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- Summary
- Main text (~20,000 words + a range of visuals)
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Title* Evaluation of the Urban Resilience Co-production Framework: A Case Study Based Analysis

Acknowledgments We want to extend our gratitude to Morgan Jennings and Alejandro Barcena for all their support and guidance in undertaking this research project. We would also like to thank all the people working on the case studies for providing us with the information we needed and answering our questions.

Introduction* Urban resilience is broadly concerned with enhancing the ability of urban demographics to withstand climate stresses. However, what exactly resilience entails for different demographics is context dependent. The complexities of contextual vulnerability are often overlooked in urban resilience solutions, as top-down approaches neglect varied needs within vulnerable 'communities'. Co-production methods aim to address this issue by creating an open dialogue of knowledge sharing and negotiating between different stakeholders. The co-production framework developed by Barcena & Bahadur (2023) provides guidance for effective co-production of urban resilience initiatives. This paper evaluates the framework based on nine empirical case studies of urban resilience initiatives.

Summary* (either > 700 words [single page] or maximum 1,000 words [spread])

This paper assesses the utility of Barcena and Bahadur's (2023) urban resilience co-production framework by applying it to nine case studies which have used co-production processes in order to design and deliver urban resilience initiatives. By applying the framework to these case studies, we critically evaluate the guiding potential of the framework, and explore best practice recommendations for co-production processes and urban resilience interventions. The analysis reveals several key considerations for inclusive co-production of urban resilience. For inclusion of vulnerable groups, (re)framing of urban resilience issues through mapping and educational workshops, building trust, and employing flexibility in engagement were key to empowerment and removing barriers to participation. The inclusion of powerful groups should be informed by their dynamics with the vulnerable group, and the capacity of powerful groups to enhance urban resilience. The framework is found to have great guiding and supporting potential for future co-production for urban resilience interventions, particularly due to its attention to contextual influences. Recommendations for improvement of the framework are also outlined, including the need to consider long-term sustainability and the role of intermediary groups. Additionally, the 'defining problems and solutions', and 'achieving impact' orientations of the framework are recommended to be adapted to be relational to orientations towards vulnerable and powerful groups: these orientations best serve their function in guiding the inclusion of vulnerable and powerful groups and determining the impacts of co-production towards different stakeholders.

Main text* (~20,000 words + range of visuals)

Introduction

Urban resilience is broadly concerned with enhancing the ability of different urban demographics to withstand and recover from climate extremes and stresses. However, what exactly resilience entails for different demographics is context dependent, determined by the root causes of their specific vulnerability. These complexities of vulnerability are often overlooked in urban resilience solutions, as top-down, linear approaches fail to capture and consider the varied needs of individuals in a vulnerable 'community'. Co-production aims to bridge this gap and bring together different stakeholders to address urban issues by creating an open dialogue of knowledge sharing and negotiating. Co-production approaches are instrumental in building urban resilience, as the interventions and outcomes are viewed within a specific community context. This allows interventions to be shaped by the needs, experiences and perspectives of the stakeholders who are impacted by the issue being addressed. The co-production framework developed by Barcena and Bahadur (2023) aims to provide guidance and a theoretical basis for effective co-production of urban resilience initiatives. They highlight the need for co-production processes to consider power relations between stakeholders and to facilitate the inclusive and meaningful participation of marginalised groups and communities.

The purpose of this paper is to evaluate the framework based on empirical case studies of urban resilience interventions in nine different contexts. Each of the case studies takes a different approach to building urban resilience and co-producing with relevant stakeholders. These case studies aim to build urban resilience with a specific focus on climate change and environmental risk. Climate change and environmental issues are linked to a spectrum of environmental, social and economic impacts and issues in cities (Mi et al., 2019). These are likely to continue to grow as the frequency and magnitude of climate change-linked events and issues is projected to increase. These impacts also disproportionately affect more vulnerable communities and groups in cities. Therefore, building urban resilience to climate and environmental risks is imperative.

This paper aims to identify effective methods of co-production and reveal shortcomings and areas of future development in the framework. The paper will first provide an overview of Barcena and Bahadur's (2023) urban resilience co-production framework. Methodology for analysing the case studies will then be introduced, followed by case study analysis from the perspective of co-production orientations. Based on findings from case study analysis, the framework will then be evaluated, and conclusions will be drawn for learnings on the co-production process and future development of the framework.

Overview of Framework

The key aim of Barcena and Bahadur's (2023) urban resilience co-production framework is to provide guidance for creating more inclusive urban resilience solutions. The framework considers four key contextual categories that drive urbanisation and shape the power relations of the context: *public institutions*, *culture*, *economic processes* and *electoral politics*.

- *Public institutions* and affiliated stakeholders can hold key resources, knowledge, and networks for implementing urban resilience solutions.

They may also have the power to enforce or regulate policy, or provide a platform to communicate and build trust with different stakeholders.

- *Cultural institutions* determine the norms and practices of the context, and how different stakeholders communicate in the co-production process.
- *Economic actors* can have control over key assets that urban resilience solutions address, while economic structures drive material power relations between different groups, and can therefore influence whose interests are served in the urban context.
- *Electoral politics* can influence social relations and alliances between different demographic groupings. Political candidates and parties also have the power to amplify different causes and put them in motion through public institutions – hence it is important to be aware of electoral cycles.

The way actors from these contextual categories are included in the co-production process influences how, and to what extent, urban resilience interventions address local power relations.

The framework identifies four different orientations for including and targeting stakeholders from these contextual categories (Figure 1): *orientations towards vulnerable groups*, *orientations towards powerful groups*, *defining problems and solutions*, and *achieving impact*. Each of these orientations functions as an axis that should be viewed as a spectrum rather than as binary. These orientations overlap within a single co-production initiative, and based on how different groups are included/targeted, the initiative falls somewhere on each of these spectrums.

Orientations towards vulnerable groups

Behaviour Change ←————→ Empowerment

Orientations towards powerful groups

Brokering Agreements ←————→ Systems Restructuring

Defining problems and solutions

Pre-identified Problems and Solutions ←————→ (Re)framing Problems

Achieving impact

Knowledge Generation ←————→ Building Institutions

Figure 1: Orientations of urban resilience co-production diagram

Co-production initiatives can include and target vulnerable populations on a spectrum of *behaviour change* to *empowerment*. Behaviour change approaches encourage members of a vulnerable group to adapt their activities within current power structures to promote resilience, while empowerment approaches build capacity, and provide resources and support for marginalised groups to tackle the structural inequalities underpinning their vulnerability.

To include and target powerful groups, co-production initiatives function on a spectrum of *brokering agreements* to *systems restructuring*. The brokering agreements approach aims to persuade powerful stakeholders to shift some of their power and resources to adopt and support policy and actions focused on urban resilience. Systems restructuring on the other hand aims to change systems and systemic processes to integrate recognition of environmental and social justice issues. This includes considering the experiences of marginalised groups and taking these into account in the planning process.

In terms of defining urban resilience problems and solutions, a co-production initiative can either work with *pre-identified problems and solutions*, or use the co-production process to *(re)frame* and understand the issues a community is facing.

Co-production impacts can range from *knowledge generation* to *building institutions*. When the aim of an urban resilience intervention is knowledge generation, resilience is enhanced through increased awareness, communication and promotion of education on socio-environmental issues. With the aim of building institutions, resilience is enhanced through shifting of institutional responsibilities, power, and resources to identify new structural capabilities.

Barcena and Bahadur's (2023) framework has also identified five different domains of urban resilience action:

- Community: assets and services
- Knowledge, data and information
- Governance: planning and capacity building
- Infrastructure: grey and green, and
- Finance through existing and innovative sources.

This paper aims to identify how the contextual conditions of the nine case studies have influenced their co-production orientations, and how that in turn has affected their ability to enhance urban resilience. The domain of urban resilience action for each of the case studies will also be identified. However, the primary focus of the paper is to evaluate the co-production orientations suggested in the framework with reference to the case studies.

Methodology

The following section will discuss how the case studies were selected, interrogate the methodology used to apply the framework and analyse the case studies, as well as reflect on bias and positionality.

Case Study	Authors	Location	Domain(s) of urban resilience action
Case Study 1: Adaptation of a city square, <i>Plaza la Paca</i> , into a functional green space	Daniela Mastrángelo and Andrea Ines Paoloni	Rosario, Argentina	Infrastructure: grey and green Community: assets and services

Case Study 2: Climate Change impacts and adaptation strategies of waste Pickers	Sonia Diaz, WIEGO	Brazil	Knowledge, data and information
Case Study 3: 'Zero Waste Community' initiative	Enrique Kato	Barrio Arriba, México	Community: assets and services
Case Study 4: Co-production of defence strategies for occupants of abandoned buildings	Francisco de Assis Comaru and Talita Gonsales	São Paulo, Brazil	Infrastructure: grey and green Knowledge, data and information
Case Study 5: CityAdapt regional initiative urban resilience interventions	Ophélie Drouault	Kingston, Jamaica San Salvador, El Salvador Xalapa, México	Finance through existing and innovative sources Community: assets and services
Case Study 6: Empowering communities for resilience: a story of Unnat Basti (model slum settlement) development	Aravind Unni	Jagannathpur, Ranchi, India	Governance: planning and capacity building Community: assets and services
Case Study 7: Participatory methodology for monitoring temperature and humidity	Milagros Sanchez, Bárbara Pasik and Patricia Himschoot.	Barrio 20, Buenos Aires, Argentina	Knowledge, data and information
Case Study 8: A placemaking approach for climate action –	Mark Ojal	Luthuli Avenue, Nairobi, Kenya	Governance: planning and capacity building Knowledge, data, and

an urban experiment			information Community: assets and services
Case Study 9: Sowers of Hope: Urban gardens for food security and community climate resilience	Elsa María Arroyo Hernández	Ecatepec, Temoaya, Toluca and Tejupilco municipalities, Mexico	Community: assets and services

Table 1: List of urban resilience case studies analysed in this paper, matched with domain of urban resilience action

The nine case studies were submitted to IIED for the purposes of this project by the third-party organisations who delivered the respective urban resilience initiatives. These initiatives were selected as they were all co-production projects which were broadly oriented towards climate stresses. The organisations were required to provide key project details in their submissions, to ensure consistency of information so the case studies could be analysed and compared. The questions posed to the organisations allowed them to evaluate and reflect on the co-production process utilised in their respective contexts, which was central to understanding their actions and how they delivered their work.

The organisations were financially compensated for their time and work submitting their case studies. This facilitated and supported the participation of those with limited resources and time who may not have been able to participate otherwise. Although submission of case study information by the delivering organisation is likely to lead to a level of bias in the presentation and scope, this was the most appropriate method of building the case studies within the timeframe, scale, geographies and resources available.

Following submission, the case studies were checked against the key content requirements outlined by IIED by the authors of this paper, and any gaps or follow up questions were noted. For the case studies submitted in Spanish, 'DeepL' translation software was used to translate the text into English. All nine organisations were then contacted for a voluntary follow-up interview for further details on their urban resilience interventions. In case of translated case studies, the interviews also served to ensure that no original meaning was lost in translation. Due to scheduling conflicts, some of these interviews were conducted as written email communications.

All case studies were analysed using the framework developed by Barcena and Bahadur (2023), and an analysis tool composed for the purposes of this paper. Firstly, the contextual factors – public institutions, culture, economic processes and electoral politics – impacting the case studies were outlined. Secondly, the level to which urban resilience intervention defined problems and solutions was examined. Thirdly, the extent to which vulnerable and powerful groups were included in the co-

production process was considered, and how these choices for engagement and building dialogue were informed by context. Finally, the type of impact achieved by the urban resilience intervention was identified and analysed through a contextual lens. The findings of case study analysis are presented in the following section of the paper through the perspective of co-production orientations.

A note about the authors

It is important to acknowledge the authors' backgrounds. Both authors are currently based in the UK and have not been directly, or indirectly, involved in any of the case studies. They are also removed from the locations and contexts of the case studies, so it is important to recognise any bias as a result. The authors were also not involved in developing the urban resilience co-production framework. However, a level of separateness from the case studies and framework is beneficial for evaluating the framework, and critically analysing and comparing co-production processes.

Case study summaries

The following section provides a brief overview of each of the case studies.

1. Adaptation of a city square, *Plaza la Paca*, into a functional green space

Daniela Mastrángelo and Andrea Ines Paoloni

The initiative, coordinated by the Municipality of Rosario, aimed to build urban resilience by transforming a city square into a functional green space in Rosario, Argentina. The main objectives were to preserve existing green areas, increase tree cover and improve infrastructure. Enhancing the accessibility of the square to different demographics of the neighbourhood was also a key aim – women and children previously had limited access because of criminal activity in the area, and fights between football club 'supporters'.

The project began by reaching out to the local school, which helped to identify other relevant organisations (health centre, church and sports club) to get more local residents engaged in the project.

This was followed by community mapping sessions at the local school. During these sessions, the different neighbourhood groups were able to outline their different needs for the square. In parallel, the Municipality of Rosario was coordinating dialogues with the landowners of the square, to gain their permission to make alterations. The landowners agreed to this, as transforming the city square was also in their interest. At the same time the Municipality of Rosario officials also negotiated with the government of the Province of Santa Fe to confirm their agreement to finance the transformation of the city square.

Having secured land access and funding, the project was able to realise its aims and transform the square to accommodate the needs of local people. The green space was preserved, trees were planted and new equipment was installed: playground equipment, tables and benches, ball racks and football goals. Women from the Villa Manuelita Health Center decorated the new tables with a mosaic technique. Residents were also given trees for their neighbourhood streets and homes. A derelict house previously used by criminals was removed from the square, making the area safer. An educational workshop was held with high school students on the benefits of trees. Another workshop on the care of public space and the use of the square was held with elementary school students who produced informational

flyers entitled 'Recipes to take care of the Square'. A festival was held for the inauguration of the square that included different cultural and recreational activities, when the flyers were distributed.

2. Climate change impacts and adaptation strategies of waste pickers

Sonia Diaz, WIEGO

This initiative, led by WIEGO (Women in Informal Employment: Globalizing and Organizing) and a research group from the University of Sheffield, aimed to improve knowledge on waste pickers' experiences of climate change in Brazil, as well as their contributions to addressing its effects. At the outset it was acknowledged that waste pickers are disproportionately impacted by climate change, facing related hazards at work and at home. Meanwhile, their contribution to sustainability is often overlooked by government institutions.

The project began by engaging with waste pickers through their unions, and an NGO that had created an app for the non-unionised waste pickers. This was difficult due to COVID-19 and it being an election year in Brazil, but the project had some flexibility because it received core funding.

Dialogue with the waste pickers began by telephone and in-person interviews. Participatory focus groups and key informant, semi-structured interviews were then held with some of them. The results from all these sessions were gathered by the research group to map the experiences of waste pickers. Throughout the dialogue phase, the research group also held workshops with waste pickers to share knowledge about climate change.

The mapping identified several policy recommendations: for better consideration of waste pickers in state planning; improvements to the workplace (sorting centres, dumpsites, public areas), documentation of impacts and risks assessments, and investing in improved sanitation.

The results of mapping were shared with the waste pickers and other stakeholders from public institutions in policy dialogues. The discussions resulted in the signing of two commitment letters. The first was signed by the Prosecutor's Office with WIEGO. It committed to factor in climate issues in the work that waste pickers do across cities in the Minas Gerais state, and to start using WIEGO's greenhouse gas calculator to gather data on the workers' contributions to greenhouse gas reduction. The second commitment letter was signed between the Municipal Waste and Citizenship Forum and WIEGO, which led to the creation of a working group to document the impacts of extreme weather at workers' cooperatives from 2024.

3. 'Zero Waste Community' initiative in Barrio Arriba

Enrique Kato

The initiative launched by [ASEMEJA](#), aimed to implement a 'Zero Waste Community' in Barrio Arriba, Mexico with the purpose of improving quality of life, and mitigating and adapting to climate change through a 'Circular Microeconomy' approach.

Visualising a 'Zero Waste Community' in Barrio Arriba was particularly powerful because of the neighbourhood's perception of its own vulnerability and government neglect as an issue of social and environmental injustice. Because of

tensions between the community and the government, the project initially excluded the latter from the project. Universities, World Resources Institute (WRI), the Mexican manufacturing company, Flexico, and municipal authorities were gradually integrated throughout the process.

The project began by a call to participation through the 'settler committee' attended by 20 people. A meeting was then arranged in the Language Centre associated with the University of Guanajuato – a familiar place for community members. It was agreed that meeting participants would each bring a simple snack to share, and their own cup in line with the zero-waste aim. Icebreaker activities were carried out at the first meeting, and an educational workshop was held in accessible language to discuss issues of waste, climate change, and resilience.

A participatory mapping technique was carried out with attendees to identify risks in the neighbourhood and a list of complaints for the government. Project members voted for establishing vermicomposting (where worms are used to accelerate the composting process) and community gardens as the aims of the initiative. Training focussing on organic waste and vermicomposting was then provided. The community requested vacant land from the parish to be used for the project which was initially approved but later rejected.

After failing to secure land, the community realised the zero-waste aim through an agreement with a cleaning products manufacturing company whereby spent cooking oils would be exchanged for cleaning products. A monthly collection of recyclable materials was also organised and a fair with environmental education workshops for children. Despite failing to materialise the initial vision of the community, the participatory sessions had united the neighbours in pursuit of the zero-waste vision. This led the participants to seek other ways of achieving this goal.

4. Co-production of defence strategies for occupants of abandoned buildings Francisco de Assis Comaru and Talita Gonsales

This case study examined the response of organised civil society to the threat of mass removal of families from occupied abandoned buildings in São Paulo, Brazil. This was a government proposal, following the fire and collapse of the Wilton Paes de Almeida Building, which was occupied by approximately 150 families at the time of the tragedy.

Brazil has a history of housing movements in recent decades where the most explicit and direct form of activism that the homeless movements have carried out is by occupying some of the countless empty buildings that have been left abandoned for decades by their owners. The demand for housing at a time of crisis outweighs the government's slow and ineffective responses.

The initiative began by the housing movement, comprising those occupying the buildings, contacting academic activists. These two groups have a history of working together in regard to housing issues in São Paulo. The academic activists were linked to laboratories at public universities, non-governmental human rights organisations, housing advisory firms, independent journalists and other professionals – who possessed the skills to provide the movement with technical support.

Weekly strategy meetings were organised between the housing movement and the academic activists to identify several tactics to push back against the state's eviction threats. Seminars would be held at the university and journalistic reports would be produced on the housing crisis, in order to shift public and state opinion on

homelessness – hitherto commonly viewed as a criminal issue. The activity of the São Paulo City Hall, the Public Prosecutor's Office, and the Public Defender's Office was monitored, and the housing movement entered into a debate with these institutions. This helped to shift state perceptions of the living conditions in abandoned buildings to prevent eviction of families – legal advice from academic activists was particularly useful in this process. The housing movement and academic activists also improved the living conditions in abandoned buildings based on the state's concerns, to reduce risk to inhabitants.

As a result of these efforts, the mass removal of families from the abandoned buildings was prevented, for the time being at least. The awareness created by the academic activists had a long-term, positive impact on public opinion towards the housing crisis in Brazil.

5. CityAdapt regional initiative urban resilience interventions

Ophélie Drouault

The CityAdapt project worked across three cities: Xalpa (Mexico), San Salvador (El Salvador) and Kingston (Jamaica). It was funded by the Global Environment Facility (GEF) 2018-2023 and focused on building capacity of governments and local communities to integrate ecosystem-based adaptations into urban planning policy in order to build urban resilience to climate change and environmental issues.

Through mapping, identifying and working with technical stakeholders and local organisations in each of the cities they were able to identify suitable locations and effective adaptations. A series of ecological restoration projects were conducted including: soil restoration and conservation; tree planting and creation of live barriers to prevent erosion; reforestation in conservation areas; wetland and riparian corridor restoration; filtration gardens, artificial wetlands and rainwater harvesting systems; and water storage facilities to improve water management.

The initiative also supported and promoted more climate-resilient alternative livelihoods including: native tree planting and agroforestry; family orchards; agrosilvopastoral management; sustainable agriculture (including infiltration ditches and riparian forest restoration); food gardens (to improve food security as well as providing green areas for temperature regulations in urban settings); mushroom plots as alternative agriculture practices; and beekeeping colonies for sustainable apiculture livelihoods and biodiversity conservation. This included training women in beekeeping in Kingston, working with coffee producers in San Salvador, and promoting mushroom cultivation in Xalapa.

Working with local organisations and technical stakeholders built and embedded the knowledge and capacity needed to deliver the initiatives. The diversity of the stakeholders strengthened the impact and delivery of the initiatives. Each intervention was also conducted alongside consultation workshops with local communities to integrate local knowledge into the project. Strategic dialogues with a diverse range of stakeholders led to the production of key resources and knowledge such as climate risk assessments, academic research (created in collaboration with local universities) and policy recommendations. These were key to delivering the projects and also extending and sharing learning and knowledge beyond the cities and projects remits.

Training sessions and workshops on ecosystem-based adaptations were also held with other stakeholders and decision-makers, including local and municipal

governments. This allowed them to participate in the process of co-production and provided encouragement to engage in the projects proposed – and it meant they could incorporate ecosystems-based analysis into local urban planning policy and plans. A series of educational workshops were also held in local schools.

These initiatives provided key guidance and learning which could be used in other ecosystem-based adaptation projects. As well as creating technical stakeholders, and building capacity and knowledge, many stakeholders were able to incorporate these skills in their work portfolios which they took forward in future work with other clients and projects. For example in Kingston, the Forestry Department has introduced a new pathway for urban forestry within its objectives. The ecosystem-based adaptation measures were successful in building urban resilience, particularly in the context of flood risk reduction in the short term. Other impacts included providing alternative livelihoods and economic resources for families, particularly for women.

6. Empowering communities for resilience: a story of Unnat Basti Development – Aravind Unni

This initiative focuses on the community housing area 'Jagannathpur' in Ranchi, Jharkhand, India. Ranchi is the capital city of the Jharkhand state in India. It is an industrial city with steel production, coal mining and heavy engineering industries. Ranchi's position as an industrial and economic hub attracts influxes of migrant labour from nearby regions, looking for employment opportunities and contributing to the city's growth. Jagannathpur has grown into a community housing settlement of over 10,000 residents and 2,500 households, with the majority being from marginalised Caste groups. Key challenges faced by the community include low income, inadequate access to education and poor living conditions.

There also is inadequate engagement with the Jagannathpur community from the municipal authorities. There is an Urban Local Body (ULB) composed of local representatives. However currently development and investment does not filter through from the ULB to the community as it is not directed by community needs or community ownership. The ULB is responsible for many urban governance issues such as planning, budgeting, and development projects in the Jagannathpur informal settlement. Climate change impacts are further exacerbating vulnerabilities and issues faced by the community.

An Improvement plan was created and initiated by IGSSS (Indo Global Social Service Society), which aimed to create a LAP (Local Area Plan) led and developed by the community in order to highlight community needs and issues, as well as to integrate community participation into decision-making processes. This was conducted in a phased approach, which began with a post COVID-19 relief stage. A process to map the community's history of climate change impacts and its education and knowledge of climate change, with the participation of community elders and young people, was undertaken. This identified key needs and issues which led to interventions being formulated in response. Actions included: mapping to identify key stakeholders and organisations; researching and identify major issues raised during community focus group discussions; listing major slums in Ranchi; conducting transect walks in the community; and working with local health workers and official volunteers.

Impacts included: infrastructure developments (including the construction of drainage systems, roads, borewells, and water supply improvements); creation of a LAP to communicate the community's needs and issues; formation of community-based organisations (CBOs); increased collaboration with ULBs and the Ward Councillor; climate change sensitisation; and youth-led initiatives, specifically facilitating the participation of women.

As well as providing support with transitioning to alternative resilient livelihoods such as mushroom cultivation and pig rearing, over 50 families engaged in urban farming, improving access to fresh produce, and increasing income. This initiative also led to the formation of ten Self Help Groups (SHGs) to provide a network and support for communities and families to help each other with alternative livelihoods. These groups provided space for knowledge sharing and capacity building.

The initiative was also able to engage the elected representative for the community, the Ward councillor. Although initially reluctant to engage with the process, the Ward councillor realised that the participatory approach was effective in addressing community needs, and is now supportive, applying a more community-centred approach to decision-making.

7. Participatory methodology for monitoring temperature and humidity

Milagros Sanchez, Bárbara Pasik and Patricia Himschoot

This case study was conducted in Barrio 20, Buenos Aires, Argentina. Barrio 20 is a vulnerable and under-resourced neighbourhood located in Comuna 8. Extreme heat events pose a threat to the city of Buenos Aires, exacerbated by the urban heat island effect in densely populated, built up urban areas lacking adequate green space. As climate change is predicted to continue to increase, the frequency and magnitude of extreme heat events will continue to increase the risks associated with extreme heat. The Barrio 20 neighbourhood has been in the process of re-urbanisation since 2016. This process has been conducted with participatory methodology and mechanisms for decision-making.

A phase of mapping key organisations and stakeholders to be involved in the project, and dialogue with IIED-AL and the Instituto de la Vivienda de la Ciudad (IVC), identified the Environmental Roundtable as a key actor. The Environmental Roundtable is a participatory space of local residents and organisations who discuss and make decisions about environmental issues in the Barrio 20 neighbourhood. Through collaboration with this group, strategic locations to install data loggers and thermos hygrometers (to measure temperature and humidity), were identified based on locations with organisations and individuals nearby who could monitor and maintain the equipment. A diversity of locations was used.

The 'Environmental Promoters' were a group formed within the Environmental Roundtable, who were trained to install and maintain the equipment and were key in developing the strategy and co-designing the project's delivery and installation process. One such location chosen for installation was at a primary school. Educational workshops were conducted with the children and staff, as well as a long term plan to have the children involved in the monitoring and maintenance of the equipment.

Key impacts of the project include current, accurate monitoring and measurement of humidity and temperature in the Barrio 20 neighbourhood. This helps to provide evidence and build understanding of the impacts of extreme heat on the area. Increasing knowledge and awareness of extreme heat, its impact and climate change, among local residents (including primary school students) and Environmental Promoters through their training has been extremely beneficial. Through this process key knowledge has been shared between the IVC and Environmental Roundtable, strengthening collaboration and building relationships.

8. A placemaking approach for climate action: an urban experiment

Mark Ojal

This initiative encompasses a series of approaches in Luthuli Avenue, Nairobi, Kenya. This intervention focused on air pollution in relation to transport and promoting the environmental and health co-benefits of active transport. Particulate matter from the transport sector is one of the biggest emitters in the city. Although paratransit and walking are the most popular transport modes in the city, continued investment in urban and transport sectors to use carbon-intensive modes of transport is leading to elevated levels of air pollution. The city also lacks a comprehensive air quality monitoring system to understand Nairobi's air quality.

The regeneration of Luthuli Avenue was an urban experiment initiated by

Nairobi City County Government in 2016, with the support of the C40 Cities network, which aimed to test and measure the co-benefits of active transport for environment and wellbeing, and to explore the effectiveness and impact of creative co-design methodologies.

The project was conducted in a phased approach. The first phase included identifying and (re)defining the issue, key causes and barriers and vulnerabilities. This included engaging many different stakeholders and identifying their purpose, scope, and capabilities. The Nairobi City County Government (NCCG) was identified as a key target to engage as it had the capability to enact change across all levels in the city, as well as engaging universities, traffic police, and private and informal sector stakeholders. Phase two was the participatory, co-design phase implemented under the Implementing Creative Methodological Innovations for Inclusive Sustainable Transport Planning (i-CMiiST) project. Using creative methods such as digital storytelling, photo album 'hangouts' and collaborative design competitions, the project aimed to facilitate more inclusive participation.

Impacts of the initiative include enthusiasm and greater openness of stakeholders, such as NCCG and UN-Habitat officials, to integrating creative methods into processes of co-production, planning and project delivery, as well as positively influencing the city county staff's capacity to co-produce and experiment with projects and planning. It fostered positive shifts in attitudes towards more sustainable transport and air quality monitoring, as well as building networks and relationships between stakeholders. It has also created an awareness of the importance of air quality, as well as of wider climate change and environmental issues. NCCG has expressed its intention to extend the climate action interventions to six additional streets in the Central Business District.

9. Sowers of Hope: Urban gardens for food security and community climate resilience

Elsa María Arroyo Hernández

The project was based in four municipalities in México: Ecatepec, Temoaya, Toluca and Tejupilco. These regions were identified due to high poverty levels and marginalisation, which were exacerbated by the COVID-19 pandemic resulting in people losing their livelihoods. The aim of the project was to build the communities' climate resilience through focusing on food security. The delivering organisation identified women leaders with whom they had pre-existing links and relationships, to engage them as experts and agents of change. From these connections, further community members and groups were identified (through leafletting and working with a local school) to engage in community mapping workshops to highlight key issues and find solutions.

This was accompanied by research and compiling data from official data sources such as the National Institute of Statistics and Geography (INEGI) and the National Survey on Time Use (ENUT). This process identified and engaged key organisations to collaborate with, such as the Autonomous University of Chapingo, Autonomous University of Querétaro, the Youth Social Program Building the Future, Carzzu (a gourmet meat supplier), the Association of Local Authorities of México AC (AALMAC), auxiliary authorities, citizen participation councils (COPACIS), and cultural collectives, among others.

A key part of the project was training, cultivation and marketing of agricultural and meat products, as well as rescuing food waste. Training in agroecological

practices was delivered to increase food security and build resilience. Dialogue and networks between local women and municipalities was also promoted in order to improve governance, resilience and food security. They also provided 1,500 low-cost meals to low-income families in the local neighbourhoods. Another key issue the intervention aimed to tackle was access to fresh and healthy food in the communities.

Although there was an effort to engage local governments, this was not successful due to lack of cooperation and trust from government stakeholders, as well as issues of transparency and corruption. However, the project did build collaborative networks between other local stakeholders, and displayed the potential for co-production to facilitate food security projects. In the future, there is hope that learnings and findings from this project can be implemented in other municipalities to increase food security and resilience. There is also an ambition to establish self-management processes with local communities to sustain the impact.

Case study analysis

In this section we will explore each of the orientations of the framework by looking at how they have been applied in different case studies to the co-production process, and how these orientational choices have been informed and influenced by contextual factors.

Orientations towards vulnerable groups

Defining problems and solutions

All of the case studies exemplified that willingness to reframe and adjust pre-defined problems and solutions is key to empowering vulnerable communities. Each of the interventions had a set of pre-defined problems and solutions for the basis of the urban resilience intervention. However, these were based on existing knowledge that was divorced from the immediate needs of the community, lacked an intricate understanding of the complexities of contextual vulnerability, and/or excluded the valuable knowledge of marginalised groups. To address these shortcomings and transform the initiative from a top-down approach to a participatory one, initiatives conducted vulnerability mapping, co-production workshops, local transect walks, community discussions, and collaborated with local organisations. Through these processes of mutual reframing and redefining of knowledge, vulnerable groups were empowered in various ways, and the initiatives themselves were better able to achieve their aims. Behaviour change was still a component of some of the initiatives. However, behaviour change became informed by collective reframing of community needs and therefore included an element of empowerment.

Taking the example of Case Study 7, the participants of a local Environmental Roundtable of Barrio 20 were approached with the defined issue of measuring heat and humidity due to the vulnerability of the neighbourhood to heat risk linked to climate change. The organisation had identified locations for the measuring equipment to be placed, however, through conversations with the community, more suitable locations were revealed. As a result the measuring equipment was located near primary schools, children's playgrounds and in the Health and Community Action Centre. Through the process of reframing, community needs were better attended to, and the initiative became more successful in achieving its key aim.

The role of trust in creating engagement

In terms of engaging vulnerable populations in the co-production process, cooperation with civil organisations was key in Case Studies 1, 2 and 3. In Case Study 1, the local school, health centre, church and sports club were engaged to reach and build trust with different sectors of the vulnerable community. The same objective was achieved in Case Study 2 through waste picker cooperatives and NGOs, and in Case Study 3 the Language Centre and the settlers union.

When a community has been systematically neglected by the state or by economic processes, it is essential that an initiative by a third-party organisation establishes itself as a trusted partner through communication with local civil organisations that already have relationships of trust with the vulnerable group/community. Through these civil organisations, the third party can familiarise itself with local socioeconomic dynamics and distinguish its intervention from a top-down approach. Once a trusting relationship is established between the civil organisation(s) and the third party, the community surrounding that civil organisation is more willing to engage in the co-production process as they have more reason to believe that their interests are heard and fairly represented.

The same objective can also be achieved through outreach to community elders as exemplified in Case Study 6. Community elders were culturally seen as trusted informants and individuals which promoted and built trust in the initiative for the residents. Recognition of cultural dynamics is therefore key to building a trusting relationship with communities for participation and engagement.

Similarly in Case Study 4, the academic activists who were contacted for support by the housing movement had a pre-existing relationship of trust with the movement. Additionally, the academic setting had seen an influx of students from minority backgrounds, and the populations occupying abandoned buildings. Thus, there was a deep alignment in values between the housing movement and academic activists, and an intimate understanding of the central concerns of the initiative. As a result, the housing movement trusted the academic activist to provide them with legal and other technical advice and represent their interests to the public in the media.

Case Study 2 showed that depending on the wider cultural and political context, the initiative might also need to build understanding and trust within the vulnerable group before co-production can take place. The project in Case Study 2 was conducted in 2022 which was an election year in Brazil. Brazilian society was highly polarised on many issues, climate change being one of them – this polarisation was also present among the waste pickers. As the initiative wanted to understand waste pickers' experiences of climate change, they needed to first address this polarisation within the group by depoliticising climate change. Consideration for social dynamics that stem from electoral politics is therefore key for creating engagement in a politically polarised society. Case Study 3 demonstrated that conducting icebreaker activities and asking participants to bring snacks to share at the participatory sessions can also help to connect members of the vulnerable group and create a joint identity.

Empowerment versus behaviour change

Case Studies 2 and 5 exemplify the importance of flexibility in the co-production process when the aim is empowering vulnerable groups. Case Study 2 highlights that the participatory approach in working with waste pickers was made possible by core funding. While many initiatives are limited by organisational

deadlines that require the researchers to impose their timelines onto the vulnerable population, core funding of the initiative in Case Study 2 ensured the researchers could work around the schedules of the waste pickers. This allowed for more waste pickers to participate in the project, and ensured that the research group didn't place additional pressure on informal workers already facing volatile conditions. In Case Study 5, flexibility was key to ensuring and enabling women's participation: the beekeeping training schedules were adapted to fit around their existing commitments.

A cultural awareness of vulnerable groups is therefore key to overcome barriers to participation. For urban resilience initiatives to be able to exercise empowerment, there needs to be contextually informed flexibility and support from the third-party organisation for the schedules and commitments of the vulnerable group. Initiatives framed around prioritising local stakeholders and communities are, therefore, more impactful for facilitating participation of vulnerable groups, whereas interventions orientated around powerful stakeholders' parameters may create and perpetuate barriers to participation.

Educational workshops were a key empowerment and capacity-building tool across the urban resilience initiatives. Case studies 2, 3, 5, 6 and 8 showcase how conducting educational workshops at the outset of the co-production process helps to build the capacity of stakeholders to engage. For example in Case Study 2, waste pickers involved in the co-production process were familiarised with the language of climate change in order to improve their capacity to engage in dialogue, and also continue to advocate for themselves beyond the initiative. In Case Studies 1, 3, 5, and 7 educational workshops were held with students at the end of the initiative. This encouraged long-term sustainability and maintenance of urban resilience, as education creates capacity for local people and organisations to continue to uphold what the initiative implemented, and engage in further conversations and negotiations.

Mapping activities with vulnerable groups were also a common co-production tool for empowerment. In Case Study 1, collective mapping directly involved the vulnerable group in outlining their needs for improvement of the city square. Similarly in Case Study 9, women, men, young people, and elders of the vulnerable group directly participated in mapping to identify and create strategies to solve food security problems. As these were relatively small-scale projects focusing on a neighbourhood or a municipality, conducting mapping workshops directly with the vulnerable group was feasible in the scope of the research. In Case Study 2 mapping was conducted by the research group based on individual and focus group interviews with waste pickers – this decision was again determined by the scope of the research, as a large number of waste pickers were involved in the project and direct collective mapping would have been logistically difficult. Case Studies 5, 6 and 9 utilised a phased mapping approach throughout the various stages of the project to continue to update and develop the initiative during co-production with local communities and stakeholders. The phased approach facilitated the development of situated knowledge and action as local knowledge and lived experiences continued to be integrated into the initiative. In each of these cases, mapping played a crucial role in understanding local vulnerabilities, barriers to participation and climate realities, as well as integrating cultural perspectives into the initiative.

Dialogue with the local community was also key for implementing behaviour change approaches. In Case Study 5, younger farmers in San Salvador perceived the implementation of ecosystem-based adaptation techniques as 'old-fashioned'

and were reluctant to adopt them. Through identifying this response from the young farmers, a stronger dialogue was adopted to highlight that the older and sometimes more traditional methods were valuable, and often had positive benefits for yields, as well as building climate resilience. In Case Study 6, pig rearing was designated an appropriate alternative livelihood source due its cultural acceptance within the Scheduled Caste (SC) community in Jagannathpur. Identifying cultural responses and norms through conversation can therefore aid effective implementation of behaviour change initiatives, while also assuring that local perspectives are taken into consideration.

Orientations towards powerful groups

Strategic exclusion and separation of powerful groups

Case Studies 1, 3 and 4 displayed how depending on the contextual conditions, the exclusion of certain powerful groups from the co-production process can improve the ability to serve the interests of the vulnerable group. In Case Study 1, the landowners of the city square were not involved in the co-production process as they did not personally live in the neighbourhood and use the square in their daily life. Only the neighbourhood people directly impacted by access to this social space were included in communal mapping, so as to consider their daily needs.

In Case Studies 3 and 9, there was distrust between the vulnerable group and the local government. So local government representatives were strategically excluded from certain dialogue spaces in order to create a comfortable, co-production environment for participants from the vulnerable group. Local government representatives became included in later phases of the projects in Case Studies 3 and 9. In Case Study 4, some of the abandoned buildings occupied by the homeless were owned by private economic actors. However, the initiative only targets the state in its efforts to defend the residency of the occupants. This is because at this stage of the situation, private economic actors would have to go through the state to regain control of their properties. Therefore, it was more efficient for the initiative to focus on the state as the stakeholder with active power, in order to most efficiently ensure the occupants did not lose their residency. In Case Study 8, there were concerns that some of the creative methods used in the co-production process could be used to co-opt citizens into powerful stakeholders' hidden agendas and vested interests, and normative practices of policy making and planning would remain unchallenged. In order to address that, powerful and vulnerable stakeholders were strategically separated in some activities in order to create space and opportunity for all stakeholders to be able to participate in the process. Engaging informal sector stakeholders such as *Matatu* (Kenyan minibus) drivers was extremely important due to their position in the informal sector, their cultural significance, and their capability to resist public policy changes. However, due to their relative power to influence and negotiate within the vulnerable group, dedicated sessions were held with them in order to gain their insight and participation in the co-production process. However, these were held separately to other vulnerable stakeholders to avoid conflict during the session and to foster a co-operative environment for other local stakeholders and communities.

Inclusion of powerful groups

In Case Studies 4 and 7, the inclusion of public institutions was key to providing the initiative with technical support and knowledge. In Case Study 4,

academics from the local university provided the housing movement with legal advice in order to give them the skills to challenge state representatives. The academic activists also used their skills to produce media reports on the issue of homelessness, which helped the housing movement by reframing their purpose in the eyes of the public. In Case study 7, the initiative collaborated with the the city housing institute (IVC) in order to provide important context and technical support with the implementation of the measuring equipment. Case Study 9 was supported by data from Mexican state institutes such as the National Institute of Statistics and Geography (INEGI) and the National Survey on Time Use (ENUT).

Brokering agreements versus systems restructuring

The key determinants in orientations towards powerful groups were the scope of the initiative in regards to structural changes, and whether the powerful actors involved had the resources and power to transform structural conditions. Case Studies 1, 3, 5 and 7 focused on empowering members of the vulnerable group within their neighbourhoods by improving access to community assets and services.

Relevant powerful groups were included through brokering agreements. In Case Studies 1 and 3 landowners were negotiated with to gain access to their land, and Case Study 5 participants brokered with private economic stakeholders to get financing for the initiative. Case Study 7 similarly took a brokering agreements approach, however, the asset in question was knowledge. During the Environmental Roundtable dialogues, the IVC was brokered to provide background information on Barrio 20 which wasn't available or shared during the re-urbanisation process. Members of the Environmental Roundtable called for transparency of the information in order to benefit the neighbourhood and the citizen science strategy. An agreement was subsequently shared with them which created a space for knowledge to be generated through the citizen science strategy and information to be shared between different groups and public institutions. A 'brokering agreements' approach was therefore common in initiatives that aimed for local, community-level transformation and needed economic actors/public institutions to provide the project with different assets or financing.

Case Studies 2 and 4 both had an underlying aim of transforming the structural conditions of the vulnerable group. Case Study 2 aimed for the state to better consider the work of waste pickers in light of climate change, and Case Study 4 aimed for the state to change their approach to dealing with homelessness. In Case Study 2, the state had adequate resources and power to put these structural changes into motion. Case Study 2 therefore took a systems restructuring orientation towards powerful actors. However, in Case Study 4 the state didn't have the immediate resources to better house the homeless, and it lacked capacity to transform the market conditions that had generated a housing crisis. Thus while the initiative would have liked to see systems restructuring, it took on a brokering agreements approach instead to best benefit the vulnerable population in the current context. The state was negotiated with, and the conditions in abandoned buildings were improved by the housing movement to decrease risk for inhabitants. When choosing between brokering agreements and systems restructuring, it is therefore important to think beyond the larger aims of the initiative, and question whether systems restructuring would be feasible under current contextual conditions. The aim is to choose the approach with the most potential to benefit the vulnerable population, and under difficult contextual conditions brokering agreements may better serve this purpose. Recognising the realistic capacities of the powerful stakeholders is therefore key to a successful co-production process.

Achieving impact

Knowledge generation and building institutions

Knowledge generation and sharing is an integral part of the co-production process, and to a varying degree was present in each of the initiatives. This section outlines different ways of achieving impact through knowledge generation, and how knowledge can be translated into building formal and informal institutions.

Case Study 4 had identified the public and state perceptions of homelessness as a key barrier to adequately dealing with the housing crisis. Homelessness was criminalised in mainstream public discourse and this belief was perpetuated by powerful media outlets with ties to conservative political parties. In order to benefit the vulnerable group in the long run, this perception had to be reframed. The academic activists linked to the housing movement generated media reports on the issue, conducted seminars in the university, and engaged in dialogue with state officials. Through these processes of knowledge generation and sharing, perceptions of homelessness and the housing crisis began to shift. Case Study 4 highlights that before systems can be restructured, perceptions of the systemic issue might need to be reframed through knowledge generation, to create a foundation for institutions to be built and transformed in the future.

Case Studies 2 and 6 similarly display the need for a knowledge basis to build institutions. In Case Study 2, the research group worked with waste pickers to map their experiences of climate change, and in Case Study 6, a framework was developed for the urban local body to better integrate community-identified needs and issues into urban planning processes. In Case Study 2, the knowledge generated with waste pickers was then translated into commitment letters signed by the Prosecutor's Office, the Municipal Waste and Citizenship Forum, and WIEGO (the organisation delivering the initiative). This served to better incorporate the experiences of waste pickers into institutional planning. The case highlights that with willingness from powerful state actors, the knowledge generated through co-production can be integrated into existing institutions and bring about changes in these establishments. In Case Study 6, knowledge generated through the co-production process led to the formation of Community-based Organisations (CBOs) and youth groups. Elected leaders from CBOs were responsible for addressing issues identified in the Local Area Plan as well as perpetuating further knowledge sharing. Youth groups also addressed specific issues which had been identified. The formation of the CBOs facilitated further participation of the community in decision-making and helped to establish a dialogue with the Ward councillor. Case Study 6 shows that co-production of knowledge can also lead to the establishment of entirely new institutions that generate capacities for the local community to advocate for themselves and address community needs.

Case Studies 1, 3, 5, and 6 exemplify how sharing in the co-production process can also build informal institutions within the vulnerable group, as well as with other stakeholders. In Case Studies 1 and 3, communal mapping with people from the neighbourhood built informal institutions within the vulnerable group by improving understanding between different demographics and uniting them in pursuit of a common goal. Case Study 6 also built informal institutions within the vulnerable group through the formation of 10 Self Help Groups (SHGs), which provided a space for families to support each other through participation in initiatives and by generating and sharing knowledge. The SHGs particularly focused on engaging women, which was key to empowerment. Case Study 5 similarly built communities of

practice which promoted active collaboration and learning from each other on lived experiences of implementing ecosystem-based adaptation, alternative livelihoods and the co-production process. In Case Study 5, however, the informal institutions facilitated mutual learning for powerful and intermediary stakeholders.

In summary, knowledge generated through the co-production process can serve as a foundation for building future institutions, be translated into formal institutions if there is willingness from stakeholders, or create informal institutions of social inclusion and communication.

Impacts through creative methods

Case Studies 1 and 8 show that meaningful impact can also be achieved through creative methods. In Case Study 1, an artistic intervention was carried out by the women who attended the Villa Manuelita Health Center and the neighbourhood dining halls by decorating the tables of the newly transformed city square with a mosaic technique. Through this artistic intervention the case study employed the concept of dwelling (Jones 2019) to reaffirm the women's presence in the social space from which they had previously been excluded. Creative methods can therefore also allow for stakeholders to become active constructors of 'everyday life in place and time' which has positive impacts in creating long term inclusion (Jones 2019).

Case Study 8 used digital storytelling, photography 'hangouts', collaborative design competitions and other creative methods to generate empathy between stakeholders and foster trusting relationships in an inclusive and accessible way. The emotional impact of creative methods transformed the relationship between the general public and the city county government from confrontational to one of mutual support and collaboration. Creative methods also encouraged the participation of individuals and groups who may be deterred from participation in formal community meetings and dialogues. As a result, the initiative was able to generate a sense of urgency among a broad variety of stakeholders to address issues of air pollution, congestion and road safety. Creative methods were also a medium through which to test, measure and document the impacts and experiences of the initiative. Overall this led to enthusiasm and greater openness of stakeholders such as National City County Government and UN-Habitat officials to integrate creative methods into processes of co-production, planning and project delivery. It also encouraged NCCG staff to co-produce and experiment with projects and planning. Although the use of creative methods was limited by budgetary and resource constraints. Creative methods can therefore be particularly useful in generating an emotional impact and transforming the relationships between stakeholders.

Evaluation of the Framework

This section will utilise the findings of case study analysis to evaluate the guiding capacity of Barcena and Bahadur's (2023) urban resilience co-production framework and suggest potential improvements.

The framework was useful in highlighting contextual factors that would influence the co-production process. As revealed in case study analysis, understanding of power dynamics in the context of the initiative was key to deciding the method of co-production, its scope, and which stakeholders to include in the co-production process. The contextual categories – public institutions, electoral politics,

economic processes and culture – highlighted by the framework help to identify these power relations, and guide effective co-production.

It is important to note that in the most effective implementation of contextual factors they were not viewed as static and there was continual engagement and consideration of them throughout the process. This was achieved by mapping and learning that continued to evolve in collaboration with stakeholders, and included their insights throughout co-production. A phased approach to the co-production processes facilitates a dynamic understanding of contextual influences whilst also building the trust and commitment of stakeholders. While the framework categorises these contextual factors, it is important to recognise they are interlinked and to consider a systems approach to them. Understanding how contextual factors interact with each other in a system allows an urban resilience initiative to identify which actors are key to achieving its aims.

The defining problems and solutions orientation had the most impact on engagement of vulnerable groups. While working with pre-defined problems and solutions, as well as pre-identified stakeholders, is easier and faster, this approach is not necessarily the most beneficial for achieving the aims of the initiative, and it excludes marginalised groups. Willingness to reframe pre-defined problems and solutions increased empowerment for vulnerable groups and helped the delivering organisation to have greater impact. Defining problems and solutions did not have a significant separate impact on powerful groups, and therefore it is recommended that this orientation be adapted as relational to orientations towards vulnerable groups.

While the achieving impact orientation is applicable to some aspects of urban resilience intervention, its binary nature fails to capture the impact of other aspects. Infrastructural initiatives are particularly overlooked by a binary approach, as their material impacts are significant, but do not fit into the categories of knowledge generation or building institutions. By degrading the achieving impact orientation from assessing the overall impacts of an initiative, to assessing the impacts of the initiative towards vulnerable and powerful groups, the orientation can be more productive. Hence it is recommended that the achieving impact orientation be adapted as relational to the orientations towards vulnerable and powerful groups.

The framework for co-production is a flexible tool, and should be deployed in different ways based on the needs of the initiative. For example, an initiative may begin by inquiring the context, and then identify suitable orientations and a domain of action to build urban resilience. The framework can also be deployed in reverse by first deciding on a domain of action, and then inquiring contextual influences and determining orientations. The sequencing of the framework should therefore be perceived as dynamic, adaptable to the needs of the initiative and stakeholders.

Between powerful and vulnerable groups, there are a lot of intermediary actors who don't necessarily hold stakes in the initiative but are involved due to value-driven reasons. These groups often provide the initiative with technical support or help to build trust with vulnerable and powerful groups. Their input can determine the success of the co-production process. Their involvement in co-production could be captured by an additional orientation towards intermediary actors, with a binary spectrum ranging from 'technical support' to 'building trust and networks'.

One key factor that the framework does not fully address is the long-term sustainability of the intervention and long-term impact of the co-production process. Best practice in co-production processes for urban resilience interventions must include mechanisms of participation, maintenance and reflection. This is important as climate risks continue to evolve in magnitude and frequency.

Finally, it is important to foster a sense of pride in the outcomes of co-production and for all stakeholders to be recognised and given appropriate credit. This is important for sustaining the participation and engagement of stakeholders, and for building trust and relationships between different actors and organisations.

Conclusion

This paper evaluated Barcena and Bahadur's (2023) urban resilience co-production framework by evaluating the practical implications of co-production orientations in nine different case studies.

Through applying the framework to these case studies key lessons and learning for co-production for urban resilience interventions were highlighted. These included using processes of defining and re-defining the issue with local communities and stakeholders through mapping, building and sharing knowledge between stakeholders, and deploying a phased approach to delivering the intervention as key for building trust and capacity. The need to consider power dynamics between different stakeholders in order to engage them all in an inclusive and safe way was also highlighted. Knowledge generation (and sharing) and building institutions are integral to sustaining a longer term impact of the policy, ensuring local stakeholders have the capability to maintain and evolve the interventions. Embedding flexibility, reflection and evaluation into the interventions is integral to ensuring inclusive participation of different communities and groups, and is key to working in culturally specific contexts. This learning provides insights and lessons for the future co-production of urban resilience interventions.

Based on these findings, the paper highlighted key utilities, as well as areas of improvement in the co-production framework. The framework's consideration for contextual factors provides good guidance for future initiatives, as it facilitates understanding of power dynamics and norms in the co-production process. Contextual factors must, however, be viewed as a dynamic interacting system, in order to identify which stakeholders and methods of co-production are significant for achieving the aims of the initiative. It was found that the 'defining problems and solutions' orientation, as well as the 'achieving impact' orientation, would better serve their guiding purposes when made relational to orientations towards vulnerable and powerful groups. The framework should be deployed in an order that best facilitates the individual initiative. It is recommended that the framework adopt an additional orientation towards intermediary groups and organisations, in order to capture their involvement in the co-production process by providing technical support, or building trust and networks. Consideration for long-term impacts should be adapted as a best practice guideline for future initiatives. Finally, fostering a sense of pride in the outcomes of co-production and giving appropriate credit to all stakeholders is important for sustaining participation, and building relationships between them. These learnings are important for future application of the framework, to guide the development and implementation of co-production processes for urban resilience interventions in different contexts.

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Appendices*

Each appendix should be clearly numbered with a title

Acronyms*

Acronyms

AALMAC	Association of Local Authorities of México AC
CBOS	Community-based Organisation
COPACIS	Citizen participation councils (Mexico)
ENUT	National Survey on Time Use (Mexico)
i-CMiiST	Inclusive Sustainable Transport Planning (Nairobi)
IGSSS	Indo Global Social Service Society
IIED	International Institute for Environment and Development
IIED-AL	IIED América Latina
INEGI	National Institute of Statistics and Geography (Mexico)
IVC	Instituto de la Vivienda de la Ciudad
LAP	Local Area Plan
NCCG	Nairobi City County Government
NGO	Non-governmental Organisation
RAS	Refugee Affairs Secretariat (now DRS)
SC	Scheduled Caste
SHG	Self Help Group
ULB	Urban Local Body
WIEGO	Women in informal Employment: Globalizing and Organizing
WRI	World Resources Institute

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