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Reframing governance possibilities for urban biodiversity conservation through systemic co-inquiry

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Abstract

Despite decades of effort, biodiversity has not attracted effective political discourse, policies, or action to halt its decline. In cities in particular, biodiversity conservation is challenged by short-term approaches, separately focusing on biodiversity or community well-being rather than on their interconnection, and pervasive beliefs that urban citizenry lack the requisite ethic or skills for conservation action or biodiversity governance. We describe how a systemic co-inquiry in Victoria Australia, conducted by citizen and agency practitioners alongside policy developers and academic researchers, modified understandings, practices, and institutional arrangements (governance) for urban biodiversity conservation. The most impactful outcomes of the early co-inquiry period were (1) start-up funding for a network to forge collaborations between community and local government actors that engage urban residents in supporting indigenous biodiversity in their gardens, and (2) empowered co-inquiry members driving the network's development. These efforts have led to on-going social learning and long-term institutional arrangements for a burgeoning network of municipally based nature stewardship collaborations that are nurturing local human–nature relations. Key challenges include(d): maintaining the co-inquiry, paradigms that undervalue urban biodiversity and the role of citizens, organizational inertia, and evaluation measures incommensurate with strengthening person-nature relationships. Our research shows how systemic co-inquiry involving citizen practitioners can surface misleading assumptions around biodiversity stewardship and governance, and help to empower citizen and agency actors to focus on nurturing sustainable human-nature relations in cities.

KEYWORDS
biodiversity conservation, biodiversity stewardship, governance, human–nature relations, social learning, systemic co-inquiry, urban biodiversity

1 | INTRODUCTION

Sustaining healthy human relations with non-human nature is not an end-state, but an unfolding dynamic. Currently we humans are clearly on an undesirable trajectory, with global biodiversity and ecosystems in rapid decline due to human activity (McPhearson et al., 2021). Contributing factors include concepts and stories about biodiversity conservation that constrain how we understand and act (e.g., species-centric conservation campaigns devoid of social considerations) on its loss (Wyborn et al., 2019); biodiversity conservation initiatives that

inadequately focus on power and politics (Fougères et al., 2022); governance approaches that are short term, reactive, and limit civil society participation (Clark & Harley, 2020; Merçon et al., 2019); siloing of research and policy efforts into separate (albeit inter-related) agendas and forums such as climate change, biodiversity conservation, and sustainable development (IPBES and IPCC, 2021; Ison & Straw, 2019); and a failure to address nature—society interactions in terms of their dynamic interconnections, heterogeneity, and non-linearity (Clark & Harley, 2020).

A strong argument can be mounted that the ongoing decline of biodiversity exemplifies framing failure around "governance" and "biodiversity conservation" overlaying deeper-seated problems associated with framing choices for "nature," including "urban nature" (Kowarik et al., 2020) and the value of nature, for example, focusing only on instrumental or economic values (Buijs et al., 2022). As Woroniecki et al. (2020, p. 1) argue "nature is neither passive nor external to human society but expressed in frames" and these frames can affect the response of social actors to environmental change. For example, the paradigm that biodiversity conservation is the role of professionals in areas with minimal human modification reinforces disconnection between urban communities and the nature they shape, and disempowers residents as actors (Adams & Mulligan, 2003).

There are expanding calls for and attempts at governance reform through forms of co-production between diverse social actors (Chambers et al., 2021; Lavorel et al., 2020). It is the limited evidence of innovation and sustainable progress in governance reform of the type that incorporates diverse civil actors, social learning, ongoing interrogation of understanding and practices, and responses to uncertainty and change, that our research sought to address.

Our research asks: how can systemic co-inquiry be used to modify the governance (i.e. practices, understandings, and norms and rules) of urban biodiversity conservation? We do this by using a case study—a co-inquiry on the governance of urban biodiversity in the state of Victoria Australia—and explore how its initial phases laid the foundations for a now burgeoning network (Gardens for Wildlife Victoria) of community–local government collaborations that are nurturing local human–nature relations (Gardens for Wildlife Victoria, 2022a; Mumaw & Raymond, 2021).

We begin by describing our theoretical approaches to framing and governance, followed by an account of systemic co-inquiry and its suitability for stimulating urban biodiversity governance innovation. The methodological approach and co-inquiry description follow. Findings, discussion, and conclusions complete the article.

2 | LITERATURE REVIEW—KEY THEORETICAL FRAMINGS

2.1 | Framing

By framing, we refer to the assemblage of elements and relationships associated with a word or concept, infused with underlying beliefs, values and perceptions (Lakoff, 2010). These are often unsaid, unreasoned, and unconscious (Schon & Rein, 1994). Schon and Rein (1994) contend that controversies arise when contending parties hold conflicting frames. Scranton (2015) and Ison and Straw (2020) make the case that deframing (consciously removing historical frames from consideration and use) and reframing (developing new frames) are the first critical steps for governance innovation.

New framings of the links between ecosystems and society continue to emerge, changing peoples' values and expectations of nature, and their perspectives on conservation (Colloff et al., 2017). In using a systemic co-inquiry we particularly sought to avoid pre-determined concepts of what effective urban biodiversity conservation planning might be, for example, based solely on ecological goals, knowledge, and quantitative targets, or relying on projects that do not allow for emergence of new or responsive approaches in order to pursue innovation and change (refer Fougères et al., 2022 for a review of these pitfalls in ecosystem conservation). Nor did we adopt an a priori normative framing for biodiversity conservation in the urban context. Instead, through the systemic co-inquiry the range of framings of diverse participants were brought into consideration and articulation to enable a commonly held framing for "urban biodiversity conservation" to emerge. How and what concepts emerged comprise some of our research findings.

2.2 | Governance

By governance we refer to the arrangements, including practices, institutional arrangements and underpinning meanings and assumptions that societal actors use to make decisions and take actions for the common good (Clark & Harley, 2020). Within this framing actors include state (public agencies), market, community, and non-profit sectors, and individual people who may have diverse roles within these sectors (Avelino & Wittmayer, 2016). For any social innovation to be effective a conducive governance setting is required, one that enables rather than constrains actors to undertake effective and adaptive practices such as social learning (Ananda et al., 2020; Ison & Straw, 2020).

Environmental governance operates at the interface between interlinked social and ecological systems, across multiple scales and time periods (Paavola et al., 2009). Frameworks of environmental governance elements have been proposed (e.g., Bennett & Satterfield, 2018). Circularity, feedback dynamics and co-evolutionary coupling of the social with the biophysical are core to environmental governance where the presence of, and responses to, feedback from the biophysical world occur in relation to social purpose (Ison, 2016; Ison & Straw, 2020). Many hold that environmental governance should be situated and principled (Coffey et al., 2020). A governing community can develop shared values, understanding, and responses in their relationship with nature to piece together new institutional and practice arrangements from what they have to hand (Cleaver & Whaley, 2018).

Urban biodiversity governance operates in social and ecological settings that are particularly dynamic and complex. There is a broad

spectrum of formal and informal urban biodiversity conservation initiatives operating in different places and scales on fragmented patches of public and private land (Bulkeley et al., 2022; Pauleit et al., 2019). These use diverse governance approaches involving a range of actors singly or combination, such as national, state, and local governments, NGOs, community organizations, and citizen volunteers; vertical integration (from local to national and beyond) is rare (Bulkeley et al., 2022; Hansen et al., 2022).

While this growing diversity of approaches heralds opportunities to positively transform urban biodiversity governance, contestation and inequities over who is involved and what nature will be conserved continue (Bulkeley et al., 2022). The prominence of biodiversity in urban policy making and planning remains relatively weak, for example, often biodiversity is listed as a "co-benefit" of economic or climate change policies, reducing attention on addressing the drivers of biodiversity loss (Bulkeley et al., 2022). Municipal policies dealing with urban greening are inconsistent, conflict with urban densification strategies, deal inadequately with biodiversity on private land (Bush, 2020; Puppim de Oliveira et al., 2011) and are poorly integrated with social and wellbeing considerations (Maller, 2021; Mumaw & Mata, 2022). Positive changes in urban greening planning and governance have frequently proven to be incremental (Hansen et al., 2022). Research is needed that engages, and is understood by and relevant to, practitioners and stakeholders (Fougères et al., 2022).

2.3 | Systemic co-inquiry

The burgeoning field of inquiry and innovation around biodiversity governance is built upon different theoretical and praxis lineages making comparisons a problematic undertaking (Hölscher & Frantzeskaki, 2021; Torrens et al., 2021). It is often unclear whether the effectiveness of particular approaches relates to, inter alia, their ontological and epistemological basis, institutionalization, design affordances, praxis efficacy or the extent to which an innovation is enabled by the current modes of operating governance practices. (Ison & Straw, 2020; Raymond et al., 2021).

Systemic co-inquiry involves participants in exploring framing choices, governance arrangements, and praxis in order to set in train viable governance approaches to address a situation of concern where the struggle is to know and agree what "the problem" is and where improvement arises through changes in trajectories of unfolding human-nature relations. The challenge of urban biodiversity conservation fits the features of such a situation of concern.

The approach to systems thinking in practice described here arises from 50 years of systems education design and provision (Ison, 2017; Open University, 2022). Importantly, systemic co-inquiry begins with situations rather than systems; systems are created as epistemological tools by participants for understanding and addressing their situations of concern. Uncertainty, the condition of not knowing, is acknowledged from the start of a systemic co-inquiry, with a contingent requirement to monitor and respond to feedback/learning over time (Ison & Straw, 2020).

Participation in a systemic co-inquiry is triggered by enthusiasm for an issue that motivates people to accept an invitation from the organizers/enablers/facilitators to enter into a conversation that becomes, for those who remain engaged, a co-inquiry process (Mackay, 2018; Mackay et al., 2020). The major limitations of such an approach are the skills to choreograph an unfolding performance among participants agreeing to engage in concerted action.

Systemic co-inquiry is informed by lineages of scholarship that include Deweyian inquiry (Dewey, 1982), and insights from and experience with deliberative policy analysis, action research and coproduction/co-creation approaches (Bartels et al., 2020; Bartels & Wittmayer, 2018; Heron, 1996; Reason & Bradbury, 2008). In this research lineage, social learning is an emergent property of a co-inquiry and can be conceived of as both a social process and a mechanism by which new practices, understandings and rules or norms can together be institutionalized within a governance system (Collins & Ison, 2009).

Among the key conceptual bases of the theory of change (Maru et al., 2018) that underpins systemic co-inquiry are understandings that knowledge and context are "evoked within practice" (Cook & Wagenaar, 2012, p. 3), all being and doing creates and responds to changes within the context (Proulx, 2006), and all actors have a history, a tradition of understanding out of which they think and act (Russell & Ison, 2000). As an approach, appropriately enacted, it is sensitive to different ways of knowing and to different knowers (e.g., Greenaway et al., 2022; Jagannathan et al., 2020).

A body of research evidence has now accumulated showing the efficacy of systemic co-inquiry to enable social learning processes to begin (e.g., Foster et al., 2019; Hannaford et al., 2019; Hovardas, 2021; Ison et al., 2021). There is less evidence for how social learning, realized through systemic co-inquiry, can contribute to more effective governance systems in the longer term, that is, practices of on-going social learning and adaptive governance (Li & Wagenaar, 2019).

3 | METHODOLOGICAL APPROACH

3.1 | Enacting the systemic co-inquiry

The Victorian urban biodiversity conservation co-inquiry arose as one of four sub co-inquiries from an overarching systemic co-inquiry into opportunities to improve natural resource management (NRM) governance in the state of Victoria, Australia (Allan et al., 2020; Mackay et al., 2020). The situation of concern for what became the urban biodiversity conservation co-inquiry was initially expressed as the decline in human-nature relations in urban Victoria. The overarching inquiry (from here the NRM co-inquiry) was facilitated by a consortium of researchers with common experiences in the failure of NRM governance despite significant investment and policy development over 30 years. It brought together NRM practitioners from community groups, regional and state agencies, and local government; philanthropic trusts and universities to inquire into how NRM governance could be improved (Mackay et al., 2020).

Each sub co-inquiry involved one or two members of the NRM researcher consortium and organized forums that supplemented events held by the NRM co-inquiry. The initial four members of the urban biodiversity working group invited twelve further co-inquiry participants on the basis of their experience, current roles, and leadership in grass roots biodiversity stewardship (three), biodiversity conservation policy and/or management at local (two), regional (three) and state (five) levels, and related academic research (five); two had experience in two categories. Nine of the 16 participants were citizen (five) and agency (four) conservation practitioners working on private and/or public land, reflecting the importance of engaging coal-face actors in planning for and sustaining change.

A timeline of the workshops and meetings during the co-inquiry period covered by this article is shown in Figure 1. Events (denoted by alpha-numerics referenced in the rest of the article) took place between February 2015 and August 2016. They were organized as part of (A) the NRM co-inquiry and B) for the urban biodiversity conservation co-inquiry alone.

The rationale and design (reported in Allan et al., 2020) for events A1-A5 (Figure 1) in summary were: (A1) frame the co-inquiry; (A2) describe an ideal system to achieve the vision of co-inquiry participants; (A3) describe the current system, identifying emergent themes and exploring patterns; (A4) codesign interventions that could lead to a desirable purposeful system; (A5) select a change pathway that is systemically beneficial and culturally feasible.

Sessions B1-B5 (Figure 1), specific to this co-inquiry, included meetings with Victoria State Department of Environment (DELWP) staff (B1, B3, B4), a briefing session with recruited co-inquiry members to bring them into the process (B2), and a workshop to detail a fundable urban biodiversity conservation improvement project for DELWP (B5). Minutes of each of these events were provided to attendees. The research received ethics approval from the Research Ethics Committee of Monash University.

3.2 | Data making and analysis

Authors of this article were members of the urban biodiversity conservation co-inquiry. As action researchers, we acknowledge that our interactions, reflections, and the context within which we explore questions inform and are part of the data making. We paid rigorous attention to self-reflexivity and transparency and use thick description and external evidence of impact to assist readers to consider application to their contexts and to address markers of quality

in our field including credibility and contribution (Richards & Morse, 2013; Tracy, 2010).

For data making we drew on minutes, preparatory materials, and diagrams associated with the co-inquiry, and personal diary notes. Additionally, in October 2019 we met, with these materials in hand, to jointly refine and analyze data from the co-inquiry period reviewed for this article (not included on the Figure 1 timeline). One of the authors facilitated the review with prompts reflecting the intended purposes of the co-inquiry: (1) develop shared understanding of the situation of concern (What is your understanding of "urban biodiversity governance" in Victoria? How did the initial phase of the co-inquiry develop this understanding?), (2) select a change initiative (How/why did your thinking about opportunities to change the urban biodiversity conservation situation evolve into the chosen initiative?), and (3) implement the initiative and share learnings about the process (What were the challenges, achievements, and learnings from the initial phase of the co-inquiry and since that time?). The facilitator provided notes of the discussion for further feedback from the group.

4 | FINDINGS

Our findings are presented in three inter-related sections. Firstly, we describe the shifts participants had in understanding, conceptualizing and reframing urban biodiversity governance conservation through the initial phase of the systemic co-inquiry. Secondly, we describe our assessment of the outcomes in terms of changed policy and practices, and thirdly, our learnings about conducting and maintaining a co-inquiry seeking to effect a trajectory shift in the prevailing governance system.

4.1 | Developing systemic understandings

4.1.1 | Framing and reframing by the co-inquiry

"Rich picturing" (Bell et al., 2016; Oreszczyn & Lane, 2017) was used at A1 and B2, when new participants joined the co-inquiry, to explore different perspectives on urban human-biosphere relations. Rich picturing evokes framing images and metaphors and matters of personal concern by requiring you to draw a picture of the situation and place yourself in your picture, to share pictures with others, and to jointly collate a set of important "emergent themes" worthy of ongoing inquiry. From rich picturing participants came to agree on some key framing dimensions of the situation: (1) people all have a
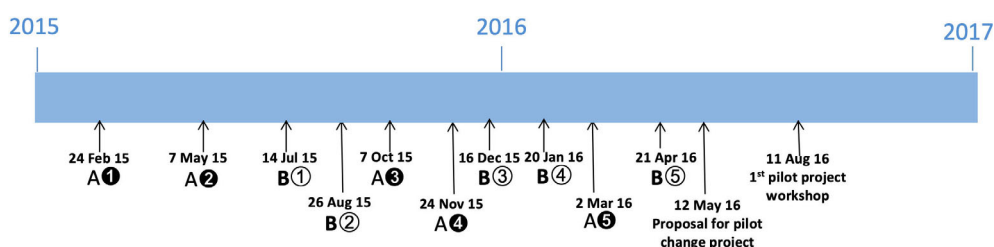

FIGURE 1 Workshops and meetings reviewed for this research. A = NRM co-inquiry events, B = separate biodiversity co-inquiry events. [Color figure can be viewed at wileyonlinelibrary.com]

relationship with nature; (2) people's health, wellbeing, and life opportunities rely on healthy biodiversity/nature; (3) biodiversity continues to decline and environments to deteriorate; (4) we need to involve everyone in nurturing nature; and (5) biodiversity planning is one mechanism to do that.

Participants outlined these aspirations: (1) Biodiversity conservation needs to be understood and pursued in ways that are *on-going* and *embedded* in the lives of all Victorians; (2) We need to plan and act for biodiversity in *urban* areas, where most Victorians live; and (3) We want to plan and foster biodiversity in ways that are *inclusive, recognizing and empowering individuals and agencies* to participate in *stewardship* efforts across *public and private land*. As emphasized by the words in italics, their aspirations look to the future, support nurturing human-nature relationships, embrace all social actors, and focus on urban biodiversity including the totality of its diverse environments and tenures. These aspirations continue to endure.

The second workshop (A2) built on the themes emerging from the rich pictures by exploring how planning for biodiversity conservation could be understood as "a system for" and identifying the interested stakeholders (Figure 2). In this "ideal" system the group conceived planning for biodiversity conservation as "a system to motivate and involve all Victorians in caring for our natural heritage" and concluded that the system would work better if there were better links between strategy making, decision-making and community involvement. Importantly, this reframing shifts development of a biodiversity strategy from a focus on plant and animal species and habitats, which in the view of the participants was a systemic failing of the prevailing mainstream policy, to motivating and involving humans to foster them.

The group continued to clarify their understanding of key concepts over the period reviewed; this helped to make framing assumptions apparent and to explore which elements required attention, and why. Participants agreed that by "urban" they were referring loosely to cities, townships and villages—areas with a high proportion of residents and residential land but under-considered as conservation actors and landscapes (Hostetler et al., 2011; Soanes et al., 2019). The group put a high value on conserving plant and animal species and ecosystems native to their locales, whether they be listed as threatened or endangered or not, within the fabric of urban ecosystems. The co-inquiry group came to define "codesign" as a collaborative activity wherein participating actors had equivalent contribution rights and responsibility, irrespective of any organizational standing, in the design and development of a program or process. They distinguished this concept from "consultative" processes that have criteria or boundaries set by one or more actors that restrict the ability of all actors to make a contribution, noting that organizations sometimes called these consultative processes "codesign." Their focus on codesign reflected their aim of developing a system that can "motivate and involve *all* Victorians in caring for our natural heritage" and their prior experiences with biodiversity strategy and decision-making that failed to incorporate community involvement, thinking, and knowledge.

4.1.2 | Exploring systemic issues and leverage points for change

To move toward effective systemic governance, the constraints and possibilities of current arrangements have to be fully appreciated. To
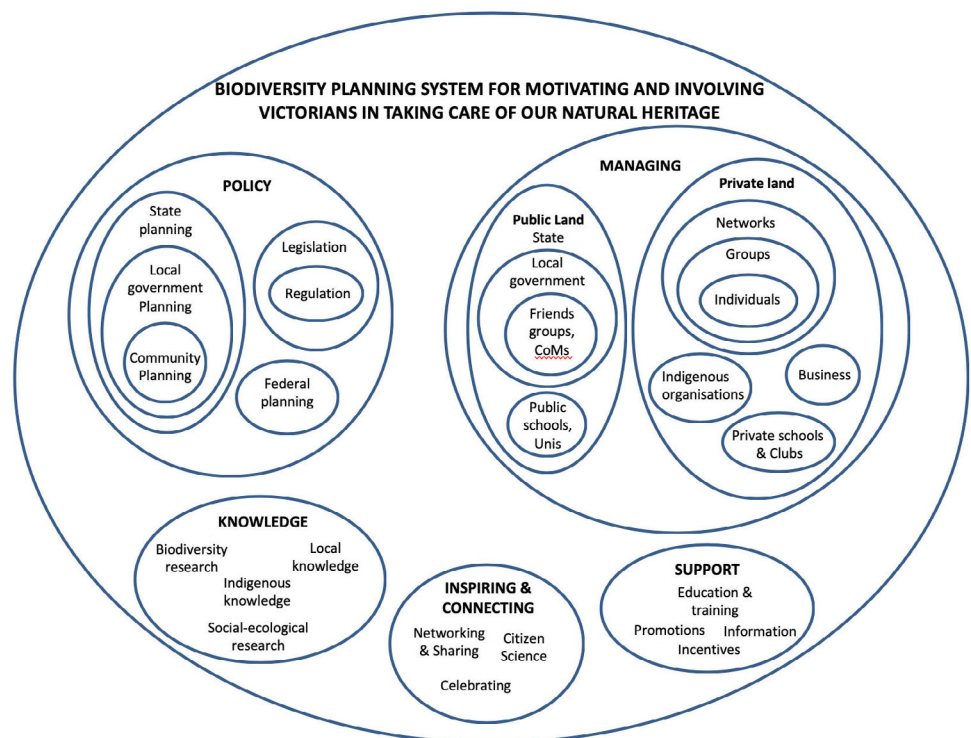
FIGURE 2 Elements of a biodiversity planning system to motivate and involve Victorians in taking care of our natural heritage. [Color figure can be viewed at wileyonlinelibrary.com]
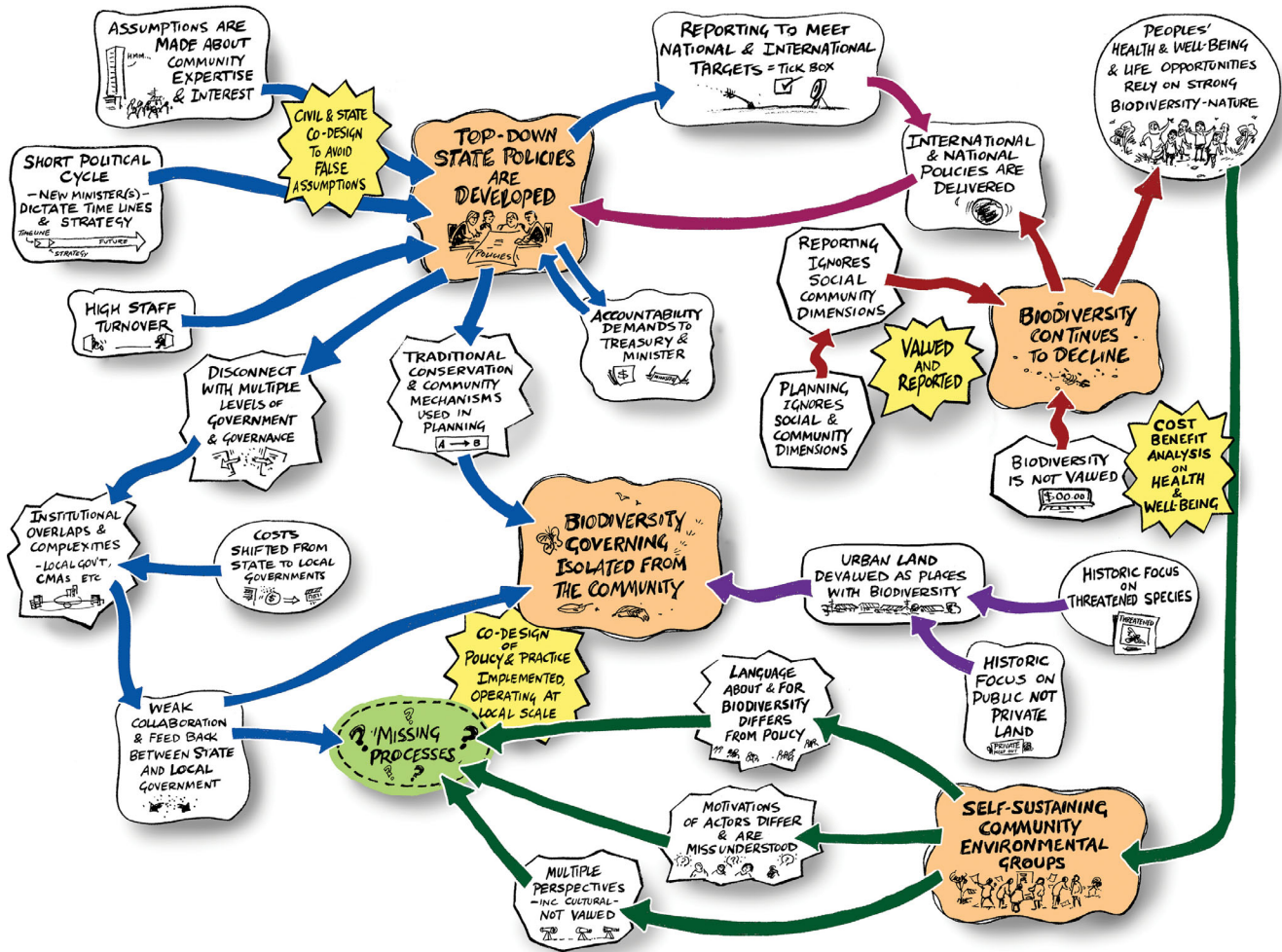
FIGURE 3 Multiple cause diagram generated by the co-inquiry group for urban biodiversity governance. [Color figure can be viewed at wileyonlinelibrary.com]

do this the co-inquiry group developed collaboratively a multiple cause diagram (Open University, 2006) based on their perceptions of interacting elements in the then "system of urban biodiversity governance" (Figure 3). This was not to produce a rigorous accounting, but rather to identify key context, starting conditions, systemic flaws and potential change pathways and leverage points (Meadows, 1997). Table 1 highlights key problematic areas identified by the co-inquiry group and an example of corresponding potential leverage points and pathways. Further detail is provided below.

Three key themes emerged around problematic causal relations. The first related to the framing and formulation of public policy for biodiversity conservation. Policies came pre-framed with assumptions and targets pre-established by international treaty makers, Federal Government and then State Government bureaucrats—with limited attention to contextual social factors, dynamics and implications. Short political cycles dictate timelines and strategy making. There was high staff turnover in state-agencies and accountability demands to Treasury and political priorities. Discontinuity between multiple levels of government (local, regional, and state government and their

TABLE 1 Problematic issues and potential change leverage points and pathways in urban biodiversity governance in Victoria Australia identified by the co-inquiry.

Problematic issues	Potential leverage point	Potential change pathway
Framing and formulation of public policy	Different conditions for public policy	Initiatives that require codesign with diverse actors and across divisional silos
Valuation of biodiversity: listed species, non-urban landscapes	Plan and act for urban native biodiversity broadly	Value and foster native biodiversity on urban private and public land
Disconnection between social and ecological dimensions of biodiversity stewardship	Recognize and report on inter-related human and ecological wellbeing factors	Involve urban communities to codesign local biodiversity conservation programs

agencies) also affected policy implementation, characterized by institutional overlaps, disconnections, weak collaboration and feedback, and perceived cost shifting from state to other levels of government. Together these factors constituted for those in the inquiry evidence of a dysfunctional system.

Participants felt that the potential leverage point to respond to these issues was to create different conditions for public policy development and use. They felt this change could be catalyzed by an empirical initiative that links various actors in pursuing a common purpose and requires working across organizational silos, for example, policy codesign which admits more diverse perspectives into agency processes.

The second theme related to how biodiversity was valued in the Victorian conservation and urban landscape contexts. State conservation goals were based on state- and national-listed threatened and endangered species, with the belief that the designated species would not thrive in urban landscapes. This belief was compounded by the use of "habitat hectares"—protected large-scale swathes of quality habitat—as a measure of species survival success with an accompanying focus on public land. Private land, while comprising the majority of urban land, is highly fragmented, outside government control, and perceived to be too costly or difficult to improve to conservation quality. Yet, many threatened species are found in urban areas (Ives et al., 2016) and cities can be refuges for these species (Lewis et al., 2019; Maclagan et al., 2018). The rapidly increasing areas of land set aside for high-density residential development in urban areas underscored that biodiversity was valued less there than development. Potential leverage points with particular importance for urban landscapes included: (1) to foster native biodiversity more broadly, including species perceived as common; (2) to value species native to and threatened in local areas, even if common in other areas; (3) to use a landscape approach, fostering conservation work on private land and integrating it with that on public land.

The third theme highlighted a set of disconnections between the social and the ecological dimensions of motivating and involving Victorians in biodiversity stewardship. The co-inquiry noted that organizational processes did not adequately engage many different urban actors, including their multiple perspectives, cultural values, and diverse language and concepts for biodiversity (De Kleyn et al., 2020). Assumptions made about urban community expertise, motivation and interest, disregarded the existence and impact of environmental volunteers and self-sustaining environmental groups who have successfully championed and fostered their local biodiversity. Moreover, biodiversity planning and reporting omits the human health, social connections, and wellbeing benefits linked to biodiverse environments and indeed, the nurturing of them (Husk et al., 2016; Maller et al., 2019). Potential leverage points here included: (1) to involve local communities and a wider range of professionals and disciplinary perspectives in codesigning biodiversity conservation strategies and programs, and (2) to focus on the social/community realm in tandem with the biophysical through performance measures, reporting, and policy implementation, in

particular social, health and wellbeing costs and benefits of biodiversity stewardship.

4.1.3 | Selecting a change initiative

The co-inquiry group agreed that the change initiative should be contextually grounded in the lives of urban Victorians, address private as well as public land, and focus on wellbeing and social benefits as well as the biophysical. Co-inquiry members considered potential initiatives from among the leverage points and pathways identified in their exploration of systemic issues that would achieve this purpose, drawing diagrams outlining how to put them into action, a method known as activity modeling (Checkland & Poulter, 2006). Figure 4 shows a diagram of the change initiative the group ultimately selected: convening community and government actors with expertise and motivation in urban environmental management to develop a framework for codesigning stewardship programs in urban communities and give "legitimacy to the importance of urban nature conservation" (Mackay et al., 2020, p. 6). The core elements of this initiative reflect key principles of systemic inquiry and knowledge co-production (Norström et al., 2020; Steyaert & Jiggins, 2007), that is: involve a mix of community and government actors to pool their multiple knowledges and skills to shape plans and develop a shared vision, purpose, language and values; embed ongoing learning by monitoring and reflecting on actions and their impact; and flexibly adapt successful programs to local contexts.

The group drew heavily on a collaboration familiar to co-inquiry members, Knox Gardens for Wildlife (in Figure 4, left bubble), codesigned and managed by a Knox environmental group and Knox City council. Research had shown that this expanding program, launched in 2005, involved hundreds of local households improving habitat for indigenous biodiversity in their gardens to align with local government efforts on public land (wildlife gardening) (Mumaw & Bekessy, 2017). Participation increased residents' well-being and social connections, increased their stewardship knowledge and practice, and strengthened the relationship between community members and local government (Mumaw, 2017; Mumaw et al., 2019; Mumaw & Mata, 2022). During the co-inquiry process (in the period between B1 and A4 on the timeline), some members had led workshops of local government biodiversity officers in which significant interest was expressed in adopting wildlife gardening programs of this type in their municipalities.

The change initiative was presented by seven of the co-inquiry group to a group of environmental volunteers (eight), biodiversity officers (14) from 13 local governments and DELWP biodiversity staff (two) (Figure 1, 11 Aug 16). Participants discussed various options for codesigning biodiversity stewardship programs but chose to develop a network to support expansion of wildlife gardening programs using the Knox Gardens for Wildlife program as a working model to adapt to local circumstances. Programs would not be duplicated, carbon copy fashion, but in a collaborative governance innovation, be codesigned and implemented by community members and local government staff within their own local government areas.
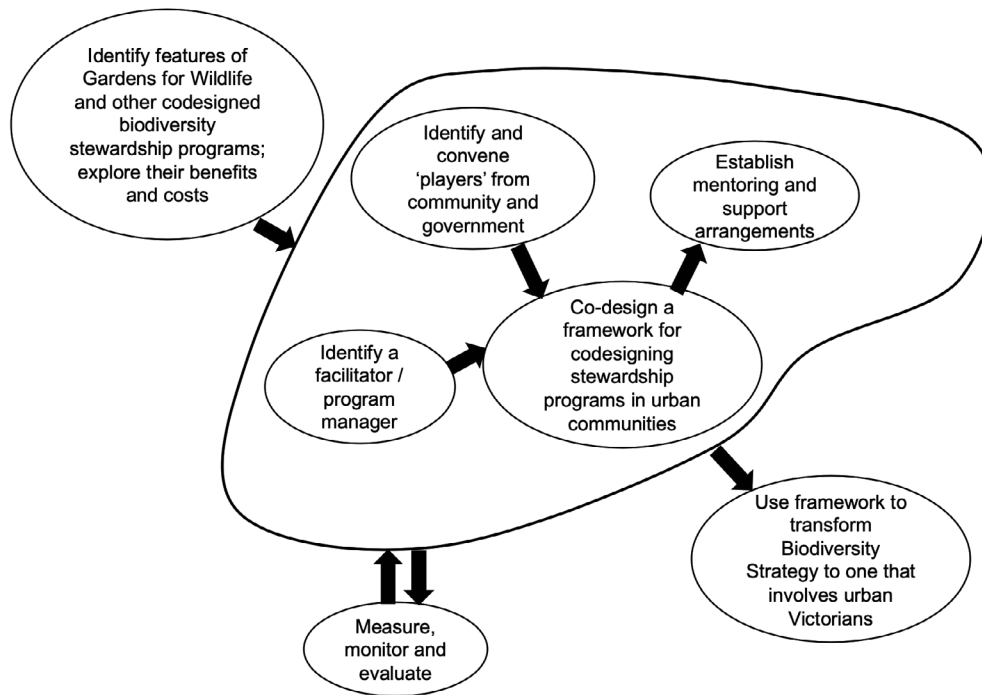
FIGURE 4 The key set of activities required for an initiative to embed nature stewardship in urban biodiversity governance through codesign/co-inquiry processes.

4.2 | Shifting from what is to what could be: Changing practice and policy

4.2.1 | Changing practice: A growing stewardship network

The change initiative proposed by the co-inquiry received approximately $40,000 for one year to launch as a pilot program in late 2016. A series of institutional innovations were made: a steering group was established, initially comprised of co-inquiry members, including research, local government, state government, and community members. By December 2019 the initiative had evolved to become Gardens for Wildlife Victoria, a network of community and government actors supporting the formation of codesigned biodiversity stewardship programs focused on wildlife gardening across Victoria (Gardens for Wildlife Victoria, 2022a; Mumaw & Raymond, 2021). By 2021 there were programs in various stages of development in 40 of Victoria's 79 local government areas (Gardens for Wildlife Victoria, 2022b). Funding from sources other than the state have been sought and gained. The successful formalization in 2020 of the co-inquiry hub in the form of a registered not-for profit charity (Gardens for Wildlife Victoria Ltd) with a board, marks a new milestone in the evolution of social learning through systemic co-inquiry as a "governance mechanism" within Victoria's overall biodiversity governance system. The Gardens for Wildlife Victoria board continues to reflect annually on the impact of their work, and whether, how and why they should continue, that is, to revisit at least annually the articulation and rearticulation of purpose, a key design feature of systemic co-inquiry. Research on the impact of the network and how best to assess and communicate its performance is a core activity (Gardens for Wildlife Victoria, 2022c).

4.2.2 | Changes in policy: Resistant paradigms and approaches

At the first workshop (A1), one of the DELWP participants suggested using the co-inquiry to contribute terms of reference for a new Victorian Biodiversity Strategy and begin to build the relationships and shared vision to develop and implement it. Despite the leveraging possibility of the co-inquiry this proposal turned out to be unrealistic. Other DELWP staff explained that they had already established a process with mandatory deadlines and reference groups drawn from state-level organizations, research institutes and established peak bodies, followed by a consultation process in which a short timeframe is given for public response to a pre-crafted document. It was agreed that DELWP Strategy development and the biodiversity co-inquiry would run in parallel. The co-inquiry would focus specifically on opportunities for planning and implementing urban and peri-urban biodiversity conservation with the involvement of community members, harnessing individuals with a passion for and track record of biodiversity stewardship. The choices made maintained the co-inquiry's on-going, self-directed, autonomy. The co-inquiry group provided feedback to a consultation draft of the Strategy, including a rationale for how the pilot program intervention could address the lack of tangible opportunities in the Strategy to develop and enact its goals on the ground in urban communities using collaborative governance approaches that involve community members (Mackay et al., 2020, pp 6–10).

During and in the time since the initial co-inquiry the authors confronted traditional paradigms about what biodiversity conservation is and who can do it. A clear demonstration of the tenacity of these paradigms in state policy development is their retention in the Victorian Biodiversity Strategy (now called a Plan) developed at the time of the co-inquiry, Biodiversity 2037 (DELWP, 2017). Despite interactions between co-inquirers and plan authors, the Plan's framing of the problem, solutions and players reflects traditional paradigms and approaches, detailed below. There is no articulation of the value (or potential) of urban landscapes and actors to contribute to conservation. Nor is there reference to the urban nature stewardship-framework developed by the co-inquiry.

While the Plan has a social goal, listed first—"Victorians value nature" - and an ecological goal—"A healthy natural environment," these are illustrated as two separate objectives with no interconnecting pathways (ibid, p. 13). The corresponding narrative and measurement frameworks for each are also presented separately. Social initiatives are described as "enabling," with measures of success to be developed in an undefined future, suggesting how new, and therefore poorly developed these are.

By contrast, within the Plan, the ecological objectives, targets, methods and measurement framework are highly prescribed. They incorporate traditional methods and assumptions identified by the co-inquiry as problematic for inclusive urban biodiversity governance. The key measure of success remains "net change in suitable habitat" (ibid, p 19) and the key mechanism to achieve this is "collaborative forums" which "plan a response to statewide targets" (ibid, p. 15). The State is to develop the targets and build shared understanding of their procedures for how other actors can contribute and report (ibid, p 40), a continuance of exerting vertical governance power over local communities. Identified actors are drawn from local government, business, NGOs, traditional owners, and established community groups. There is no explicit role for citizen stakeholders. In the associated decision support tool (DELWP, 2018), urban areas are largely excluded. Built into the model are benefit–cost ratios whose parameters de-value urban land and actors, for example, opportunity costs associated with land use and transactional costs linked to "the number of stakeholder interactions likely to be required" (DELWP, 2018, p 11).

4.3 | Conducting and maintaining a co-inquiry

The authors initially experienced systemic co-inquiry as daunting because of the conceptual challenges involved. Facilitation by, and ongoing contact with, the NRM co-inquiry in the early phase was essential in supporting the co-inquiry and enabling it to develop its own skills and momentum. So too was championing of the co-inquiry by participants to their respective organizations and networks. Participants needed to be open to the learning of the group, not constrained as "representatives" of their organizations' pre-established position. It remained important to develop shared concepts and language, and to make theory more accessible through practical application. The limited amount of time agency staff had for co-inquiry participation was and

remains a key challenge; ongoing interchange is essential to develop shared understanding and relationships, and the impetus and empowerment to challenge top-down, project-oriented agency processes (Mumaw & Raymond, 2021).

5 | DISCUSSION

Our research has much in common with burgeoning interest in governance innovation and co-production processes (see Buijs et al., 2016; Bulkeley & Castán Broto, 2013; Chambers et al., 2021; Turnhout et al., 2020) but differs in two significant ways. Firstly, by means of a case study, it focuses on critical praxis elements that are key to *emergence* of longer-term practice by actors that include community members as well as policy developers and researchers. Secondly, from its early stages it devoted attention to how the governance system in which its innovation would sit and evolve over time could support the adequacy and sustainability of effective practices.

Our research shows how new understandings, new ways of knowing-in-action, and enhanced social relations can be developed from a systemic co-inquiry to generate new governance approaches to local nature stewardship in the form of linked citizen actor–local government collaborations. These collaborations, and the network that links them, continue to develop five years after the co-inquiry period reviewed in this article (as profiled in Frantzeskaki et al., 2022 and further explored in Mumaw & Raymond, 2021).

5.1 | Reframing urban biodiversity conservation

The foundational work of the systemic co-inquiry reported here involved breaking deeply entrenched conceptual framings for urban biodiversity conservation (e.g., a focus on listed threatened or endangered species in non-urban environments and overlooking of citizen actors as meaningful collaborators), then reframing urban biodiversity conservation as a collaboration between local government and residents. Together they care for indigenous species, common and threatened, across public and private patches of urban land to achieve intertwined human and ecological wellbeing benefits. This framing has potential to stimulate integration of community development and health policies with those for urban greening and urban biodiversity conservation (Davies et al., 2019). It supports continued exploration of the relationship between values and action, the directionality between them (Maller, 2021), and the implications for governance.

In the policy/governance space, our emergent understanding now deframes codesign as implementation of policies using "consultation" by agencies, and reframes it as designing policy and practice with concerned actors who build their roles through a social learning process. This approach encourages testing and modifying "in-the-doing" rather than adhering to projects with pre-established methods and targets developed within a short time frame. Our experience thus far (the process is ongoing) points to a continuing need for vigilance in articulating and rearticulating deframing and reframing concepts.

5.2 | Engaging and empowering new governance actors

A systemic co-inquiry with praxis elements as reported here, can give stakeholders the confidence, motivation and tools to trial a new form of governance that can catalyze a change in the broader governance system and scale up participation and impact (Mumaw & Raymond, 2021). A review of international case studies seeking to reshape how ecosystems can be managed sustainably using co-production approaches noted that projects emphasizing reframing "often struggled to engage solutions-oriented actors and produce concrete actions" (Chambers et al., 2021, p. 985). Participants in our co-inquiry (particularly citizen actors) initially found the work confusing and overly theoretical. Alongside acknowledging and embedding practitioners' concepts and language, bricolage (building on known examples and features of success—here the Knox Gardens for Wildlife program) proved to be a key tool in supporting governance change, as identified by others (Cleaver & Whaley, 2018). Having impact, doing something meaningful to you, having the capability to do it, having a choice, and having support are what cause participants to persist (Mumaw & Raymond, 2021).

5.3 | Institutional innovation

Cumming and colleagues (2020) in setting out a post-Ostrom[1] research agenda, argue for the need to understand how institutions emerge, change, and influence social-ecological outcomes. We report an example of how it is possible to design and manage for emergence of an unplanned institution, with actors that include citizen and agency practitioners as well as policy developers and researchers. At the start we had no blueprint, or specified goal, or set of objectives to be achieved deterministically, other than the desire to co-inquire around an issue of shared concern. Experimenting with governance parameters (practices, understandings and norms and rules) enabled the emergence of a mediating governance institution (Gardens for Wildlife Victoria), a network of citizen and government agency actors that operates between vertical (government-based) and horizontal (civil society-based) governance (Harris & Milofsky, 2019; Newig & Fritsch, 2009; West et al., 2019). It remains to be seen whether the institutional scaffolding within which the co-inquiry now exists will continue to exemplify and enact a different governance trajectory within the biodiversity conservation space.

Elements of promise for continuity in this new governance trajectory are (i) the fractal structure of the emerging GWV network as locally codesigning affiliate hubs; (ii) the largely self-organizing, yet "rule-based" approach around organizing principles (based on learning from the co-inquiry) through an affiliation process (Gardens for Wildlife Victoria, 2022d); and (iii) the efforts to build and sustain learning-based relationships among the network. Nonetheless, continuing to conserve and enact the principles of systemic co-inquiry is challenging, particularly the practice of codesign that involves government and community actors (Mumaw & Raymond, 2021).

Voices of hope and optimism are critical, as are examples of success grounded in the participants' knowledge, experiences and personal networks (Mumaw & Raymond, 2021).

5.4 | Tracking success for potential sustainable change

Cumming and colleagues (2020, p30) assert that "theory and concepts (including frameworks) should be both inspired and tested through observations of real-world phenomena". But which phenomena and over what time frame? Research using empirical case studies of how mediating organizations operating in the environmental governance space can form, develop, and endure is still emerging (e.g., Pereira et al., 2020; Pollard et al., 2020). Policy development is one area that participatory, multi-level governance collaborations involving civil and state actors struggle to achieve (Newig & Fritsch, 2009). The initial phase of the co-inquiry reported here shows similar struggles with influencing policy development, although subsequently, inroads are being made at local government level (Mumaw & Raymond, 2021).

Clearly significant changes in human–nature relations take time and thus require long-term monitoring of the development of governance and practice innovations over time and the related impact. We recommend using and recording success indicators critical to the progression of innovations from planning and exploration to achieving momentum, scaling, impact, and longevity. While some factors will likely differ with context, actors, and different phases of development, others, such as the longer-term building of social relationships around a shared vision and commitment to caring for biodiversity, will continue to be critical as a precursor to enhanced human-nature relations.

6 | CONCLUSIONS

Our research indicates that systemic co-inquiry can combine practice and governance innovation for biodiversity conservation with potential to alter, over time, the trajectory of sustainable human-nature relations. The co-inquiry has launched what appears to be a robust institutional form capable of evolving with changing circumstances—a formalized network of autonomous municipal local government–citizen conservation collaborations developed over the five years after the systemic co-inquiry began. The co-inquiry process reported here indicates that key catalysts for change include: (1) replacing unhelpful mainstream framings and processes with understandings and practice more attuned to working with complexity, uncertainty, and the long-term; (2) understanding biodiversity conservation actions as social learning seeking to alter, over time, the trajectory of sustainable human-nature relations; (3) recognizing and empowering citizens to be co-leaders and participants in change processes; (4) allowing for emergence of new institutional forms; and (5) embedding ongoing review and adaptation into processes.

The co-inquiry process provided a safe space for building common understanding, learning, relationship building, and empowerment

outside mainstream institutional constraints. This supported participants to interrogate the context (system) and challenge assumptions about urban biodiversity conservation - from how it is measured to who can enact it - and to embark on a process of learning how to build and expand an inclusive, shared ethic and practice to sustain it. In the face of the enormity of the challenge, it provided an avenue to experiment with a new approach that is grounded in real-life contexts, harnesses actors' multiple, partial, perspectives and knowledges in these contexts, and emphasises ongoing learning and adapting from the doing. We encourage further investment in, and ongoing experimentation with, governance innovation, to support what likely will be a portfolio of approaches related to the actors and situations involved.

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ENDNOTE

[1] Elinor Ostrom was a Nobel Prize winning American political economist who developed seminal work on social-ecological system frameworks and potential solutions for natural resource problems

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