



**Digital Commons@**

Loyola Marymount University  
LMU Loyola Law School

---

Center for Urban Resilience Scholarship

Center for Urban Resilience

---

2023

## Leveraging environmental stewardship mapping and assessment research as a relational process for ecology with cities

Bemmy Jennifer Maharramli

Michele Romolini

Follow this and additional works at: [https://digitalcommons.lmu.edu/ures\\_pub](https://digitalcommons.lmu.edu/ures_pub)



Part of the [Environmental Studies Commons](#)

---

This Article is brought to you for free and open access by the Center for Urban Resilience at Digital Commons @ Loyola Marymount University and Loyola Law School. It has been accepted for inclusion in Center for Urban Resilience Scholarship by an authorized administrator of Digital Commons@Loyola Marymount University and Loyola Law School. For more information, please contact [digitalcommons@lmu.edu](mailto:digitalcommons@lmu.edu).



## OPEN ACCESS

## EDITED BY

Byron Andrew Miller,  
University of Calgary, Canada

## REVIEWED BY

Victoria Fast,  
University of Calgary, Canada  
R. Patrick Bixler,  
The University of Texas at Austin, United States

## \*CORRESPONDENCE

Bemmy Jennifer Maharramli<sup>1\*</sup>  
✉ bmaharramli@college.ucla.edu

## SPECIALTY SECTION

This article was submitted to  
Innovation and Governance,  
a section of the journal  
Frontiers in Sustainable Cities

RECEIVED 27 May 2022

ACCEPTED 17 February 2023

PUBLISHED 06 March 2023

## CITATION

Maharramli BJ and Romolini M (2023)  
Leveraging environmental stewardship  
mapping and assessment research as a  
relational process for ecology with cities.  
*Front. Sustain. Cities* 5:954870.  
doi: 10.3389/frsc.2023.954870

## COPYRIGHT

© 2023 Maharramli and Romolini. This is an  
open-access article distributed under the terms  
of the [Creative Commons Attribution License  
\(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or reproduction  
in other forums is permitted, provided the  
original author(s) and the copyright owner(s)  
are credited and that the original publication in  
this journal is cited, in accordance with  
accepted academic practice. No use,  
distribution or reproduction is permitted which  
does not comply with these terms.

# Leveraging environmental stewardship mapping and assessment research as a relational process for ecology with cities

Bemmy Jennifer Maharramli<sup>1\*</sup> and Michele Romolini<sup>2</sup>

<sup>1</sup>Center for Community Engagement, University of California, Los Angeles, Los Angeles, CA, United States, <sup>2</sup>Center for Urban Resilience, Loyola Marymount University, Los Angeles, CA, United States

Increasingly, scholars, policy makers, and others have put forth that governance and management of urban environments requires a consideration of cities as social-ecological systems, necessitating involvement from a broad range of actors. Yet the research on environmental governance and development of tools to support it is often completed for rather than with those responsible for carrying out the work. We examined a university-led research effort on urban environmental stewardship in Los Angeles (LA), USA. A university urban research center conducted an environmental Stewardship Mapping and Assessment Project (STEW-MAP) in Los Angeles County, which draws upon network analysis and GIS to better understand sustainability relationships, opportunities, and gaps. STEW-MAP is intended to be both a research study examining stewardship organizations across sectors, scales, jurisdictions and geographic space, as well as an application providing tools to facilitate collaborative environmental stewardship. We sought to contribute to a better understanding of how the process of STEW-MAP can leverage sustainability for a more relational ecology with cities approach. To evaluate the process of the LA STEW-MAP, we conducted our conceptual analysis of this stewardship tool by examining co-production of knowledge and co-production of place, drawing particularly from workshops with community partners that took place in 2017 and 2018. This article will show that the LA STEW-MAP process can be improved to better operationalize a relational ecology with cities approach. This research contributes to the urban sustainability governance literature by focusing on how the process of the LA STEW-MAP can be a relational model and advance an ecology with cities' approach that captures and leverages multi-scalar interactions.

## KEYWORDS

urban environmental stewardship, ecology with cities, social-ecological systems, stewardship mapping and assessment, engagement

The interconnected spaces where environmental stewardship takes place can contribute to human health and wellbeing (Connolly et al., 2013). Ecosystems, and the services and benefits they provide through stewardship can contribute to making cities more resilient, sustainable, and livable (Tan et al., 2020). In understanding the place of natural ecosystems in cities, there has been a dynamic, interconnected discourse over the past 25 years that began as “ecology *in* cities”, then “ecology *of* cities”, “ecology *for* cities”, and most recently “ecology *with* cities” (Grimm et al., 2008; Jansson, 2013; Grove et al., 2016; Pickett et al., 2021).

Earliest in this discourse, the “ecology *in* cities” framing recognized ecological patterns and processes within cities as analogs to the same phenomena occurring in more rural or wildland settings. There was then an “ecology *of* cities” lens, which shifted to seeing the city and its surrounding regional landscape as one ecosystem, or social-ecological system, including equity and socioeconomic factors (ibid). The discourse then transitioned to how ecosystems can be *for* the benefit of residents in cities, or “ecology *for* cities” (Grove et al., 2016).

Most recently there has been the articulation of an “ecology *with* cities” approach (Pickett et al., 2021). Ecology *with* cities captures efforts toward sustainability and resilience in cities that are characterized by more co-productive, engaged, and reciprocal interactions in social-ecological systems (Pickett et al., 2021). Conceptually, our focus here will be on the “ecology with cities” approach, highlighting the importance of co-productive, reciprocal interactions for urban sustainability governance. An ecology with cities approach links co-production of place and co-production of knowledge, with engagement a key cross-cutting feature (Pickett et al., 2021). As Saltmarsh et al. (2009) explain, engagement can be a democracy building process, as described through their democratic civic engagement framework around reciprocity and shared processes and purposes.

In this conceptual analysis, we evaluate a specific process, the Stewardship Mapping and Assessment Project (STEW-MAP) in Los Angeles from the perspective of an ecology with cities approach; specifically, “the relationship of co-production of place, co-production of knowledge, and their synthesis to support research and action” (Pickett et al., 2021, p. 766). We build on a body of urban environmental stewardship and civic ecology literature contending that cities are social-ecological systems (SES) (Tidball and Krasny, 2010; Svendsen, 2016). A social-ecological system is where people and nature are linked and they both depend upon and influence each other (Berkes and Folke, 1998; Berkes and Colding, 2003; Cumming et al., 2012). Cities exemplify social-ecological systems given their complex and intense relationship with social and ecological systems both near and far (Tzoulas et al., 2007; Pickett et al., 2013; Andersson et al., 2014). We use the definition of environmental stewardship that is defined broadly as, “conserving, managing, caring for, monitoring, advocating for, and educating the public about local environments” (Svendsen, 2016, p. 4). Environmental stewardship can be a way of facilitating broader engagement with other social and ecological opportunities and challenges. Indeed, stewardship activities can be seen as a “civic asset”, as a way to engage communities and develop partnerships in local natural resource management and thus contribute to the “social ecological resilience of a community” (Tidball and Krasny, 2007; Krasny and Tidball, 2009; Folke et al., 2011; Svendsen, 2016, p. 5). We explore STEW-MAP as a means of better evaluating urban environmental stewardship across urban social-ecological systems and specifically how this process itself can be a platform for improving stewardship practices and collaborations (Arakawa et al., 2018).

STEW-MAP is a research program of the U.S. Forest Service and is, “designed to answer the questions: who are the active environmental stewardship groups in my area and where, why, and how are they caring for the land” (Svendsen, 2016, p.1). STEW-MAP was developed in New York City (NYC) when the city launched their Million Trees Campaign and their Sustainability PlaNYC in 2007 (Svendsen, 2016). STEW-MAP has since been applied in other U.S. cities, such as Baltimore, Chicago, Seattle, Philadelphia, Denver, Honolulu, San Juan, and internationally in Paris, France and Valledupar, Colombia. Research utilizing STEW-MAP is meant to allow for the integration of social and ecological phenomena, which has been a challenge to the study of urban stewardship networks and governance regimes that facilitate urban resilience and sustainability (Romolini et al., 2016b). STEW-MAP researchers have produced a body of scholarship on urban environmental stewardship, including characterizing (Fisher et al., 2012; Wolf et al., 2013; Westphal et al., 2014; Svendsen, 2016) and comparing (Romolini et al., 2016a; Jasny et al., 2019) stewardship organizations; assessing the relationship between the geographic locations of stewardship and environmental conditions (Romolini et al., 2013; Johnson et al., 2019); and examining the roles of stewardship networks and partnerships in governance of urban ecosystems (Connolly et al., 2013; Muñoz-Erickson et al., 2016; Romolini et al., 2016b). Romolini et al. (2016b) note that the STEW-MAP process can be a way to evaluate and facilitate social-ecological governance through urban stewardship networks, thus providing a platform for an ecology with cities approach.

After a STEW-MAP data collection is complete, the project can continue to be a public-facing tool in cities to help partners better understand social and environmental dynamics across a landscape over time (USFS, STEW-MAP). In our assessment of STEW-MAP as an ecology with cities process, we are particularly interested in whether and how STEW-MAP links co-production of place and knowledge, such as environmental stewardship interactions that are characterized as collaborative and reciprocal (Pickett et al., 2021). This conceptual analysis contributes to the urban sustainability governance literature by analyzing the process of LA STEW-MAP relationally across scales and its utility toward an ecology *with* cities approach. This article will show that the LA STEW-MAP process can be improved to better operationalize co-production of knowledge and co-production of place. There are two areas of analysis: (1) the utility of STEW-MAP in terms of co-production of place and knowledge, and (2) the challenges and potential of STEW-MAP as a strategic ecology with cities tool.

This work builds on previous STEW-MAP research, which has focused on the overall methods or the results of STEW-MAP in particular cities. By examining STEW-MAP from an ecology with cities lens, this conceptual analysis sheds light on the project’s value, challenges, and opportunities for environmental stewardship partners across scales, which can be insightful for other cities and sites considering conducting a STEW-MAP. We provide recommendations for STEW-MAP in the context of LA that can be applied in

other cities, noting these insights reach beyond the scope of STEW-MAP to inform other large scale urban social-ecological research programs.

## Background on LA STEW-MAP

This conceptual analysis was conducted as a research partnership between the two authors. We considered our own positionality during this research and sought to maintain reflexivity. After completing the data collection and preliminary data analysis, Center for Urban Resilience (CUREs) held two workshops in the summer of 2017 about the preliminary findings and sought feedback on how to make the resulting products useful for community partners. Participant observation of this workshop process captured conversations among CUREs staff members and partners about environmental stewardship in LA, challenges and opportunities, and the potential utility of the research. In addition, semi-structured interviews were conducted with LA stewardship practitioners. These two data sources—participant observation of the LA STEW-MAP workshops and semi-structured interviews—provide the main data sources for this conceptual analysis.

In total, there were 220 organizational representatives invited to participate in the two workshops, drawn from the STEW-MAP survey respondent data. Invitations for the workshops were sent via email and 33 invitees registered online for the workshop, with 26 organizational representatives participating. Each workshop was three hours long and followed the same format: (1) welcome and overview, (2) presentation of the LA STEW-MAP results and possible applications, (3) guided discussion for participants to provide their insights on how the data could be most useful in their work, and (4) concluding remarks and identification of next steps. The main question that the researchers asked participants during the workshops was, “Can you think of a time when STEW-MAP would be useful in your work?” As a part of this, they asked two sub-questions: “How is this data useful?” and “How do we get this data into practice?” Group discussions during the workshops provided the authors an opportunity to better understand STEW-MAP’s utility to environmental stewardship partners. The first author recorded detailed notes and a few others shared their notes from the workshops. The authors also drew upon relevant documents such as the STEW-MAP Framework Guidance, the LA STEW-MAP website, and the general STEW-MAP website (Svendsen, 2016; STEW-MAP, 2022; STEW-MAP USDA Forest Service).

The STEW-MAP framework guidance was utilized as a resource for informing the semi-structured interview guide questions. The authors interviewed more than 50% of the top collaborator organizations, as identified through network analysis of the STEW-MAP data (Figure 1). With some of the larger top collaborator organizations, there were multiple interviews with different members of their organization. These interviews allowed the authors to gain additional understanding, beneficial to the STEW-MAP workshops and participant observations of CUREs, of urban environmental stewardship in LA.

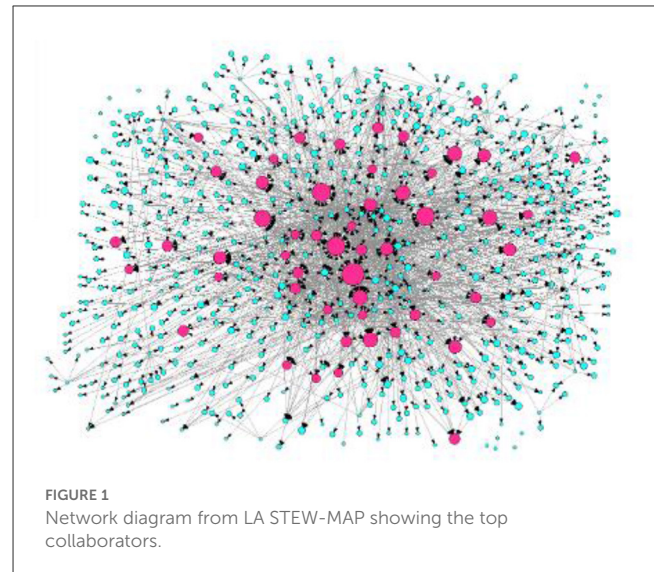


FIGURE 1  
Network diagram from LA STEW-MAP showing the top collaborators.

We examined the participant observation and semi-structured interview data (2017 and 2018) pertaining to the utility of STEW-MAP as a strategic tool for facilitating an ecology with cities process, focusing on co-production of knowledge and co-production of place. Most of this analysis draws from the STEW-MAP workshops, including planning the workshops, the workshops themselves and post-workshop reflections. We organize this conceptual analysis following the ecology with cities frame described by Pickett et al. (2021), evaluating LA STEW-MAP in terms of co-production of place, co-production of knowledge, and their synthesis to support research and action.

## Utility of LA STEW-MAP in co-production of place

As described by Pickett et al. (2021): “Co-production of place refers to the ongoing process by which the substance of the urban place itself is created by biophysical and social features and their interactions.” Stewardship practitioners and their collaborative networks are often at the nexus of these social-ecological interactions, and the research and associated tools of STEW-MAP have the potential to facilitate this work.

When asked how STEW-MAP could be useful to them, workshop participants described applications such as a static directory, a report, network analysis, research tool for case studies, interactive public database and online map that provides multiple ways of searching, and a mapping tool that utilizes stewardship turfs. Examples were shown of data applications developed in other STEW-MAP cities, including Seattle, Chicago, and NYC. Many participants described the utility of STEW-MAP as a layer in concert with other tools, or overlays. Box 1 describes the utilities of STEW-MAP, as described by the participants in the workshops. These uses show how STEW-MAP could be used by multiple partners to inform and guide better local environmental stewardship.



**BOX 1 Participant-described utilities of STEW-MAP.****STEW-MAP utilities described by practitioner participants**

- Apply as a user-friendly spatial layer in combination with other spatial tools
- Inform others which partners they can work with in an area
- Determine where “stewardship gaps” are spatially
- Assess the types of stewards working in an area
- Assist funders determine who to fund in an area
- Assist fundees justify being funded in a grant proposal
- Contribute and add texture to stewardship narratives in a place
- Analyze an organization internally through an ego-network (network of one organization)

One NGO participant explained during the workshop how they do not have the ArcGIS mapping software and that in their experience Google Earth crashes computers. They just needed to have access to smaller layers they could import into Google Earth, or to have layers that everyone can use “just for that instant”, such as what a STEW-MAP layer could provide. Another participant mentioned that they would like something more user friendly, “they don’t need 800 buttons”, they just want to know where organizations are. This seemed to imply that other cities’ tools, while appealing to university researchers, may not be user-friendly for other types of partners. Hill et al. (2019) caution how sometimes a tool that is meant to be useful to the community is overly complicated, and in the end has the unforeseen consequences of creating disengagement in the process.

Participants discussed how STEW-MAP could help local government entities determine which partners to work with in a place. Building on this, many agreed that STEW-MAP would be useful in helping partners determine where there are “stewardship gaps”, or little to no stewardship, in certain places. Another participant mentioned the Ballona Wetlands as an area that STEW-MAP could help assess more. The Ballona Wetlands Ecological Reserve is a protected urban area that has been the subject of decades of conflict over their management and restoration. The workshop participant explained that in considering who should be involved in decision-making about this place, “we know who the loud groups are, but who are the silent majority? The people who don’t have time to go to the meetings because they are working?” STEW-MAP research and tools could provide a way to identify and reach out to these groups.

## Utility of STEW-MAP in co-production of knowledge

As referenced by Pickett et al. (2021), co-production of knowledge “refers to the generation of scientific knowledge based on ongoing, mutually respectful, multi-way interactions among researchers, policy makers, managers, residents, and civil society.” The very intent of the STEW-MAP process, and the LA STEW-MAP workshops is to co-produce understandings of local

environmental stewardship that have value and meaning for the various stakeholders. Below are some examples that arose from our data.

Participants in the workshops discussed that an application of STEW-MAP is assisting funders determine who to fund, as well as to become more aware of how the same groups are being “tapped over and over again”. Conversely, the tool could also be used by fundees to justify in a grant proposal why a particular organization should be funded. The researchers cited this as having occurred in the case of the Baltimore STEW-MAP, with one of the organizations touting themselves as a top collaborator in funding proposals. These examples demonstrate the possible synergistic interlinkages between co-production of knowledge and co-production of place.

Participants seemed interested in the possibility of STEW-MAP helping their organizations reflect on how they define themselves and how they have changed as a form of co-produced knowledge. One participant from a top collaborator organization posed the question, “Is this the best stewardship version of ourselves?” After viewing the top collaborator network (Figure 1), participants were interested in going deeper into their own networks, aided by Ego Network analyses. In social network analysis, an Ego Network is defined as the network of one organization - their specific network, who they are sharing information with, and who they are receiving information from. The researchers showed examples of several organizations’ Ego Networks during their presentation in the early part of the workshops, and conversation ensued during the discussion portion, particularly in the second workshop. We explained that this could be useful for many reasons, but deferred to them (the people in the room) to tell us how. Participants expressed interest in having analyses of Ego Networks conducted for their organizations. We pointed out that this was not in the scope of the project, and participants agreed to consider developing a joint funding proposal to conduct Ego Network analysis for some organizations. The interest in Ego Network reflects an additional possible utility that a STEW-MAP project can offer to participating organizations, which is to help individual organizations better understand their networks and possibly use this analysis to address gaps or leverage funding proposals.

During the workshops, participants expressed keen interest in knowing which organizations were top collaborator organizations in the network. Defined earlier, top collaborator organizations are organizations most frequently cited by others as one they regularly collaborated with and/or received information from related to stewardship issues. The researchers did not share this information during the workshops, expressing privacy of the respondents’ information, and has since not yet been shared with participants. CUREs researchers explained that the LA STEW-MAP data was still going through review. Participant interest in knowing top collaborator organizations reveals the lack of alignment between practitioner and academic timelines. STEW-MAP data could be useful to practitioners earlier, but for academic researchers there is pressure to allow more time for validation of the data and peer review of the larger research. It also reveals tensions between data sharing in STEW-MAP vs. privacy concerns around the data. Increasing data sharing is an attribute of community-engaged research; however, this also involves thinking through participant privacy and confidentiality. In hindsight, the authors

see the workshops as a missed opportunity to get feedback from participants on the top collaborator findings. CUREs took steps to share the STEW-MAP results by making available the STEW-MAP turf data later and maintaining the public LA STEW-MAP website.

Participants also saw the potential of STEW-MAP in terms of informing the story of urban stewardship and revealing new narratives. A partner described how, “LA has a richness of networks and collaborations, and STEW-MAP can help reveal this”. This partner also described how, “STEW-MAP can show that people living in cities do care about environmental issues and are more connected than is the general narrative.”

## Challenges for STEW-MAP in realizing ecology with cities potential

An ecology with cities approach does not seem fully realized in the LA STEW-MAP process. This echoes academic work critiquing the inconsistent social-ecological systems approach in STEW-MAP, even though the tool is well suited for such an approach throughout all phases (Romolini et al., 2016b). The intentional implementation of ecology with cities approach—one that synthesizes co-production of place and knowledge is needed to promote connections between stewardship and social issues that many stewardship groups are already envisioning on the ground. In this section, we describe a few of the challenges that were uncovered in our analyses.

While the university as a partner has been integral to the implementation of STEW-MAPs in cities, the STEW-MAP survey itself has largely not included institutions of higher education (IHEs) explicitly. Publicly available STEW-MAP tools for the cities of Baltimore and New York City both indicate under organization type, “school or university”. However, Baltimore’s survey itself did not denote a space for IHE’s, so any IHE respondents would have to be identified in the data clean-up and analysis process. Similarly, NYC’s survey was a bit ambiguous in terms of IHE’s, referring broadly to “schools”. For the LA STEW-MAP, initial reporting categorized respondents by sector, so that a university respondent would have been labeled as either public or non-profit (for private institutions) in the data analysis phase. The lack of universities in the survey was brought up and discussed by participants in both LA STEW-MAP workshops. The researchers explained that universities could have been a respondent and they would have been coded as either a public or non-profit entity. However, categorizing the universities at that larger scale, public or private, reduces the utility of the information. In consideration of this, more recent versions of the STEW-MAP survey do separate out colleges and universities.

Workshop participants provided feedback on challenges with STEW-MAP. One participant mentioned the survey was tough to fill out and long, advising that they could have a shorter version. Many participants discussed how the results of the survey would vary depending on who filled out the survey in their organization, especially with larger organizations. There may also have been confusion in filling out the survey by respondents, with some questions seeming vague or overly broad regarding what environmental stewardship groups work on, as well as concerns about what is missing. For example, climate change was not explicitly identified as a possible organizational focal area in the

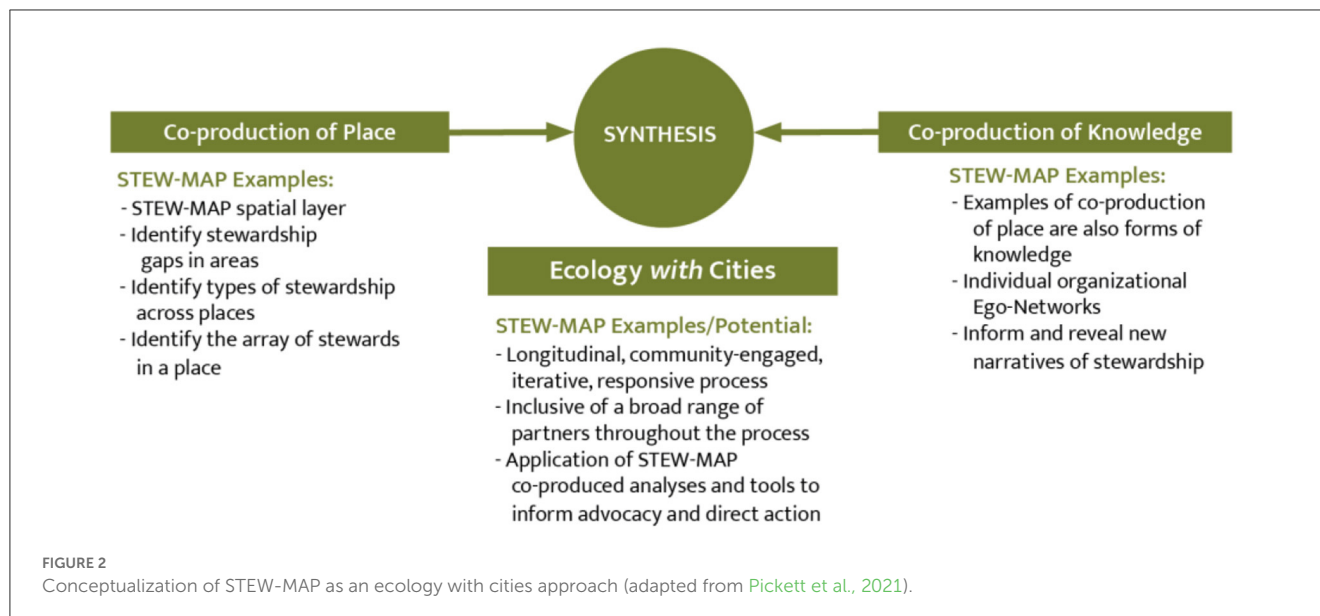
STEW-MAP survey, although the researchers noted during the workshops that climate change was a common write-in answer for respondents. There was also discussion that the knowledge produced by STEW-MAP is just one snapshot in time, with potential value in repeating STEW-MAP processes and allowing the results to be updated online.

As it stands, the potential to embody an ecology with cities approach by informing linked co-production of place and knowledge is not being fully explored in the LA STEW-MAP process. For example, in the survey phase of STEW-MAP, when respondents are asked, “what does your group work on?”, what is potentially confusing about this is that the “environment” is one option among many other broad categories (art/culture, education, youth, employment/jobs, etc.). However, all groups responding to the survey are environmental stewardship groups working in the area of the “environment”, as defined by the screener question and inventory that is done as part of the first phase. Therefore, having such broad categories may be confusing for the respondent and from a data analysis perspective, cast the net too wide or is not fine scaled enough to be useful. The survey could be (1) revised to state that as a part of an organization’s environmental work they should identify which categories of environmental work they focus on; and (2) another question could be asked that seeks to address what the main social issues are they seek to connect their environmental work to. This would also allow for better triangulation in the survey between social and ecological issues and efforts. Such triangulation would enable LA STEW-MAP to better assess stewardship synergies, gaps, and network analyses.

## Possibilities of STEW-MAP as an ecology with cities tool

Figure III shows how we conceptualize STEW-MAP as an ecology with cities approach, following the framing from Pickett et al., and drawing from examples we found in our data (2021). As described in this paper and in Figure 2, our analysis of data from interviews and the LA STEW-MAP workshops revealed various ways that the STEW-MAP process had utility in facilitating co-production of place and knowledge for an ecology with cities approach. For example, the development of the STEW-MAP layer itself can demonstrate co-production of place and reveal lesser known narratives, thus co-producing knowledge of environmental stewardship. STEW-MAP can facilitate the synthesis of the co-production of place and knowledge by informing new and future collaborations around advocacy and direct action.

The initial creation of STEW-MAP was rooted in partnership to produce knowledge for better stewarded places. The original New York City STEW-MAP was developed by a partnership between the U.S. Forest Service and university researchers at Columbia University (Svendsen, 2016). This government agency-university partnership model has been followed in other cities, such as Seattle, Baltimore, Chicago, and Philadelphia. In addition, conducting a STEW-MAP is an intensive environmental stewardship activity itself that is meant to inform the practice of social-ecological governance, including co-production of knowledge and place. Conducting one STEW-MAP takes years to complete (about 2–3 years), requiring dedicated time, community connections and



relationships, technical expertise, and funding resources (Svendsen, 2016). The effort of conducting a STEW-MAP is reflected in the commitment required to reach out to groups to do the surveys, follow-up with groups during data collection, manage and analyze the data, share results, conduct participant workshops, and co-produce a tool that is useful to stewardship groups. As such, the lengthy, involved process of STEW-MAP represents an opportunity to consider improvements and even innovation in collaboratively engaging partners to develop a shared vision for the purpose, process, and product(s) of the tool (Stanton, 2007).

The STEW-MAP framework guidance document mentions particular interest in, “the type of stewardship that is often voluntary and conducted for altruistic reasons” (Svendsen, 2016, p. 5). While this is an important part of stewardship and civic engagement (and the analysis thereof), focusing on people who can volunteer their time and/or do so for altruistic reasons may not be inclusive and leaves out co-production opportunities with people who cannot afford to do so. It may also miss opportunities in environmental stewardship by examining other ways of engagement, such as paid internships, school credit, and certificate programs that people, especially students, often in reality need for their time. It may also leave out some of the context of a place. In some places certain organizations may be especially influential (e.g., foundations, conservancies, religious groups, or a public-private partnership). Being aware of this context is part of the stewardship narrative of a place. A co-production process in place during the inventory phase should catch some of these contextual elements, and thus potentially be reflected in the survey.

While STEW-MAP situates itself in the SES literature, more can be done to strengthen this potential utility to advance an “ecology with cities” approach. LA STEW-MAP could more fully engage stewardship partners throughout the process, which would serve as an advisory group across all phases of the STEW-MAP process. Instituting a community advisory group would require additional resources to manage, including deliberating a process to decide how groups can be involved. From this process, CUREs

could build trust with groups through this transparency and allow for more inclusive engagement and empowerment, such as through joint publishing and potentially inspire social-ecological and stewardship innovation.

Table 1 describes recommendations for LA STEW-MAP, broken down by each of the four phases. It is important to recognize that STEW-MAP is a labor and time intensive process. Implementation of these recommendations would require further resources.

This article showed participant perspectives of the utility of STEW-MAP in Los Angeles and how the process can be strengthened to better facilitate a meaningful and valuable ecology with cities approach. Practitioners are already seeing these social-ecological connections and opportunities on the ground. STEW-MAP can help capture and leverage these connections and stories in part by embedding, from the beginning, a stronger community engagement component in the process. As work utilizing STEW-MAP in other cities has shown, such as NYC, in some places connecting environmental work to community development has emerged to become a critical strategy (Romolini et al., 2016b).

This research highlights how STEW-MAP can be a tool in the operationalization of an ecology with approach. LA STEW-MAP could be strengthened in its role as a community engagement tool that can inclusively involve a fuller range of partners in co-production of knowledge and place. STEW-MAP also has the potential to reveal new narratives and is complementary to other areas of CUREs’ work, such as restorative justice.

There are future research opportunities as it pertains to STEW-MAP. More research could be done on how STEW-MAP results are used, such as piloting partnerships in identified stewardship gaps. Participants in the workshops expressed interest in better understanding their own organizational networks, such as through Ego Network analysis. More research should be done on the role of IHEs as a possible bridge organization between environmental stewardship and other social-ecological systems issues. A STEW-MAP approach could be conducted with a university as the

TABLE 1 LA STEW-MAP recommendations by phase.

1. Inventory of organizations	2. Survey the network	3. Conduct data analysis	4. Disseminate the results
STEW-MAP community advisory group (CAG): Inform purpose, process, and products			
Form inclusive STEW-MAP CAG	Revise survey to reflect CAG feedback and clearer stewardship focus areas	More analyses of local stewardship activities	Develop user-friendly public-facing tool that respondents can update and manage
Seek to understand context and narratives of local stewardship	Survey relevant partners previously not included	Analysis of alignment and convergences with local stewardship narratives	Conduct STEW-MAP at several points in time
CAG advise who to include in the survey	Make the survey less time intensive and enable multiple respondents for larger organizations	Share preliminary data for feedback from all participants	Encourage SES partnerships and policy processes to address gaps and opportunities identified

focus to assess on-campus organizations, off-campus partnering organizations, their interactions, and partnership gaps and opportunities among them. Also, given CUREs’ growing portfolio around restorative justice work, STEW-MAP analyses could also inform where restorative justice approaches might be especially needed. CUREs’ partners have expressed interest in restorative justice and this tool could be part of their future research efforts to integrate justice more deeply in their urban ecology work (Humphreys and Reiter, 2014; Hill et al., 2019). Indeed, restorative justice is recognized as an element of “Justice-Inspired Research” in the ecology with cities conceptual framework (Figure 1).

Since the workshops, the researchers have shared presentation slides, a publicly available data layer, a master’s student thesis examining LA STEW-MAP, and CUREs continues to maintain the LA STEW-MAP website. CUREs staff participate in bimonthly meetings of the national STEW-MAP community of practice, which regularly considers and addresses issues like the ones raised in this article. In addition, at the end of data collection for this research CUREs received funding to conduct a STEW-MAP of the LA River Watershed, or LA River STEW-MAP. This funding was in part an outcome of the LA STEW-MAP workshops, in which participants expressed the need for a more in-depth analysis of partners working along the LA River. This research for this article informed the development of the LA River STEW-MAP (2022). For example, educational institutions have been incorporated into the LA River survey, as well as some other minor revisions of the survey based on feedback from other stakeholders. The LA River STEW-MAP report also shared information on the names of top collaborators. This underlies the utility of STEW-MAP as a dynamic and iterative process because of community feedback and engagement, emblematic of an ecology with cities approach. The launch of the LA River STEW-MAP also allows for the application of the tool in an area that has been identified as a high priority by the mayor’s office and in the city’s sustainability plan. The attention on the LA River has invigorated discussions among stakeholders and advocates concerning the impacts of green development on lower income neighborhoods along the LA River, including ecogentrification, access to nature, etc. (Christensen, 2018).

A ecology with cities approach to complex interactions between systems is critical in a time when human beings are the driver of global environmental change. These changes in turn have major

impacts on human well-being, especially the most vulnerable, as seen through increased natural disasters and public health threats. Through the iterative process that is STEW-MAP, this article illustrates the current and exciting latent ecology *with* cities potential of this social-ecological systems research tool.

### Ethics statement

The studies involving human participants were reviewed and approved by the University of California, Irvine IRB and Loyola Marymount University, Los Angeles IRB. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

### Author contributions

Study conception, design, and data collection: BM. Analysis and interpretation of results and draft manuscript preparation: BM and MR. Both authors reviewed the results and approved the final version of the manuscript.

### Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

### Publisher’s note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.



## References

- Andersson, E., Barthel, S., Borgstrom, S., Colding, J., Elmqvist, T., Folke, C., et al. (2014). Reconnecting cities to the biosphere: stewardship of green infrastructure and urban ecosystem services. *Ambio* 43, 445–453. doi: 10.1007/s13280-014-0506-y
- Arakawa, S., Sachdeva, S., and Shandas, V. (2018). *Environmental Stewardship: Pathways to Community Cohesion and Cultivating Meaningful Engagement. Handbook of Engaged Sustainability*. Berlin: Springer International Publishing.
- Berkes, F., and Colding, J. C. (2003). *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change*. Cambridge University Press, Cambridge.
- Berkes, F., and Folke, C. (1998). *Linking Social and Ecological Systems. Management Practices and Social Mechanisms for Building Resilience*. Cambridge: Cambridge University Press.
- Christensen, J. (2018). *Can the LA river avoid green gentrification? CityLab*. Available online at: <https://www.citylab.com/equity/2018/02/can-the-LA-river-avoid-green-gentrification/553613/Christensen> (accessed April 2, 2019).
- Connolly, J. J., Svendsen, E. S., Fisher, D. R., and Campbell, L. K. (2013). Organizing urban ecosystem services through environmental stewardship governance in New York City. *Landscape Urban Plan.* 109, 76–84. doi: 10.1016/j.landurbplan.2012.07.001
- Cumming, G. S., Olsson, P., Chapin, F. S., and Holling, C. S. (2012). Resilience, experimentation, and scale mismatches in social-ecological landscapes. *Landscape Ecol.* 28, 1139–1150. doi: 10.1007/s10980-012-9725-4
- Fisher, D. R., Campbell, L. K., and Svendsen, E. S. (2012). The organisational structure of urban environmental stewardship. *Environ. Polit.* 21, 26–48. doi: 10.1080/09644016.2011.643367
- Folke, C., Jansson, A., Rockstrom, J., Olsson, P., Carpenter, S. R., Chapin III, F. S., et al. (2011). Reconnecting to the Biosphere. *Ambio*. doi: 10.1007/s13280-0110184-y
- Grimm, N. B., Faeth, S. H., Golubiewski, N. E., Redman, C. L., Wu, J., Bai, X., et al. (2008). Global change and the ecology of cities. *Science* 319, 756–760. doi: 10.1126/science.1150195
- Grove, J. M., Childers, D. L., Galvin, M., Hines, S., and Munoz-Ericsson, T. (2016). Linking science and decision making to promote an ecology for the city: practices and opportunities. *Ecosyst. Health Sust.* 2: e010. doi: 10.1002/ehs2.1239
- Hill, G., Kolmes, S., Humphreys, M., and McLain, R., and Jones, E. T. (2019). Using decision support tools in multi-stakeholder environmental planning: restorative justice and subbasin planning in the Columbia River Basin. *J. Environ. Stu. Sci.* 9, 170–186. doi: 10.1007/s13412-019-00548-x
- Humphreys, M. L., and Reiter, M. A. (2014). Doing justice: the role of ethics in integrated ecosystem management and the implementation of the integrated assessment and ecosystem management protocol. *Interdisciplinary Environ. Rev.* 15, 183–192. doi: 10.1504/IER.2014.063647
- Jansson, Å. (2013). Reaching for a sustainable, resilient urban future using the lens of ecosystem services. *Ecol. Econ.* 86, 285–291. doi: 10.1016/j.ecolecon.2012.06.013
- Jasny, L., Johnson, M., Campbell, L. K., Svendsen, E., and Redmond, J. (2019). Working together: The roles of geographic proximity, homophilic organizational characteristics, and neighborhood context in civic stewardship collaboration networks in Philadelphia and New York City. *Ecol. Soc.* 24, 8. doi: 10.5751/ES-11140-240408
- Johnson, M. L., Locke, D. H., Svendsen, E., Campbell, L. K., Westphal, L. M., Romolini, M. (2019). Context matters: influence of organizational, environmental, and social factors on civic environmental stewardship group intensity. *Ecol. Soc.* 24, 14. doi: 10.5751/ES-10924-240401
- Krasny, M. E., and Tidball, K. G. (2009). Community gardens as contexts for science, stewardship, and civic action learning. *Cities Environ.* 2, 1–18. doi: 10.15365/cate.2182009
- Muñoz-Erickson, T. A., Campbell, L. K., Childers, D. L., Grove, J. M., Iwaniec, D. M., Pickett, S. T. A., et al. (2016). Demystifying governance and its role for transitions in urban social-ecological systems. *Ecosphere* 7, 1–11. doi: 10.1002/ecs2.1564
- Pickett, S. T. A., Boone, C. G., McGrath, B. P., Cadenasso, M. L., Childers, D. L., Ogden, L. A., et al. (2013). Ecological science and transformation to the city. *Cities* 32, S10–S2. doi: 10.1016/j.cities.2013.02.008
- Pickett, S. T. A., Cadenasso, M. L., and Rademacher, A. M. (2021). Co-production of place and knowledge for ecology with the city. *Urban Ecosyst.* 1, 1–7. doi: 10.1007/s11252-021-01190-8
- Romolini, M., Bixler, R. P., and Grove, J. M. (2016a). A social-ecological framework for urban stewardship network research to promote sustainable and resilient cities. *Sustainability* 8, 956. doi: 10.3390/su8090956
- Romolini, M., Grove, J. M., and Locke, D. (2013). Assessing and comparing relationships between urban environmental stewardship networks and land cover in baltimore and seattle. *Landscape Urban Plann.* 120, 190–207. doi: 10.1016/j.landurbplan.2013.08.008
- Romolini, M., Morgan Grove, J., Ventriss, C. L., and Koliba, C. J. (2016b). Toward an understanding of citywide urban environmental governance: an examination of stewardship networks in baltimore and seattle. *Environ. Manage.* 58, 254–267. doi: 10.1007/s00267-016-0704-4
- Saltmarsh, J., and Hartley, M., and Clayton, P. (2009). *Democratic Engagement White Paper*. England: New England Resource Center for Higher Education.
- Stanton, K. S. (2007). *New Times Demand New Scholarship - Research Universities and Civic Engagement: Opportunities and Challenges*. Campus Compact Conference Report. University of California, Los Angeles.
- STEW-MAP (2022). *Stewardship Mapping and Assessment Project. U.S. Department of Agriculture Forest Service*. Available online at: <https://www.nrs.fs.fed.us/STEW-MAP/> (accessed May, 2022).
- STEW-MAP USDA Forest Service. Available online at: <https://www.nrs.fs.fed.us/STEW-MAP/>
- Svendsen, E. S. (2016). *Stewardship Mapping and Assessment Project: A Framework for Understanding Community-Based Environmental Stewardship*. Washington, DC: United States Department of Agriculture. United States Forest Service Northern Research Station.
- Tan, P. Y., Zhang, J., Masoudi, M., Alemu, J. B., Edwards, P. J., Gret-Regamey, A., et al. (2020). A conceptual framework to untangle the concept of urban ecosystem services. *Landscape Urban Planning* 200, 103837. doi: 10.1016/j.landurbplan.2020.103837
- Tidball, K. G., and Krasny, M. E. (2007). "From risk to resilience: What role for community greening and civic ecology in cities?" in *Social Learning Towards a More Sustainable World*, ed A. E. J. Wals. Wageningen: Academic Press.
- Tidball, K. G., and Krasny, M. E. (2010). Urban environmental education from a social-ecological perspective: conceptual framework for civic ecology education. *Cities Environ.* 3, 11. doi: 10.15365/cate.31112010
- Tzoulas, K., Korpela, K., Venn, S., Yli-Pelkonen, V., Kazmierczak, A., Niemela, J., et al. (2007). Promoting ecosystem and human health in urban areas using green infrastructure: a literature review. *Landscape Urban Plann.* 81, 167–178. doi: 10.1016/j.landurbplan.2007.02.001
- Westphal, L. M., Davis, A. Y., Copp, C., Ross, L. M., Bouman, M. J., Fisher, C. L., et al. (2014). Characteristics of stewardship in the Chicago Wilderness Region. *Cities Environ. (CATE)* 7, 1–34. Available online at: [https://www.fs.usda.gov/nrs/pubs/jrnl/2014/nrs\\_2014\\_westphal\\_001.pdf](https://www.fs.usda.gov/nrs/pubs/jrnl/2014/nrs_2014_westphal_001.pdf)
- Wolf, K. L., Blahna, D. J., Brinkley, W., and Romolini, M. (2013). Environmental stewardship footprint research: linking human agency and ecosystem health in the Puget Sound region. *Urban Ecosyst.* 16, 13–32. doi: 10.1007/s11252-011-0175-6