Permanent inter-municipal cooperation structures	Metropolitan service agencies	Metropolitan or regional authority	Metropolitan governance with a regional focus
Maputo			Metropolitan transport agency		
Tunis	Multi-purpose waste treatment centre				
San Salvador				COAMSS/ OPAMSS	
San Francisco[A]			BARC (consortium of agencies)		
Guadalajara			IMEPLAN		
Barcelona				AMB	
Rotterdam		Inter-municipal agreements			
Guangzhou					Guangzhou City Council
Seoul					Seoul Metropolitan Government

A. The Bay Area Regional Collaborative is a regional and state agency cooperative mechanism focusing on the metropolitan region around San Francisco (California).

Source: the authors.

In the A'SIMA Tunis project, a specific inter-municipal cooperation agreement was reached to set up a pilot project for a multi-purpose waste treatment centre. This centre will consist of a waste recycling centre, a triage centre, a bulky waste management centre and, in the future, a waste transfer centre. This form of cooperation is incentivised by three key elements. Firstly, the legal framework provided (the Local Collectives Code adopted in 2018), which permits the implementation of inter-municipal cooperation projects that go beyond the competencies of the difference authorities.[5] Secondly, the homogeneity of preferences among the cooperating municipalities (there was a great deal of interest in addressing waste management at the local level due to existing environmental and public health problems related to waste management). Thirdly, the geographical proximity of the 36 municipalities bordering Tunis. Thus, this project marks the end of a period in which there was no reflection on the territory in metropolitan terms. Until now, a lack of a culture of cooperation, exchange and shared reflection had prevailed, with the exception of a composting treatment centre in three territories in the north of Greater Tunis.

The Rotterdam Business Case project arose from a specific, permanent inter-municipal cooperation agreement with a specific mission in relation to a particular service: assistance for entrepreneurs and the self-employed. Applicable regulations make social affairs the responsibility of the municipality. However, they can be managed in partnership with other local public authorities. Thus, the central city of Rotterdam promoted the cooperation agreement with the surrounding municipalities. Rotterdam City Council played a leading role and contacted neighbouring municipalities individually and on a personal basis to promote this form of inter-municipal cooperation. The member municipalities in the agreement pay for the service provided by the Rotterdam City Council Regional Office for Entrepreneurs and the Self-Employed.

The project started with a total of eight municipalities, while others have subsequently joined. Today, a total of 28 municipalities have joined the structure,[6] of which make up the metropolitan region around the city of Rotterdam. As noted, this process for new municipalities to join the agreement is driven primarily by Rotterdam local government, which has made a notable effort to demonstrate the benefits of cooperation and to mitigate the "little brother syndrome" by encouraging participation by smaller municipalities. The Rotterdam City Council Regional Office for Entrepreneurship and the Self-Employed proposed extending this cooperation to the Rotterdam-The Hague metropolis, but this did not go ahead as The Hague did not agree with the proposal, according to Rob Gringhuis.

Three metropolitan service agencies were identified: Bay Area Regional Collaborative (BARC) of San Francisco; the Maputo Metropolitan Transport Agency; and the Institute of Planning and Development Management of the Guadalajara Metropolitan Area (IMEPLAN).

The main function of The Bay Area Regional Collaborative (BARC) consortium in San Francisco is to promote collaboration and cooperation among its member agencies on issues related

5. This legal framework was in place at the start of the A'SIMA Tunis project. As discussed in the following sub-chapter, this regulatory framework changed during the course of the project.

6. Alblasserdam; Brielle; Capelle aan den IJssel; Dordrecht: Gouda; Hardinxveld-Giessendam; Hellevoetsluis; Hendrik-Ido-Ambacht; Hoeksche Waard; Krimpenerwaard; Krimpen aan den IJssel; Lansingerland; Leiden; Leiderdorp; Maassluis; Midden-Delfland; Nissewaard; Oegstgeest; Papendrecht Pijnacker-Nootdorp; Rotterdam; Schiedam; Sliedrecht; Vlaardingen; Westvoorne; Zoetermeer; Zuidplas; Zwijndrecht.

primarily to climate change and resilience. The consortium was set up by the California State Legislature in 2004 to ensure coordinated actions in terms of land use and transportation planning, as required by state regulations (Senate Bill 375). Thus, the consortium started with the membership of the regional agencies responsible for these two tasks, namely the Association for Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC). Two more agencies joined later the consortium: the San Francisco Bay Conservation and Development Commission (BCDC) and the Bay Area Air Quality Management District (BAAQMD); as well as three further members: Caltrans District 4 (state transport agency), San Francisco Bay Regional Water Quality Control Board (responsible for water quality in San Francisco Bay) and the State Coastal Conservancy (SCC). The latter three, however, do not have voting rights on the governing board as they are state bodies. BARC's governing board represents the seven agencies in the consortium, with the aim of working together to develop coordinated policies, increase efficiency, leverage resources and provide better services to local governments struggling with climate change issues.

The Maputo Metropolitan Transport Agency was created in 2017 by the Mozambique Council of Ministers. It is a public body with administrative and financial autonomy, whose purpose is planning and managing the integrated transport system in the municipalities of Maputo, Matola and Boane, and the districts of Boane and Marracuene. Apart from the Metropolitan Transport Agency, the Ministry of Transport and local governments also have competencies in mobility and transport.

IMEPLAN is a decentralised inter-municipal public body that acts as a metropolitan technical coordination body for the Guadalajara metropolitan area. The Guadalajara Metropolitan Coordination Board, made up of political representatives from the 10 local governments in the Guadalajara metropolitan area and the governor of the state of Jalisco, is also an example of metropolitan coordination in Guadalajara. The board meets monthly or bi-monthly to address metropolitan-wide issues and make decisions of municipal interest.

In the case of San Salvador, the San Salvador Metropolitan Area Planning Office (OPAMSS) and the San Salvador Metropolitan Area Council of Mayors (COAMSS) can be identified more with a metropolitan authority. COAMSS is a decentralised autonomous body, with authority delegated to it by the 14 local governments in the San Salvador metropolitan area. The OPAMSS is the technical advisory body, which acts as the executive secretariat of the COAMSS. The OPAMSS was created in 1988 as a decentralised and autonomous municipal body, and set up as a project of the San Salvador Mayor's Office. With the approval of the Law for the Development and Territorial Planning of the San Salvador Metropolitan Area and Adjacent Municipalities, passed at the end of 1993, OPAMSS was established as the body responsible for planning and managing urban development in the San Salvador metropolitan area. The result was a much stronger and more consolidated structure, which now employs more than 100 people. The OPAMSS executive is appointed by the COAMSS, and its functions include integrating different services to cover multiple purposes: metropolitan-focused spatial planning; support for economic and social development; technical support to city councils to guarantee can fulfil their responsibilities in spatial planning and development; promoting strategic alliances and internationalising the metropolitan agenda, among others.

The AMB is the metropolitan authority responsible for promoting the Bicivia project and managing and coordinating its roll-out in the 36 municipalities of the metropolitan territory.

Through the Metropolitan Cycle Office, it is responsible for ensuring inter-municipal connections, an essential part of metropolitan mobility. Given the AMB's lack of powers over public space, this network must be implemented jointly with the municipalities responsible for executing it. Thus, the AMB promotes and leads the process of defining the network and incorporating the metropolitan vision among the municipalities. In this way, the metropolitan cycle network has become a window of opportunity to foster cooperation between local stakeholders, but also between supra-local authorities, thus adding new actors to metropolitan cycle governance.

Finally, two metropolitan governments with a regional focus are identified: Guangzhou and Seoul. In both cases, the functional urban area coincides with the already established local government area. Seoul's local government has powers traditionally associated with metropolitan governments, such as urban planning and water management policy. In Seoul, urban planning is used for citizen-led urban regeneration policy, while in the case of Guangzhou, water management policy is used for the Guangzhou Ecological Belt Master Plan implementation policy.

As can be seen, the creation and institutionalisation processes for these inter-municipal cooperation mechanisms and instruments are obviously conditioned by the institutional and political context. There are cases of top-down metropolitan authority processes (i.e. those created by the national government or by supra-local authorities), as with the Maputo Transport Agency or BARC in California. Others, are more bottom-up processes (i.e. created by local governments), as with the COAMSS.

Differences in the functions of these bodies can also be identified: some are designed to provide services (as with The Rotterdam Business Case); these are the so-called *metropolitan action-oriented solutions*. Others have the mission to promote planning and identifying more strategic and long-term priorities and alternatives (e.g. IMEPLAN or BARC), but also to manage and improve the tools to facilitate management of the territory from the metropolitan sphere in a more transparent, effective and efficient way; these are the so-called *metropolitan management-oriented solutions.* Finally, there are others with a mixed nature, such as the OPAMSS or the AMB (although in the case of Bicivia, the AMB plans and coordinates, but does not implement).

Criterion 2. Facilitating agglomeration economies

Among the international solutions analysed, two intentionally facilitate agglomeration economies, i.e. benefits in costs (production, transaction costs, etc.) or in qualitative factors resulting from spatial concentration of resources and productive agents (population, companies, institutions, public services, etc.). These cases are, specifically, the COAMSS/OPAMSS and The Rotterdam Business Case. However, each one does so through different policy domains: in the first case, through urban and land use planning and economic development; in The Rotterdam Business Case, from the perspective of economic development alone.

In terms of urban planning and land use, OPAMSS aims to contribute to land use planning and urban development in the San Salvador metropolitan area and surrounding municipalities, through the use of resources in different areas and planning instruments, in accordance with

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Article 1 of the Land Use Planning Law passed in 1993. In this regard, OPAMSS is working to achieve high-rise densification of the central areas of the San Salvador metropolitan area and to raise the carrying capacity of services and public infrastructure in the area. It also implements and develops sustainable urban mobility infrastructure, as well as policies for territorial economic development and promoting the employability of women and young people.

In The Rotterdam Business Case, the role of intermediary between the different agents involved (local governments, universities, Retired Entrepreneur Volunteer Foundation) to achieve a more inclusive development in the metropolitan area of Rotterdam is worth stressing. In this framework, all the actors are part of an agglomeration economy. At the same time, everyone benefits: for students at the University of Applied Sciences, the project is an opportunity for learning and growth, as it allows them to carry out their university internships, put their theoretical knowledge into practice and gain practical experience; retirees are active in socially useful activities; and finally, entrepreneurs improve their skills to restart their business and make it more sustainable, as well as increase their income.

Criterion 3. Improving public service provision

Some of the international solutions analysed have been designed specifically to improve public service delivery. This has mainly been achieved through economies of scale to cut costs in shared services, but also by making use of specialisation among technical staff and the institutional capacity of the body promoting the metropolitan solution. The following international solutions whose main objective is to improve public service provision are worth highlighting: COAMSS/OPAMSS, The Rotterdam Business Case and A'SIMA Tunis. Following the classification proposed in Niaounakis (2021), the first case may be considered as consolidation and the other two as joint production.

In San Salvador, 14 local governments have been consolidated into a larger unit, the OPAMSS, which is responsible for providing services similar to those previously provided locally, such as building permits (residential, equipment, commercial, etc.) and land-plotting permits. This consolidation is not only legitimised by producing economies of scale, but also by the multidisciplinary technical specialisation available in the OPAMSS (engineers, architects, hydraulic specialists, etc.) and its institutional capacity. Both are valued as key factors by the head of Metropolitan Strategic Management and Executive Assistance at COAMSS.

The Rotterdam Business Case is an example of joint production, as improvements to the service provision through a cooperative agreement for service provision to achieve economies of scale. The services and programmes for entrepreneurs and the self-employed with financial difficulties are provided through a collaboration agreement between the 28 municipalities of the Rotterdam metropolitan region and the city of Rotterdam Regional Office for Entrepreneurs and the Self-Employed, which is currently responsible for running the service throughout the Rotterdam metropolitan region. This form of service provision has numerous advantages. Firstly, there are financial benefits, by ensuring economic efficiency through economies of scale for the services (e.g. when carrying out surveys among economic agents). Secondly, it draws on the experience and expertise of the Regional Office's multidisciplinary team. The technical staff make it possible to compare proposals, ideas and results, thereby guaranteeing optimum results. Thirdly, this cooperation mechanism is more sustainable over time, especially for smaller municipalities with fewer resources (technical and economic). Ultimately, this cooperation mechanism is considered beneficial for all: it creates a win-win situation for both the city of Rotterdam and the other municipalities, thereby improving service delivery.

The A'SIMA Tunis cooperation project is another example of joint production to improve the waste management service. The pilot project, arising from the consensus opinion that local actors were unable to act separately in managing urban waste, will not only allow them to manage urban waste jointly, but also make progress in building trust between local actors, creating spaces for coordination and joint work. Thus they are consolidating a shared vision of needs in the territory which, in turn, allows them to act together in negotiations or dialogue with other actors involved in the territory who define policies, such as state government.

Criterion 4. Promoting social and environmental justice throughout the metropolitan area

A number of metropolitan social cohesion policies to promote social and environmental justice and mitigate residential segregation in metropolitan areas have been identified, in different spheres. Of particular note is the Maputo mobility and gender project, in the field of mobility, while mention should also be made of the cases of community-led housing and informal settlement upgrading in Gobabis, the Jaga Mission in Odisha and the citizen-led urban regeneration policy in Seoul, in the areas of urban planning, housing and comprehensive neighbourhood programmes.

For several years now, the Maputo metropolitan region has been committed to a holistic view of the metropolis, particularly in terms of the city's daily mobility. One line of action is promoting gender mainstreaming in Maputo's metropolitan mobility management, such as the creation of a protocol against violence in metropolitan public transport. Although it is yet to be approved at the municipal level, it will be implemented at the metropolitan level.

Training programmes have also been conducted for former women bus conductors interested in becoming drivers for public bus operators. According to the head of the AMB's International Cooperation Service, female drivers are involved in fewer accidents and are better at dealing with situations of violence against women on public transport. This training has not only improved their salaries (as bus conductors are paid less), but also means there are now women drivers in the metropolitan area of Maputo. This, in turn, has opened up a new line of action to adapt bus drivers' workspaces (toilets, seats, equipment, etc.).

In addition, an intervention project has been carried out at Maputo Central Hospital to improve inclusion and equality in access for all metropolitan services. This project aims to improve users' access and admission to the hospital. The hospital facility was chosen strategically, because provides service to the whole metropolitan area despite being located in the city of Maputo, as people from Matola, Boane and Marracuene visit it. A diagnosis was made of the initial situation (bus routes accessing the hospital, i.e. whether they were urban or metropolitan lines, pedestrian access, types and dynamics of users' journeys, etc.) and a comprehensive intervention plan was proposed for access to the hospital, based on a metropolitan approach. The plan took into account the design of public space, mobility dynamics, a gender-based focus and sustainability criteria, in order to improve inclusion and equality in access to metropolitan services for all, regardless of where people come from.

In this area of urban planning, comprehensive neighbourhood plans and policies to improve housing and informal settlements stand out as processes that often go beyond municipal boundaries.

In the case of Namibia, for example, informal settlements began after the country's independence in 1990. A project was initiated to reverse this situation, starting with surveys of informal settlements and collecting data on existing households and infrastructure services, followed by settlement planning, driven by the community and approved by local authorities. To ensure security of tenure and economic empowerment for people living in informal settlements, the planning process involves dividing or combining plots to create a standard-sized piece of land known as a *blockerf*. The *blockerf* contains individual home plots and a communal area. This informal settlement replanning and upgrading project is accompanied by a programme to allow people with land titles (for individual plots) to use them as credit collateral to improve housing. When someone obtains a land title, they become part of a land title association, a community association that entitles them to subsidies and financial support. The aim is to help them meet housing, infrastructure and service needs. The state provides the funds to buy the materials and community members install them, after receiving training.

The Jaga Mission in Odisha aims to make Odisha the first slum-free state in India. To do this, a programme has been implemented that aims to grant land titles to residents in informal settlements while simultaneously promoting a slum upgrading programme that will drastically improve living conditions and promote social equality. The project has been implemented through a decentralised governance model, in which slum-dweller associations partner with public authorities to manage and sustain the upgrading of informal settlements. The associations are formally recognised as government partners in implementing the Jaga Mission and monitoring implementation of infrastructure. Residents are hired to do improvement work in the community and receive fair wages in return, providing them with

better livelihood opportunities. Overall, the project is helping to empower the communities in these neighbourhoods socially, economically and politically. Neighbourhood associations have been created to manage neighbourhood upgrading themselves, electing representatives of their territory. It is also helping to change public perceptions of slum dwellers and informal workers. Traditionally perceived as “invaders” of city services, this perception is now being challenged by the residents’ collective responsible for improving their communities. In addition, the Jaga Mission promotes environmental sustainability (all the materials used to improve infrastructure are locally sourced) and environmental justice (residents near landfills and flood zones can volunteer to move to safer and healthier locations).

Finally, Seoul’s citizen-led urban regeneration policy is worth highlighting as another way of promoting social justice in the urban system as a whole. The policy aims to improve the city’s physical environment in order to address the problems it has faced (especially after the 2008 global financial crisis and the city’s slowdown in economic growth and urban vitality), such as the negative effects of excessive gentrification in certain areas of the city, the destruction of cultural and heritage sites and the ghettoisation of urban centres. Consequently, after the Special Law on Promotion and Support for Urban Regeneration was passed in 2013, the focus was placed on restoring the city’s social and civic communities, preserving important historical and cultural spaces in the city and generally promoting sustainable development and growth. However, the policy adopts a bottom-up rather than a top-down approach, encouraging the participation, engagement and collaboration of stakeholders in the city and the public administration.

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Criterion 5. Improving the efficiency and circularity of urban metabolism

Among the international solutions analysed here, three cases adopt a focus on the metabolic functioning of the territory, aiming to move towards more circular and self-sufficient economies, in order to mitigate the environmental and ecological effects of pressure on resources and natural systems. Specifically, these are: Guadalajara's rain nests, Tunis's waste treatment centre and Guangzhou's ecological belt.

The rain nests installed in the municipalities of the Guadalajara metropolitan area are a response to the severe drought in the state of Jalisco in 2021. The phenomenon caused water shortages and significantly affected over 300,000 inhabitants of the northern neighbourhoods of the Guadalajara metropolitan area. The population had to be supplied water by distribution trucks who, taking advantage of the water crisis, had raised their prices. However, the most drought-affected areas were difficult for water distribution trucks to access (no paved roads and criss-crossed with ravines). Consequently, a new water supply, storage and use model was implemented for the most water-vulnerable areas of the Guadalajara metropolitan area; a project very much based on the ancient experience of pre-Hispanic cultures, such as the Mayan civilization, and their practice of rainwater harvesting and storage.

By installing rainwater harvesting systems in the most water-vulnerable neighbourhoods and localities, access to water has improved and social vulnerabilities reduced, with a significant gender-related impact: people, mainly women and children, no longer had to spend time and resources on fetching water. Likewise, rain nests have a very important environmental role, as capturing rainwater eases stress on other factors related to water supply, such as energy and resources. Ultimately, this project has not only increased the circularity the water, but also helps to spread a water management culture that encourages good use of water resources.

The Tunis case highlights the mismatch between ecosystems that make life possible in these urban areas and the institutions that govern them. The problems of waste management (related to the environment, public health, etc.), lack of waste recovery infrastructure and the need to achieve economies of scale led to a growing interest in promoting inter-municipal cooperation to improve waste management policy. Thus, taking advantage of the territorial proximity of the municipalities around the country's capital, a pilot project is currently underway that will take the waste from seven different local governments, including the capital, Tunis. The project foresees the need for inter-municipal cooperation and coordination to involve the different stakeholders in the waste management cycle (producers, consumers, collectors, treatment providers, recyclers, etc.) and thus improve the efficiency and circularity of the urban metabolism of cities.

Finally, the Guangzhou Ecological Belt Master Plan presents an approach based on the interrelationship between the anthropic and natural components of the territory, to address the problems arising from accelerating urbanisation in Guangzhou and the consequent environmental and ecological effects of the pressure on the city's water resources network, which includes more than 5,000 km of rivers, representing 10% of Guangzhou's land area. The planning and construction of Guangzhou's ecological belt has led to a reconceptualisation of the value of urban rivers: Guangzhou's river network is seen as a key area for enhancing biodiversity and supporting different natural cycles, but also for improving health, people's

quality of life and the economy of riverfront areas. Implementation of this plan takes into account ecology, daily life and production for urban governance from a holistic perspective of symbiosis between the city and the water system. It provides a model that sees the interrelationship between cities and rivers as a way to protect the ecosystem and create resilient spaces in areas that face high levels of urbanisation. The projects implemented in the plan prioritise ecosystem conservation and protecting biodiversity in the river environments of the 11 districts[7] of the city. For example, the plan identifies a number for important ecological areas, establishes over 5,000 km of ecological corridors and aims to restore the territory's fish and bird migration ecosystem. The effects of these interventions in terms of socio-environmental justice and fostering green gentrification processes will need to be analysed in the future.

4.2. WHAT DRIVES METROPOLITAN SOLUTIONS?

All the solutions analysed here are committed to key issues in the 2030 Agenda and international agendas, such as inclusion and social cohesion, resilience, sustainable mobility and commitment to climate change. In this sense, the actions incorporate medium and long-term visions. Based on the literature review and the analysis of the metropolitan solutions included in this study, below we reflect on some of the factors that can drive metropolitan solutions, which could be useful to explore further through a larger number of cases.

A. The institutionalisation of metropolitan cooperation (cause and consequence)
B. Collaborative governance in public policy-making
C. Promoting metropolitan plans without prior regulatory changes
D. Sufficient public expertise to deal with complex urban issues
E. Options for obtaining resources and funding
F. Relational leadership and political support from local authorities
G. Experimentation and the ability to learn

A. The institutionalisation of metropolitan cooperation (cause and consequence)

The institutional context is a key factor in implementing metropolitan solutions. The existence of a metropolitan body is a key element for ensuring the adaptation (if solutions come from elsewhere) and sustainability of metropolitan policies. Where there is a stable administrative body at the metropolitan level, the recognition of the metropolitan dimension of solutions is much clearer and more evident than in the absence of such institutions. In other words, the main mission of the metropolitan bodies analysed here (BARC, AMB, Metropolitan Transport Agency, COAMSS/OPAMSS and IMEPLAN) is specifically to identify and take advantage of windows of opportunity to apply a metropolitan-scale perspective, based on the local perspective, and incorporate it into the different areas of jurisdiction. In short, institutionalising these metropolitan bodies favours treatment of the territory from the metropolitan sphere.

7. Yuexiu, Haizhu, Liwan, Tianhe, Baiyun, Huangpu, Huadu, Panyu, Nansha, Conghua and Zengcheng.

Table 6. Distribution of cases according to whether there is a formalised metropolitan body

A formalised metropolitan body exists	No formalised metropolitan body exists
• Mobility and gender: a dialogue of cooperation • The Rotterdam Business Case • COAMSS/OPAMSS • BARC • Nidos de Lluvia • Seoul's citizen-led urban regeneration policy[A] • Bicivia • Guangzhou Ecological Belt Master Plan[B]	• Community-driven housing and informal settlement upgrading • A'SIMA Tunis • Jaga Mission

A. The capital, Seoul, has the different status of a special city (특별시 / teukbyeol-si). However, in practice the distinction between special city and metropolitan city has little meaning (OECD, 2014). Seoul's local government has powers traditionally associated with metropolitan governments, such as urban planning.

B. Guangzhou's local government has powers traditionally associated with metropolitan governments, such as water management.

Source: the authors.

However, there are global cases that show how the existence of a metropolitan body is not a *sine qua non* condition for the creation and implementation of metropolitan solutions. In other words, an institutionalised metropolitan body is not essential to start deploying metropolitan solutions. Cooperation between stakeholders to push for a solution is a factor that encourages and strengthens the creation and maturation of metropolitan institutions. The case of Tunis is highly illustrative. Inter-municipal cooperation projects were supported by provisions in the Local Authorities Code. This code was adopted at a time of optimism, after the Arab Spring, and established the role of municipalities as developmental actors at a time of strengthened decentralisation, which provided fertile ground for establishing new forms of multilevel governance. Within this framework, the A'SIMA Tunis project has provided an opportunity to begin to reflect on the territory in metropolitan terms: cooperation between stakeholders to promote a solution has become a factor encouraging a metropolitan reflection on treatment of the territory.[8]

Typically, these solutions are scalable to other metropolises and challenges. These cases show how metropolitan solutions have been replicated in other areas of the metropolis (e.g. policies to support entrepreneurs in the different municipalities of Rotterdam or improvements to informal settlements in Odisha), and also in other facilities in the same metropolis (from 2021, installation of rainwater harvesting systems began not only in homes, but also in schools and community centres. A year later, these systems were also installed in health centres in the metropolitan territory).

However, it is also necessary to foster adaptation to the context, in terms of specifying both the problem at the local level and the mechanisms for implementing the solution. This is especially difficult when there is no institutionalised metropolitan body to drive and facilitate metropolitan policies. In other words, scaling up solutions is easier when there is a formalised

8. All this collapsed in March 2023, when the municipal councils were dissolved by the country's president with elections due to be held. This has put a brake on implementing the A'SIMA Tunis project, as there are currently no elected municipal councils and consequently no political representation, nor is there a clear idea of when elections will be held. This is the result of political instability in Tunisia that started with the election of the current president, leading to reversal of the country's decentralisation process. As a result, the A'SIMA Tunis project has been affected and solutions for viable new forms of multilevel governance have had to be sought among this change and uncertainty.

metropolitan body. The need to create metropolitan bodies to make solutions sustainable becomes apparent where no metropolitan authority exists. Once again taking the A'SIMA Tunis case of the multi-purpose waste treatment centre management as an example, the creation of governance mechanisms (either through a waste management services agency or through a public-private partnership) is being assessed in order to move the project forward.

Finally, it is also worth noting that metropolitan solutions are framed in very different institutional and legal contexts, from centralised or unitary countries (such as El Salvador, Namibia or Tunisia) to federal ones (such as Mexico, India and the United States). In some cases, metropolitan areas are governed by the national framework (e.g. El Salvador), in others by the sub-national state (e.g. Mexico or Spain), and in others not at all (e.g. Namibia or Tunisia). This creates complex scenarios where the regulatory and legal context for implementing actions becomes a challenge, particularly where areas of competence overlap (e.g. mobility issues, urban planning, etc.). This regulatory challenge is found both in metropolitan environments where there is no formalised metropolitan body (such as Tunisia), and in metropolitan areas where such bodies do exist, such as San Salvador or Maputo.

B. The drive for collaborative governance in public policy-making

The metropolitan sphere is particularly fertile ground for developing collaborative governance in public policy-making, due to the lower regulatory powers of metropolitan bodies (where they exist), greater interdependence between stakeholders, and the cross-cutting and integral nature of the challenges facing metropolises and, therefore, of the implemented solutions.

Metropolitan solutions are driven through collaboration, with the participation of a plurality of actors (private sector, public sector, non-profit organisations, universities, etc.) through more or less formal cooperation mechanisms and arenas. More informal examples are the spaces for cooperation and collaboration between the mobility technicians of the city councils of the Barcelona Metropolitan Area to coordinate actions for implementing the metropolitan cycle network. By contrast, the Bay Area Regional Collaborative consortium in San Francisco is an example of a formal cooperation mechanism. This consortium coordinates actions in different fields (local governance, transport and mobility, air quality, etc.) to tackle the negative effects of climate change. Another example of formal cooperation is The Rotterdam Business Case. Through a triple alliance, local governments, universities and pensioners' organisations are driving forward a policy to support entrepreneurs, in the so-called *triple helix.* These latter two cases (BARC and The Rotterdam Business Case) show how metropolitan solutions involve collaboration with others parties from diverse backgrounds in terms of academic or professional experience. These co-creation processes are not only a tool for service improvement, but also provide a lever for developing innovative solutions to solve problems in metropolises that are difficult to tackle through top-down processes or the market (Ansell and Torfing, 2021).

Strong interdependence between stakeholders is a fundamental element of metropolitan solutions. This multiplicity of stakeholders interacting in the same area often brings with it the challenge of matching responsibilities, powers and rules when implementing metropolitan solutions, as noted above.

On the other hand, involving diverse stakeholders in rolling out metropolitan solutions means sufficient resources are provided to move such solutions forward. The installation of rain

nests in the Guadalajara metropolitan area is a good example of how more stakeholders have become involved over the course of the project. For example, private enterprise has joined the project, donating financial resources and offering equipment and production plants to install rain nests to capture more rainwater.

Finally, within this framework of collaborative governance, it should be noted that citizen participation is a fundamental element of metropolitan solutions. The cases of Namibia and Seoul exemplify how community participation makes projects more economical, grounded in local reality and sustainable over time. Where communities have been involved in planning processes as well as project implementation, a sense of ownership has been created that strengthens the willingness and commitment of communities to remain engaged in the policy. At the same time, these participatory processes empower communities and make them more resilient and ready to face new scenarios in the future. Finally, it is also worth mentioning that the degree of openness in the processes (i.e. having the collective intelligence of all the stakeholders) has implications for implementing solutions. Involving multiple stakeholders entails processes of consultation and negotiation that can lengthen the process of designing and implementing metropolitan solutions.

C. Promoting metropolitan plans without prior regulatory changes

The metropolitan arena offers the chance of pushing for policy change without first pushing for prior changes in legal and regulatory provisions. Rather than through regulatory changes, metropolitan solutions have been driven by agendas and other planning instruments (which, in turn, are mostly driven by international agendas).

Table 7. Metropolitan solutions implemented through planning instruments

Case name	Planning tool
A'SIMA Tunis	Tunis's strategic plan, in the framework of a strategic planning and multilevel governance project for a resilient metropolis
Nidos de Lluvia (Guadalajara)	Guadalajara's water resilience agenda
Bicivia (Barcelona)	Metropolitan Urban Mobility Plan 2019-2024
Guangzhou Ecological Belt Master Plan	Guangdong Provincial Government unified plan

Source: the authors.

For example, the Nidos de Lluvia project, which arose out of the *Water Resilience Agenda for the Guadalajara metropolitan area,* aims to improve water resilience in the area, enhancing water management in the light of the climate crisis and the socio-economic challenges that put sustainable water access at risk for the population, agriculture and industry.

The multi-purpose waste treatment centre pilot project in Tunis is another example. It stems from the Tunis Strategic Plan, approved in November 2022, with the aim of strengthening multilevel governance in the city of Tunis to meet the metropolitan challenges of sustainable development and achieve the Sustainable Development Goals, in conjunction with all the stakeholders in the territory. This plan is voluntary and consensual in nature, with the aim

of complementing and providing greater coherence to the design and implementation of regulatory provisions.

Implementing these solutions may imply subsequent *regulatory changes* through collaboration among the different stakeholders involved. For example, in the case of the AMB Bicivia project, the implementation of an administrative procedure involving transfer of powers to the AMB by local governments for the maintenance of cycle paths is a possible future consideration. In other words, in addition to planning, the metropolitan authority should be able to take charge of maintenance and regulation of the cycle network.

However, other cases of metropolitan solutions are the result of a regulatory provision approved by the state (either central or federal) (see table 8), rather than the metropolitan level. In these cases, implementing the projects is therefore mandatory.

Table 8. Metropolitan solutions implemented through legal provisions

Case name	Regulations
Community-driven housing and informal settlement upgrading in Gobabis	Flexible Land Tenure Act to provide security of tenure and economic empowerment for people living in informal settlements (2012)
COAMSS/OPAMSS	Law for the development and territorial planning of the San Salvador metropolitan area and neighbouring municipalities (1993)
Jaga Mission	Slums Dwellers Act to grant land rights to slum dwellers (2017)
BARC	Senate Bill no. 849
Citizen-led urban regeneration policy	Special Law on Promotion and Support for Urban Regeneration (2013)

Source: the authors.

In conclusion, the ways in which metropolitan solutions arise and are implemented vary, from binding regulatory provisions issued by supra-local governments to instruments whose implementation is voluntary.

D. Sufficient public expertise to deal with complex urban problems

Creating technical partnerships has become a widely used strategy for dealing with the complex urban problems facing metropolises. In many of the cases analysed here, this expert support comes from counterparts (notably through international cooperation in the Mobility and Gender Project in Maputo and A'SIMA Tunis). In others, the support is provided by expert NGOs (as in the case of Nidos de Lluvia in Guadalajara and the Jaga Mission in Bhubaneswar). Also worth noting are partnerships with technical universities in the countries where the metropolitan policy is implemented.

In the former cases, the creation of expert alliances with counterpart bodies makes it possible to carry out joint work with specific departments (involved in the specific field of the metropolitan policy) which has led to the sharing of knowledge, experiences, methodologies, contacts, etc. For example, the A'SIMA Tunis project is supported by MedCities and the AMB. As Tunisia is part of the MedCities network, this project arose quite organically, out

Foto MedCities

of knowledge of the reality and problems in the territory, including the lack of a strategic planning instrument in Tunis and the need to address waste management jointly. This need positioned the AMB as a third actor in the project, due to its experience in waste management and treatment and its experience in metropolitanisation processes. Expert cooperation has facilitated the transfer of policies adapted to the local context, taking into account the local political, social and economic conditions in Tunisia.

This is, in fact, one of the characteristics identified in these technical partnership processes: technical partnerships help to promote solutions based on experience, while grounded in local realities. This is particularly evident in the case of designing mobility infrastructure from a gender and diversity perspective in the Maputo metropolitan region.[9] In the words of the AMB head of international cooperation: "We used our design for how to make a bus stop in Barcelona as a starting point. We then made one in the Mozambican, Maputan style. But they do this in Maputo, they make the Maputan version. This Maputan version is made by analysing what we have done with all the stakeholders brought together there, with groups and associations, people with reduced mobility, with women's groups, school groups, gender groups".

Technical partnerships have also been formalised with non-governmental organisations. The Nidos de Lluvia project in Guadalajara is one such case. Water.org, a global non-profit organisation working to bring water and sanitation to the world, was instrumental in the initial

9. This cooperation framework materialised through the different lines of work presented in this document, after the Maputo City Council Department of Transport requested advice from the AMB to create a metropolitan transport authority.

definition and technical analysis of the most suitable water harvesting system for Guadalajara; and the technical support has been maintained during the implementation phase.

Finally, partnerships are identified with technical universities in the countries where the solutions are implemented to strengthen the capacities of the people in charge of project implementation. In Gobabis, for example, with the aim of improving community-driven housing and informal settlements, collaboration agreements have been signed with the country's technical universities, which are in charge of training community members to implement the infrastructure and materials themselves. Thus, the communities build their houses after receiving training from the universities involved in the process.

Ultimately, these examples show that technical partnerships strengthen the leap from a project-centred approach to a broader culture of supporting cities in implementing systematised solutions, based on other experiences, but grounded in local realities.

E. Options for obtaining resources and funding

Funding is another important element in developing metropolitan solutions. The case study analysis identifies numerous efforts to be proactive in seeking funding to develop and implement metropolitan solutions.

Metropolitan solutions are in some cases funded by the authorities benefiting from their implementation. For example, the Bay Area Regional Collaborative in San Francisco has an annual budget of USD 1.2 million from its member agencies. Another example is The Rotterdam Business Case, in which the 28 municipalities in the inter-municipal agreement make a financial contribution to Rotterdam City Council and, specifically, to the Regional Office for Entrepreneurs and the Self-Employed, so that it can run the project.

There are also cases where actors have been able to obtain sources of funding from international cooperation. Obtaining European funds has been very important in the cases of metropolitan solutions in the European continent and in North Africa. A'SIMA Tunis, for example, is funded by the European Commission under the call for proposals "Local Authorities: Partnerships for Sustainable Cities" (EuropeAid/161146/DH/ACT/Multi), which aims to promote integrated urban development through partnerships. In the case of the Barcelona Bicivia, the AMB received funding from the NextGenerationEU funds to improve horizontal signage and signposts, and to install permanent devices to count users on the Bicivia.

In the case of the Global South, donations from international cooperation are an important source of funding. For example, in the period 2019-2023 COAMSS/OPAMSS received more than USD 6,000,000 from various actors, such as the Spanish Agency for International Development Cooperation and the European Union. These funds have been allocated to different areas, such as institutional strengthening, knowledge management and territorial investments.

Finally, it is worth noting that the analysis identifies how once metropolitan bodies are institutionalised, this gives them greater stability, as well as greater weight when requesting funding from international organisations. At the same time, the solutions requiring funding incorporate the collaborative and multi-stakeholder approach that donors seek when funding policies.

F. Relational leadership and political support from local authorities

Another significant element is leadership and political support from mayors (or representatives of the local authorities involved) to implement metropolitan solutions. There is a general consensus that one of the key elements in implementing the international solutions analysed here is commitment from the political actors driving them. Commitment refers to the extent to which the organisation is willing to implement strategies to achieve strategic objectives (Noble and Mokwa, 1999, cited in Lee, 2023). This political commitment is manifested in a variety of ways (some more formal, some less so) in the cases reviewed. The following specific examples have been identified:

— Specific sessions to discuss the development and monitoring of metropolitan strategies in spaces of political representation with a metropolitan perspective.
— Signing metropolitan collaboration agreements (either ad hoc or permanent) to improve the effectiveness of solutions.
— Creation and promotion of collaborative networks.
— Guarantee of economic and financial resources.

Firstly, the analysis has detected that in territories with a formalised metropolitan body, sessions are held to specifically discuss the development of metropolitan strategies, as well as to monitor them. They are carried out by the representatives of the municipalities (or local authorities) in the metropolis with the mayors, in spaces of political representation with a metropolitan perspective. Some examples of these specific sessions are the COAMSS in San Salvador and the Metropolitan Coordination Board in Guadalajara, which meet periodically to discuss metropolitan issues and make decisions of municipal impact.

Secondly, another form of political commitment is signing metropolitan partnership agreements (which can be ad hoc or more permanent) to improve the effectiveness of solutions. The Rotterdam Business Case is such an example. The representatives of the 28 municipalities in the project have formalised their willingness to collaborate in helping entrepreneurs in economic difficulties, through the collaboration agreement with the Rotterdam City Council Regional Office for Entrepreneurs and the Self-Employed. The multi-purpose waste treatment centre project in Tunis and six other municipalities is another example of a one-off collaboration agreement between local governments. Finally, another case of note is the metropolitan agreement to improve the effectiveness of the protocol against violence in the metropolitan area of Maputo. Although its approval is municipal, there is an agreement that it will be implemented at the metropolitan level. For this reason, a form has been incorporated so that all the existing lines – municipal and metropolitan – for reporting sexual harassment on public transport collect the same data at the time of the complaint. This is a way of standardising the process and data, as well as paving the way for creating a single metropolitan hotline in the medium term.

Thirdly, political leadership and support has materialised with the promotion of collaborative networking between different actors. These networks may involve local governments, civil society, NGOs, universities, etc. We highlight the following two examples here. First, the Odisha project, which has been implemented through a decentralised governance model, in which slum-dwellers' associations partner with public authorities to manage and sustain informal settlement upgrading. Given the limitations of local governments in reaching out to communities in informal settlements, it was decided to create a partnership with Indian NGOs, which have

much greater experience and technical and institutional capacity to work with these sectors. At the same time, a slum dwellers association was fostered, registered and recognised by local authorities. The associations are formally recognised as partners of the government in implementing the Jaga Mission and monitor the implementation of infrastructure. The second case is The Rotterdam Business Case and the creation of the aforementioned triple alliance between local governments, universities and the Retired Entrepreneurs Volunteer Foundation.

Finally, another recurrent form of political commitment in the solutions is the allocation of sufficient economic and financial resources to ensure their adequate implementation. Although funding was identified by some of the interviewees as a constraint to implementing these solutions (either to scale up the scope of the project or scale it out, reaching out to more actors or other locations), numerous efforts have been identified to be proactive in seeking funding to develop and implement metropolitan solutions, as discussed in more detail in the previous section. In policies where funding is limited, the case study analysis shows there is a commitment to seek even more transformative solutions as a strategic way to leverage available resources into metropolitan solutions with a real and visible impact on people's daily lives.

G. Experimentation and the ability to learn

Metropolitan solutions address complex challenges such as the negative effects of climate change, rising poverty, social inequalities and lack of decent and affordable housing, among many others. Faced with these challenges, local governments see the need to innovate in how they do things, in order to offer answers and design and implement policies that allow them (as far as possible) to solve these public problems and satisfy citizens' demands.

The metropolitan solutions analysed illustrate that changes have been made to how things are done. New policies have been designed (such as Nidos de Lluvia, an innovative policy based on the ancient experience of pre-Hispanic cultures, such as the Mayan civilization, and their practice of rainwater harvesting and storage); new implementation strategies have been devised (such as in urban regeneration policies, which have switched from top-down approaches to bottom-up strategies inspired by citizen input); new forms of partnership, engagement and collaboration (such as decentralised governance models, where slum-dwellers' associations partner with local governments to manage informal settlement upgrading).

Implemented solutions therefore test and put into practice new forms of metropolitan policy-making. To this end, testing solutions using small-scale pilot projects has been identified as the most commonly used mechanism. Results from pilot project permit a decision on whether to endorse scaling up the project in other territories, with other actors or in other facilities. The housing and informal settlement upgrading programmes run by the Gobabis community, the Jaga Mission in Odisha, the Nidos de Lluvia project in Guadalajara and The Rotterdam Business Case entrepreneurship support project all started with a smaller scale pilot project and have been scaled up as they have become more firmly established.

It is also worth noting that the drivers for implementing metropolitan solutions very often rely on data, systems and tools to make decisions. Worthy of mention are metropolitan observatories (as in the case of San Salvador), which help define the implemented policies, as well as their follow-up and monitoring, or the Guadalajara water vulnerability map, a strategic tool to generate integrated action to address flood risk in the Guadalajara metropolitan area.

Conclusions

This report discusses the conceptualisation of the term *metropolitan solution.* It is an easily understood, practical and publicly approved concept, as it carries with it the connotation of problem solving and positive outcomes for society. However, it can hide necessary reflection on the causes of the problems that justify the solution, and underestimate the fact that "solutions" can generate new problems and that public problems are almost never fully solved.

According to this study, a metropolitan solution is an effective response to a problem, issue, need, challenge or demand implemented in a metropolitan environment with the involvement of a variety of local bodies. Such solutions have multiple dimensions (social, economic, community, environmental, etc.) and are intended to be innovative in nature by trying out new forms of policy-making. Metropolitan solutions should not fall into *technological* solutionism, but rather foster institutional cooperation and citizen co-creation. They have to involve a plurality of actors (private sector, public sector, NGOs, universities, etc.) through more or less formal cooperation mechanisms and arenas. The metropolitan sphere is particularly fertile ground for developing collaborative governance in public policy-making, due to the lower regulatory powers of metropolitan bodies, greater interdependence between stakeholders, and the cross-cutting and integral nature of the challenges facing metropolises and, therefore, of the implemented solutions.

Metropolitan solutions are also framed in the guidelines contained in international agendas. These metropolitan responses have become a way of linking metropolitan responses to SDGs. Thus, metropolitan solutions address crucial issues in the 2030 Agenda and other international agendas such as social inclusion and cohesion, resilience, sustainable mobility and commitments regarding climate change.

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Metropolitan solutions from different countries have been analysed. The capacity for horizontal learning between local and metropolitan governments in different places to address shared problems is one of its strengths. However, it is necessary to promote processes of adaptation and accommodation in the same context, both in terms of the specifying the problem at the local level and the mechanisms for implementing the solution. The existence of a metropolitan body is a key element for ensuring the adaptation (if solutions come from elsewhere) and sustainability of metropolitan policies over time. The institutionalisation of metropolitan cooperation is one of the drivers of metropolitan solutions.

However, the existence of a metropolitan body is not a *sine qua non* condition for the creation and implementation of metropolitan solutions. In other words, a metropolitan institution is not essential to start implementing metropolitan solutions. Cooperation between actors to push for a solution becomes a factor that encourages and strengthens the creation and maturation of metropolitan institutions.

At this point, it is worth noting that not all public policies need to be addressed at the metropolitan level. This report analyses the relevance and specificity of metropolitan solutions and makes a proposal with regard to the specific academic literature. Five criteria are suggested to determine when it might make more sense to actually develop a solution at the metropolitan level. In particular, the specific criteria provided by this study refer to when the solutions:

— promote cooperation between actors from different local jurisdictions to solve joint challenges.
— facilitate agglomeration economies.
— produce improvements in public service provision.
— promote social and environmental justice in the metropolitan area as a whole.
— improve the efficiency and circularity of urban metabolism.

There is still a much room for improvement in the policies promoted at the metropolitan level. One of the main challenges is to overcome institutional fragmentation and the gap between the problems shared by different local governments and their management in the same urban area. Closing this gap requires developing and consolidating a culture of collaboration between the existing bodies in the territory to enable them to take on the metropolitan challenges. In parallel, a range of mechanisms can be deployed, from more ad hoc municipal cooperation mechanisms to the institutionalisation of a metropolitan body or government, as well as less institutionalised mechanisms, such as agreements or networks with the intention of becoming permanent.

There is also scope to promote metropolitan policies that facilitate economies of agglomeration within metropolitan environments. From urban and land-use planning, mobility and public transport, and economic development, metropolitan policies can be promoted to take advantage of the feedback from the concentration of markets, activities and public services, and to address the negative externalities this generates.

In order to improve the provision of public services and achieve improvements in terms of economic efficiency, metropolitan bodies have various mechanisms at their disposal, such

as merging bodies, joint production between different public organisations and delegating competencies to another public authority with a wider scope. Using these mechanisms can lead to cost savings in the provision of shared services, although it is important first to analyse the characteristics of each service and the territory (in terms of population, density, interrelationships, etc.), as well as always seek a balance between efficiency, equity and accountability.

The world's metropolises also have numerous mechanisms at their disposal to promote social and environmental justice. Institutional fragmentation and local autonomy in strongly interdependent environments can unintentionally lead to greater socio-territorial inequality. A joint vision of urban planning, housing policies, education, fiscal policies and urban regeneration programmes can be tools to improve metropolitan social and environmental justice.

Metropolises can also take advantage of their concentration of knowledge, resources and technology to facilitate metabolic and circular functioning of resources. Given that urban areas are the largest consumers of global resources and the main producer of waste, metropolitan areas should try to reduce the amount of inflows. To achieve this goal, they must improve the efficiency of metabolism through internalisation, lower consumption, avoiding waste and promoting reuse in areas such as water, energy and food. They need to always take into account interdependent relationships between urban and rural environments both inside and outside metropolitan areas and to develop compensatory mechanisms.

However, public policies applicable in each area will undoubtedly depend on the social, political and economic context in which they are implemented. The solutions deployed by local and metropolitan governments around the world to meet the global challenges they face today must be tailored to local realities and needs. Technical partnerships can, in this sense, strengthen the leap from a project-based approach to a broader culture of supporting cities in implementing systematised solutions, inspired by other experiences, but grounded in local realities.

Finally, relational leadership and political support from the local authority representatives involved in implementing metropolitan policies are key factors. This political impetus will often involve actively seeking funding, supporting testing and experimentation, and encouraging new forms of policy making in order to solve (as far as possible) public problems and meet citizens' demands through agreement and collaboration.

Future lines of research

The presence of metropolises in the world is increasing and forecasts indicate that this will continue to grow rapidly. However, there is a global gap in metropolitan management, i.e. between functional realities and their political and institutional management. In order to improve metropolitan management, one of the first steps is probably to identify where there is most value in promoting policies from the metropolitan level. This is especially important given that the metropolitan area has recently been recognised by UN-Habitat in the resolution on "Localization of the Sustainable Development Goals" adopted at the June 2023 assembly. Thus, this study identifies five criteria that can help determine when a solution has value at the metropolitan level. However, more detailed knowledge on metropolitan

management is needed. The results of the study open up interesting threads and potential lines of research to address it.

First, the five criteria related to the advantages of metropolitan approaches (inter-municipal cooperation, agglomeration economies, economies of scale, social and environmental justice and urban metabolism) need to be further elaborated in order to refine the most relevant policies and services at the metropolitan scale. Exploring these criteria in more detail would also facilitate analysis of interrelationships and linkages between the criteria. This is particularly timely considering these are complementary, not exclusive, criteria. In this respect, therefore, the possible complementarities and tensions between them should be more clearly specified. For example, the link between agglomeration economies and promoting social and environmental justice could be explored; or the effects of service fragmentation on improving the efficiency and circularity of urban metabolism in metropolises should be investigated. Establishing linkages and interrelationships between these criteria can help define when a solution has value at the metropolitan scale, and how it can be virtuously deployed without harming the other criteria.

This exploration of criteria necessarily implies further review of the theoretical knowledge and articulating a common language from the different disciplines that impact on metropolitan management, such as political science, geography, urban sociology, regional economics, environmental sciences and urban ecology. In relation to the latter discipline, it is particularly important for the study of metropolises and their governance to overcome the strong anthropocentric character and take into account the underlying biophysical matrix. A special effort is needed to break down and shed light on metropolitan management from the perspective of bioregions and circular urban metabolism.

At the same time, a proactive search for theoretical frameworks, learning and challenges from the Global South is needed to lessen the current bias of knowledge anchored in the epistemologies of the Global North. This could open the way for diverse and inclusive perspectives that reflect the knowledge of regions less represented in hegemonic academia.

Secondly, it would be useful to look more closely at the relationship between solutions and metropolitan cooperation institutionalisation processes. In this sense, the study highlights the relationship between solutions for specific problems and the strengthening and institutionalisation of metropolitan cooperation. However, there is still insufficient clarity and evidence on which types of solutions facilitate more or less progress in metropolitan cooperation institutionalisation, and on which mechanisms, issues or outcomes of solutions contribute to progress (or setbacks) in strengthening metropolitan cooperation. In this sense, it would be especially useful to study more closely those metropolises that are in the initial stages of metropolitan cooperation through the AMB's own cooperation projects.

Another line of research that remains open is that of collaborative governance in metropolitan areas. As described above, the metropolitan sphere is particularly fertile ground for developing collaborative governance in drawing up and implementing public policies, given the interdependent relationships between the different stakeholders involved, as well as the cross-cutting and comprehensive nature of the challenges faced by metropolises. In this context, it is essential to have greater clarity on what kind of leaderships are needed, the incentives of each actor, and the most appropriate arenas

and spaces for collaboration. Progress needs to be made in implementing solutions in this collaborative governance framework to obtain greater clarity on how to coherently structure responsibilities, competences and capacities among the different authorities and ensure their transparency and accountability.

The AMB, in collaboration with UN-Habitat, Metropolis and other large city associations, is leading the debate on and recognition of metropolitan reality, as well as promoting initiatives to improve its global management. In this environment of collaboration between different organisations, associations and regions of the world, promoting knowledge and innovation transfer is especially important. It is in this context that the proposals and lessons learned from this study might have the greatest impact. The study discusses the need for metropolitan management beyond specific services. It also highlights the need to develop collaborative formulas beyond the existence of metropolitan authorities. This broadens the scope of the AMB's cooperation with the local governments and metropolitan institutions it works with, and places special emphasis on metropolitan forms of cooperation while providing technical support to implement metropolitan solutions.

Internally, the AMB can also apply the five criteria defined in this study within the metropolitan institution, raising the value of its progress and challenges in each of the established criteria. Specific policy areas are identified for each of the criteria from the literature review. The case of the AMB could be illustrative in providing greater clarity on how progress is being made in each of the areas: How do policies implemented in the metropolitan area of Barcelona recognise the benefits of and promote agglomeration economies? How do we jointly limit agglomeration diseconomies? How do AMB-managed services improve economies of scale? What methodology can we use to assess more objectively the benefits a metropolitan service rather than local provision? Do all metropolitan policies incorporate a metabolic vision? Do environmental interventions take into account their impact on social justice and vice versa? How are different metabolic flows (such as water, food, energy, energy and waste) between the metropolitan area and its surroundings taken into account and managed? The study shows there is still a long way to go in developing metropolitan policies, in their innovation and in their legitimisation.

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Appendix 1. Case files analysed

The 11 cases analysed are sorted alphabetically by name of the central city.

BARCELONA – BICIVIA (METROPOLITAN BICYCLE NETWORK)

Geographical and population context

Region	Europe	**No. of municipalities**	36
Subregion	Europe (Western)	**Population (municipal)**	1,636,193 inhab.
State	Spain	**Population (metropolitan)**	3,303,927 inhab.
Central city	Barcelona		

Institutional context

Metropolitan governance model	Metropolitan authority
Year established	2010

OBJECTIVES

To create a metropolitan cycle network (550 km) to offer and guarantee continuity to existing local connections in the Barcelona metropolitan area.

Start year	2016
Planned end year	-
Current status	Implementation

DESCRIPTION OF THE SOLUTION

The Bicivia metropolitan cycle network aims to connect the metropolis from north to south and east to west, i.e. all urban centres and areas of economic activity, quickly, directly and safely. The Bicivia network falls between a basic network and secondary network. The basic network covers new major axes and while the secondary one links basic axes and connects them with the entire metropolitan territory.

Promoting institution

Barcelona Metropolitan Area (AMB)

Challenge or problem addressed

A lack of cycling connections in the metropolitan area was identified, as well as lack of collaboration on cycling policies among local governments and the government authorities that own the roads in the metropolitan area.

Multidimensional perspective of the solution

The project aims to connect the metropolis from north to south and east to west, i.e. all urban centres and areas of economic activity, quickly, directly and safely, to improve connections in the metropolis. The aim is also to promote cycling as a sustainable and active form of mobility to improve the health of people in the metropolis. And finally, the policy is a means of promoting metropolitan-wide coordination and dialogue among local and supra-local government mobility officials.

Solution methodology

Given the political and technical consensus of the city councils in the metropolitan area, the AMB Metropolitan Cycle Office was created in 2016 with the approval of the Metropolitan Council, with the aim of giving the AMB a leading role in coordinating and promoting public policy to favour cycling. Once the office had been set up, the cycle routes were planned, with the technical consensus of the city councils, in order to provide continuity for local connections. Once these were defined, a meeting of councillors and mayors was convened to present the proposal for the axes, producing a consensus on the proposal for a metropolitan cycle network, which was then approved by the Metropolitan Council. Work on implementing the network has been ongoing since then. In order to coordinate this task with local government mobility officers, the AMB holds training sessions, provides technical support to the municipal services, provides funding for metropolitan municipalities to develop the Bicivia; and coordinates executive projects, among other actions. An external audit has now been contracted to assess the work so far.

Beneficiary groups

The entire population of the metropolitan area, especially cyclists and pedestrians.

METROPOLITAN SCOPE

Type of metropolitan solution	Type of action
Focused on metropolitan action	Planning and coordination

Criterion: 1 Coordinating cooperation between local actors to solve shared challenges

The AMB, through the Metropolitan Cycle Office, is responsible for ensuring inter-municipal connections, an essential part of metropolitan mobility. As the AMB does not have powers over the public space, the network has to be implemented under the direction of the municipalities, which are the authorities that execute it. Thus, the AMB promotes and leads the process of defining the network and incorporating the metropolitan vision among the municipalities. This makes the metropolitan cycle network a window of opportunity to promote cooperation between local actors, but also between supra-local authorities which, until eight years ago, did not plan to earmark financial or technical resources to cycling, thereby adding new actors to metropolitan cycling governance.

GOVERNANCE AND PARTICIPATION

Multilevel dimension	Citizen participation
The AMB fosters continuous communication with local governments to ensure such aspects as the integration of the Bicivia network into (local) urban mobility plans. Actions are also coordinated with Barcelona Provincial Council, the Ministry of Transport, Mobility and the Urban Agenda, and the Generalitat de Catalunya. The latter two have implemented sections of the Bicivia network in the metropolitan area on roads that fall within their jurisdiction.	As part of the current audit, four participatory sessions were held with the municipalities, as well as sessions with civil society (associations promoting cycling in the metropolis). An exploratory women-only walk was also held to introduce a gender perspective to implementation of the policy.

INNOVATION AND BUDGET

Innovative elements of the solution and associated SDGs

This solution sets out a new approach to metropolitan governance. The bicycle is given a central role in governance. Cooperation among local and supra-local actors is coordinated through the cycle network.

Budget	Actors funding the project
-	Metropolitan area of Barcelona city councils, AMB, Barcelona Provincial Council, Generalitat de Catalunya, European Union.

More information Bicivia - Mobility - Barcelona Metropolitan Area (amb.cat)

BHUBANESWAR – JAGA MISSION

Geographical and population context

Region	Asia	**No. of municipalities**	-
Subregion	East Asia	**Population (municipal)**	840,000 inhab.
State	India	**Population (metropolitan)**	2,000,000 inhab.
Central city	Bhubaneswar		

Institutional context

Metropolitan governance model	-
Year established	-

OBJECTIVES

To implement land titling and slum upgrading across the state of Odisha to radically improve living conditions and promote social equality.

Start year	2017
Planned end year	-
Current status	Implementation

DESCRIPTION OF THE SOLUTION

The project aims to make Odisha India's first slum-free state. The project is implemented through a decentralised governance model, in which slum dwellers' associations partner with public authorities to manage and sustain the upgrading of informal settlements.

Promoting institution

Government of Odisha Housing and Urban Development Department

Challenge or problem addressed

About 25% of the total population of the state of Odisha (1.7 million people) live in urban slums; 50% of them are concentrated in the state's five metropolises, one of which is the capital of Odisha, Bhubaneswar. Slum dwellers suffer from unsanitary conditions and have no access to basic services and infrastructure such as water, electricity and sewage, and no land rights. In this context, residents find themselves in a vicious circle of poverty and marginalisation, which has led to the growth of an informal business around informal settlements.

Multidimensional perspective of the solution

The programme is divided into two strands: firstly, it is based on the fundamental principle that all households in Odisha's urban slums should be granted land rights with security of tenure to ensure that they have access to public housing subsidies and to mitigate the threat of forced eviction and displacement. Land rights certificates are inheritable and mortgageable, but are not transferable to avoid gentrification. A programme of service and infrastructure improvements has also been launched to ensure the following services, among others: sewerage, sanitation, water supply, access to individual household toilets, smart street lighting and multi-purpose community centres.

Solution methodology

In 2017, the Slum Dwellers Act was passed to grant land rights to people living in slums in Odisha. From on this policy framework, local governments in small and medium-sized cities started to implement the programme. At the end of 2021, the legislation was amended to allow for its implementation in Odisha's metropolises as well. At the same time, since 2020, the slum upgrading programme has been underway to turn slums into liveable environments. This is led by neighbourhood associations that have been formally recognised as local government partners and have control over implementing improvements to and maintenance of community assets, including direct access to project funds through a bank account.

Beneficiary groups

Slum dwellers in small and medium towns and metropolises in Odisha state. In Bhubaneswar, 40,000 land titles have been issued. Not only are slum dwellers benefiting from the project, but the Government of Odisha is also reaping benefits as a result of improved collaboration between the state government, city authorities and residents.

METROPOLITAN SCOPE	
Type of metropolitan solution	**Type of action**
Focused on metropolitan action	Legislation and service provision
Criterion: 4 Promoting social and environmental justice throughout the metropolitan area	
In addition to the obvious benefits to residents' health and well-being, the Jaga Mission is also helping empower the communities in these neighbourhoods socially, economically and politically. Neighbourhood associations have been created to manage neighbourhood upgrading themselves, electing representatives of their territory. It is also helping to change public perceptions of slum dwellers and informal workers: traditionally perceived as "invaders" of city services, today this perception is challenged by residents' collective responsibility over improving their communities. In addition, the Jaga Mission promotes environmental sustainability (all materials used to improve infrastructure are locally sourced) and environmental justice (residents near landfills and flood zones can volunteer to move to safer and healthier locations).	
GOVERNANCE AND PARTICIPATION	
Multilevel dimension	**Citizen participation**
Local governments have implemented the programme thanks to legislation passed at state level.	Community participation is a key feature of the project. The associations are formally recognised as government partners in implementing the Jaga Mission and monitor the implementation of infrastructure. Residents are hired to do the improvement work in the community and receive fair wages, providing opportunities for a better livelihood.
INNOVATION AND BUDGET	
Innovative elements of the solution and associated SDGs	
This project implements a new policy, with an innovative form of partnership, engagement and collaboration between citizens and governments.	
Budget	**Actors funding the project**
USD 65,000,000/year	State of Odisha
More information	Jaga Mission - Odisha Habitable Habitat Mission (metropolis.org)

GOBABIS – COMMUNITY-DRIVEN HOUSING AND INFORMAL SETTLEMENT UPGRADING

Geographical and population context

Region	Africa	**No. of municipalities**	-
Subregion	Sub-Saharan Africa	**Population (municipal)**	19,101 inhab.
State	Namibia	**Population (metropolitan)**	-
Central city	Gobabis		

Institutional context

Metropolitan governance model	-
Year established	-

OBJECTIVES

Construction and improvement of housing in informal settlements in Gobabis.

Start year	2013
Planned end year	-
Current status	Implementation

DESCRIPTION OF THE SOLUTION

The community-led informal housing and settlement upgrading project addresses the urgent housing crisis by helping communities formalise land ownership, meet their infrastructure needs and access funds to improve housing. The project is led by the Shack Dwellers Federation of Namibia (SDFN), a network of community savings groups, and the Namibia Housing Action Group, in collaboration with the state and municipal authorities.

Promoting institution

The Shack Dwellers Federation of Namibia (SDFN) and Namibia Housing Action Group, in collaboration with the government and municipal authorities

Challenge or problem addressed

More than 40 per cent of Namibia's population (and approximately 80 per cent of the urban population) lives in informal settlements, with little or no access to basic services and no land rights.

Multidimensional perspective of the solution

This project includes participatory planning and diagnosis processes that involve the communities to analyse the socio-economic situation of residents in informal settlements and housing. Land regulation processes are also carried out to promote security of tenure (rather than relocating communities to other sites). At the same time, local universities are driving education and training in the communities, so that can construct the houses themselves.

Solution methodology

The local authority and community members conduct a survey of the informal settlement, and collect data on existing households and infrastructure services. From this point, a community-driven settlement plan is developed and submitted to the local authority for approval. The first pilot project was in the "Freedom Square" settlement. One of the conclusions from the survey on this project was the need to secure land tenure. As a result, the Flexible Land Tenure Act was signed in 2012 to provide security of tenure and economic empowerment to people living in informal settlements. And in 2013, a partnership agreement was signed between the local government, the SDFN and the Namibia Housing Action Group to promote settlement upgrading.

Prior to establishing a title, informal land must be divided or combined with other plots to create a standard-sized plot known as a *blockerf*, containing individual household plots and a communal area. Land titles can also be used as credit collateral. When someone obtains a land title, they become part of a land title association, a community association that entitles them to subsidies and financial support. The aim is to help these people meet their housing, infrastructure and service needs. The state provides the funds to buy the materials and community members install them, after receiving training.

Beneficiary groups

By 2022, some 4,000 houses had been built with water and sanitation services, directly benefiting 25,000 people, and services had been upgraded for 2,310 households in three informal settlements in Gobabis.

METROPOLITAN SCOPE	
Type of metropolitan solution	**Type of action**
Focused on metropolitan action	Regulation, planning and service provision

Criterion: 4 Promoting social and environmental justice throughout the metropolitan area

The project's land titling offers these residents greater security. Similarly, improvements to services and housing reduce health and safety hazards, while the participatory and community-led nature of the project empowers communities and increases their resilience. This project also fosters greater social cohesion in the community. The majority of SDFN members are women and, as such, most of the savings group construction teams are women. The project offers internships for students on construction sites to boost the presence of women in the construction sector. The environmental problems of informal settlements are mainly addressed through risk-sensitive planning and training, landfill upgrading, promoting urban agriculture and animal husbandry and recycling, among other measures.

GOVERNANCE AND PARTICIPATION	
Multilevel dimension	**Citizen participation**
The Namibia Housing Action Group is part of the National Housing Advisory Committee that advises the Namibian Ministry of Housing. This action group acts as an interest group to push for greater support for informal settlement upgrading. In 2019, a National Alliance for Informal Settlement Upgrading (made up of authorities and expert professionals, among other parties) was created to help scale up the project in the rest of the country.	Community participation is a key element in the project: the community has been involved in both the planning and implementation process of the project, thereby creating a sense of ownership and strengthening the community's willingness and commitment to continue the process. The community has learned to work collaboratively and the town council has learned to plan with the community. Local universities are also involved, as well as actors from international cooperation (GIZ, UN-Habitat).

INNOVATION AND BUDGET

Innovative elements of the solution and associated SDGs

The creation of partnerships between local authorities and communities has empowered residents to lead their own housing and neighbourhood improvement processes.

Budget	Actors funding the project
USD 6,353,240	Namibian state (42%), private sector (17%), external grants (6%) and community savings groups (35%).
More information	Community-driven housing and informal settlement upgrading (metropolis.org)

GUADALAJARA – NIDOS DE LLUVIA

Geographical and population context

Region	America	**No. of municipalities**	10
Subregion	Central America and the Caribbean	**Population (municipal)**	1,385,629 inhab.
State	Mexico	**Population (metropolitan)**	5,179,874 inhab.
Central city	Guadalajara		

Institutional context

Metropolitan governance model	Metropolitan authority
Year established	2014

OBJECTIVES

The objective is to improve access to water by installing rainwater harvesting systems in the most water-vulnerable neighbourhoods and localities, under a decentralised supply model.

Start year	2021
Planned end year	-
Current status	Implementation

DESCRIPTION OF THE SOLUTION

This project aims to implement a new model of water supply, storage and use in the most water-vulnerable areas of the Guadalajara metropolitan area.

Promoting institution

Government of Jalisco, Guadalajara Metropolitan Area Institute of Planning and Development Management of the (IMEPLAN)

Challenge or problem addressed

In 2021, the state of Jalisco faced a severe drought, which led to low levels of water supplies, such as the Calderón reservoir. The phenomenon caused water shortages and significantly affected more than 300,000 inhabitants in the northern colonies of the Guadalajara metropolitan area. The population had to be supplied by water distribution trucks which, taking advantage of the water crisis, had raised water prices. The areas most affected by the drought are marginal areas, lacking paving and criss-crossed by ravines, which further complicated the logistics of water distribution by truck.

Multidimensional perspective of the solution

The solution has an environmental component, since harvesting rainwater eases stress on other factors related to water supply, in terms of energy and resources. It also has a significant social dimension, by reducing social vulnerabilities, because the *colonias* (zones) most affected by the drought are marginal areas, with large low-income populations. The solution also has an important gender impact: thanks to its implementation, people, mainly women and children, no longer had to spend time and resources on fetching water.

Solution methodology

Nidos de Lluvia (rain nests) started in 2021 with a pilot scheme in the north of Zapopan involving 600 systems in the most drought-affected neighbourhoods, with also have high levels of marginalisation. To decide on the location of the pilot project, first of all, a water vulnerability analysis was carried out for the Guadalajara metropolitan area which, through an overlay analysis of different variables, provided accurate technical information on where the households with the greatest need were located.

Beneficiary groups

By 2023, more than 4,250 rain nests had been installed free of charge, and more than 15,000 people now have safe drinking water in 15 municipalities in the state of Jalisco (9 of them in the Guadalajara metropolitan area).

METROPOLITAN SCOPE

Type of metropolitan solution	Type of action
Focused on metropolitan action	Service provision

Criterion: 4 Promoting social and environmental justice throughout the metropolitan area

Nidos de Lluvia addresses social vulnerability to climate change, as it is deployed in neighbourhoods of the metropolis which, according to the vulnerability map, are most affected by the water shortage crisis and also have a large concentration of low-income populations. These areas are suffering from the effects of climate change, but their low resource base have means they have limited capacity to respond and adapt to them. Thus, Nidos de Lluvia aims to ensure all neighbourhoods in the Guadalajara metropolitan area have the same protection against the effects of climate change in terms of health and quality of life, regardless of income levels.

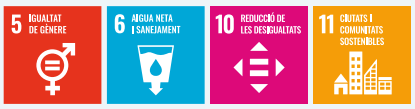
GOVERNANCE AND PARTICIPATION

Multilevel dimension	Citizen participation
The state of Jalisco finances and manages the Nidos de Lluvia project. IMEPLAN promotes the technical side of the project and consolidates participation of different actors (public, private, etc.). IMEPLAN's Executive Board is made up of political representatives from the local governments of the municipalities in the Guadalajara metropolitan area. The Metropolitan Coordination Board meets on a (bi) monthly basis, to discuss metropolitan issues and make decisions with a municipal impact.	A notable contribution to the project was the participation of the international NGO water.org during the initial definition and technical analysis of the most suitable water harvesting system. The communities participated in the project socialisation processes. Childcare spaces were provided to ensure women's participation. Catchment committees involving parents, teachers and pupils are set up for rain nests installed in schools, which have a much larger catchment area. This creates a culture of water management and water savings, so pupils recognise the natural water cycle as early as the infant stage.

INNOVATION AND BUDGET

Innovative elements of the solution and associated SDGs

It is an innovative policy based on the ancient experience of pre-Hispanic cultures, such as the Mayan civilization, and their practice of rainwater harvesting and storage.



Budget	Actors funding the project
MXN 80,000,000 (EUR 4,000,000)	Government of Jalisco, Inter-municipal Drinking Water and Sewerage Services.

More information https://nidosdelluvia.jalisco.gob.mx/

GUANGZHOU – GUANGZHOU ECOLOGICAL BELT MASTER PLAN

Geographical and population context

Region	Asia	**No. of municipalities**	11 districts
Subregion	East Asia	**Population (municipal)**	-
State	China	**Population (metropolitan)**	18,000,000 inhab.
Central city	Guangzhou		

Institutional context

Metropolitan governance model	Metropolitan government
Year established	-

OBJECTIVES

The Guangzhou Ecological Belt Master Plan aims to improve water quality, restore the river, promote ecological conservation, revive waterfront life and redevelop the metropolis.

Start year	2019
Planned end year	2035
Current status	Implementation

DESCRIPTION OF THE SOLUTION

Guangzhou City Council launched the ecological belt planning project in 2019, with the aim of providing a new model of river and lake management to promote the city's urban development, ensuring high standards of living for its people. The planning and construction of the ecological belt is a new approach to the value of rivers in the urban development of cities. The ecological belt is designed as a natural corridor for animals, for citizens to enjoy culture and leisure, and as an environmentally-friendly area of economic activity.

Promoting institution

Guangzhou City Council

Challenge or problem addressed

Guangzhou has a network of 1,368 rivers (more than 5000 km), accounting for 10% of the land area. However, the water system had not been comprehensively and systematically used in the urban development of the city.

Multidimensional perspective of the solution

Guangzhou's river network is seen as a key area for enhancing biodiversity and supporting different natural cycles. For this reason, a network of blue-green infrastructure has been created with several objectives: controlling pollution and flooding; improving the ecological environment of the river basin; promoting the construction of urban infrastructure; increasing the use of space; promoting industrial transformation and upgrading, and activating the diverse community values of cities.

Solution methodology

After Guangdong Provincial Government set the target of creating a 10,000 km green belt in the province, Guangzhou City Council began implementing the ecological belt planning and construction project in 2019, committing to providing 2,000 km of the 10,000 km of green belt in the province. It started with an assessment of the city's water system and selection of 2,000 km of water corridor. More than 1,000 km of the ecological belt were built between 2019 and 2022. By 2025 it is expected to reach 1,500 km, with a target of 2,000 km by 2035. The project is implemented by Guangzhou City Council and coordinated with the 11 city districts, which carry out the administrative and liaison work with the community organisations involved in the project.

Beneficiary groups

Population of Guangzhou

METROPOLITAN SCOPE

Type of metropolitan solution	Type of action
Focused on metropolitan action	Planning

Criterion: 5 Improving the efficiency and circularity of the urban metabolism

The project presents an approach based on the interrelationship of citizens and the natural environment of Guangzhou, to address the problems arising from urbanisation in the city and the resulting environmental and ecological effects on the city's water network. The planning and construction of Guangzhou's ecological belt is a reconceptualisation of the value of urban rivers by making full use of the water network to provide systematic, nature-based solutions for water treatment and economic and industrial revitalisation, reactivation of the cultural and leisure dynamics of riverfront spaces and city governance. Guangzhou's river network is seen as a key area for enhancing biodiversity and supporting different natural cycles, but also for improving health, people's quality of life and the economy of riverfront areas. To do this, the projects plan the territory, prioritising the ecosystem conservation and protecting biodiversity.

GOVERNANCE AND PARTICIPATION

Multilevel dimension	Citizen participation
The project, promoted by the Guangdong Provincial Government, is being implemented by the Guangzhou City Council in coordination with the 11 city districts, which carry out the tasks of administration and contacting the community organisations participating in the project.	Citizens have participated in the following activities through a variety of channels: designing micro-spaces, micro-structures, water conservation facilities and service stations along the waterway to improve the quality of key spatial nodes; photography competitions; and activities in the public space, among others.

INNOVATION AND BUDGET

Innovative elements of the solution and associated SDGs

Implementation of this plan takes into account ecology, daily life and production for urban governance from a holistic perspective of symbiosis between the city and the water system. It provides a model that considers the interrelationship between cities and rivers as a way to protect the ecosystem and create resilient spaces in highly urbanised areas.

Budget	Actors funding the project
More than 5 trillion yuan	Guangzhou Municipal People's Congress. Supplementary contributions have also come from private enterprise.

More information Guangzhou Ecological Belt Masterplan (metropolis.org)

MAPUTO – MOBILITY AND GENDER

Geographical and population context

Region	Africa	**No. of municipalities**	4
Subregion	Sub-Saharan Africa	**Population (municipal)**	1,088,449 inhab.
State	Mozambique	**Population (metropolitan)**	2,582,219 inhab.
Central city	Maputo		

Institutional context

Metropolitan governance model	Metropolitan Sectoral Agency (transport)
Year established	2017

OBJECTIVES

Include a gender and diversity perspective in the Maputo metropolitan area metropolitan mobility strategies.

Start year	2017
Planned end year	-
Current status	Implementation

DESCRIPTION OF THE SOLUTION

This line of action aims to incorporate a comprehensive gender and diversity perspective into the mobility dynamics in the Maputo metropolis. Based on contacts between the Maputo Metropolitan Transport Agency and the AMB, a line of work has been set up that includes different projects and perspectives, with the aim of: understanding and recognising the need to incorporate the gender and diversity perspective in urban mobility; promoting symbolic transformational changes (e.g. including women in male-dominated spaces); developing public policies on mobility and gender; transforming values and daily practices; and promoting actions in public space, based on transformational experiences that exemplify a different way of understanding the metropolis.

Promoting institution

Maputo Metropolitan Transport Agency, Maputo City Council, AMB, Architecture Without Borders

Challenge or problem addressed

Firstly, the lack of a comprehensive perspective of the metropolis in terms of mobility; and secondly, problems of violence (physical, sexual) towards women during their journeys in the Maputo metropolitan area.

Multidimensional perspective of the solution

The mobility and gender strategy in Maputo includes actions ranging from data collection and diagnostics to understand and analyse diversity and discrimination in mobility in Maputo (e.g. a map of violence has been drawn up), to actions in the public space (e.g. in Maputo Central Hospital, as a basic metropolitan service) and training sessions for mobility teams (e.g. bus drivers). Developing public policy has also been promoted (e.g. a protocol against violence in the metropolis has been drawn up), as well as awareness-raising processes, fostering spaces to talk about mobility and gender, prioritising women's voices.

Solution methodology

To roll out this mobility and gender strategy, the local authorities (Maputo Metropolitan Transport Agency and City Council) are receiving support from the AMB and an NGO, Architecture Without Borders. The following two commissions have been set up to divide the tasks between the promoting institutions: the Joint Commission, made up of political or expert decision-makers (e.g. AMB, the Metropolitan Transport Agency director, the Maputo councillors and the director of ASFE Maputo); and the Management Commission, for project coordination (AMB, the director of Transport and Mobility, the director of Equality Issues, etc.).

Beneficiary groups

The inhabitants of the Maputo metropolitan area, particularly women.

METROPOLITAN SCOPE	
Type of metropolitan solution	**Type of action**
Focused on metropolitan action	Planning and service delivery
Criterion: 4 Promoting social and environmental justice throughout the metropolitan area	
From the different lines of action (training, awareness-raising, public policy development, actions in the public space), the objective is social production of space that generates equality (and not advantages for some groups and disadvantages for others). In this sense, for example, the intervention at Maputo Hospital has a strategic nature, as its impact will benefit the entire metropolis, given that all its inhabitants use the hospital. The intervention is based, among other things, on environmental sustainability criteria. In addition, the approved protocol against violence includes a form to ensure all the reporting phone lines in the different municipalities of the metropolis collect the same data, etc. Thus the end goal is to foster changes in people's daily lives to improve social and spatial justice in the urban system.	
GOVERNANCE AND PARTICIPATION	
Multilevel dimension	**Citizen participation**
There is an overlap of actions in the area of mobility and transport, as municipalities are responsible for transport and the Ministry for transport throughout the country. The Maputo Metropolitan Transport Agency also reports to this ministry. Therefore, constant structuring and cooperation are needed to avoid overlaps and to coordinate actions.	Citizen participation processes (interviews, surveys, workshops, etc.) have been carried out in the different lines of action, such as those related to data collection (e.g. creating the violence and security map).
INNOVATION AND BUDGET	
Innovative elements of the solution and associated SDGs	
This is an innovative policy in the country, based on a new form of partnership, commitment and collaboration between local bodies, international cooperation and civil society.	
Budget	**Actors funding the project**
-	AMB, Maputo City Council and Maputo Metropolitan Transport Authority
More information	Mobility and gender: a dialogue of cooperation (amb.cat)

ROTTERDAM – THE ROTTERDAM BUSINESS CASE

Geographical and population context

Region	Europe	**No. of municipalities**	28
Subregion	Europe (Western)	**Population (municipal)**	598,199 inhab.
State	The Netherlands	**Population (metropolitan)**	1,015,677 inhab.
Central city	Rotterdam		

Institutional context

Metropolitan governance model	Metropolitan Authority (Metropolitan Region Rotterdam The Hague, MRDH)
Year established	2015

OBJECTIVES

To improve the profitability and sustainability of entrepreneurs in financial difficulties.

Start year	2012
Planned end year	-
Current status	Implementation

DESCRIPTION OF THE SOLUTION

The aim of The Rotterdam Business Case is to address the business problems and skills of entrepreneurs in the Rotterdam metropolitan region to restart their business, improving their income and make their business more sustainable. Resolving these problems is essential to giving these entrepreneurs a fair chance at restarting. Therefore, a triple partnership has been created in which students of the Rotterdam University of Applied Sciences and senior entrepreneurs support and advise entrepreneurs in marginal economic areas to improve their economic independence.

Promoting institution

Rotterdam City Council – Regional Office for Entrepreneurship, Rotterdam University of Applied Sciences, Retired Entrepreneur Volunteer Foundation

Challenge or problem addressed

Entrepreneurs operating below the poverty line.

Multidimensional perspective of the solution

This solution aims to fight poverty among a productive group of society (private companies) that is vulnerable (entrepreneurs and the self-employed). At the same time, it is a learning and growth opportunity for students at the University of Applied Sciences, as they do their university internships, put their acquired theoretical knowledge into practice and gain practical experience. It is also a way to encourage retired people to stay active and engage in socially useful activities.

Solution methodology

People who find themselves in financial difficulties bring it to the attention of the Chamber of Commerce, which redirects them to their municipality, which, in turn, puts them in contact with the Rotterdam Regional Office for Entrepreneurship. After an assessment of their personal situation, the entrepreneur receives support from students and senior advisers.

Beneficiary groups

A total of 1,400 entrepreneurs with financial difficulties have benefited from this solution in the Rotterdam metropolitan region.

METROPOLITAN SCOPE

Type of metropolitan solution	Type of action
Focused on metropolitan action	Service provision

Criterion: 1 Coordinating cooperation between local actors to solve shared challenges
3 Improving public service provision

The municipalities are responsible for social affairs in the Netherlands. However, they can also voluntarily collaborate with other municipalities. This cooperation to help entrepreneurs with financial problems is driven by the Regional Office for the Self-Employed, which saw an opportunity to improve the provision of this service and the benefits of working on it to achieve economies of scale and take advantage of the technical expertise and administrative work of the Rotterdam City Council unit. At present, all 28 municipalities within the Rotterdam metropolitan region are part of it. This makes it more sustainable for organisations.

GOVERNANCE AND PARTICIPATION

Multilevel dimension	Citizen participation
The 28 municipalities involved in the project pay for this service provided by the City of Rotterdam Regional Entrepreneurship Office. They find the support costs to be reasonable considering the potential cost of an entrepreneur going bankrupt.	Target groups, universities, municipalities and private companies are involved, termed *the triple helix*. The parties regularly meet workers with problems. There is very close collaboration between all parties.

INNOVATION AND BUDGET

Innovative elements of the solution and associated SDGs

Triple helix: a) it brings together different social forces that do not normally work as a team (universities, municipalities, private companies); b) it focuses on entrepreneurs and the self-employed; c) it transforms an existing social service into a learning and growth opportunity; d) it offers an innovative training opportunity for students.

Budget	Actors funding the project
EUR 300,000/year	Instituut Gak, Municipality of Rotterdam, 28 municipalities, Rotterdam University of Applied Sciences
More information	https://use.metropolis.org/case-studies/the-rotterdam-businesscase-de-rotterdamse-zaak

SAN FRANCISCO – BAY AREA REGIONAL COLLABORATIVE (BARC)

Geographical and population context

Region	America	**No. of municipalities**	101
Subregion	North America	**Population (municipal)**	815,201 inhab.
State	United States	**Population (metropolitan)**	7,753,000 inhab.
Central city	San Francisco		

Institutional context

Metropolitan governance model	Association of municipalities and agencies
Year established	1961

OBJECTIVES

It is a consortium of state and regional agencies working together to address issues facing the San Francisco Bay Area.

Start year	2004
Planned end year	-
Current status	Implementation

DESCRIPTION OF THE SOLUTION

The Bay Area Regional Collaborative of San Francisco was established by the California State Legislature to coordinate planning and transportation issues at the metropolitan scale. The consortium consists of the Metropolitan Transportation Commission (MTC), Association for Bay Area Governments (ABAG), Bay Area Air Quality Management District (BAAQMD) and San Francisco Bay Conservation and Development Commission (BCDC); and three other non-voting bodies on the Governing board: Caltrans (the state transport agency), San Francisco Bay Regional Water Quality Control Board (BRWQCB) and State Coastal Conservancy (SCC).

Promoting institution

State of California

Challenge or problem addressed

Lack of collaboration to align planning and transport policies (driven by ABAG and MTC, respectively) and, as a consequence, non-compliance with the state law (Senate Bill 375) which sets out that joint statewide land use and transport planning is required.

Multidimensional perspective of the solution

BARC provides regional coordination, i.e. it coordinates the agency's action on national and state legislation for issues within its competencies. Thus, BARC provides a coherent and coordinated regional voice to support outcomes that benefit the Bay Area in its policy approach and other important issues, focussing particularly on climate change and other issues central to the Bay Area that benefit from the four agencies advocating together. In addition, BARC coordinates bilaterally and multilaterally on cross-cutting regional issues that affect more than one agency.

Solution methodology

Given the lack of collaboration between ABAG and MTC in aligning planning and transport policies, in 2004 the Joint Policy Committee (JPC) was created through federal legislation. Subsequently, with the addition of two other agencies, the Bay Area Air Quality Management District (BAAQMD) and the San Francisco Bay Conservation and Development Commission (BCDC), the Consortium changed its name: BARC. Later, three other agencies were added as members of the Governing Board but without rights, as they are state-level agencies: Caltrans (the state transport agency), the San Francisco Bay Regional Water Quality Control Board (BRWQCB) and the State Coastal Conservancy (SCC). The Bay Area Regional Collaborative is made up of a executive board of board members and commissioners from member agencies, a group of executive directors and other inter-agency staff working teams.

Beneficiary groups

101 San Francisco Bay Area municipalities.

METROPOLITAN SCOPE	
Type of metropolitan solution	**Type of action**
Focused on metropolitan management	Planning
Criterion: 1 Coordinating cooperation between local actors to solve shared challenges	
To overcome institutional fragmentation and address challenges that transcend municipal boundaries, such as climate change, resilience and rising sea levels, BARC brings together seven agencies to address cross-cutting issues of regional importance, with the ultimate goal of improving the quality of life for all Bay Area residents. BARC is an instrument through which member agencies can learn, explore, collaborate, incubate, coordinate and communicate policy and good practices. The main theme of the work is climate change to ensure that the Bay Area becomes more resilient. In this regard, the agencies work together to develop coordinated policies, increase efficiency, leverage resources and provide better services to local governments struggling with climate change issues. This collaborative work builds on the different roles and responsibilities of the agencies involved and fosters links between state, federal and regional programmes.	
GOVERNANCE AND PARTICIPATION	
Multilevel dimension	**Citizen participation**
BARC has an executive committee composed of the executive directors of four metropolitan agencies (ABAG, MTC, BAAQMD and BCDC). These members are the operational decision-makers. Each agency has four representatives. In addition to these agencies, there are also three state agencies (from California), which are members of the consortium because of their associated competencies in the field of climate change and resilience. They do not have the right to vote.	The BARC consortium supports its member agencies in citizen participation processes.
INNOVATION AND BUDGET	
Innovative elements of the solution and associated SDGs	
The consortium provides an innovative form of partnership and collaboration between authorities with territorial competencies on the same issue: climate change and resilience.	
Budget	**Actors funding the project**
USD 1,200,000	Quotas from agency partners
More information	Home | Bay Area Regional Collaborative (ca.gov)

SAN SALVADOR – COAMSS/OPAMSS

Geographical and population context

Region	America	**No. of municipalities**	14
Subregion	Central America	**Population (municipal)**	-
State	El Salvador	**Population (metropolitan)**	1,810,000 inhab.
Central city	San Salvador		

Institutional context

Metropolitan governance model	Metropolitan authority
Year established	1987

OBJECTIVES

The San Salvador Metropolitan Area Planning Office (OPAMSS) was created by the San Salvador Metropolitan Area Council of Mayors (COAMSS) as a mainly technical, decentralised and autonomous body. It is responsible for promoting urban development and the planning, control and economic development of the metropolitan territory, with a strategic and unified vision of the metropolis.

Start year	1988
Planned end year	-
Current status	Implementation

DESCRIPTION OF THE SOLUTION

The mayors of the cities around San Salvador affected by the 1987 earthquake created the COAMSS to cooperate in and organise joint efforts for the reconstruction of the cities. In 1988, the OPAMSS was created as its technical branch. Between 1980 and 1990, the Office was configured as a project out of the San Salvador Mayor's Office. With the passing of the Law for the Development and Territorial Planning of the Metropolitan Area, the OPAMSS took charge of planning and managing the urban development of the San Salvador metropolitan area.

Promoting institution

San Salvador Metropolitan Area Council of Mayors (COAMSS)

Challenge or problem addressed

The complexity and specialisation of the activities carried out in the municipalities around San Salvador require associated and collaborative management for the metropolitan territory.

Multidimensional perspective of the solution

The OPAMSS promotes different innovative actions, processes and tools. On the planning side, it draws up and implements planning instruments with a metropolitan approach. In terms of service provision, is provides support for local economic and social development, enabling the construction sector to invest in the metropolitan area. Likewise, technical support is offered to local councils to guarantee they can fulfil their responsibilities in territorial planning and development. It also promotes strategic alliances and is responsible for internationalising the metropolitan agenda. International cooperation funds are also managed, with an emphasis on disseminating open data.

Solution methodology

The San Salvador metropolitan area local government representatives meet in the COAMSS plenary session every 15 days on an ordinary basis. Specific committees work to decide which operational actions are taken. Decisions are made by consensus and, in the event of a tie, the General Coordination has a casting vote. The COAMSS appoints the OPAMSS executive directors.

Beneficiary groups

Population of the San Salvador metropolitan area (1,810,000 inhabitants); representing 27% of the population of the whole country).

METROPOLITAN SCOPE

Type of metropolitan solution	Type of action
Focused on metropolitan management	Planning, regulation and service provision

Criterion: 1 Coordinating cooperation between local actors to solve shared challenges
3 Improving public service provision

The COAMSS and OPAMSS were created to tackle the complexity and specialisation of territorial planning and urban development control activities, which require associated and collaborative management of the San Salvador metropolitan territory, fostering intersectorality and interscalarity, given that socio-spatial dynamics cannot be addressed locally or from a specific sector. They promote inter-municipal cooperation, thereby generating economies of scale in economic efficiency and technical expertise. It would be much more costly in financial, technical and other terms for a municipality in San Salvador to open an urban control office. Technical support in spatial planning and development is also provided to municipalities.

GOVERNANCE AND PARTICIPATION

Multilevel dimension	Participation
OPAMSS works with the Ministry of Health, the National Water and Sewerage Administration (ANDA), the National Registration Centre (CNR) and the Ministry of Public Works, among others. In addition, a number of agreements have been signed to facilitate better operation and share responsibilities in line with each body's competencies.	COAMSS/OPAMSS public policies are promoted through participation with the community. Initially, the OPAMSS promotes local work with the COAMSS and its mayors. This approach helps reach technical teams in each municipality, subsequently facilitating a smoother, more legitimate arrival in the communities. Between 2016 and 2021, more than 12,000 people of all ages were involved in participatory designs, socio-cultural activities, etc.

INNOVATION AND BUDGET

Innovative elements of the solution and associated SDGs

COAMSS/OPAMSS is the first and only experience of an association of municipalities in the country, within a framework of metropolitan law, in charge of the planning and control of the municipal territory in the metropolitan area.

Budget	Actors funding the project
-	14 municipalities in the San Salvador metropolitan area, international cooperation (donations), the state (donations)

More information https://opamss.org.sv/

SEOUL – CITIZEN-LED URBAN REGENERATION POLICY

Context geogràfic i poblacional

Region	Asia	**No. of municipalities**	3
Subregion	Asia	**Population (municipal)**	9,659,322 inhab.
State	South Korea	**Population (metropolitan)**	26,043,325 inhab.
Central city	Seoul		

Institutional context

Metropolitan governance model	Seoul Metropolitan Government (special)
Year established	1962

OBJECTIVES

Promote urban regeneration focused on improving the physical fabric of the city and revitalising community programmes through public-private partnerships, ultimately contributing to the creation of positive community identities and sustainable urban growth.

Start year	2013
Planned end year	-
Current status	Implementation

DESCRIPTION OF THE SOLUTION

The city's Urban Regeneration Plan aims to restore local communities and achieve sustainable urban growth through public-private partnership and citizen participation. Traditionally, the Seoul Metropolitan Government urban policies were driven by a top-down approach, but a paradigm shift in 2013 means it now pursues a bottom-up approach that encourages participation, engagement and collaboration among city stakeholders and government.

Promoting institution

Seoul Metropolitan Government

Challenge or problem addressed

Economic growth and Seoul's urban vitality began to wane after the 2008 global financial crisis. The issues facing the metropolis included the destruction of cultural and heritage sites, the ghettoisation of urban centres, rising housing prices, a shortage of housing for low-income households, the dismantling of local communities and the gentrification of parts of the city.

Multidimensional perspective of the solution

Initially, the policy was intended to promote urban regeneration focused on improving the physical structure of the city and revitalising community programmes, i.e. firstly improving the physical environment through facilities and infrastructure and, secondly, restoring vitality to local communities. However, between 2019 and 2021 the city government realised community-focused urban preservation and regeneration projects had not brought about significant visible change and, as a result, shifted towards projects that primarily involved the rehabilitation of the physical environment.

Solution methodology

The years 2013 to 2015 marked the implementation phase of the urban regeneration activation policy, adopting bottom-up approach in formulating the urban regeneration plans, thereby including the voice of citizens. In 2013, the Special Law on Promotion and Support for Urban Regeneration was enacted and the central state took steps to strengthen support for municipalities by allocating funds for different projects. With the launch of the urban regeneration project, the Seoul Metropolitan Government established the Urban Regeneration Support Centre, consisting of a group of experts, Seoul City Hall officials and community activists. This centre serves as a link between the public sector and local residents. The centre currently has 23 offices throughout Seoul. The years 2016 to 2018 were a period of expansion for urban regeneration activation projects.

The Seoul Metropolitan Government monitors the progress of urban regeneration in the areas every two to three years through interviews, field inspections and surveys organised out of the Urban Regeneration Support Centre. An interactive website was launched to give citizens the opportunity to share their views on local issues and to open up the whole decision-making process to them so that the different parties involved can learn from each other. On completing each project, the Seoul Institute produces a report on the results.

Beneficiary groups
Population of Seoul

METROPOLITAN SCOPE	
Type of metropolitan solution	**Type of action**
Focused on metropolitan action	Planning

Criterion: 4 Promoting social and environmental justice throughout the metropolitan area
Seoul's urban regeneration policy aims to improve the city's physical environment to address its problems, such as the negative effects of excessive gentrification in certain areas of the city, the destruction of cultural and heritage sites and the ghettoisation of urban centres. With this policy, it is committed to recovering the city's social and civic communities, preserving relevant historical and cultural spaces in the city and generally promoting sustainable development and growth. So much so that this urban regeneration policy has been taken as an example by other local governments in Korea and even become an impetus for central government to promote the project as a national policy.

GOVERNANCE AND PARTICIPATION	
Multilevel dimension	**Citizen participation**
The Seoul Metropolitan Government receives state funding and coordinates actions with 23 offices of the Urban Regeneration Support Centre.	More than 2,600 citizens are actively involved in different urban regeneration projects in different areas of the metropolis. Some of them have been appointed honorary deputy mayors in different districts of the city.

INNOVATION AND BUDGET	
Innovative elements of the solution and associated SDGs	
New bottom-up urban regeneration policy implementation strategy, based on citizens' input.	
Budget	**Actors funding the project**
KRW 1.06 trillion	State of South Korea, Seoul Metropolitan Government. Additional funding has also been secured from 92 institutions, including universities and private companies.
More information	Citizen-led urban regeneration policy | Seoul | use: urban (metropolis.org)

TUNIS – A'SIMA TUNIS

Geographical and population context

Region	Africa	**No. of municipalities**	38
Subregion	North Africa	**Population (municipal)**	-
State	Tunisia	**Population (metropolitan)**	2,815,100 inhab.
Central city	Tunis		

Institutional context

Metropolitan governance model	-
Year established	-

OBJECTIVES

Implement the Sustainable Development Goals through multi-level governance in a specific area: waste management.

Start year	2020
Planned end year	2024
Current status	Implementation

DESCRIPTION OF THE SOLUTION

The A'SIMA Tunis project aims to strengthen multilevel governance in Tunis by coordinating metropolitan stakeholders around a common city strategy: 1) conducting a participatory diagnosis of the city and approving the Tunis Strategic Plan at the metropolitan scale; 2) addressing the challenge of metropolitan waste management; and 3) promoting regional partnerships and initiatives for sustainable urban development in the country.

Promoting institution

Tunis City Council, MedCities, Barcelona Metropolitan Area

Challenge or problem addressed

Lack of strategic thinking that goes beyond Tunis
Lack of experience and institutions or structures for coordination and shared reflection among the municipalities in Greater Tunis
Waste management

Multidimensional perspective of the solution

This project is twofold, both in terms of waste management and multi-level planning and governance: strategic reflection has been fostered on the city of Tunis and surrounding cities, in the definition of its metropolitan governance model and projects to improve waste management.

Solution methodology

Local governments in Tunisia are responsible for waste collection, but do not intervene in the rest of the chain, especially treatment and recovery (this being the responsibility of the National Waste Management Agency). There was growing interest in fostering nearby inter-municipal cooperation, given the problems of waste management (the environment, public health, etc.), lack of waste recovery infrastructure and the need to achieve economies of scale. Thus, work is underway to identify inter-municipal cooperation projects. Cooperation, trust and a culture of cooperation are being fostered on a very specific topic, where there was consensus on promoting improvements.

Beneficiary groups

Citizens of the Tunis metropolitan region

METROPOLITAN SCOPE

Type of metropolitan solution	Type of action
Focused on metropolitan action	Service provision

Criterion: 1 Coordinating cooperation between local actors to solve shared challenges
3 Improving public service provision

In order to address institutional fragmentation and the need to tackle waste management problems in a piecemeal way, different inter-municipal cooperation mechanisms and projects are being assessed through a participatory process. Of particular note among these governance mechanisms is the pilot project on waste management. The options are a waste management service agency or a public-private partnership. However, the current political context (following the dissolution of local councils in March 2023 by the Tunisian president) makes medium- and long-term strategic planning difficult.
There is also a dynamic towards regionalisation at the state level, the emphasis is on setting up agencies to take advantage of economies of scale from region-wide projects, beyond the technical and economic capacity of municipalities.

GOVERNANCE AND PARTICIPATION

Multilevel dimension	Citizen participation
The city of Tunis and six other municipalities are collaborating to set up a multi-purpose waste treatment centre, located in the southern part of Tunis.	Key actors in the territory have been involved in preparing the diagnosis, as well as drafting the action plan: representatives of ministries, national agencies, the government and associations, as well as socio-economic actors and universities.

INNOVATION AND BUDGET

Innovative elements of the solution and associated SDGs

The use of technical cooperation, in an area where there is a recognised need and incapacity of local actors as a basis for joint action, to create greater trust between them by establishing spaces for coordination and defining shared visions on the needs of the territory, and to act as a union in relations with other state actors involved the territory and in defining policies.

Budget	Actors funding the project
EUR 2,684,786	European Commission

More information A'SIMA TUNIS - MEDCITIES

Appendix 2. Repositories of reviewed good practices

Urban Best Practices (UN): is an online repository of inspiring practices in the implementation of the New Urban Agenda and the Sustainable Development Goals. It contains practices that have been approved and provided by various international award programmes.

C40 case studies: online repository of cases from C40, a global network of nearly 100 mayors from the world's leading cities who are united in action to tackle the climate crisis.

Guangzhou Award (international database on urban innovation): a searchable bank of global initiatives on urban innovation, with documented theories and practices, as well as news and research reports on urban innovation and building liveable communities and sustainable development.

International Association of Educating Cities: the Experience Bank contains information on more than 500 initiatives, illustrating practical examples of the principles of the Charter of Educating Cities, which can be read in the three official languages of the association: Spanish, French and English.

Mercociudades: network of 375 cities in 10 South American countries. Its objectives are: improving quality of life in the network cities; legitimising the institutional representation of Mercociudades; influencing national, regional and global agendas, developing joint policies between cities and stimulating exchange of experiences.

International Observatory for Participatory Democracy (IOPD): a leading space for finding information on participatory democracy and citizens' initiatives. For this reason, its website offers a repository of publications and experiences on these issues.

Good practices: the UCLG Committee on Culture developed this tool with more than 280 good practices on cities, culture and sustainable development.

Sustainable Urban Exchange (USE): an online platform for promoting sustainable urban development. It showcases successful programmes, projects and policies.

Cities for Global Health: an online repository of government and community-driven experiences in response to the consequences of COVID-19.

Inclusive Cities Observatory (UCLG): repository with a collection of local government policies on human rights, the right to the city, housing and other key issues for local agendas of social inclusion and participatory democracy. It includes more than 60 case studies from the Inclusive Cities Observatory initiative.

International Urban and Regional Cooperation – A Program of the European Union (iurc.eu): global reference network for urban and regional innovation, which includes cases and other relevant information in three major thematic networks (ecological transition and green deal; urban and regional renewal and social cohesion; and innovative, sustainable and carbon-neutral ecosystems and strategic sectors), funded by the European Union.

Knowledge Hub: compilation of local government policies on human rights, the right to the city, housing and other key issues for local agendas of social inclusion and participatory democracy. The search engine includes more than 60 case studies from the Inclusive Cities Observatory initiative (a joint work by UCLG-CSIPDHR, University College London and the University of Coimbra Centre for Social Studies).

Driving change together: a compilation, as part of the European Union International Urban Cooperation Programme, which aims to lead and develop a form of decentralised international urban and regional cooperation in the field of sustainable urban development and innovation in key partner countries and regions, with the added value of international cooperation, in three thematic networks: ecological transition and the green pact; urban-regional renewal and social cohesion; innovative, sustainable and carbon neutral ecosystems and strategic sectors.

Milan Urban Food Policy Pact: the Milan Pact Awards (MPA), part of the Milan Pact for Sustainable Food, have been held since 2016 with the aim of recognising the most creative efforts in cities related to sustainable food. The repository includes more than 600 good practices from 80 countries around the world.

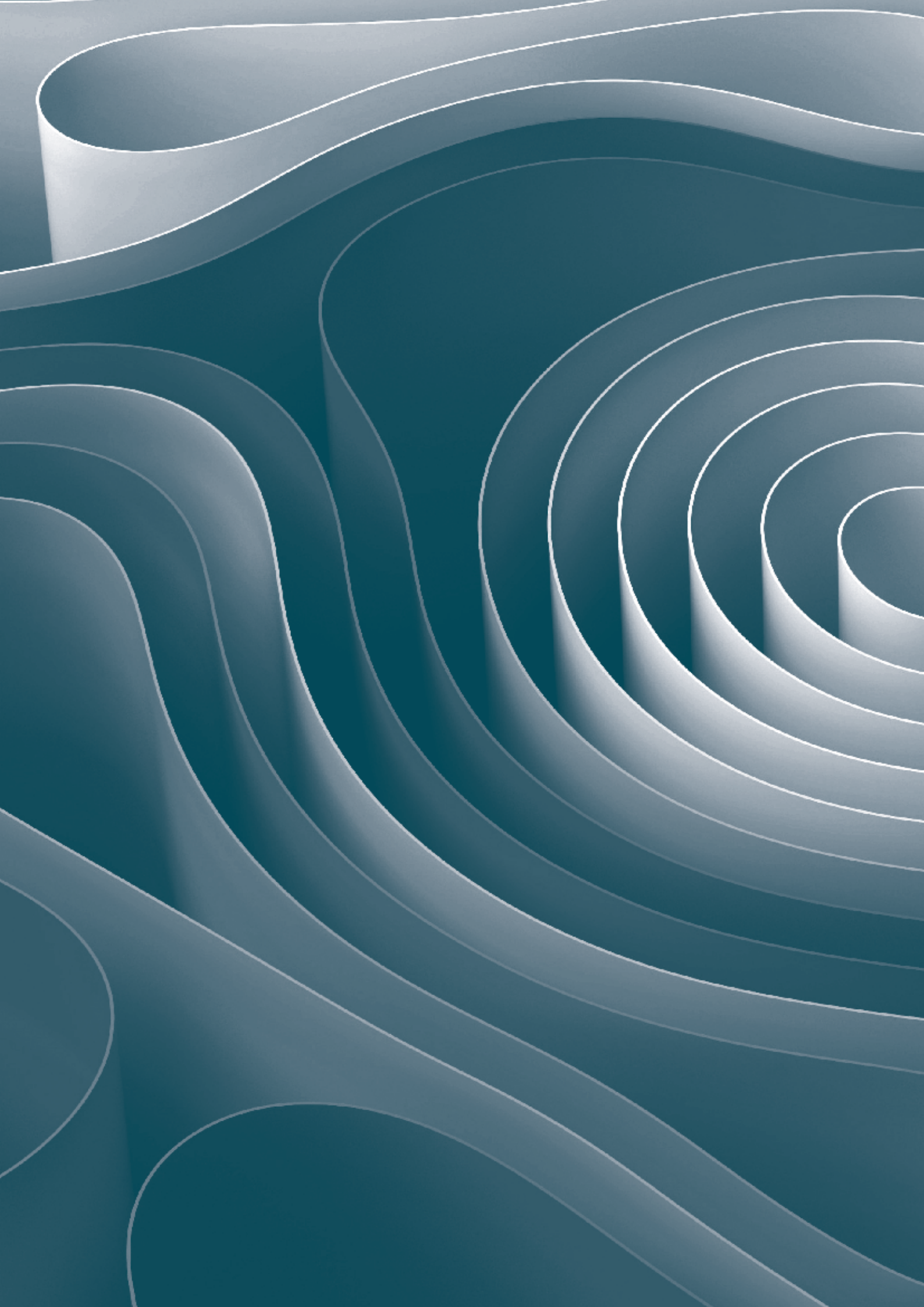
Eurocities: this repository presents projects funded mainly by the European Union, which generate innovative ideas and foster the exchange of knowledge between European cities to develop a common and better future.

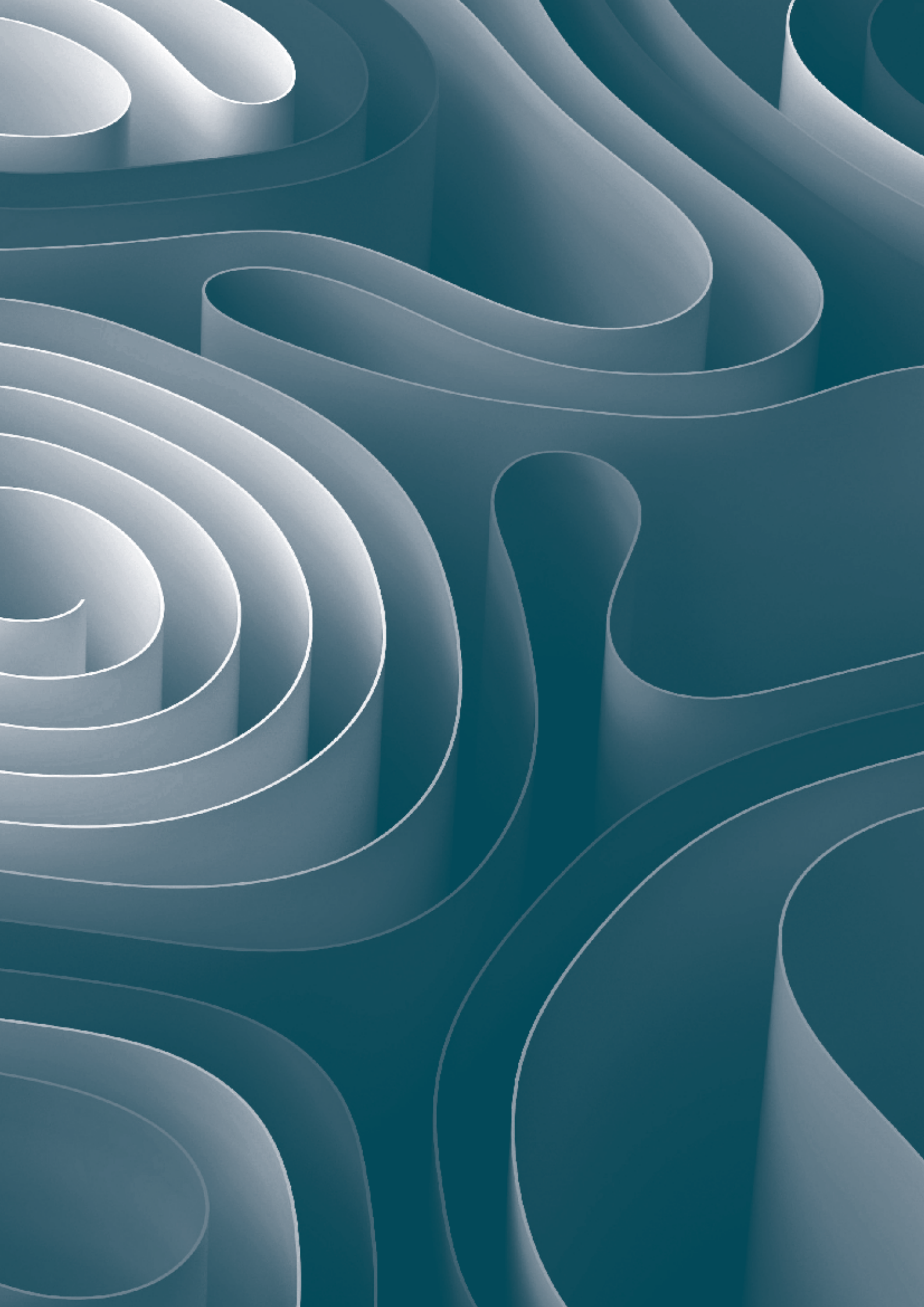
URBACT Good Practices: this includes projects from European cities that have promoted positive change in three areas: fair cities, green cities and productive cities. The cases presented are policies and projects that have been successfully implemented and could be replicated in other cities. Most good practices are low cost and high impact.

Appendix 3. Summary of cases

	Region	Country	City	Case name	Topic	Person interviewed	Post
1	Africa	Namibia	Gobabis	Community-driven housing and informal settlement upgrading	Informal settlements and poverty alleviation	Anna Muller	Namibia Housing Action Group national coordinator
2	Africa	Mozambique	Maputo	Mobility and gender: a dialogue of cooperation	Transport and mobility	Maria Peix	Head of the AMB International Cooperation Service
3	Africa	Tunisia	Tunis	A'SIMA Tunis	Metropolitan governance	Konstantia Nikopoulou	Project manager - MedCities
4	America	El Salvador	San Salvador	COAMSS/ OPAMSS	Metropolitan governance	Ana Yanci Ortiz	COAMSS head of Metropolitan Strategic Management and Executive Assistance
5	America	United States	San Francisco	Bay Area Regional Collaborative (BARC)	Metropolitan governance	Allison Brooks	Executive director, Bay Area Regional Collaborative (BARC)
6	America	Mexico	Guadalajara	Nidos de Lluvia	Climate change	María Macías	IMEPLAN director of strategic management
						Jacobo Reinoso	IMEPLAN technical secretary
7	Asia	South Korea	Seoul	Citizen-led urban regeneration policy	Urban and territorial planning	Sang Hyeok Jeong [A]	Director of the Seoul Institute
8	Asia	India	Bhubaneswar	Jaga Mission	Informal settlements and poverty alleviation	Mathi Vathanan	Principal secretary, Government of Odisha Housing and Urban Development Department
9	Asia	China	Guangzhou	Guangzhou Ecological Belt Master Plan	Urban and territorial planning	Shen Ziqian	Senior engineer, Guangzhou Urban Design and Planning Survey Research Institute
						Ye Zhilin	Senior engineer, Guangzhou Water Authority
10	Europe	Spain	Barcelona	Bicivia	Transport and mobility	Ruth Lamas	Head of the Metropolitan Cycle Office (AMB)
11	Europe	The Netherlands	Rotterdam	The Rotterdam Business Case	Economic development and employment	Rob Gringhuis	Project manager, Municipality of Rotterdam

A. This interview was conducted in writing.



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