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Adaptive governance of urban green spaces across Latin America – Insights amid COVID-19

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ABSTRACT

Urban green spaces' well documented role as a hub for physical and mental health was enhanced by restrictions to mobility issued worldwide as a response to COVID-19. In this context, managers of urban green spaces (UGS) were prompted to provide controlled access under *impromptu* safety protocols. This unprecedented challenge required planning and operational strengths reflecting flexibility, innovation and learning. These management features are essential for an adaptive governance – an underdeveloped research topic within the study of UGS. Using eighteen semi-structured interviews from six countries, we analyze adaptive governance as reflected by UGS managers' responses across Latin America – a region where access to UGS is a matter of public health and of environmental justice. We document responses that can be categorized based on the governance arrangement in place. On one hand, both polycentric and dedicated-management governance have been able to learn through piloting ideas, adapting personnel roles and the function of UGS infrastructure, and adjusting their decision-making process. On the other hand, managers within municipal public services areas – the most prevalent governance arrangement across Latin America – report difficulty to adapt – likely due to their dependence on political will, limited autonomy, insufficient budgets, absence of formal paths to self-funding, shortage of technical know-how, and insufficient citizens' involvement. We discuss implications of UGS adaptive governance in terms of capacity to deal with future public health, climate-related or other types of shocks.

1. Introduction

Restrictions to mobility were issued worldwide in an effort to prevent the spread of COVID-19. These restrictions faced managers of urban green spaces (UGS) to unprecedented challenges such as (i) interpreting ever evolving, ambiguous national- and sub-national guidelines; (ii) designing protocols to regulate access to UGS; and (iii) implementing, communicating, and enforcing such protocols. To add further complication, with over 90 % of COVID-19 cases occurring in urban contexts (United Nations, 2020), demand for access to UGS increased amid COVID-19 as residents became more aware than ever of the role played by UGS in supporting people's health and social cohesion – worldwide, visits to all types of green spaces increased amid COVID-19 (Geng et al., 2021).

The degree of success with which managers of UGS have incorporated restrictions to mobility in management protocols has varied. In developed countries, managers have designed and implemented protocols balancing mobility restrictions and access to UGS through

measures such as dedicated park times for different age groups, entry allocations systems, and use of apps to monitor total number of visitors (Shoari et al., 2020). In contrast, managers of UGS in the Global South have been less successful in providing regulated access to UGS due to institutional and resource limitations (Shackleton et al., 2021; Venter et al., 2020b).

The ability of adapting to evolving, uncertain conditions reflects the presence of an adaptive governance – decision makers that flexibly apply rules, experiment and learn through complex processes, and innovate during challenging times are said to perform as part of a system with an adaptive governance (Folke et al., 2005; Dietz et al., 2003). This adaptive governance, we purport, has enabled managers of UGS to face the challenge of balancing restrictions to mobility and access to UGS.

Thus, with an environmental adaptive governance theoretical framework in mind and a focus in Latin America, this study empirically explores (i) to what extent UGS managers have been able to successfully tackle the unprecedented challenges that COVID-19 brought in the form of restrictions to mobility in UGS; (ii) the role played by governance

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arrangements in prompting (or deterring) adaptive actions of managers of UGS; and (iii) specific adaptive actions resulting from different governance arrangements.

Using content analysis of semi-structured interviews to eighteen stakeholders –including UGS managers and staff – of six Latin American countries – Argentina, Colombia, Ecuador, Guatemala, Peru, and Mexico–, we reconstruct meaningful chain of operational and strategic decision-making associated to designing, communicating, enforcing, and adapting COVID-19 mobility protocols.

This study covers a number of aspects that have been overlooked in academic literatures. First, previous research on provision of UGS has barely paid attention to the perspective of managers. In addition, Latin America is a region largely understudied in terms of governance of UGS – which represents a gap in the literature because Latin America is a region where access to UGS is a matter of public health and an environmental justice issue. Third, this manuscript is part of a growing literature documenting the role of UGS amid COVID-19 – a literature that has focused mostly on the demand side of the equation, overlooking the perspective of managers when it comes to studying provision of UGS.

By documenting to what extent managers of UGS across Latin America have been able to adapt to COVID-19 conditions, we have gained insights into current environmental governance arrangements in UGS across Latin America – insights that, to the best of our knowledge, have not been documented in previous studies.

Section 2 of this manuscript describes literatures to which this study contributes. Section 3 presents our research design and data collection strategy. Section 4 reports a typology of governance of UGS that arises from insights obtained in this project. Section 5 reports main empirical findings. Section 6 discusses theoretical and public policy implications from such findings. Section 7 concludes.

2. Related literature

This section reports on how this study intersects two academic literatures. The first literature encompasses a growing number of studies documenting the role played by urban green spaces (UGS) to support people's health and social cohesion amid COVID-19. This scholarly work has missed a managers' perspective (Boulton et al., 2021; Ordóñez et al., 2019). The second literature of interest in this section encompasses studies on governance of UGS in general, and adaptive governance in particular. As the focus of this study is on managers' perspective, this section puts an emphasis on governance literature documenting provision of UGS and highlight that provision has largely been overlooked by such literature (Boulton et al., 2018), (Boulton et al., 2021; Dobbs et al., 2019). Both literatures of interest in this section have largely overlooked Latin America – with exceptions such as Cortinez-O'Ryan et al. (2020); Boulton et al. (2018); Rigolon et al. (2018); Barona et al. (2020).

2.1. Urban green spaces amid COVID-19

Supported by longstanding literatures documenting the many services provided by UGS,¹ recent studies have put forward UGS as a source of resilience amid COVID-19 (e.g., Samuelsson et al., 2020). For instance, UGS have been documented to contribute to people's health during COVID-19 even if residents are not able to access them – in Tokyo, Japan, residents with a view to UGS have reported lower levels of depression, anxiety and loneliness (Soga et al., 2021); in Italy, residents with a view to UGS have reported lower levels of anger and irritability (Spano et al., 2021). On the other hand, lack of access to UGS amid COVID-19 has been associated with negative effects on physical and mental health of residents of all age cohorts, with consequences on cognitive abilities, stress and depression, school achievement,

exercising, and overweight (Husky et al., 2020; López-Bueno et al., 2020; Lopez et al., 2020; Wang et al., 2020; Xie et al., 2020b,a). In addition, domestic violence has increased amid COVID-19, and this increase is likely a reflection of people's diminished physical and mental health (Froimson et al., 2020; Piquero et al., 2020; Silverio-Murillo et al., 2020).

A number of studies documenting the role of UGS in Asian cities, which have followed different sampling strategies and empirical methodologies, have reported an increase in visitation of UGS and a corresponding positive effect on physical and mental health (Uchiyama and Kohsaka, 2020; Xie et al., 2020a; Zhu and Xu, 2021).

Similar findings are reported for European cities. Since the beginning of the pandemic, recreational activity in UGS has increased threefold in Oslo, Norway (Venter et al., 2020a). Analyzing data from Croatia, Israel, Italy, Lithuania, Slovenia, and Spain, Ugolini et al. (2020) highlight behavioral adaptations, including visits to UGS that respondents would usually have not visited – e.g., walking to small urban gardens (in Italy) or tree-lined streets (in Spain and Israel).

One finding that has consistently been documented across case studies is an increase in visits from urban residents to green areas that are not urban (or peri-urban) but are near to urban settlements – these areas have presented themselves as safer options to access green spaces during the COVID-19 pandemic (Ugolini et al., 2020; McGinlay et al., 2020; Ma et al., 2021).

Access to UGS across Latin America is unevenly distributed by income groups (Dobbs et al., 2019). Consequently, researchers were prompted to warn at the very beginning of the pandemic about a potential increase in health inequalities across Latin America due to restrictions to mobility and access to UGS amid COVID-19 (Cortinez-O'Ryan et al., 2020). Mobility restrictions, coupled with pre-existing inequality in access to UGS, are expected to have higher impacts on poorer residents, as affluent neighborhoods have more resources to cope with mobility restrictions – more space at home and better access to open green space. In line with such warnings, inequality in access to UGS amid COVID-19 has been documented in Mexico (Mayen Huerta, 2022; Mayen Huerta and Utomo, 2021b). To add a further layer of complication, criminality is a common feature of UGS in the Latin American context (vonDöhren and Haase, 2015; Shackleton et al., 2016; Groff and McCord, 2012; Troy and Grove, 2008; Han et al., 2018; Hilborn, 2009). This feature was also put forward earlier in the pandemic as a factor that expectedly would deter use of UGS in poorer neighborhoods, increasing even further inequality (Cortinez-O'Ryan et al., 2020). This prediction has been confirmed in Mexico amid the pandemic – with women being particularly vulnerable to the negative effect from criminality in UGS (Mayen Huerta and Cafagna, 2021a).

Departing from the newly found recognition among general public that UGS are key in supporting people's physical and mental health, (Hanzl, 2020) and (Kleinschroth and Kowarik, 2020) have pointed out that cities must develop policies that guarantee provision of more and better green spaces. In developing this policies, managers' perspective is essential. However, to the best of our knowledge, no previous study has documented how managers of UGS have adapted to accommodate restrictions to mobility in their management protocols, and whether their specific governance arrangements have enabled them to adapt or not.

2.2. Governance of urban green spaces

Governance has been defined as an effort to steer societies towards collectively beneficial outcomes (Young, 2009). Environmental governance refers to a set of processes, mechanisms and organizations that determine environmental outcomes (Lemos and Agrawal, 2006).

The literature on governance of UGS is sparse. The focus of this literature has been on the role of non-state/non-governmental actors when it comes to designing, managing and using green spaces under strategies of participatory planning, communities participation, inter-agency institutional approaches and other forms of strong stakeholder

¹ See Hartig et al. (2014)) and Reyes-Riveros et al. (2021) for reviews on effects from UGS on people's welfare, public health, and social cohesion.

involvement (Boulton et al., 2018; Pincetl and Gearin, 2005; Colding et al., 2013; Zingraff-Hamed et al., 2020; Lovell and Taylor, 2013; Ambrose-Oji et al., 2017; Lawrence et al., 2013; Huang et al., 2021). For instance, Ambrose-Oji et al. (2017) discuss how the centrality of local authorities in planning and managing UGS has shifted in Europe, which has produced instances of co-management, co-governance, or co-production.

As our study focuses on managers' perspective, it contributes to documenting provision of UGS – which in itself is a contribution because has managers' perspective has been largely overlooked by the literature on governance of UGS (Boulton et al., 2018), (Boulton et al., 2021; Dobbs et al., 2019; Biernacka and Kronenberg, 2018). In Latin America, government institutions play the central role when it comes to provision of UGS – with few exceptions (see Devisscher et al., 2022), government agencies in the region are in charge of management, planning, funding and building infrastructure of UGS. This feature partly explains the few studies documenting governance of UGS in Latin America (see Boulton et al., 2018; Ojeda-Revah et al., 2020; Ojeda-Revah et al., 2017; Sainz-Santamaria, 2022).

This paper's most novel contribution arises from using an adaptive governance approach to analyze managers' decision amid COVID-19 and, in this way, document governance of UGS across Latin America. The adaptive governance approach has arisen as a natural candidate to study how managers have faced evolving and uncertain challenges brought by COVID-19. This framework has been implemented on UGS only recently by a couple of studies (see Green et al., 2016; Hsu et al., 2020), and none has focused on Latin America.

Adaptive governance addresses decision makers' capacity to respond to emerging situations with flexibility, creativeness and implementing learning processes (Folke et al., 2005).² In particular, this paper aims to determine whether actions reported by managers interviewed as part of this project can be classified as adaptive, and whether different degrees of adaptive capacity is associated with specific governance arrangements.

Thus, we first have identified factors that, according to the literature on adaptive governance, determine a manager's operational capacity. Fig. 1 classifies these factors in two types. The *institutional settings and management characteristics* refer to UGS governance arrangements, managers' characteristics, and UGS policy and planning tools. The *fixed factors* include green infrastructure and societal attitudes towards rule of law. These factors are fixed in the sense that a change in green infrastructure and in societal attitudes towards rule of law may occur, if any, slowly and a noticeable change would only be observed after a number of decades.

In the context of COVID-19, from among all factors listed in Fig. 1 only policy and planning tools can be modified in the short term. The selection of UGS under analysis in this study allows for variation in UGS governance arrangements and characteristics of managers of UGS spaces, while green infrastructure and societal attitudes towards rule of law remain fixed. In this respect, COVID-19 works as a quasi-experiment that allows us to draw a categorization of governance arrangements of UGS across Latin America.

2.2.1. Institutional setting and managers characteristics

To our knowledge, there is no previous systematic account of factors determining whether operational and managerial decisions of UGS managers are adaptive or not. Yet comprehensive reviews by Boulton et al. (2018) on UGS provision and Ordóñez (2021) on municipal

² While generic capacity to adapt has been labeled using other concepts such as 'efficacious policy' – a term used by Boulton et al. (2021) to reflect a capacity to provide green space in an agile and flexible manner – we apply the adaptive governance framework because it is explicit about the importance of decision makers' capacity and awareness to purposely learn, innovate and change in response to shocks.

manager's decision making document key factors for governance of UGS, including stakeholders, policy tools, resources, organizational procedures and leadership. Case studies documenting the determinants of green space provision at the city level from managers' perspective, such as Boulton et al. (2021) in Logan, Australia, have documented that provision of UGS is shaped by the interplay of factors at different scales of government: political leadership and organizational culture at the municipal staff scale; and governance tools at the state level and legislation at the national level.

In terms of a multi-level governance framework, Kabisch and Haase (2014) highlight five categories within which factors can fall when it comes to effective governance: operational, tactical (agenda development), networking, strategic, and reflexive (deliberation that allows adjustment of strategies and agendas).

Focusing on operational and management decision making regarding safe access during COVID-19, it is relevant to identify actors with agency that are impacting a given factor. In Fig. 1, the first row highlights policy and planning tools, which are determined by public officials, interest groups, and organizations and all relevant actors that are involved in a policy issue – e.g., restrictions to mobility in UGS – and whose interactions constitute a policy subsystem (Howlett et al., 2009). The first row in Fig. 1 also highlights management characteristics such as leadership, level of training, and access to networks; and UGS governance arrangements – determined at a national scale by the legal/political system of each country.

2.2.2. Fixed factors

Factors determining decision making at the UGS level include (i) green built environment infrastructure available – which usually cannot be changed in the short term –, and (ii) overall levels of compliance related to the social norms and attitudes towards rule of law, which are also invariant in the short term. These two factors are of particular relevance during COVID-19 because, depending on their features, they become hindlers or enhancers of governance of UGS.

We refer to availability, design and equipment of UGS as green built environment – which at the city level is defined by urban planners and politicians projects. In regard to green built environment, a level of green space modulates the capacity of supplying access without compromising the control of contagion during COVID-19. Case in point, Schneider et al. (2021) find that trail width, density and signaling have determined compliance with rules in the United States. Before COVID-19, Biernacka and Kronenberg (2018) highlighted the design and equipment of green spaces as determinants of UGS access and attractiveness. Baycan-Levent and Nijkamp (2009) reports an association between success in management of UGS and share of green space in urban land. Also in pre-COVID times, Akpinar (2016) reported positive health associates with presence of large and visible UGS.

As to concerns with compliance within UGS, we refer to a broader perspective on the determinants of behavior as defined by institutional approaches. We refer to social norms – i.e., those conventions or shared understandings that influence what is considered as permitted or forbidden in a society (Ostrom, 2000). These norms is what Williamson (2000) calls institutions of embeddedness, which would change only in the very long term.

Tyler (2021) refers to them as normative commitments, which determine to what extent people have a tendency to abide by the law due to their beliefs about rules being just, or their belief in the legitimacy of law. Licht (2008) points out that rule of law is a social norm connecting formal and informal rules, and that can be understood as a group process. Licht et al. (2007) report on empirical evidence suggesting different levels of agreement with rule of law at country level. Regarding societal behavior, compliance with rules is a general principle for adaptive governance Dietz et al. (2003). In general, evidence has been reported on a weak rule of law across Latin American countries (O'Donnell, 2004).

Factors driving operational activities are on the right of Fig. 1. At the

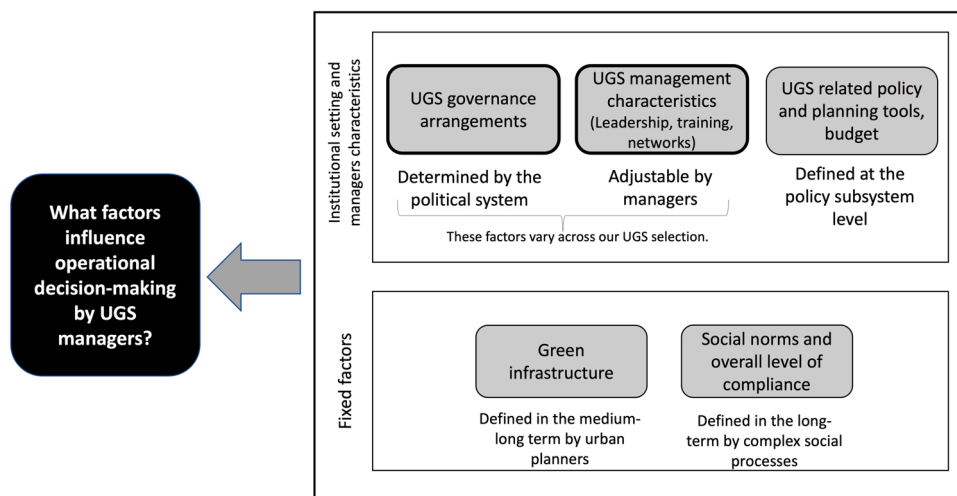


Fig. 1. Factors that influence operational decision-making by managers.

country level and across countries, fixed factors and the UGS related policy and planning tools are relatively similar (for instance, the inequality in access to UGS is present in all countries, as well as the low level of prevalence of rule of law). What varies distinctly in our sample are the governance arrangements and UGS management characteristics. In the former case, we identified all the fragments referring to the organizational nature of the entity in charge of UGS, which we have used to elaborate the typology on governance types in Table 2. For the latter case, we identified whether there were instances of management training and networking of UGS managers (all informants were asked about their training and networks).

3. Materials and methods

In this section we describe our data-collection process and how we have prepared data for analysis.

3.1. Semi-structured interviews

We have gained insights into the governance of UGS across Latin American cities amid COVID-19 by implementing eighteen semi-structured interviews to managers and personnel in charge of UGS. Table 1 enlists the role of respondents, agency, UGS they are in charge, their location, and date of interview. Interviews lasted on average 50 min and were carried out between September 10th and October 30th, 2020. Interviewees were informed about the project’s purpose and accepted to be recorded for transcript purposes only. They agreed on record to be mentioned as interviewees in documents and reports if necessary for the purposes of this study.

We have followed international standards and practices in designing and implementing our survey, and in processing gathered data. An informed consent was requested prior survey implementation to record the conversation and to report publicly their posts, a valid practice in the case of elite interviews (Ellersgaard et al., 2021), when (i) specificity is relevant for the purposes of the research; (ii) the information reported is not sensitive; and (iii) informants are not *vulnerable elites*.

Our eighteen interviewees are located in thirteen cities of six Latin American countries – Argentina, Colombia, Ecuador, Guatemala, Peru, and Mexico. The location and spread of cities covered in this study are illustrated in Fig. 2. Following Tansey (2007), we have used a non-probability sampling. We have looked for a diverse selection of countries so that we obtain an overall picture. In particular, we have aimed to document experiences including country capitals (e.g., Bogota, Mexico City, Quito) and non-capital cities of varying sizes.

To recruit interviewees, we resorted to professional networks of this

manuscript’s authors. The corresponding author personally requested interviews to public officials of Central Mexico, communicated through email to a non-for-profit organization that manages periurban natural parks in Guatemala, and recruited interviewees through the National Parks Association of Mexico (ANPR) – which has a wide network with park managers throughout Mexico and other Latin American countries.

Most of our interviews were carried out via Zoom, one-on-one, with two exceptions: the interview with managers from Aguascalientes, Mexico, was carried out in situ at one of the interviewees suggestion; the members of Bogota’s Instituto Distrital de Recreación y Deporte (IDRD) preferred to send written responses to our questionnaire. Also, we implemented a focus group via-zoom with park managers from Quito, Ecuador and managers of urban parks in Monterrey and Mexico City, Mexico to motivate a discussion on better management practices during COVID-19 among those we have identified as likely to present adaptive governance features, allowing us to develop a list of possible manager’s responses.

To make the cases comparable in terms of the period of time they refer to, we have asked informants to report on their initial response to the beginning of restrictions due to COVID-19, which happened in all cases from the second half of March to June 2020. Interviews after June did collected information on what the managers did up to the day of the interview, which are described when relevant, but we avoid generalizations when periods are not comparable.

3.2. Data on restrictions to mobility and tracked mobility

To identify the degree of restriction to mobility issued in each country, we have resorted to the Oxford Stringency Index, which summarizes nine types of measures – school closing, workplace closing, cancellation of public events, restrictions on gatherings, closing of public transportation premises and services, stay-at-home requirement, restrictions to within-country mobility, international travel controls, and public information campaigns. For further details, see Thomas et al. (2020); and (Zhu et al., 2020), for the Latin American case.

To estimate overall visitation to parks during our period of study, we have used Google Mobility Reports (Google LLC, 2020), which estimates the percentage change of visitation to parks as compared to a baseline, determine as the median visitation for the corresponding day of the period from January 6 to February 6, 2020. Under the category Parks, Google estimates visitation to local parks, national parks, public beaches, marinas, dog parks, plazas, and public gardens (Google LLC, 2020). Data collection is based on the location data from user’s mobile devices. These data may be less representative of behavior in low-income neighborhoods due to the comparatively lower percentage

Table 1
Interviews.

Country	Respondent	Agency	Urban green space	Location
Argentina	Consultant of public spaces for the municipality	Municipality of Salta	Parks of the municipality of Salta	Salta, Argentina
Colombia	Park manager	Instituto Distrital de Recreación y Deporte (IDRD)	5256 parks (including pocket, neighborhood, and zonal parks, plus 18 metropolitan and one regional park).	Bogota, Colombia
Ecuador	Entrepreneur	State owned hydroelectric	Ecological corridors at hydroelectric Project at historical downtown of Quito	Quito, Ecuador
Guatemala	Chief of Department	Public Services	415 parks in Guatemala (they attend a fraction of them)	Guatemala, Guatemala
Guatemala	Director	Fundación Calmecac (not-for-profit NGO)	Parque Ciudad Nueva en Guatemala	Guatemala, Guatemala
Guatemala	Chief of Department of Social Activities Chief of Department	Public Services of the municipality of Villa Nueva (Department of Guatemala)	109 parks	Villanueva, Guatemala
Mexico	Director of Park	Asociación de Colonos de Santa Fe	La Mexicana	Santa Fe, Mexico City, Mexico
Mexico	Head of Ecological Restoration Department Head of Social activities Department	Agencia Metropolitana de Bosques de Guadalajara	Eleven Metropolitan Parks	Metropolitan Area of Guadalajara, Jalisco, Mexico
Mexico	General Director of a metropolitan agency	Instituto Metropolitano de Planeación (IMEPLAN)	N/A	Metropolitan Area of Guadalajara, Jalisco, Mexico
Mexico	Director of Park	Parque Tamayo	Parque Tamayo	Municipality of San Pedro Garza, Nuevo Leon, Mexico
Mexico	Director of Centro de Educación Ambiental Landeros Director of Culture and Environmental Education of the Center	Ministry of Water and Natural Resources	Centro de Educación Ambiental Rodolfo Landeros	Aguascalientes, Aguascalientes, Mexico
Mexico	Secretary of General Services of Zacatecas, Zacatecas.	Secretary of Public Services of Zacatecas, Zacatecas.	50 parks and public spaces (30 urban parks)	Zacatecas, Zacatecas, Mexico
Mexico	Secretary of Public Services of Jesús María, Aguascalientes.	Secretary of Public Services of Jesús María, Aguascalientes.	56 parks and public spaces	Jesús María, Aguascalientes, Mexico
Mexico	Chief of Department	Director of Natural Resources, Leon, Guanajuato.	82 parks	León, Guanajuato, Mexico
Mexico	Director	Jardines de México	Recreational park Jardines de México	Cuernavaca, Morelos, Mexico
Peru	Architect in a real state development company	Developer of private parks within gated housing	Private parks at gated communities in Piura, Peru	Piura, Peru

of people with mobile devices and the quality of the telephone carrier antennas.

3.3. Coding procedures

To analyze our interviews, we implemented content analysis, guided by initial steps of process tracing approach. All interviews were transcribed and labeled using a categorization system based on variable of interest – whether managers implemented adaptive actions or no – and factors that explain such variable and that vary within our sample.

Our coding procedure focuses on identifying an actor and an action, following general process tracing principles (Beach and Pedersen, 2019; Bennett and Checkel, 2015; Kay and Baker, 2015). We have used the interviews to build a meaningful chain of events, formed by pairs of entities (individuals, groups or organizations) and activities that linked together built a given result. This approach has been used in social science and policy evaluation to address causal questions systematically. In particular, when there is an interest in the mechanism or condition that explains the phenomena of interest. The method allows us to identify the role of specific actors, to operationalize adaptive actions, and to think rigorously what factors have led to observed results.³

As illustrated in Fig. 1, our key variable of interest is the extent to which the specific operational activities put into place by managers to

³ We use the process tracing to systematically build a chain from governance structures to specific actions that ensued from manager decisions when facing COVID-19, which is the first block of the method. However, we did not follow through the whole process tracing methodology, as ours is an exploratory cross-case study that did not generate specific hypothesis to be tested. This could lead to further research seeking for causal explanations.

design, implement and monitor COVID-19 protocols were adaptive or not. The first procedure was to identify such activities for every case and label them as adaptive or not adaptive. The criteria are straightforward: activities denoting flexible, innovative, experimental or that denoted learning, were denoted as *adaptive*; those activities that were rigid or presented lack of choices, were classified as *non-adaptive*. Additionally, the activity was assigned to a topic, as shown in Fig. 3. For instance, the incapacity to adjust entry points during the pandemic to facilitate access is labeled as *non-adaptive* within the topic ‘Regulation of access’, while piloting a new schedule to analyze crowding and determine whether the protocol worked, was labeled as *adaptive* within the same topic.

4. Governance of UGS in Latin American cities

This section describes the UGS governance typology we constructed based on our semi-structured interviews to managers of UGS in cities across Latin America. We use the labels *municipality management* (with public services and inter-agency subtypes), *dedicated agency management* (with public, private, and non-for-profit subtypes), and *polycentric management* (see table 2). These management types cover a wide range of the governance arrangements in Latin America, according to our findings.

For the case of natural parks, Eagles (2008) states that the key features of governance emerge from the combination of three characteristics: who owns the land, source of income, and identity of the management body. In the case of UGS, land is of public ownership in most cases, and as a general rule with exceptions their funding is also public – i.e., assigned by administrators of a government agency either at the municipal-, state-, or nation-wise level. Therefore, we single out the management bodies in charge of the UGS as the key variable for categorization. In general, the characteristics of a UGS are strongly

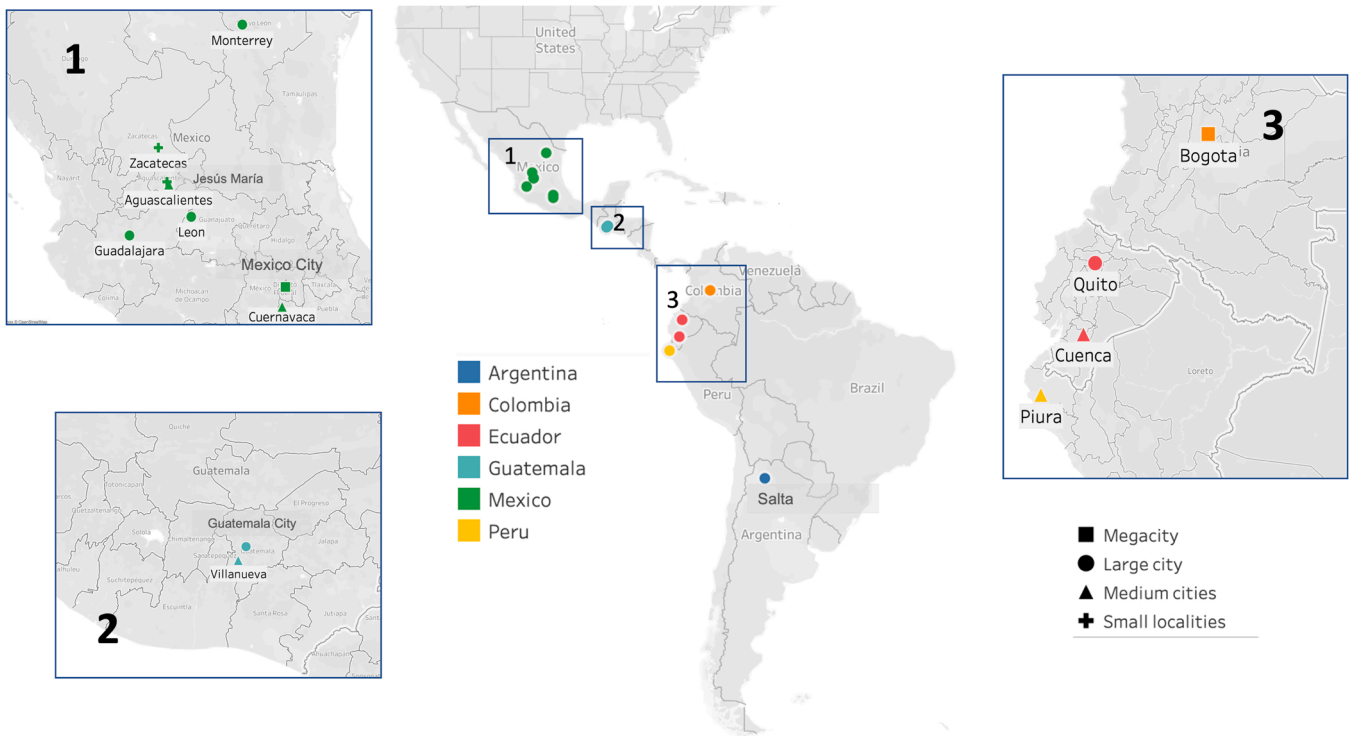


Fig. 2. Location and spread of cities covered in this study. We use an OECD classification (OECD, 2012), and complement it by adding a ‘megacity’ category. Accordingly, small urban areas host less than 200,000 people; medium-sized cities host between 200,000 and 500,000 people; metropolitan areas, between 500,000 and 1.5 million; large metropolitan areas host between 1.5 million and 5 million people; and megacities host more than 5 million people. In all cases, we have used estimations of population in the corresponding metropolitan areas – as population within administrative boundaries does not reflect entirely the size of a city.

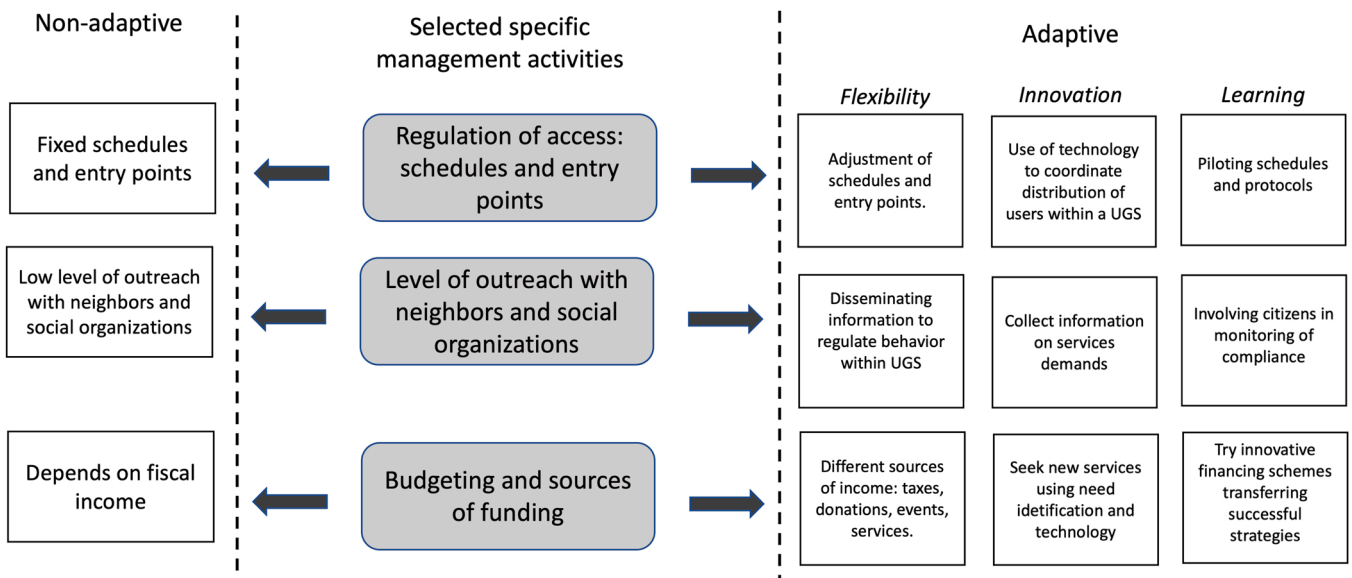


Fig. 3. Examples of adaptive/non-adaptive management actions.

determined by who is the management body and to the characteristics of the UGS.

4.1. Municipality management

We use the label *municipality agency type* to describe an arrangement under which an agency from a municipality entity is in charge of managing public UGS. The most frequent case is the subtype where a Public Services Office is in charge of maintaining and operating parks and other

UGS, such as medians, gardens, roundabouts and others.⁴

⁴ It is noteworthy to point out that in all the governance types we identify, the UGS we refer to is a park (neighborhood, urban, or natural park) with the exception of municipal types of governance, which include a variety of green spaces such as medians and roundabouts. While there is no single definition of park, the most used definitions address the term based on size and the type of service supplied to citizens.

Table 2
Governance of urban green areas in Latin America typology.

Type	Sub-Types/Description	Cases
Municipality Agency A municipality agency is in charge of managing public urban green areas.	Public Services This is the most frequent governance model, where an office within Public Services Direction or Secretariat is in charge of maintaining and operating parks and other urban green areas, such as medians, gardens, roundabouts and others. Inter-agency An office (for instance, Sports, Youth, or Environmental Resources) that is in charge of the strategic decisions related to urban green spaces —such as landscaping based on a vegetation palette or defining the activities allowed within the urban green space. Importantly, a different municipality office is in charge of maintenance and some operation decisions.	Argentina City of Salta Colombia Bogota (Instituto Distrital de Recreación y Deporte) Guatemala Municipality of Guatemala Municipality of Villanueva Mexico Jesús María Zacatecas León, Guanajuato (Inter-Agency) Ecuador Cuenca
Dedicated management Characterized by the existence of an entity (frequently organically linked to a state or municipal government) in charge of planning, maintaining and operating a single urban park.	Public Management A decentralized office, under state or municipal supervision, is in charge of Metropolitan parks or long linear parks. Private Management A private entity (e.g. neighborhood association) manages a public urban park. Not-for-Profit usufruct A NGO is in charge of managing and getting funding for a park under the figure of usufruct	Ecuador Quito Ecological corridors at hydroelectric Project at historical downtown of Quito Mexico Park Tamayo in San Pedro Garza Public park La Mexicana in Mexico City (private management) Aguascalientes (Centro de Educación Ambiental Landeros) Guatemala Parque Ciudad Nueva in Guatemala Peru Greenspace within gated communities Mexico Urban Parks managed by Agencia Metropolitana de Bosques
Polycentric management Planning, operation and maintenance of a network of parks are responsibilities shared by agencies of different levels of government.	There are many combinations in which local and state level governments collaborate.	

Overall, according to our informants, in Argentina, Ecuador, Guatemala, Mexico, and Peru, most UGS are managed under a municipality agency approach. For instance, in Mexico there are 29,520 parks managed by municipalities – without counting gardens and other smaller UGS (INEGI, 2019).

A distinctive feature of the municipality management subtype is that provision of UGS is one of several tasks carried out by the public office. Conventionally, a municipal Public Services Office is in charge of public lighting, waste collection, and management of public spaces – of which, green spaces is one category. In most cases, the Public Services Office will have an area for management and maintenance of UGS.

A consequence of the previous feature is that provision of UGS frequently falls behind when it comes to prioritizing resources among the many services provided by Public Services offices. Underfunded municipal Public Services offices allocate just enough resources to afford minimal maintenance. Case in point, municipal green spaces frequently have no public restrooms – and, if restrooms are installed, they are not open, or their maintenance is far from adequate (Quintanilla and Ayala,

2018).

There are exceptions to underfunded Public Services Offices. In the Canton of Cuenca, Ecuador, parks and gardens are in charge of the Public Company of Sanitation (EMAC). EMAC is a public company with its own assets, and it has legal, administrative and management autonomy. The head of EMAC is appointed by a directorate and receive funding from electric and telephone lines fees. Being a public company, they have a clear set of performance indicators and a focus on efficiency. They are similar to its counterparts in the continent in the relevance of maintenance as the key function of the agency.

Within the municipality agency type, we have identified a sub-type of governance that we label as *inter-agency approach*. In this approach an agency different from the Public Services Office – typically a Environmental Resources Secretariat – is in charge of the strategic decision-making related to UGS such as landscaping, vegetation palette, or activities to be carried out in the UGS. In these cases, a different municipality area is in charge of maintenance and some operation decisions.

4.2. Dedicated management

In contrast to the municipality management subtype, where an entity is in charge of many UGS, the *dedicated management* refers to the existence of an administrative entity – i.e., one with at least one manager, one operative position, and one administrative position – in charge of a single UGS. Usually, these UGS are urban parks bigger than ten hectares that attract visitors from all around a metropolitan area.⁵ These parks may be managed by a state or municipal government through an office or a decentralized entity that reports to a Secretariat and has its own bureaucratic structure. In most cases, these parks have access to funding that allows them hiring of trained personnel and specialized human capital such as landscape or ecological restoration specialists.

Dedicated management parks usually have a variety of gardens, a lake, running tracks, zoo or wildlife areas, a variety of sport courts, and an offering of activities – from educational to races, competitions, concerts and others. Parks in the dozen of hectares may have museums, auditoriums, vivarium, orchards, a variety of gardens, and ecological reserves.

More an exception than a rule, a neighbors’ association sometimes may manage a urban park. Our cases include La Mexicana, a 28 has park in an affluent business district west-side of Mexico City. This park does not receive funding from the government and depends on the permits sold to restaurants located within the park, services to business, and rent of spaces for movie or TV sessions.

An UGS might be managed by a not-for-profit, non-governmental organization (NGO), under an agreement with the government of a municipality to protect a natural area and with the permission to develop a business plan to financially sustain their activities. In Guatemala City, for instance, usufruct is the common legal figure for those agreements – i.e., the municipality allows an organization to implement an approved business and management plan in an ecological area. The commitment is that the non-for-profit conserves the area and gets its own funding, from international donors, entry fees to the park and sale of services (food, banquets, training). It is the case of Parque Ciudad Nueva, Guatemala, one of the twelve parks managed by the non-for-profit Fundacion Calmecac. Other types of UGS under this type are ecological corridors for use of public enterprises, such as the area around a hydroelectric in Quito, Ecuador. The objective of this area is to protect the biodiversity of the area, to serve as recreation of the employees of the

⁵ Mexico’s Parque Tamayo in the state of Nuevo León with 14.7 has is considered small from the perspective of an urban or metropolitan park; La Mexicana has 28 ha. As a reference, a country’s flagship urban park may reach hundreds of hectares: Chapultepec in Mexico City has little less than 700 ha; Central Park in New York has 340 ha; Parque San Martín in Mendoza, Argentina, has 324 ha.

state-owned company, and work as a buffer of the hydroelectric which is very close to the city of Quito.

4.3. Polycentric management

In contrast to the municipality management subtype, a *polycentric management* entails the participation of agencies from more than one level of government – typically state and municipal governments – agreeing on how to manage a network of parks. In contrast to the dedicated management type, which refers to the management of a single UGS, a polycentric type entails the management of a network of parks.

An illustrative case is the one by the Metropolitan Agency of Forests at Guadalajara⁶ which was created by the state government and manages ten metropolitan parks of the Metropolitan area of Guadalajara, integrated by nine municipalities. Managing a system of parks, they are able to coordinate their staff to implement monitoring services. The Agency operates in coordination with the municipalities through the Institute of Metropolitan Planning (IMEPLAN).

5. How did managers of UGS face COVID-19 challenges in Latin America?

In this section, we describe how managers of UGS across Latin America have faced the challenges of designing, implementing, enforcing, and adapting restrictions to mobility within their realm of responsibility. We show those actions we classified as adaptive or non-adaptive. Fig. 6 summarizes our results, identifying which actions we labeled as non adaptive and which as adaptive, relating the latter actions to either flexibility, innovation, or learning/experimentation. We show also the combination of type/country corresponding to each action.

At the beginning of the pandemic, managers of public spaces shared a single objective – collaborating with national and local governments in implementing a set of restrictions to mobility to reduce the spread of the SARS-CoV-2. Fig. 4 shows the evolution of a Stringency Index for the six countries under consideration in this study, from January 1 to October 30, 2022 – based on numbers reported by Thomas et al. (2020).

The six countries in which our study cases are located issued restrictions to mobility at national level during the second and third week of March. For instance, closing spaces to enable activities labeled as non-

essential – including UGS. The Stringency Index is constructed based on the formal measures enacted by each country. The implementation varied widely by country. Some countries implemented curfews and applied penalties or even days in jail for non-compliance.⁷

The differences in enforcement produced different levels of actual mobility, as captured by Google Mobility data. In Fig. 5, we show tracked mobility in parks as reported by Google LLC (2020) for each of the sub-national territorial units where our green spaces are located. Mobility in parks in Lima, for instance, has a very distinct pattern, where mobility drops close to 90 % during weekends of April and May, where there was an observed curfew. The pattern in Mexican cities is noisier – suggesting a less coordinated social response, arguably resulting from laxity of the enforcement and that the message communicated at the national level was inconsistent and did not convey the urgency of the pandemic to the population. Mexico City shows a lower mobility.

5.1. Designing, implementing and communicating lockdown

Four layers have complicated the design and implementation of protocols in COVID-19 times in Latin American cities: (i) impromptu protocols to access UGS were designed under loose guidelines from national governments; (ii) UGS personnel had to perform tasks different from those they regularly perform; (iii) managers are used to plan budgets and personnel tasks according to scheduled activities with defined time tables, but COVID-19 forced budget changes in all areas; and (iv) managers have considered whether and how to implement restrictions not only within premises of their UGS but also in the contiguous public space, which requires coordination with cities’ authorities.

As shown in Fig. 6, adaptive actions included the following measures:

- Adapting health protocols to UGS. The mobility protocol included use of masks, provision of hand sanitizer at the entrance, and personnel at the entrance regulating access – in some cases, personnel were in charge of measuring temperature and registering users.
- Using innovative devices to regulate people movement within UGS. The Metropolitan Agency of Forests at Guadalajara used a simple flag

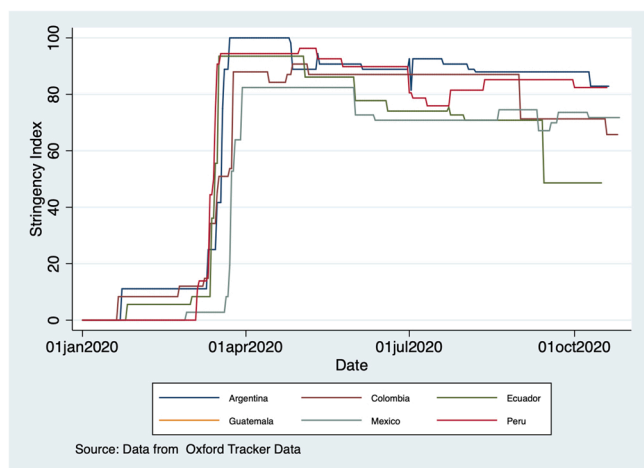


Fig. 4. Stringency index in countries of study.

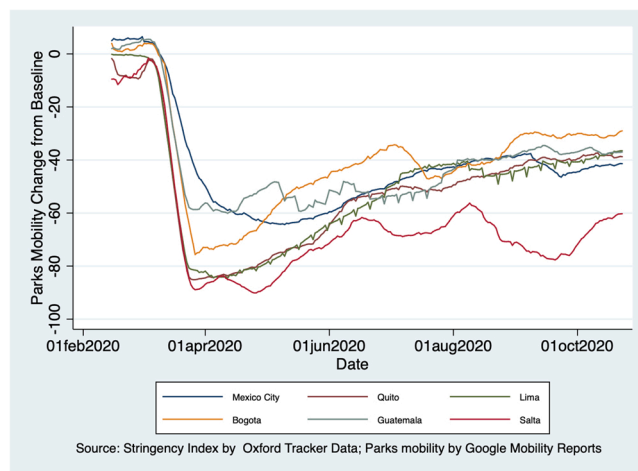


Fig. 5. Mobility in parks during the COVID-19 pandemic (Seven days moving average).

⁶ Guadalajara is the second largest city in Mexico, with more than 4 million people, counting the population of nine municipalities that integrate the metropolitan area.

⁷ For instance, Ecuadorian newspaper El Comercio reported by the end of August that 130,670 persons had been sanctioned for violating curfews or other restrictions related to the pandemic response.

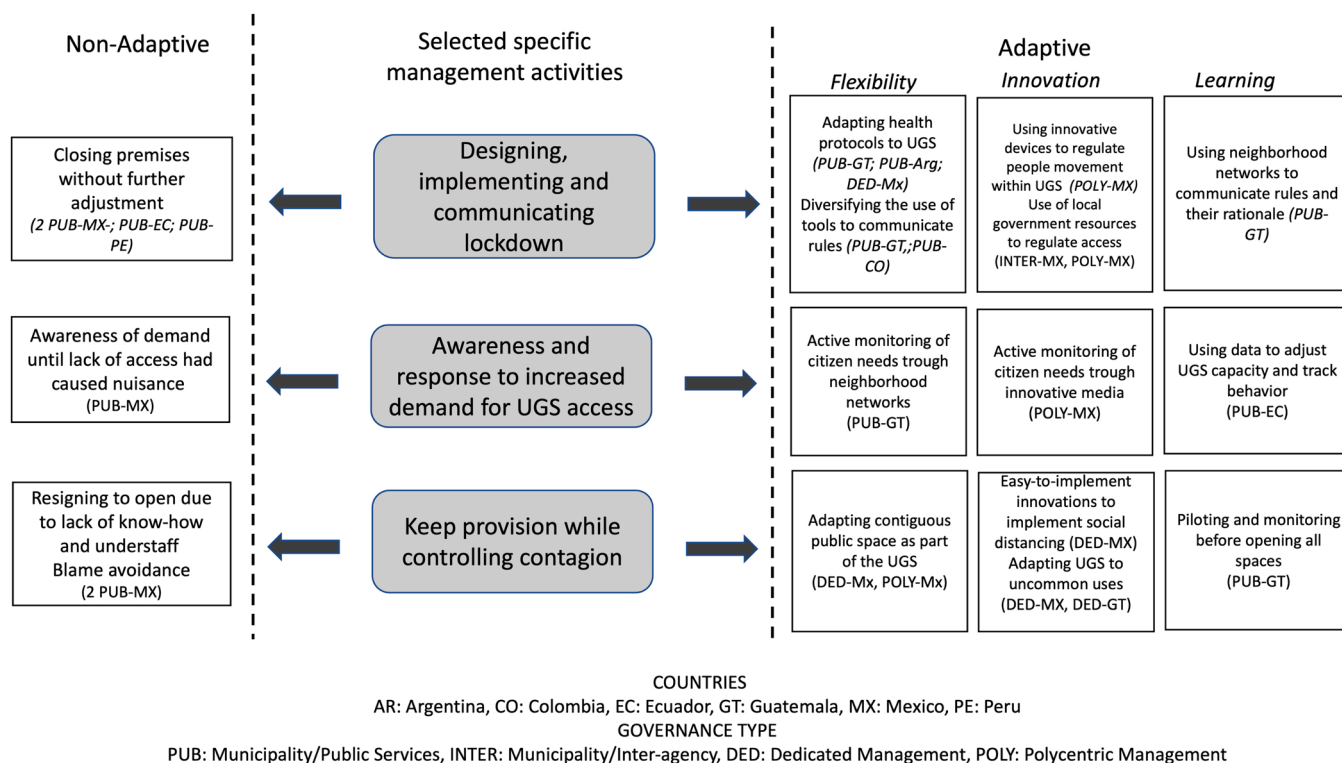


Fig. 6. Results: adaptive and non-adaptive management actions in Latin American UGS.

system to inform people about when they should leave the park, aiming to enforce their 25 % occupation restriction. In cities where initial restrictions lasted a longer period, there was a combination of tolerance and relaxation in the implementation of mobility protocols. In Guatemala City, for instance, the curfew lasted six months – with different time and days adjustments through the period. Around June, 2020, managers decided to let people exercise but aiming to dissuade those crowding specific areas. Only ‘people in movement’ was tolerated.

- Diversifying tools to communicate rules. Most managers resorted to restrict the use of UGS and communicate the decision to citizens. UGS with physical perimeters were closed. For the case of non-fenced UGS, the common measure was to communicate to the citizens that UGS were not accessible due to the pandemic – communication was carried out by using banners, newspaper, and/or radio messages. In some cases, access was allowed exercising purposes with strong recommendations to using premises during one hour only, keeping physical distance, and always wearing masks. Facilities usually providing services to children, such as courts and playgrounds, were closed. In some cases, UGS personnel or local police have requested visitors to leave the premises – particularly, at the beginning of the pandemic, when people were misinformed or skeptical about the need of the restrictions.
- Using neighborhoods’ networks to communicate rules and their rationale. Managers have reported mobility protocols through banners, newspapers, social media in the case of some metropolitan parks. Compliance was difficult to enforce in Villanueva, Guatemala, even though the government implemented penalties for those not observing curfew: “The first months people were very committed to the emergency declared by the government. Later, they started to find ways to avoid the rules. We used three strategies: public force, yellow ribbon and communication through neighborhood leaders, we talked to them explaining that avoiding use of park aimed to keep people safe. A violation of curfew could mean up to one month in jail.”

- Use of local government resources to regulate access. Personnel to monitor compliance with protocols was even scarcer in parks under the municipal public service governance type. As a general rule, UGS were closed with physical perimeters. In Jesús María, Aguascalientes, they were able to use temporary employment programs from the municipality or state government to supply controlled access in a few UGS.

Managers of UGS also resorted to *Closing premises without further adjustment*, which we consider a non-adaptive measure. In Mexican public services areas, fenced UGS were closed until the period of the interview (October). Managers under polycentric and dedicated management governance types tried to provide a controlled access to UGS but realized that visitation rates could derive in crowding and contagion, so they decided to follow more restrictive policies. Managers under municipality governance decided they were not able to provide a safe access and decided to close parks or restrict entrance.

5.2. Awareness and response to increased demand for UGS access: “When are you going to open the parks?”

After the first months of strict confinement, UGS managers faced a tension between contributing to restrict mobility in order to control virus spreading and the benefits lost due to lack of access to UGS.

- Active monitoring of citizen needs through innovative media. All managers of our study reported that after the first weeks of confinement, citizens requested access to UGS through e-mails, phone calls, Whatsapp/Telegram chats, and petitions. The manager in Cuenca, Ecuador, is aware of the role played by UGS regarding physical and mental health: “Parks have had an important role during this pandemic, allowing people to go out of their homes. That’s how they are able to breathe after strict confinement at home. Picture people three months confined at home. If they do not go to the park, they have nowhere else to go. Problems such as depression arise.”

- Active monitoring of citizen needs through neighborhood networks. In Villanueva, Guatemala, visiting UGS may represent the only recreation activity for families living in surrounding neighborhoods. Interviewees highlighted stressful conditions due to the confinement, and mentioned they have heard first-hand of domestic violence problems affecting girls in particular. Residents have frequently asked “when are you going to open the parks?”. Young people in red zones started to go to parks and broke yellow ribbons. Many private small gyms went broke: “For many, the only gym available was the tiny park with the exercising machines. It is a very important hub for mental health. When you interact with other people, your internal demons appease.”

Awareness of demand until lack of access had caused nuisance. The Mayor of Zacatecas received petitions to open UGS in a program called *Public Audience*: “Allow us to open the court.” In Jesus Maria, Aguascalientes, citizens asked about when they would open fenced parks: “People that exercise are those that request the access. I think they need it even for emotional reasons. It happens a lot with older people, they go to the gardens as their only activity. I think green areas have become more important that they were before the pandemic.”

5.3. Keep provision while controlling contagion: “We should find a way to go to the park and be safe”

After June, most governments relaxed formal restrictions to mobility. The policy objective, rather than enforcing closure was to provide regulated access, to keep providing ecosystem services while controlling contagion.

- Piloting and monitoring before opening all spaces. Municipality of Guatemala opened a few parks as a pilot, and measured visitation before deciding on opening more UGS. “It is possible to open the parks, but we cannot monitor if protocols are followed in the 400 parks. (...) We began with only four parks to verify things go well.” Piloting was also adapted in León, and a conventional protocol was implemented together with registration of cases to track contagion paths. Entrance was allowed and people not complying with protocol were banned to enter again. UGS in Cuenca, however, lack enough personnel to monitor and enforce mobility protocols: “The protocol is not only about controlling behavior, it is also about information. We trust people receive information through social media, that they know what they can do and what they should bring (...) If people is not conscious, you cannot have any type of control.”
- Adapting contiguous public space as part of the UGS. Dedicated managers in Mexico City, León (Mexico), and Guatemala, coordinated with local authorities to adapt contiguous streets and avenues for walking and jogging.
- Innovative, easy-to-implement measures. To guide social distancing, circles with 2.5 m of diameter were painted in the gardens, with a distance of 1.5 m between circumferences. “The space is enough for a small family or a couple with a dog, and it creates a feeling of closeness to the people while keeping safe distance.” To reduce access, metal fences were added and only three entrances are functioning – a strategy that allows the enforcement of use of masks and measuring temperature.
- Adapting UGS to uncommon uses. “I think a time of a lot of work for park managers is coming. If we will be more time like this, many activities could be carried out in parks, not in malls, not in museums, but in open spaces.” The park manager at La Mexicana is planning in mobilizing high-school students as story tellers for children and look for other innovative solutions that involve safe use of the parks. “People from popular neighbors have had many contagions and deaths. What do you do? To enclose them more and more? We better find a way to make social life happens in a safe way. (...) We should find a way to go to the park and be safe.”

In contrast to the efforts to provide a controlled access, some managers concluded they do not have the know-how, staff or equipment to guarantee safe access, and therefore decided to close the green spaces. Managers of UGS under municipality governance assumed from the beginning that a controlled access was not possible. In Zacatecas, the secretary of Public Services considers that it might be possible to open UGS if they had enough personnel to follow a protocol. Therefore, UGS were closed for six months. In Jesus Maria, a one hundred thousand population municipality, UGS have been closed due to lack of personnel as well. Managers in this municipality express interest in learning ways to allow access to UGS in the absence of personnel: “The Mayor is very interested in opening the parks, there is a concern for the people, after so much time without going to work. If they knew about experiences in some other places, they could use it to open more parks (...) We want people feel safe and use the spaces to get out the stress we are living with.”

Decisions to keep the spaces closed were argued on the basis of avoiding risks: “[parks remain closed because] we do not want to add causes for massive contagion.” However, it is uncertain whether closure has been an effective policy to control contagion: “We closed the courts and parks but there is a contradiction. We have street markets that are overflowed with people – brigades of sanitation are there with gel and telling people to wear masks.” This mismatch between the action and the expected outcome suggest some decisions were due to blame avoidance than to a risk assessment.

6. Discussion and policy implications

In this section, we link our findings with the research questions guiding this article: Did UGS Latin American managers implement adaptive governance measures? Did the variance in adaptive measures was driven by governance arrangements? Then we address the policy implications of our findings, discuss which could be considered specific to Latin America and which are shared with the Global South or globally. Key findings derived from the results presented in the previous section, their connection with policy recommendations and their regional relevance are shown in Fig. 7. We end this section addressing the limitations of the paper.

6.1. Did UGS Latin American managers implement adaptive governance measures?

Managers across governance arrangements have implemented measures that include features that can be described as part of an adaptive governance as operationalized in this paper – flexibility, innovations and learning. While innovation seems to be a feature of complex governance types (e.g., polycentric and inter-agency), governance of all types have produced learning outcomes – case in point, Guatemala public services offices took advantage of their relationship with other government agencies. All types of governance were capable of implementing flexible actions. Non-adaptive measures were, however, also implemented in public services types of small – due to lack of personnel, budget, equipment, and lack of networks.

A feature that seems constant across most governance arrangements is the lack of residents’ proactive engagement – a few exceptions to this finding are found in UGS under polycentric and dedicated governance. The involvement of residents is key to develop policies that incorporate UGS as an element of resilience. Decisions on land use, mobility, housing supply, and others, should incorporate UGS as an essential component (Ryan, 2011; Huang et al., 2021). Also, investment in green areas will not increase unless it moves up in the priorities of local governments in Latin America. For this to happen, stakeholders must be able to communicate the relevance of UGS.

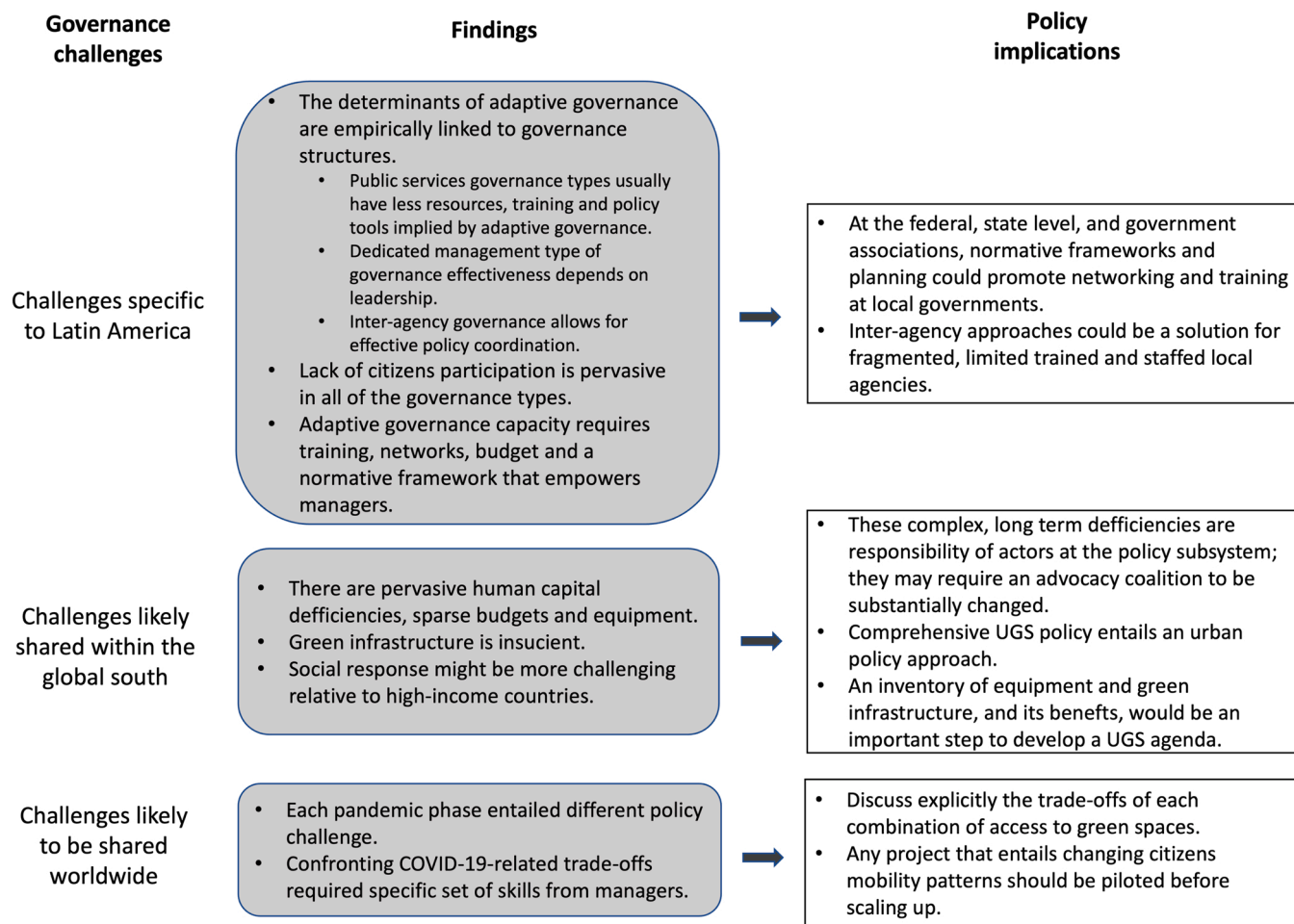


Fig. 7. Main findings and policy implications.

6.2. Did the variance in adaptive measures was driven by governance arrangements?

Our main finding is that public-services, a subtype of municipality governance, has not been able to adapt to the challenges posed by COVID-19. This is a concerning finding as municipality governance is the most common type of UGS governance across Latin America. In general, this governance type lacks flexibility, innovation and capacity to learn – all three essential elements of adaptive capacity.

In regards to the trade-off in terms of combating the spread of COVID-19 and providing services to residents, most governance types initially prioritize combating spread by closing or strongly recommending not to access UGS. Once the first couple of months had passed, managers realized that (i) residents were demanding the access to UGS; and (ii) a lack of enforcement of mobility restrictions may bring an increase in spread of COVID-19. In this context, governance started to play a role – with polycentric and dedicated managements yielding more adaptive strategies. Policies facing future public health challenges must keep in mind that different regimes of UGS governance have delivered different degrees of adaptability.

In general, lack of flexible and innovative approaches is related to the type of training and lack of network embedded in municipality governance, especially within the most conventional public-services subtype. In contrast to managers in polycentric, dedicated, and not-for-profit governance – who are used to participate in events with the goal of sharing experiences and that belong to a network in which information and opinions are exchanged – managers under municipality governance are usually not part of such an exchange of ideas that may increase their

adaptability. For instance, dedicated management have tackled trade-offs by trying different strategies to balance regulation of risk and provision of services. They have in general trained and committed staff with the normative frameworks that allows them to perform different types of adaptive responses. Innovative approaches such as polycentric governance types take better advantage of available physical, material and human capital resources.

Networking among park managers is key to learn lessons that might be useful for their own situation. While policy transfer is a complex activity, the link to different perspectives, knowledge, and plans has been useful for some of our interviewees to develop their protocols and find innovative ways to manage access to parks. This has been an effect from Latin American congresses organized by the Mexican National Association of Parks a Recreation (ANPR, a private effort) or such as the Latin America Urban Forestry Meeting, which has been celebrated twice, once in 2017 in Lima and the second one in Bogota, which encouraged collaborative endeavors such as a Regional Plan of Action for urban forest managers in addition to the dissemination of useful UGS experiences regionally.

6.3. Policy implications

The UGS literature abounds in recommendations on how to improve governance capacity, enhance UGS, develop new policy instruments, and involve communities in the UGS design process. We find this to be applicable advice but we find a key limitation to this approach: the capacity and the will to implement the advice is usually determined by the type of governance arrangement. Rather than context-absent advice,

we state that the advice should center in two strategies: what is possible (or most feasible) to do given the current governance arrangement and second, to identify windows of opportunity to design the governance arrangement itself, as in the case of the Metropolitan Agency of Forests at Guadalajara, which opened opportunities for community involvement.

6.4. Specificity of results to Latin America

We think that a subset of findings are likely to be particular of Latin America; another subset, shared by countries in the Global South; and a thirds subset reflects worldwide issues.

Enforcement of mobility restrictions in UGS requires coordination of users which, in turn, entails personnel that implement protocols, communicate rules, and spread information. However, countries in the Global South are characterized by limited human capital, insufficient green infrastructure, inequality, and lack of societal involvement in governance. These features have been reported as problematic before the COVID-19 crisis in Eastern Europe (Biernacka and Kronenberg, 2018; Kronenberg, 2015; Feltynowski and Kronenberg, 2020; Baycan-Levent and Nijkamp, 2009), South Asia (Adhikari et al., 2019), and Africa (Shackleton et al., 2021; Venter et al., 2020b) —even though this region has been notoriously understudied (du Toit et al., 2018). Thus managers of UGS in these countries may not be able to adapt flexibly or through innovation. Consequently, it is likely that enforcement of mobility restrictions in UGS is a feature that is present across the Global South and Eastern Europe.

Safety during a pandemic is a function among other factors of the capacity to spread people in space. Some Latin American cities are product of sprawl, and public green spaces were introduced afterwards in an unplanned way. Investment in green space of all types is a pending issue in the sub-continent. Insufficiency is aggravated by the inequality of UGS across within-countries regions and areas with different levels of income. This issue likely also holds across the Global South, and Eastern Europe.

Non-compliance with restrictions to mobility has been reported everywhere, including countries with residents regarded as observant of rule-of-law (Brodeur et al., 2020; Nivette et al., 2021; Augeraud-Véron, 2020). This challenge may become less of an issue when managers of UGS worldwide implement adaptation strategies.

6.5. Limitations

The main limitation to generalize our results is that UGS and their managers are very diverse in every continent, and while we tried to diversify the country, UGS and type of management, our selection is a small, non-representative sample. Recruitment through networks of associations may introduce bias, as congresses' attendees are usually directors or top managers of metropolitan parks or municipality agencies with higher motivation and resources than average managers. While we have balanced our convenience sample with other cases, our sample is likely under better conditions compared to the *average* resources and contexts that managers of UGS face across Latin America. Consequently, our findings should keep this limitation in mind.

Although our selection process implied that our informants are likely in the upper bound of material and human capacities, and therefore the challenges in a more representative sample is very likely to be much bigger.

7. Conclusions

Restrictions to mobility issued worldwide to control the spread of COVID-19 posed unprecedented challenges to managers of urban green spaces (UGS). These challenges revolved around the issue on how could/should managers balance access to UGS and mobility restrictions keeping in mind risk of contagion.

This manuscript has reported on findings arising from the exploration of whether managers of UGS in Latin America have been able to implement COVID-19 protocols that reflect an adapting governance – i. e., actions that imply a flexible interpretation of rules that arises from experimenting and learning amid COVID-19.

This concluding section summarizes findings of this project as follows. A first highlight is that some managers of UGS in Latin America have been able to design, communicate, implement, and enforce COVID-19 protocols that reflect an adaptive governance. A second highlight is that evidence suggest that adaptive governance of UGS is an exception and not a rule in Latin America – municipality management seems to be the most common governance arrangement across Latin America, and this manuscript has documented that municipality management is the governance arrangement with the least adaptive capacity. A third highlight is the relevance of human capital embedded in the management team of UGS itself – with COVID-19 acting as a quasi-experimental intervention across countries, adaptation (or lack of) mostly resulted from pre-COVID-19 capabilities embedded in the management team.

This paper, as part of the nascent literature it belongs to, illustrates that ensuring an optimal access to available urban green spaces (UGS) during a time of social crisis is a matter of governance – i.e., it is a matter that involves actions and efforts “to steer society towards beneficial outcomes and away from harmful ones” (Young, 2009). Features of future cities – including how public green space will be used– are determined by cities' capacities to deal with uncertainty. The way that managers of UGS have responded to COVID-19 challenges reveal the presence (or lack thereof) of capacities to adapt under fixed or diminished resources.

Future research agendas with a policy-relevant focus may want to focus on improving governance arrangements and/or on how to factor governance when providing policy recommendations. As COVID-19 wanes, government officials and policy makers in Latin American countries – both at national- and sub-national levels –, and society in general, would benefit from engaging in a conversation on how to enhance adaptive governance of UGS. This conversation must take into consideration managers' perspective – about which “we know surprisingly little” (Boulton et al., 2018). We highlight that we know even less about how organizational arrangements and implicit political restrictions determine managers' motivations and resources to cope with demand of UGS, and how levels of adaptation are determined by such motivations and resources. Future research may also explore a potential association between rule of law and compliance with rules in general within UGS – a relation that has been documented for forests (Abman, 2018) – because in the setting that we have analyzed, it is not clear whether lack of compliance amid COVID-19 is due to a weak rule of law or lack of adaptive governance.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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CRediT authorship contribution statement

Jaime Sainz-Santamaria: Conceptualization, Writing-Original Draft, Methodology, Investigation, Visualization. **Adan L. Martinez-Cruz:** Conceptualization, Writing-Review & Editing, Investigation.

Appendix A. Annex. Guidelines for semi-structured interviews

Semi-structured survey for the project Urban green spaces in Latin America amid COVID-19.

Introduce the research project and ask for informed consent to participate in the interview: Thank you very much for accepting an interview. This is part of a research project in charge of myself, [information about the lead researchers of the project] on urban green spaces in Latin America. We aim to understand how managers of parks in Latin America dealt with the beginning of the pandemic, the resources you have to tackle the challenges and the impact of the pandemic on your work.

General questions about the park.

- Let's begin talking about your personal trajectory as a park manager.
- According to [website, reference] you were [specific post of the interviewee]. Please tell us briefly how did you get to such position, beginning from your undergraduate studies.
- To what secretary your agency responds to?
- Please describe your staff, how many persons work in the park and what are their functions. What budget do you have? How many parks are managed by your agency?
- Ask general information about the parks: size, amenities, activities, personnel and budget.
- From your perspective, what is the role of a park in your city? Specifically, what is the contributions of the parks you are in charge of?
- What metrics do you use to determine whether you have been successful during your administration?
- What is your relationship with Civil Organizations?
- Please mention what you could consider and innovations of your administration or your agency.
- Please tell me if you take into account some of the following concepts to plan your work in the park: recreation, art, culture, education, air quality, water, erosion, noise, climate change, mental health, resilience.

COVID Section.

- The objective of this section is to build a chronology of actions on what challenges you have faced as park manager amid the pandemic
- Let's begin with the lockdown at the beginning of the pandemic. Who decided to close and who made the decision?
- Was the lockdown implemented before or after other activities in your city went into lockdown? What was the reaction of the park's users? How did the communicate their opinions? What did you do to implement lockdown?
- How challenging was to implement lockdown? What did you do to deal with parks without physical borders? Did you receive complaints from users about lockdown?
- Let's talk now about the changes when to transition from lockdown to controlled access.
- When were restrictions to access relaxed? Did you (or the park managers, the city) implemented a protocol? Did you asked for help to a different manager, or did you base the protocol in the experience of a different city?
- If a new COVID-19 outbreak emerges, would you resort to lockdown or would look for a different strategy to allow some level of access to the park?
- Speaking of pandemic impacts, what has been the impact on the number of visitors? Do you think there will be a long-term impact on

visitors? What will be the impact on budgets? What will be the impact on the type of activities?

- What do you aim with your work? What would you like to accomplish? How has that objective been modified with the pandemic?
- About visitors, do you keep a register of the visitors to your park? Is it possible to have access to your data before and after the pandemic?
- How do you think that COVID-19 will affect parks?

Specific questions depending on the manager we interviewed

Specific question according to previous information about the park found in documents or newspapers. For instance: I read in a newspaper article that you designed an Urban Park Model. What is the model about? Could the model be transferred to bigger cities? What are the obstacles for its implementation?

Closing remarks What accomplishment would you like to talk about 5 years from now if you were asked about an achievement of your administration?

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