



## OPEN ACCESS

## EDITED BY

Lise Herslund,  
University of Copenhagen, Denmark

## REVIEWED BY

Lorien Jasny,  
University of Exeter, United Kingdom  
Jack Mewhirter,  
University of Cincinnati, United States

## \*CORRESPONDENCE

Bethany B. Cutts  
bbcutoff@ncsu.edu

## SPECIALTY SECTION

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

RECEIVED 30 November 2021

ACCEPTED 15 September 2022

PUBLISHED 11 October 2022

## CITATION

Cutts BB, Greenlee AJ and Chantrill CV  
(2022) Coupling ecosystem-centered  
governance modes with  
environmental justice.  
*Front. Sustain. Cities* 4:826326.  
doi: 10.3389/frsc.2022.826326

## COPYRIGHT

© 2022 Cutts, Greenlee and Chantrill.  
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.

# Coupling ecosystem-centered governance modes with environmental justice

Bethany B. Cutts<sup>1,2\*</sup>, Andrew J. Greenlee<sup>3</sup> and  
Carolina V. Chantrill<sup>4</sup>

<sup>1</sup>Department of Parks, Recreation, and Tourism Management, North Carolina State University, Raleigh, NC, United States, <sup>2</sup>Center for Geospatial Analytics, North Carolina State University, Raleigh, NC, United States, <sup>3</sup>Department of Urban and Regional Planning, University of Illinois at Urbana-Champaign, Champaign, IL, United States, <sup>4</sup>Center of Economic Urban Studies, National University of General San Martín, Buenos Aires, Argentina

In North America, Great Lakes Areas of Concern (AOCs) were established to remediate aquatic pollution in 1987 as part of a binational agreement between the United State of America and Canada. Although the action preceded formal environmental injustice acknowledgment, the AOC program's effort to remediate legacy pollutants includes language with the potential to accomplish core goals of EJ: democratizing decision-making and reducing disproportionate environmental burden. Yet, in AOCs, discussions of public engagement regarding AOC work tend to define participation institutionally (i.e., the state, market, and civil society) rather than by racial or socioeconomic inclusivity. Understanding how AOC governance processes consider representation of, and benefit to communities negotiating remediation decisions from positions of systemic disadvantage requires addressing the relationship between ecosystem-centered governance modes and environmental justice. In this study, interviews with governance actors reveal that concern for EJ issues wield different forms of authority as ecosystem-centered governance and environmental justice couple, decouple, and uncouple. Changes in coupling correspond with shifts in ecosystem-centric governance mode, but coupling does not rely on any one particular governance arrangement. Instead, coupling relies on leadership practices and conceptions of fairness that are EJ-responsive and present EJ as indistinct from ecosystem goals and targets. Our findings reinforce the assertion that ecosystem-centered governance can be reimaged to better facilitate EJ even without changes in financial and regulatory constraints. We conclude by proposing empirical measures that advance EGM-EJ qualitative scholarship and practical advice about how to cultivate EJ-responsive leadership in ecosystem-centered governance arrangements.

## KEYWORDS

environmental justice, regional change, Great Lakes (North America), legacy pollution, stream remediation

## Introduction

Legacies of pollution and degradation are often intertwined with legacies of systemic racism and discrimination (Cole and Farrell, 2006; Pulido and de Lara, 2018). Ideally, goals for ecosystem-centered governance align with goals for those who live in the ecosystem—they are tightly coupled. However, the reality is more complicated.

Governance approaches to policy aim to include expansive series of actors who work together for the benefit of the collective good. Governance processes aim to structure public policy formulation and implementation to engage people constructively across agency boundaries, level of government, private industry, and civil society (Driessen et al., 2012).

Environmental governance realigns coalitions to reflect natural boundaries—like those of a watershed—over political ones (Leach and Pelkey, 2001; Genskow and Born, 2006; Sirriani, 2009; Cutts et al., 2018a). New boundaries necessitate collaboration across political boundaries and environmental interests. Within environmental protection agencies, there is a well-documented history of adopting governance approaches to attempt to reduce conflict and improve environmental quality. Much of the shift toward governance has been characterized by the “opening up” of government-run management processes to incorporate a more diverse group of stakeholders and a collectivizing of responsibility for goal-setting and accountability (i.e., Pellow, 1999; Gibbs and Jonas, 2000; Bulkeley, 2005; Lemos and Agrawal, 2006). New arrangements allow non-state organizations to bring diversity in terms of their constituent political and economic bases, their frameworks for intervention, and their framing of environmental issues. The formation, procedures, and successes of these arrangements have been widely studied (Davidson and Frickel, 2004; Lemos and Agrawal, 2006; Bennett and Satterfield, 2018; Wu et al., 2018; Bodin et al., 2020).

We contend that frameworks for understanding environmental governance can be understood more precisely as ecosystem-centered governance. This argument is based on evidence that the environmental governance literature has not fully explored the role of disparate political power and social inequality in local environmental governance challenges (Gauna, 1998; Dobbin and Lubell, 2021; Yamamoto and Lyman, 2021/2001). For example, pollution-generating facilities that are owned by multinational corporations, local governments, and civil society have different levels of resources to sustain support for their individual interests and to define the priorities and sufficiency of clean-ups. This means that when the state catalyzes environmental clean-up action or enforcement, the decisions they make about how to enact “good” environmental governance have substantive influence. They direct the extent to which governance responds to mobilized interests instead of disproportionate levels of risk, and the extent to which they enact race-conscious or race-blind conceptions of fairness

(Schweitzer and Kim, 2009; Konisky and Reenock, 2018; Harrison, 2019). This may include attending to distribution, recognition, interactions, receptivity, and (potentially) reparation (Toxopeus et al., 2020; Josephs et al., 2021). At the same time, environmental agencies convening governance forums often perceive contending with power differences as beyond the scope of their work and mission of their agency (Harrison, 2017; Kohl, 2019). As a result ecosystem-centered governance, policies, programs, and practices do not always democratize decision-making or reduce inequalities (Bullard, 2007; Agyeman, 2008; Shilling et al., 2009; Harrison, 2015, 2019; Konisky, 2015; George and Reed, 2017; Dobbin and Lubell, 2021). That is: effective ecosystem governance outcomes are not synonymous with improvements in environmental justice (i.e., Holifield, 2004; Shilling et al., 2009; Harrison, 2019). Ecosystem governance has the potential to derail environmental justice altogether (Newig and Fritsch, 2009; Schweitzer and Kim, 2009; Shilling et al., 2009; Lange et al., 2013; Latulippe and Klenk, 2020; Alsip et al., 2021).

The explicit goals of the intersection of cultural sovereignty and environmental protection distinguishes EJ from most of the rest of environmental governance (Konisky, 2015). In policy, EJ is commonly understood as the equitable distribution of environmental benefits and burdens. Different from equality, equity recognizes that fair distribution sometimes requires implementation strategies that are specialized (Cole and Foster, 2000). The US Environmental Protection Agency (EPA) defines environmental justice as “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies” (Exec. Order No. 12898, 1994). Implicit in the EPA definition of environmental justice are benefits—to both minoritized communities and policy innovation—through renegotiating histories of conquest, racism, and market rationales to redefine decision-making about essential relations with nature (Shilling et al., 2009). Thus, there is the potential that EJ required new modes of governance not captured in earlier typologies of ecosystem-centered governance modes.

Alternatively, it may be more fruitful to understand the inconsistencies in the relationships between ecosystem-centered governance and EJ as a product of hybrid governance dynamics. Ecosystem-centered governance in any mode would then be capable of exhibiting changing levels of epistemic distinctiveness between environmental quality and social justice. As outlined in Table 1, ecosystem-centered governance and EJ may share four types of governance relationships:

- (a) **Uncoupled** governance—ecosystem and EJ domains are independent, even if they are concurrent and engage an overlapping set of participants.

TABLE 1 Coupling definitions and implications for hybrid governance linking ecosystem-centered work with environmental justice (EJ).

		<b>Responsiveness: <i>Level of dependence, directness, strength</i></b>	
		<b>High</b>	<b>Low</b>
Indistinctiveness: <i>similarity in focus, use, and components</i>	Low	Loosely Coupled EJ <b>information</b> influences AOC institutional features. AOC actor features are <b>independent</b> from EJ actor features.  <i>Actors strategically choose to participate in EJ and ecosystem-centered collaboration, because it may influence decisions in other domains.</i>	Decoupled EJ <b>information</b> does not influence AOC institutional features. AOC actor features are <b>independent</b> from EJ actor features.  <i>Opportunities for actively unlinking; sustaining conflict within a collaborative framework.</i>
	High	Tightly Coupled EJ <b>information</b> influences AOC institutional features. AOC actor features are not <b>independent</b> from EJ actor features.  <i>Improvements in justice reinterpret practices and internalize new conceptions of ecosystem-centered work.</i>	Uncoupled EJ <b>information</b> does not influence AOC institutional features. AOC actor features are not <b>independent</b> from EJ actor features.  <i>Able to complete work piecemeal so that politically tractable projects can be accomplished. Can retrofit environmental policy to address EJ if/when political will allows.</i>

(b) **Decoupled** governance—ecosystem and EJ domain relationships are actively deconstructed to create more distinguishable foci (Meyer and Rowan, 1977).

(c) **Loosely coupled**—ecosystem governance facilitates interdependence with EJ while each retain distinct foci (Marquis et al., 2011; Tan and Geng, 2020).

(d) **Tightly coupled** governance create dependencies and actions designed to mutually benefit both domains (Sauder and Espeland, 2009). If tightly coupled, environmental quality improvements would necessarily repair legacies of disproportional burden, exclusion, and segregation as well as the capabilities of humans and nonhumans to flourish (Schlosberg, 2013; Pineda-Pinto et al., 2021). The ecological condition, politics, and policy streams are aligned with EJ.

Ecosystem-centered governance can incorporate environmental justice reforms while also remaining consistent with environmental regulatory scope (Konisky and Reenock, 2018; Harrison, 2019). Therefore, the extent to which ecosystem-centered governance generates EJ co-benefits can be influenced by EJ-responsive leadership and the capacity to link implementation of environmental protections in ways that are inextricable from social equity (e.g., to enhance indistinctiveness). In the context of the US, this coupling is important to progress toward environmental justice, because EJ is typically not a stand-alone policy. EJ is more often a directive for implementing environmental policy and environmental governance strategies (Konisky, 2015; Kim and Verweij, 2016; Liang et al., 2020). Therefore, coupling with ecosystem-centered

governance is the primary means of accomplishing institutional change that advances environmental justice. Whether and how EJ co-benefits exist within a single ecosystem-centered governance mode (EGM) or across multiple modes is in need of additional study.

## Aim and objectives

The aim of this paper is to understand whether changes in coupling are due to introducing new modes of governance, new elements to existing modes, incremental EJ-learning among ecosystem actors, or other processes. To do this, we first introduce an existing typology for capturing ecosystem-centered governance modes (EGMs). Then we identify features that would indicate that EJ is independent of ecosystem-centered governance and thereby can be achieved (or derailed) through more than one governance mode, depending on how governance actors approach opportunities to couple ecosystem and EJ interests. We examine the relevance and sufficiency of the EGM-EJ model in light of ecosystem-centered governance activity directed by the 1987 designation of an Area of Concern (AOC) to contend with legacies of industrial development (in the context of racial and ethnic discrimination) near the Grand Calumet River and Lake Michigan shoreline in northwest Indiana (USA). The AOC designation was designed to facilitate sediment remediation, wetland restoration, and other ecosystem-centered actions.

Qualitative analysis is guided by the question: *What governance conditions enable ecosystem-centered governance to achieve EJ co-benefits?*

To answer this question, we first analyze change-points to identify phase shifts in the ecosystem-centered governance arrangements associated with legacy pollution in the waterways of northwest Indiana from 1987 to 2016. Then, we identify factors that alter coupling between AOC governance and EJ and examine whether changes in the phase of AOC governance shift the potential to serve environmental justice (i.e., governance coupling).

The finding that issues could be coupled, decoupled, and/or uncoupled throughout the evolution of a governance arrangement would affirm the need to update the [Driessen et al. \(2012\)](#) model to account for epistemic differences between ecosystem-centered and EJ ways of knowing.

## Theoretical and analytical frameworks

Understanding ecosystem-centric governance and environmental justice governance as a hybrid governance problem has the potential to repair more intentionally the legacies of exclusion from and harm due to environmental decision-making ([Josephs et al., 2021](#)). To conceptualize the ways such hybrid-governance challenges may interact to produce EJ co-benefits from ecosystem-centered governance, we adapted an earlier empirical typology ([Driessen et al., 2012](#)). In this section we explain the typology in ecosystem-centered governance modes and amendments that enable opportunities to observe EJ-responsive modes of governance and/or coupling between pre-established EGMs and EJ benefits.

### Ecosystem-centered governance modes (EGMs)

Within ecosystem-centered governance literatures, the term “governance” encompasses a large range of multi-stakeholder arrangements that may organize to address environmental challenges ([Driessen et al., 2012](#); [Hegger et al., 2020](#); [Toxopeus et al., 2020](#)). To accommodate the diversity of observed governance arrangements, [Driessen et al. \(2012\)](#) devised a typology based on actor features, institution features, and content features (outlined in [Figure 1](#)). These alternative arrangements provide an instructive starting point for identifying changes to new ecosystem-centered governance modes (EGMs) and the relative level of EGM-EJ coupling over time.

There are five distinct ecosystem-centric governance modes (EGMs): (1) centralized, (2) decentralized, (3) public-private, (4) interactively-governed, and (5) self-governed ([Driessen et al.,](#)

[2012](#)). EGMs distinguish state, market, and civil society interests in order to recognize distinct orientations toward solving collective action dilemmas ([Figure 1](#)).

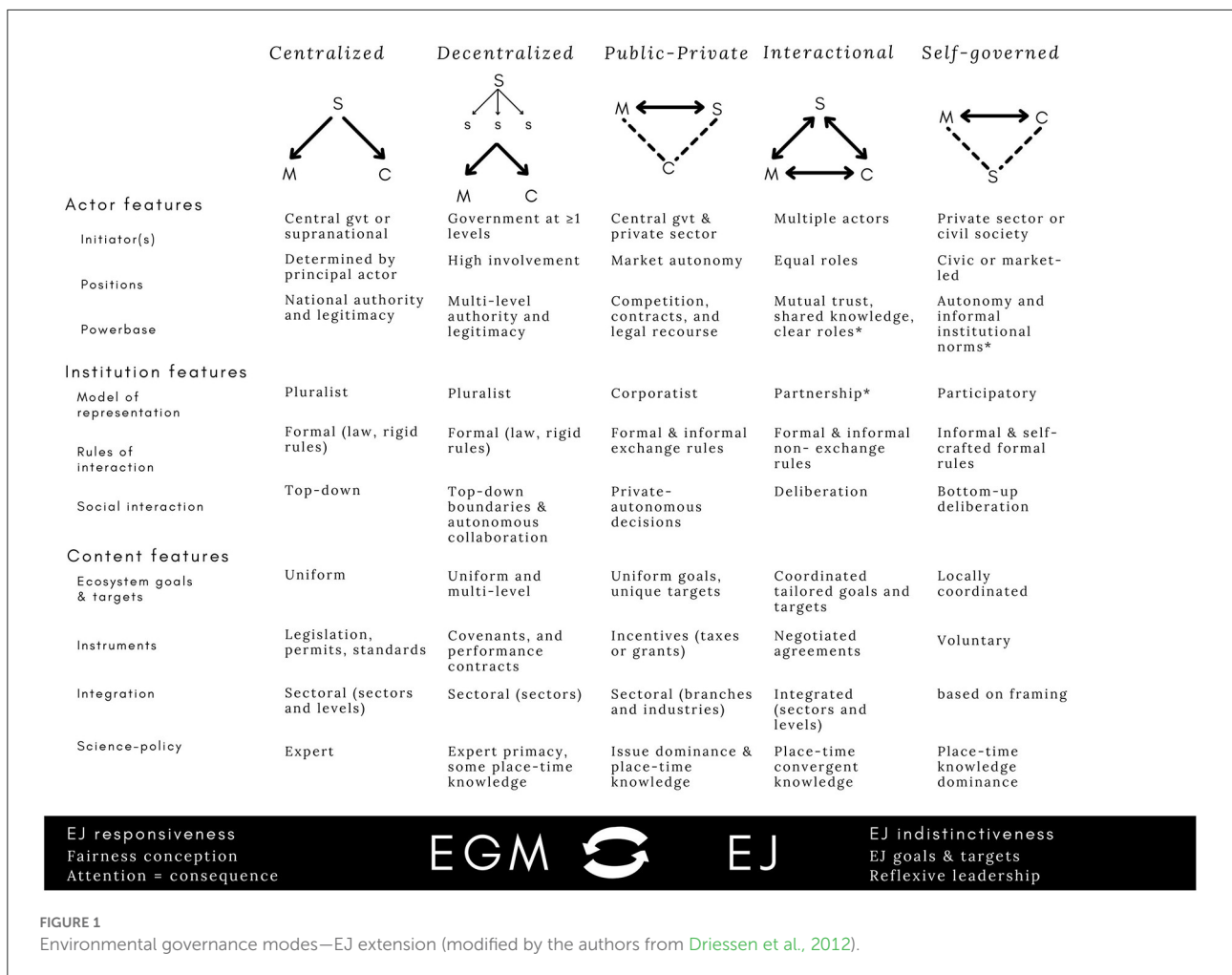
The *actor features* construct of EGM includes the following: the actor that initiates policy and their preliminary ambition (initiating actor), how they are positioned in relation to other stakeholders (stakeholder position), the policy level at which actors operate (policy level), and the basis of the power or authority among key actors (power base). The *institutional features* construct of EGM includes the model of representation, the rules and norms structuring interactions, and the mechanisms for interaction. The *policy content* construct includes policy goals, policy implementation strategy, types of knowledge that factor into decisions, and the extent to which policies are integrated.

Each of EGM (centralized, decentralized, public-private, interactional, and self-governed) differs in terms of the actor features, institutional features, and policy content ([Figure 1](#)). State, market, and civil society actors under different modes of environmental governance share different relations. In modes where the state actors are the protagonist, market and civil society receive benefits or incentives. Alternatively, governance modes can be led by cooperation between government and market actors. The result can be public-private partnerships or can be governed to collectively define and address problems and allow all three types of actors to participate on equal terms. Finally, self-governance approaches use collaborative meetings to facilitate market and civil society changes without much state intervention. Any mode has the potential to be effective when it is fit to purpose.

The EGM typology enables detailed, replicable, and comparable claims about character and intensity of shifts in ecosystem-centered governance over time. Using the constructs of actors, institutions, and features, we can identify whether some modes are more successful at generating co-benefits for environmental justice than others, or if the degree of interrelatedness seems driven by the discretion of leaders convening governance. Exploration of whether or not shifts in the EGM typology relate to EJ can provide an entry point for understanding how remediation and pollution prevention can begin to repair legacies of systemic racism and discrimination. Modifications designed to identify touchpoints between EGM and EJ are outlined in the next section of this paper.

### EGM-EJ coupling, decoupling, and uncoupling

Understanding the implications of ecosystem-centered governance for environmental justice (EJ) governance means understanding the extent to which EJ actors, features, and content become part of different modes of ecosystem-centered



governance. As a hybrid governance challenge, the degree that ecosystem-centered governance enables EJ responsiveness and/or reinforces the distinctiveness of ecology from social injustice can change across time but is not dependent on the ecosystem governance mode (EGM). Coupling between EJ and ecosystem-centered governance can change. The four alternative coupling arrangements described in the introduction (tight coupling, loose coupling, uncoupling, and decoupling) are based on the responsiveness and (lack of) distinctiveness between ecosystem-centered governance and EJ (Table 1). The ideas of responsiveness and indistinctiveness are described in detail below. They are broadly characterized as dimensions that affect either EJ responsiveness or indistinct EGM and EJ co-benefits.

**EJ-coupled EGMs are more disparity-conscious.** The EPA and other environmental regulatory agencies are often reticent to link environmental justice with race- or class-based redistribution of benefits and costs (Holifield, 2004; Liang et al., 2020). Yet re-distributing hazard evenly or remediating hazards in the physical environment of racialized groups may implicitly define justice as equal exposure to wealthy white communities

(Pulido and de Lara, 2018). This concept of fairness would be indicated by meaningful engagement with ideas of self-determination and legacies of oppression (Josephs et al., 2021). Others might privilege discussion of self-determination across different racial group identities and diversity in how people define and prioritize pressing needs and long-range goals (Yamamoto and Lyman, 2021/2001). Different from the work of individual actors, this is about the rules and norms of the governance arrangement as a whole.

**EJ-coupled EGMs reduce global risk by reducing disproportionate harms.** The degree and extent to which environmental quality is examined and measured is one indicator of EJ responsiveness. The extent to which violations result in adequate consequences and deter additional harm is the true differentiator: violations result in adequate consequences (Konisky, 2015) and deter additional harm (White, 2017). To embrace EJ fully, environmental governance would reduce harm, both in the communities where governance engagement are underway and change the global impacts of production and waste disposal methods.



EJ-coupled EGMs support mobilizing **goals and targets that reduce disadvantage**: We differentiate ecosystem-centered goals & targets (material changes in the environment at-large) from EJ goals & targets (Figure 1). EJ goals & targets attend to instrumental actions that reduce cumulative risk over those that serve mobilized interests (Konisky and Reenock, 2018). These goals support culturally diverse expressions of relatedness to nature (e.g., Pulido and de Lara, 2018). They do not presume that the acceptable hazard experience is that which is equivalent to white wealthy communities.

**EJ-coupled EGMs cultivate reflexive leadership**. We define leadership as a process separate from governance (Kompridis, 2014; Northouse, 2014; Vilá, 2022). On the front lines, agency administrators (e.g., project managers and public engagement officers) have the potential to exercise considerable discretion in governance and decision-making (e.g., Holifield, 2004; Harrison, 2019; Beckham, 2022; Vilá, 2022). Whereas the original EGM model lists leadership as a condition of the powerbase of particular governance archetypes, we contend that it circulates independently of other governance elements. Accountability for EJ by market, state, and community actors indicates indistinct EGM and EJ leadership (Vilá, 2022).

## Study context

To more fully understand ecosystem-centric and EJ governance, we selected an environmental clean-up initiative conceived of as an ecosystem-centered approach (Angradi et al., 2019; Alsip et al., 2021). Northwest Indiana (USA) is the site of the Grand Calumet AOC. The Grand Calumet Area of Concern (AOC). It is comprised of two east-west flowing branches of the Grand Calumet River. The eastern branch of the river drains into Lake Michigan. The AOC is 56.97 sq-km (22 sq-miles) in total, and encompasses portions of the cities of Gary, East Chicago, Hammond, and Whiting, Indiana (USA). Northwest Indiana was once a site of substantive steel, industrial chemical, and fossil fuel production and shipping. Residual pollution continues to present a hazard. Under Annex 1 of the 1987 Great Lakes Water Quality Agreement between Canada and the United States (1987), efforts to identify, remediate, protect, and restore the health of the Great Lakes and associated waterbodies began. The Grand Calumet Area of Concern (AOC) was the first site established. Since 1987, additional policy directives and statutes have led to the US Environmental Protection Agency and the State of Indiana investing over \$80 million to remove contaminants from the Grand Calumet River in Northwest Indiana USA. Ecologically, northwest Indiana land use decisions impact the Laurentian Great Lakes of North America. The lakes hold ~20% of the world's surface freshwater. Thus, the regional and global significance of the ecological conditions in northwest Indiana were motivation for initiating ecosystem-centric governance.

TABLE 2 Beneficial use impairments in the grand calumet area of concern.

AOC beneficial use impairments	Grand calumet AOC current status
Restrictions on fish and wildlife consumption	<i>Impaired</i>
Tainting of fish and wildlife flavor	<i>Impaired</i>
Degradation of fish and wildlife populations	<i>Impaired</i>
Fish tumors or other deformities	<i>Impaired</i>
Bird or animal deformities or reproduction problems	<i>Impaired</i>
Degradation of benthos	<i>Impaired</i>
Restrictions on dredging activities	<i>Impaired</i>
Eutrophication or undesirable algae	<i>Impaired</i>
Restrictions on drinking water consumption or taste and odor problems	Restored 2012
Beach closings	<i>Impaired</i>
Degradation of aesthetics	<i>Impaired</i>
Added costs to agriculture or industry	Restored 2011
Degradation of phytoplankton and zooplankton populations	<i>Impaired</i>
Loss of fish and wildlife habitat	<i>Impaired</i>

Areas of Concern (AOC) are defined as regions where local human activities have resulted in substantive Beneficial Use Impairments. There are 14 designated beneficial uses (Table 2). The Grand Calumet AOC is the only site that originally listed all 14 beneficial uses as impaired. Each condition is linked to environmental monitoring to identify when remediation and restoration has been sufficient. Beneficial uses can be restored individually or through comprehensive actions. As part of the AOC work, they are required to convene stakeholders. AOCs have fulfilled that requirement to various depths and levels of achievement (Muldoon, 2012; Hornik et al., 2016; Cutts et al., 2018b; Zeemering, 2018; Angradi et al., 2019; Holifield and Williams, 2019, 2021; Hartig et al., 2020; Alsip et al., 2021; Hardy, 2022).

As of this paper's submission for publication, two beneficial use impairments have been restored in the Grand Calumet AOC: (1) drinking water taste and odor; and (2) the cost of pollution to agriculture (USEPA—US Environmental Protection Agency., 2022). The US EPA estimates 2031 as the "best case scenario" for complete delisting of the Grand Calumet AOC (Table 2).

The goals and procedures established for AOCs have the potential to accomplish core goals of EJ: democratizing decision-making and reducing disproportionate environmental burden (Josephs et al., 2021). Although the AOC program preceded federal environmental justice policy directives for the EPA under Executive Order 12898, the AOC program aim is to remediate legacy pollutants from overburdened communities (Hartig et al., 2020; Josephs et al., 2021). The

racial and economic inequalities are high, the population is shrinking, and the economic opportunities are constrained by daunting environmental and infrastructure challenges. The regional history of environmental justice advocacy in northwest Indiana suggests the potential to couple AOC remediation and EJ (Chantrill, 2015). AOC remediation has the potential to either engage or ignore assumptions and misassumptions about racialized environments as part of decision-making for the common good (Zeemering, 2019; Josephs et al., 2021).

## Methods

To strengthen the EGM typology as a tool to understand how ecosystem-centered governance couples with EJ, we use qualitative data and thematic analysis. We chose this approach because the EGM has not been robustly tested in the context of EJ and its distinct orientation toward human-environment relationships and social justice.

In-depth interviews with 16 participants were completed in 2014. We interviewed people who participated in AOC priority setting, planning, remediation, or monitoring. Interview questions were oriented to address the research question through semi-structured exploration of two themes: (a) how has the AOC changed over time? (b) what ecological, social, and economic concerns are best being addressed by the AOC or other local environmental clean-up work in the area? and (c) whether they thought remediation efforts led to improvements in environmental justice (Chantrill, 2015).

A purposive sampling scheme allowed us to understand governance of the Grand Calumet AOC from a wide range of perspectives. We identified participants by reviewing official planning and environmental governance documents. The sample frame included representatives from organizations that were a formal part of the Grand Calumet River clean-up through the AOC as well as representatives from civic and private sector institutions affected by clean-up projects indirectly through secondary impacts. Additional participants were recruited using referrals made by initial contacts. Within this purposive sampling framework, we took additional efforts to ensure adequate representation across sector and across race, gender, and ethnicity. At the time of the interview, most participants lived or worked in Gary, Hammond, East Chicago or Whiting, Indiana (Table 3). Transcripts of the audio data, researcher notes, and field observations were all coded and analyzed.

We gathered policy and agency documents to understand the original stakeholder configuration (Supplementary Table 1) and to assess local context, policy instruments, timelines, and actors across the lifespan of the project, as presented in various sources. Existing documents such as the AOC website and list of partner organizations were reviewed for content related to participating organizations, activities, and remediation approach changes over time. Together with interviews, these

TABLE 3 Respondent characteristics.

Affiliation	
Government	8
Civil society	5
Industry and business	3
Time working in the community	
<10 Years	1
10–20 Years	4
>20 Years	9
Community stake	
Born and raised in the area of study	4
From surrounding communities in the same county	3
From surrounding communities outside of the county	6
From outside of Northwest Indiana	3

documents helped to create a thick description of tensions, concerns, and interpersonal dynamics that were perceived to influence the evolution of the partnership and its activity over time (Della Porta and Keating, 2008). The dates of policy actions helped to situate emergent themes and change-points identified in interviews along a common timeline.

Interviews and secondary data were analyzed using open coding in Atlas.ti (v.7). Axial coding organized the data into themes based on the constructs of the EGM-EJ modification. Authors used constant comparison methods to explore common themes, and to identify consistent transition points in the evolution of the Grand Calumet AOC remediation (Braun and Clarke, 2012). We enhanced data credibility through member checks with participants, prolonged engagement in northwest Indiana, and sustained presence at and interaction with experts in AOC remediation locally and elsewhere through the US and Canada.

## Results

Results indicate five shifts in collaborative governance from the designation of the Great Lakes Areas of Concern in 1987 until 2014. These periods are: (1) decentralized governance (1987–1998) followed by (2) centralized governance (1999–2003), (3) interactive governance (2004–2007), (4) public-private governance (2008–2011) and (5) centralized governance (2012–2014). The transitions correspond with shifts in the extent to which remediation and EJ are coupled governance processes. The essential activities that define each era are outlined in Figure 3 (additional details are in Supplementary Table 2). The EGM-EJ modification provided a valuable framework for coding the interview responses and identifying governance shifts, as many of the model's components were identified in the data (Figure 1). Additional elements emerged through open coding,

suggesting opportunities for future improvement. The following describes the findings related to the research objectives outlined above and proposes further EGM-EJ modifications.

## Phase shifts in AOC remediation governance

The first research objective focuses on coupling between the ecosystem-centered governance of waterway remediation in the AOC and environmental justice, noting the extent of this coupling and the mechanisms that lead to it. Interviews indicate that each phase of governance shifts the potential to serve environmental justice by adjusting the extent to which EJ reform is perceived as relevant and actionable within the scope of AOC directives and procedures. EGM Period 1: Establish the Area of Concern via decentralized governance (1987–1998).

The designation of the Grand Calumet AOC represents a demarcation point in the rise of a large environmental coalition that led restoration efforts to recover the quality and the value of the natural assets of the region. From its inception in 1987 until 1999, the governance mode followed a decentralized governance structure.

The Great Lakes Areas of Concern were established in 1987 under Annex 1 of the Great Lakes Water Quality Agreement, in which the US and Canada agreed to protect and restore the Great Lakes. The agreement was part of an evolving trend in both countries toward state and federal action to address regional pollution and environmental degradation. Relative to Indiana, the first major action was the 1972 Federal Water Pollution Control Act, which helped to prevent new water pollution in the US. In 1978, The U.S. and Canada took joint action to address the continued decline in water quality in the Great Lakes, by signing the Great Lakes Water Quality Agreement. Annex 1 identified 43 waterways that had disproportionately large impacts on water quality because historic pollution remained locked in the sediments (Nevers et al., 1999). The Grand Calumet River and Indiana Harbor Ship Canal was designated as the most polluted Area of Concern (AOC) meeting all fourteen beneficial use impairments.

In anticipation of binational action, actors in northwest Indiana drafted a 1984 *Master Plan for Improving Water Quality in the Grand Calumet River—Indiana Harbor Canal Final Report*. The report lays out a series of recommendations for continued coordination around the reduction of regional pollutants. To accomplish these goals, the report calls for new forms of coordination between multiple entities including the U.S. EPA, the Indiana State Board of Health, the Army Corps of Engineers, the U.S. Geological Survey, U.S. Fish and Wildlife Service, Indiana Department of Natural Resources, Northwest Indiana Regional Planning Commission, Public Interest Groups, Industry Associations, and local

residents. The U.S. Environmental Protection Agency is the initiating actor for US-based locations under the binational agreement. The plan states “successful implementation of Plan recommendations will require administrative coordination between these agencies. This will minimize the procedural delays associated with development and implementation of additional control programs and will facilitate more effective use of existing controls.” (USEPA—US Environmental Protection Agency, 1985, p.p. S-16–S-17). This plan sets the stage for a decentralized approach to environmental governance that aligned with the remedial action plans and public advisory committee commitments required to enact remediation and restoration projects when the Areas of Concern were designated in 1987.

At inception, the goals & targets of the Grand Calumet AOC are uniform and level specific. The Great Lakes Legacy Act identifies fourteen specific Beneficial Use Impairments (BUIs) which merit intervention and remediation. At designation as an AOC, the Grand Calumet River AOC contained all 14 BUIs, largely driven by legacy pollutants contained in sediments at the bottom of the Grand Calumet River. These contaminants include PCBs, PAHs, and heavy metals, the effects of which are exacerbated by high fecal coliform bacterial levels (USFWS—US Fish Wildlife Service, 2003).

Initially, the stakeholder positions of the Grand Calumet Task Force indicate that the regional EPA office would coordinate and delegate action to other government agencies as well as to local market and civil society groups. The Grand Calumet Task Force represented a major governance initiative that opened up the potential to achieve types of action, which were previously impossible to accomplish solely with local resources. That is because, on top of having to shoulder the obvious financial burden, they lack the technical capabilities and authority. The Grand Calumet Task Force helped alert people to the idea that the river could be an asset rather than a liability. As reflected in the statement below, industry stakeholders perceived coalition governance represented an opportunity to amplify the cumulative impacts of legally mandated effort to clean up environmental damages. As one industry stakeholder said:

One of the things that is unique to the Grand Calumet River is that, in conjunction with being designated as an AOC, there was also a natural resource damage assessment claim/lawsuit that involved nine industries ... ironically, the former environmental manager at the BP Whiting refinery... touched base with the other seven industries who were named in the NRDA action and said, “We would be better served if we worked collectively rather than individually to get to the settlement.(Civil Society Environmental Affairs Staff)

The power base for the coalition was both the authority afforded by the AOC in defining beneficial use impairments for Areas of Concern and the internal legitimacy of the collaborators who generated the remedial action plan and the public advisory committee. The incorporation of industry



stakeholders into AOC environmental governance also created previously impossible bonds between industry and advocacy stakeholders who had a long history of conflict. A natural resources advocate recounted the level of division prior to the formation of the Grand Calumet Task Force:

*[In the 1970s and early 80s] It was either you were on this side or you were on that side. And when you'd have regulatory hearings or you'd have meetings or presentations, or things of that nature, it was always this viewpoint vs. that viewpoint. And it became pretty clear to me and to us in the company, I says, "This is gonna get us really nowhere," because the company's philosophy, particularly [my company's] philosophy, is that it always had a big interest in the community in which it was located. (Industry Environmental Liaison)*

Top-down emphasis on collaboration driven by the binational water quality agreement (the mechanism of social interaction) had the effect of enabling policy integration. A coalition member explained that the benefit of being part of the coalition stemmed from being able to work outside of the normal constraints of their institution.

## EGM period 2 (1999–2003): Interactional governance

Collaborative governance and the potential for conflict within the coalition compelled members to think more broadly about problem and solution framing. This allowed them to circumvent issues and to develop more appealing and visionary solutions through their mechanism of social interaction, focus on multiple policy levels, and the introduction of new policy agreements.

*The early coalescence of the AOC and coalition governance emphasized bringing a deeper and more diverse set of resources to bear on problems through "good collaboration with federal agencies, state and a few of the non-profit organizations ... and in some cases universities ... you can get a lot more done because each of those layers have access to different resources. (State Environmental Agency Personnel)*

The 1999–2003 interactional phase led to legal consent decrees as a form of **policy instrument**. Hammond Sanitary contributed \$2.1 million dollars to the Grand Calumet River Restoration Fund trust. At the same time, the US Fish and Wildlife Service identified nine companies responsible for releasing hazardous substances. These actions, although litigious, were widely supported as the best way for local actors to fund remediation work and

define roles. Being part of the governance structure led to ideas for the environment that challenged the structures in city governments and turned participants into, as one community organizer mentioned, "trailblazer[s] for advancing environmental causes".

## EGM period 3 (2004–2006): Centralized governance

The flurry of activity and collaboration associated with the Grand Calumet River evolved into a more streamlined set of activities led by a few actors. By 2004, the governance mode had shifted from interactional to a more centralized approach. Funding supporting collaborative efforts ran out and so the principal agency played a stronger role in determining stakeholder position. Lengthy planning and implementation timeframes fueled perceptions of inactivity or inefficiency eroding local legitimacy and trust in governance agencies; the powerbase for remediation was limited to representation in binational policy. Volunteers and advocates grew tired. The Grand Calumet Task force had all but dissolved by 2006, which some stakeholders attributed to the loss of active leaders.

*When government actually took this up, sued the companies and the clean-up began, once things were happening people in the task force felt they achieved what they wanted. (Natural Resources Program Coordinator)*

Former Task Force participants believed that the dissolution was motivated by the completion of the coalition's mission. Once negotiations about the implementation of the clean-ups began and procedures were underway, there was a common impression that the problem was solved. People felt satisfied and lost interest in engaging in further stages of the project. Meetings became more focused on the technical aspects of remediation, which also strained the knowledge and attention of some coalition members.

Complicated feedback eroded interactional governance structure. For instance, environmental advocates' success at effectively coordinating with industry brought a need for more formal compensated work, but securing the necessary financial resources to accomplish this became a barrier to growing and maintaining that capacity. A major area where this became a concern was the professionalization of advocacy around environmental concerns:

*... all of a sudden, the people who are volunteers wanted to be paid—no argument there—but trying to find sustainable financing for those types of organizations eventually became their downfall. ... About 25, 30 years ago, we had 3 or 4 relatively strong environmental groups in the area, and it was very helpful to the industries to be able to call each of*

*those groups to have them engaged as new projects were being discussed.... Those groups have now dwindled down to one,... and that's frustrating for the business community, because [their employee only] has 24 hours in her day and wants to have a life outside of working her normal job, and she can't be all things to all people. (Civil Society Environmental Affairs Director)*

Institutional stakeholders described the impact of scarce financial resources on the scale and scope of their engagement with coalition forms of governance. As a regional land management director described, "... at the end of the day people have to operate within a budget, and [in particular for governmental jurisdictions] that budget has boundaries." Many stakeholders leveraged grant funding to catalyze their participation in coalition activities, but staff found that a substantial portion of their time was spent identifying and justifying funding sources to perpetuate programs as well as their jobs. This limited the impact of actions that are to be sustained through this type of funding. "All types of organizations are looking for funding, from regional to local agencies, including the non-profit and private sectors; in other words, everyone in Northwest Indiana is chasing dollars and projects." The executive working for the Northern Indiana Regional Planning Commission continued, "You get a group started. You get organized around it and, then, your grant goes away. It is very, very difficult to sustain effort."

Looking beyond fiscal challenges, local capacity issues created other barriers to achieving livability goals. In particular, limited fiscal and staff capacity within local governments were frequently cited as barriers to moving forward an integrated and holistic vision for targeted regional improvements that leveraged core work around environmental remediation:

*Or in East Chicago [a city in northwest Indiana] right now I'm working with [an advocacy group]. We wanted to do a tree planting. We kinda want to do it in East Chicago. They don't have a lot of trees in East Chicago. And it took a while to get a hold of them. And then, okay, so we have \$2,000 to spend on trees for you and we want them to be big enough to show. But, you know it'd be nice if you guys could dig the holes. That would be a lot better. Do you have a backhoe or something to dig a hole? Well, and I didn't believe them at first, but they got two old guys left in the park department in East Chicago. And they don't have a backhoe. They don't have the ability to dig a hole. I mean they literally don't, you know. So now I'm like, oh, I gotta rethink this. (Regional Environmental Program Director)*

When discussing this era of governance, participants also framed regional change-making capacity as it related to coalition governance goals & targets. Stakeholders viewed the powerbase of coalition environmental governance as a means of leveraging

a shared capacity and mission to deliver environmental benefits with a suite of broader concerns around community needs. Working in a coalition governance mode allowed for the creation of more holistic visions for change united through a common funding source and framework for action. It also called into play an imperative for visionary thinking beyond constraints that individual stakeholders encountered within their institutions.

#### EGM period 4 (2007–2011): Public-private partnership

Market autonomy in the region became a prevailing driver of clean-up activity and its justification, leading to a period that could best be described as a **private-public partnership**. This was codified by the 2008 re-authorization of the Great Lakes Legacy Act, which mandated that AOC remediation goals be accomplished through a coalition of partners that included the EPA as well as state agencies, local governments, environmental non-governmental organizations, and community organizations. Although civil society groups informed the process, the **powerbase** of the coalition was based in legal recourse and incentives. For the Grand Calumet Area of Concern, the Indiana Department of Environmental Management (IDEM) was designated as the agency responsible for developing a Remedial Action Plan (RAP), to address the fourteen beneficial use impairments. IDEM initiated the creation of a governance coalition, the Citizens Advisory for Remediation of the Environment (CARE) Committee. To achieve delisting targets, the U.S. EPA and the State of Indiana invested over \$80 million to remove contaminants from the Grand Calumet River through a multi-stage remedial action plan. Political and legal pressure compelled U.S. Steel to dredge waterways impacted by their polluting activities. They completed dredging in 2007.

During this time, there was broad-scale disappointment in the outcomes of AOC designation. Early remediation activities had focused on soil and water pollution. Those seeking environmental and economic justice were not seeing clean-up work facilitate transformation in ways that relieved regional economic challenges, tax base erosion, and population loss.

For others, the environmental benefits brought on by remediation were welcome, but institutional coordination challenges resulted in uneven or unclear outcomes:

*I think that every time there is a cleanup initiative there is some benefit. The bad part is when there are cleanup efforts going on but yet there is still polluting going on at the same time. So say, for example, the Grand Calumet River, you have U.S. Steel doing a massive cleanup or did a massive cleanup. And downriver the clean ups that were supposed to take place didn't take place. So U.S. Steel did what, you know they were supposed to do. And if everybody on the river did what they were supposed to do... the river would be restored*



**FIGURE 2**  
Grand Calumet area of concern remedial action plan map designating zones 1–4.

*and people could get out there in relative safety and canoe or if they wanted to swim, swim or fish and the fish would be safe to eat. But I believe that every effort to clean it up helps. But at the same time, there has to be those other things that are in place so that as you're cleaning up, you're not doing discharging [emitting point and non-points source pollution into waterways] that's impacting what you're trying to clean up. (Civil Society Natural Resources Stakeholder)*

### EGM period 5 (2011–2016) centralized governance

A centralized governance approach began in 2011. This corresponded with the successful restoration of two beneficial uses: In 2011, the pollution in the Grand Calumet was no longer generating costs to agriculture and by 2012, the drinking water safety, taste, and odor had been deemed sufficiently restored. At the same time, non-AOC activities shifted environmental benefits and burdens and altered the regional economic landscape.

The West Branch portion of the cleanup was completed in 2012, including the area known as Roxana Marsh (denominated zone A in the Remedial Action Plan, see [Figure 2](#)). Restoration and remedial efforts in the East Branch of the Grand Calumet River were expected to be finished in 2016 (zone E in [Figure 2](#)). Future phases include other segments of the river such as Homan Avenue to state line (zone C in [Figure 2](#)), from Cline Avenue to the terminus of the U.S. Steel dredging project (zone D in [Figure 2](#)), and parts of the Indiana Harbor Ship Canal (zone E in [Figure 2](#)).

Although 12 beneficial use impairments had yet to be sufficiently addressed, by 2011, many stakeholders pointed to the need to acknowledge the visible changes in air and water quality throughout the region. While stakeholders acknowledged there was still room for improvement, they shared a concern that a

prevailing stigma regarding environmental challenges made it difficult for outsiders and newcomers to see the progress that had been made. Compounding continued negative perceptions around environmental quality were broader issues regarding chronic regional economic challenges. Several stakeholders pointed to the changes in goals & targets as a result of the community bearing a double burden in terms of environmental and economic challenges in the wake of deindustrialization:

In the last 10 years the changes that I've seen is that we've endured—have had to endure more economic challenges. And a lot of that has had to do with the national economy. See, if you just hearken back during this period, even the suburban areas around here, they were considered more affluent. Those people were laying off firemen and policemen. They were talking about crumbling infrastructures. They were talking about not enough funding for education. And it used to be a time that that was only—that was a Gary [Indiana] situation. . . . You can sink into the abyss or you can rise up and challenge. And so there has been efforts to actually have Gary be more inclusive, involved in the community, in the surrounding areas. (Industry Environmental Liaison)

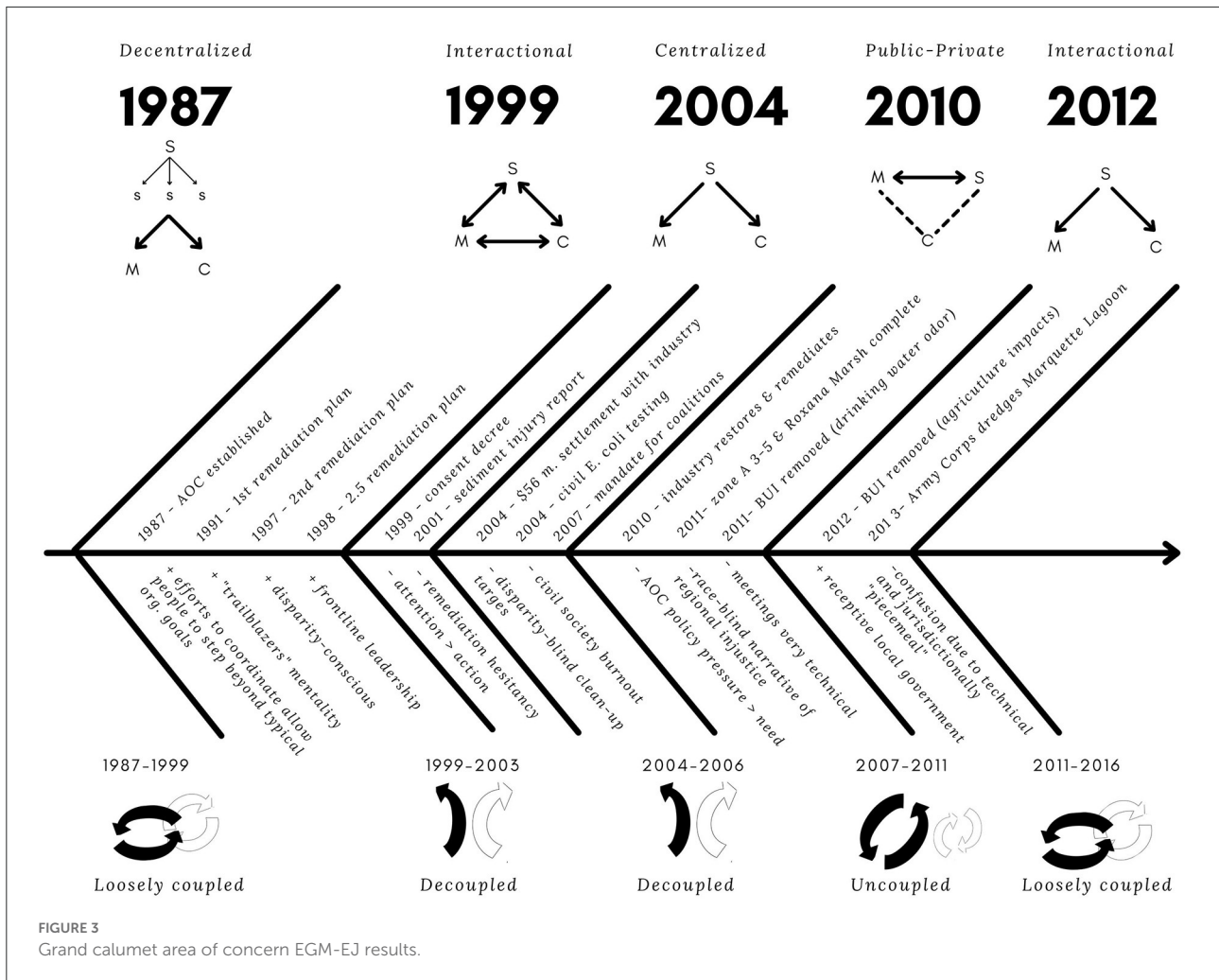
### Factors that change coupling between AOC waterways and EJ

The second research objective explored the factors that facilitate coupling between waterway remediation and environmental justice. The EJ modifications to [Driessen et al. \(2012\)](#)'s typology of EGM outline changes in responsiveness and indistinctiveness consistent with coding themes ([Table 1](#)).

Findings suggest there are multiple pathways through which environmental agencies can engage in governance steering. These pathways enable the agency to leverage their role as a network catalyst to establish core functions that provide benefits to EJ and are within the mission and purview of their technical focus. When we analyzed the AOC cleanup through a hybrid governance lens, we find that the relationship of environmental governance and environmental justice (that is, coupling, decoupling, and uncoupling) relies on policy implementation and receptivity to changing regulatory culture across each governance era. These correspond with the evolution of the AOC governance structure, but the degree of coupling is not synonymous with any single archetype ([Figure 3](#)). Thematic analysis reveals that EJ is a double challenge—informing experiences *within* the region as well as *for* the region.

### Coupling (period 1 and 5)

We found evidence of major touchpoints between the EGM typology and EJ during Period 1 & 5. Responses linked to these



periods established environmental justice and an essential to ecosystem-centered governance and advocacy.

In conversations relevant to both period 1 & 5, AOC priorities adopted a **disparity-conscious** approach to environmental clean-up. While discussing these periods of governance, participants alluded to and discussed histories of environmental racism. More than on participant acknowledged that racism contributed to environmental degradation and the inaccessibility of Lake Michigan. For example, one participant discussed the role anti-Black racism played in generating resistance to establishing Indiana Dunes National Lakeshore (Now Indiana Dunes National Park) in 1966:

*In the late 1950s and into the 1960s there was a slogan around—"Save the Dunes for the [redacted racial slur]"... You never hear it talked about. You never hear it written about these days but it existed and it is fading away. That attitude is fading away. (Civil Society Natural Resource Stakeholder)*

Stakeholders saw the overarching historical narrative of environmental degradation and deindustrialization as a challenge to moving forward with AOC work. They also acknowledged that it formed an important basis for the types of structural inequity they needed to contend with:

*There are certainly environmental justice questions about the maintenance of that river. I think in some measure, those have been addressed and are continuing to be addressed with the dredging of the river. U.S. Steel had to dredge a huge section that ran through Gary some years ago. (Regional Environmental Program Director)*

When discussing both period 1 & 5, leadership in local government in particular came up as crucially important nexus of implementation:

*...from the standpoint of doing the work, local government is the entity that does the work in the community. So when it comes to your greatest impacts to protect and*



*improve the environment, it comes from those who are actually on the ground doing the work. You know. Are making it happen. So that's your local entities, local government, local organizations, you know your local stakeholders that are doing that. (Industry Environmental Liason)*

Another stakeholder pointed to an on-going struggle for leadership that shifts away from deficit narratives for at-risk communities without ignoring the ingenuity born from regional struggle and conflict among governance participants:

*[An advocate for the region is] really tired of people thinking of [Northwest Indiana] as a pollution pit, and she wants people to recognize what values have—what incredible improvements have been made and the values that we have with our partnerships in Northwest Indiana between all stakeholder groups. . . . It's very positive, but we've lost a lot of environmental people as leaders because there's not—I mean, like I said, there's Save the Dunes now. We don't have the Grand Cal Task Force. There's room for improvement, but if a young person wants to come in and try to create a new organization or resurrect an existing organization? They need to come in and be very respectful of the progress that's been made and not come in and automatically assume that things are really, really shitty still. . . . do you want to take them back 40 years ago, or do you want to start here and go forward? Hopefully you want to start here and go forward. (Regional Land Management Director)*

Another participant discussed capacity building at the local level as well as federal and state strategy around environmental governance:

*...there was a time when there weren't adequate [regulations] at the federal and the state level to protect communities... And there was also a time where at the local level, because of how things were viewed, it was left to the state and the federal [levels] to be able to regulate and make things safer and all of that. Because that's just how things operated. But as time progressed, the local level became more involved a lot because a lotta times there were unfunded mandates. You know. They wanted things to happen, but they didn't help you make them happen. So the local level, you know found innovative and creative ways to try to address some of those imbalances. (Local Government Environmental Officer).*

Federal and private industry receptivity to both regional and national leadership in EJ from so-called frontline communities changed the goals and targets of remediation discussions by reframing policy implementation and not policies themselves. In these cases, EJ-relevant work is framed as work that is essential to reducing harm overall. It is during these periods of coupling when respondents discussed the potential value of taking care

of the people and environments harmed by industrial action to large extractive industries.

### Decoupling (period 2 and 3)

Findings demonstrate evidence of decoupling (actively unlinking) during both Period 2 and 3. Early on, the AOC work focused on defining large regional goals, and leveraging resources which many partners could help to craft, but cleanup work narrowed to focus financial resources on meeting mandates quickly instead of holistically. Narrower goals privileged technical aspects of remediation, sidelining civil society groups or saddling them with technical tasks. Most notably, residents of the Sanitary District of Hammond have a responsibility to monitor technical work but not enforcement authority or technical resources. Their attention is expected but not resourced. The stopped coming. Engagement became technical updates on project benchmarks and the ideological and geographic scope of coalition work shrunk.

The salience of environmental improvements decreased and the populations exposed to legacy hazards became more explicitly racialized. Burdens framed descriptions of historic conditions in the region as well as the baseline which stakeholders used to describe conditions at the time when the Area of Concern was designated:

*When I came up here in '77, red smoke was coming out of the stacks. There was one intersection in East Chicago where you had to turn on your headlights if there was a temperature inversion, because the emissions from an aluminum smelter were so thick that you couldn't see the stop light. That doesn't happen anymore. (Civil Society Natural Resource Stakeholder)*

As illustrated by this historical comparison made while discussing actions from period 2, decoupling enables general environmental improvements while also widening gaps in exposure to risk.

During periods 2 and 3, the rationale for collaboration—particularly for some industry stakeholders—was rooted in litigation. A public image crisis ensued, pitting polluting industries against local activists and residents. The decision for industry stakeholders to join environmental governance efforts reflected a desire to collaborate and cooperate to clean up past issues, but was also motivated by a desire to diffuse tension and social pressure surrounding pending litigation. While collaboration initially infused complimentary resources into the governance process, it also created new grounds for conflict, particularly around resources and compensation for the labor of community advocates. Such conflicts and structural imbalances resulted in the breakdown of relationships, decoupling of



ecosystem-centered and EJ work, and the devolution of coalition governance (Figure 3).

Interviews revealed a prevailing concern that pluralist and partnership-based models of representation limited both effective and aggressive pursuit of environmental justice. Environmentalists working alongside industry stakeholders defaulted to remediation standards that were disparity-blind. Most starkly, public access to remediated waterways remained prohibited.

*I'm disappointed in the, you know they've done all this dredging and all this work on the Grand Cal...they dredged it because of cost it's not very deep before the cap. They don't want people to paddle because paddling could disturb the cap and release the [pollutants in the] sediments. So I'm like you're remediated this whole river and this environmental justice community and they can't recreate on it? What an opportunity lost...with those decisions being made out of Indianapolis I don't know that the people who might potentially recreate there in the future were top of mind (Regional Environmental Program Director)*

AOC designation becomes, to some, a barrier to regional justice through race-blind and resource-blind expectations.

#### Uncoupling (period 4)

Stakeholder conceptions of regional inequity blended governance challenges associated with environmental remediation, economic stagnation, livability, and the strategic targeting of capital resources. A sense of regional **unfairness**—of being unable to shake the stigma of economic and industrial decline—contributed to uncoupling ecosystem-centered governance from EJ. Stakeholders were eager to transcend the prevalent historic narrative of disinvestment and environmental degradation. Yet the material realities informing these narratives limited local government capacity and created challenges to reaching environmental remediation benchmarks. These capacity limits also make it difficult to achieve visions for leveraging environmental remediation activities as part of a broader suite of livability interventions and enhancements. Ultimately, speedy remediation to feasible environmental thresholds became the primary concern.

The language of livability allowed a diverse group of stakeholders to find common purpose behind interventions focused on quality of life for current residents, and also addressed environmental issues through a race-blind narrative. At the same time that this language brought together governance stakeholders, it paradoxically pushed the limits of support from state legislators:

*I wanted to tell you that while they put money into parks for aesthetic improvements in our community and quality of place arguments, some of the legislatures that were supportive*

*of the creation of the RDA [regional development authority] and funded it had become very, very critical that they're not investing money in what was originally intended. So, quality of place—which is pretty synonymous with quality of life—quality of place is, I think, an important issue and it hasn't gotten traction here yet as much as it needs to. (Regional Planning Director)*

Under this definition, the extent that EJ—the environmental quality where people live, work, and play—is now an afterthought rather than the root of livability.

When AOC work did not relieve environmental and economic challenges from further reaches of the region, coalition members representing those outlying geographies began to see a greater stake within the work of the coalition:

*Now like anything else, there are people that fish along the Calumet River, those kinds of things. I mean of course when you're in an industrialized area, I mean there's remediation that needs to take place. There are things that need to be done. And quite frankly, that's not—those arteries don't just run through Gary. So fortunately, you get federal, you get state help in trying to make sure that those arteries are cared for properly and addressed. So, they're kind of—flood plans and there are plans for flow and keeping the water fresh and all those things. And fortunately, that burden don't just exist on Gary. Because you don't cut off remediating the water just when the water runs in Gary. There's no dams or borders. It's still the same water. (Chamber of Commerce Director)*

EJ interests presented a barrier to the piecemeal approach within the AOC—in which the entity overseeing particular segments had no responsibility over other near-by cleanup efforts. Community views of the waterway contrasted deeply with jurisdictional views.

## Discussion

In this paper, we used qualitative data to analyze *the conditions that allow the actors, rules, and features of ecosystem-centric governance to enable EJ*. We adopted the definition of a hybrid governance system as one that aims to facilitate multiple benefits (Kabisch et al., 2017; Toxopeus et al., 2020).

Our findings reinforce the notion that ecosystem-centered and environmental justice work come from unique epistemic traditions; therefore, EJ cannot be considered either an inevitable or an eventual part of ecosystem-centered work. This makes the coupling and uncoupling of AOC related remediation and EJ a robust means of stress, testing the capacity for benefits to be coupled, decoupled, and uncoupled through disparity-conscious definitions of fairness and by centering discussion on goals and targets with direct implications for EJ. This supports our assertion that the EGM-EJ coupling framework we present

offers an instructive tool for assessing opportunities to support EJ goals through existing ecosystem-centered governance.

As a qualitative case study that primarily relies on interviews and documents, this study has three primary limitations. First, given their participation in the Grand Calumet AOC formation and its evolution, some interview participants may have shared truncated accounts of AOC failures and challenges in order to sustain the on-going remediation work. Second, participants may have adjusted their comments to account for what they perceived to be our desired responses based on the perceived social identities that comprised the research team and the fact that we explicitly asked about environmental justice. These shortcomings are inherent to many forms of qualitative research and were considered during reflexive analysis and triangulation with formal documents. Finally, the formulation and evolution of work in the Grand Calumet AOC was selected because of its timeliness and relevance to the development of the US-based Environmental Justice movement. The importance of contextual factors to the coupling of EJ and ecosystem-governance may not fully account for differences between US-based and global concepts of EJ which, while closely related, are not identical (Adebowale, 2008; Agyeman, 2014). For example, EJ discussions in the US and elsewhere place different levels of emphasis on distribution (Agyeman, 2014). In spite of these limitations, results suggest promising extensions of the leadership and organizational reforms proposed for internal agency work (i.e., Harrison, 2019), extending even to the inter-organization and community components of governance.

The results from the Grand Calumet AOC study extend efforts to differentiate across forms of environmental governance in ways that emphasize the potential for ecosystem-centered work. These reinforce eco-apartheid and eco-authoritarian processes if not examined in light of EJ. Participant reflections on governance shifts emphasized changes in actors, institutions, and goals as described by Driessen et al. (2012). They also provided new insight into the various ways that EJ-benefits can, over the course of 27 years of work, be both directly and tangentially related to AOC remediation. Our finding that AOC work and EJ are coupled in both period 1 & 5 suggests the potential for changes in leadership to disrupt path dependencies with the potential to reduce or negate environmental injustices within a community.

In contrast to previous studies (e.g., reviewed in Palamar, 2010; Toxopeus et al., 2020), attributes of governance modes were not solely responsible for strong linkages with EJ. The implication is that coalitions can evolve modes of governance to suit different project tasks without foreclosing EJ-related gains if they so choose. Exploring hybrid ecosystem-centered EJ governance also requires attending to intentional recognition, root causes of marginalization, where the onus for change is placed, procedures to declare work done, and the extent to which minoritized groups are aware of, engaged in, and represented among decision-making entities (Palamar, 2010; Pulido and de

Lara, 2018; Toxopeus et al., 2020; Josephs et al., 2021). We incorporate these changes into the EGM-EJ modifications used to frame our analysis.

Our study of coupling sets the stage for studies of EGM-EJ in new locations and for re-analysis of previous environmental governance from the perspective of ecosystem-EJ coupling as part of a hybrid governance system. Additional qualitative work and the continued use of EGM-EJ will aid and inform parallel efforts to quantify the impact of repeated policy interactions using social network analysis and ecology of games theoretical constructs (i.e., Mewhirter et al., 2019a,b; Dobbins and Lubell, 2021). Indeed, the different ontological and epistemological starting points of the social network methodologies used by such studies are likely to reveal stark contrasts, and perhaps contradictions, with the findings from qualitative work, which can help to prevent ascribing predictive authority beyond its theoretical and analytics reach (Nightingale, 2016; Breyer, 2019). This might also shed light on whether there are as-yet unrealized modes of governance that include EJ-relevant features and indicators not observed in this study—civic republican modes of representation, for example.

## Conclusion and implications

We expect the EGM-EJ modification to become more robust and transferable with work to incorporate EJ challenges stemming from strong coupling between economic prosperity and environmental harm. There is active scholarship that aims to understand governance mechanisms that create opportunities to imagine degrowth and decarbonization, for example, and to analyze the scale and ultimate impact of such initiatives (reviewed in Vadén et al., 2020). Such analysis was beyond the scope of this study and there was no evidence that degrowth or other concepts related to decoupling environmental harm and economic growth informed the governance arrangements of the Grand Calumet AOC. However, the involvement of multinational industries in AOC clean-up suggests that the extent to which local environmental justice translates into a net reduction in harm must also contend with these challenges. We speculate that coupling between economic prosperity and environmental harm may explain why we do not observe tight coupling between ecosystem-governance and EJ.

While many analyses of EJ discuss the strategies communities and EJ advocates use to gain recognition, recognition is also a process that requires an entity to be *receptive* to reconciling differences (Kompridis, 2014; Vilá, 2022). As such, attention on who is recognizing disadvantaged groups is important. Our findings are consistent with claims that ecosystem-focused leaders may be receptive to EJ-related co-benefits but hesitant because they feel they lack the ability, authority, or identity to enable environmental justice (Harrison, 2015, 2017, 2019; Beckham, 2022; Vilá, 2022). We find that

initiating actors—those who occupy a formal role in establishing governance procedures—have influence over the extent to which EJ is institutionalized and normalized in ecosystem-centered governance—no matter the EGM archetype.

Importantly, our findings indicate that there is the potential to re-couple ecosystem-governance and EJ even when constrained by existing path dependencies and actions that are uncoupled or decoupled. Although not conclusive, our results support evidence in other studies that argue even within the existing civil and environmental rights frameworks in the US, there is the potential for changes in leadership that can contribute to harm reduction and reparation for past harm in ways that enact EJ (Harrison, 2019; Ozymy and Jarrell, 2021; Beckham, 2022; Vilá, 2022). Ecosystem and EJ governance are neither necessarily rivalrous nor synonymous.

Our findings indicate initiating actors do not need EJ-specific expertise in order to achieve marginal EJ gains (uncoupled and loosely coupled co-benefits) when such benefits align with the mission of the governance endeavor and EJ-receptive leadership. Instead, they can adopt the following practices.

**Deliberate the meaning of fairness.** By encouraging governance participants to share and deliberate definitions of fairness without asking governance participants to abandon their perspective, EJ-responsive leaders can assess EJ-receptivity, EJ hesitancy, and EJ rejection within the governance arrangement. This acknowledges the potential for disparity-blind concepts of fairness to reinforce environmental injustice. Disparity-based concepts of fairness constrain coupling between ecosystem-centered governance and EJ by framing differences as a deficit in comparison to groups with higher access to environmental benefits (most commonly wealthy white communities). Disparity-conscious concepts of fairness have the most potential to couple ecosystem-centered and EJ governance. Without discussions of what fairness means, leaders may presume high levels of EJ-rejection when, in fact, there are high levels of hesitancy or a (mis)conception or lack of confidence about EJ. Community voice methods and other modes of generating objects like documentaries or maps by external partners can be especially useful in facilitating difficult conversations (e.g., Cutts et al., 2018b, 2020, 2021).

**Be reflexive.** Ecosystem-centered governance initiators can work to be aware of their individual values, beliefs, and dispositions related to environmental protection (i.e., protection for communities or from communities). They can also work to be aware of their values around working with communities of color and legacies of segregation, discrimination, and demographic shifts. By intently questioning what kind of knowledge is relevant so that it is not just local or expert but also social and/or ecological, leaders can evaluate ways their knowledge base and assumptions might represent a partial and socially constructed worldview. Self awareness and a familiarity with their sectoral legacies will enhance understanding of

EJ-relevant context. Interrogating personal assumptions about race and culture, for example, can help to differentiate between social constraints (i.e., habits) and material constraints. Leaders who are able to leverage resources to identify and foster challenges to the status quo with empirical tools can support a culture of ecosystem-centered governance. That, in turn can affirm the responsibilities of ecosystem-centered work to acknowledge legacies of harm and resource extraction from many communities of color (Josephs et al., 2021; Van Horne et al., 2022).

**Include metrics for engagement.** Remaining EJ-receptive throughout the life course of the governance arrangement and changes in EGMs means retaining enough institutional knowledge in the governance network to recognize and challenge patterns of inequity. It also means imbuing it with enough authority to challenge patterns and procedures with the potential to disenfranchise, exclude, or displace minoritized communities. The Grand Calumet AOC was first designated in 1987 and is not expected to be delisted until after 2031. Demographics and cultural understandings of community identity will continue to change. Leaders can use analytics to design authentic civil society (re)engagement strategies (e.g., Cutts et al., 2018a), to differentiate actions that respond to political attention from those that respond to deep and systematized risk (e.g., Konisky and Reenock, 2018), and to educate governance actors on local lore and historical controversies (Hornik et al., 2016; Cutts et al., 2017; Mullenbach et al., 2022).

**Invest resources in civil society contributors.** Lastly, leaders can assess the extent to which they are positioned to understand, address, and potentially advocate for social and economic changes to promote overlapping ecosystem-EJ contexts. This form of leadership is, in truth, followership (Masciulli et al., 2016) and a key component of trustworthy work to reform environmental injustices. It does this by understanding how environmental concern is expressed as a struggle for social justice and community health.

Perhaps surprisingly, we did not observe evidence of more radical governance in our empirical case study. However, the EGM-EJ might offer a useful framework for responding to calls for nature-based solutions that support care for both human and nonhuman systems and relational values with nature (Pineda-Pinto et al., 2021). In light of the Bill of Rights that residents of Toledo proposed for Lake Erie, the rights afforded to the Magpie River in Quebec, as well as the rights of rivers in New Zealand, Australia, Bangladesh, and the rights of nature in Ecuador, Bolivia and Mexico, it's become clear that there are a growing number of places and cases where scholars might expect to see governance evolve to either fully accommodate or marginalize the rights of nature. These cases will be instrumental in identifying mechanisms for coupling EJ with ecosystem-centric governance more definitively. In places where environmental

justice is a stand-alone policy or enforceable requirement, other modes of governance may exist.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving human participants were reviewed and approved by Office for the Protection of Research Subjects, University of Illinois at Urbana-Champaign, IRB Protocol: 15070. The patients/participants provided their written informed consent to participate in this study.

## Author contributions

BC: conceptualization, writing, project administration, and funding acquisition. AG: conceptualization, writing, and funding acquisition. CC: formal analysis and writing—original draft. All authors contributed to the article and approved the submitted version.

## Funding

We gratefully acknowledge funding from Illinois-Indiana Sea Grant, grant no. NA14OAR4170095 Mapping Social

## References

- Adebowale, M. (2008). "Understanding environmental justice: making the connection between sustainable development and social justice," in *Social Justice and Public Policy*. Bristol: Policy Press, p. 251–275. doi: 10.46692/9781847423535.013
- Agyeman, J. (2008). Toward a 'just' sustainability? *Continuum*. 22, 751–56. doi: 10.1080/10304310802452487
- Agyeman, J. (2014). Global environmental justice or Le droit au monde. *Geoforum* 54, 236–238. doi: 10.1016/j.geoforum.2012.12.021
- Alsip, P. J., Hartig, J. H., Krantzberg, G., Williams, K. C., and Wondolleck, J. (2021). Evolving institutional arrangements for use of an ecosystem approach in restoring great lakes areas of concern. *Sustainability*. 13, 1–26. doi: 10.3390/su13031532
- Angradi, T. R., Williams, K. C., Hoffman, J. C., and Bolgrien, D. W. (2019). Goals, beneficiaries, and indicators of waterfront revitalization in Great Lakes Areas of Concern and coastal communities. *J. Great Lakes Res.* 45, 851–863. doi: 10.1016/j.jglr.2019.07.001
- Beckham, T. L. (2022). *Leadership in rural disaster recovery: a case study of Robeson county, NC* (Unpublished M.S. thesis). North Carolina State University
- Bennett, N. J., and Satterfield, T. (2018). Environmental governance: a practical framework to guide design, evaluation, and analysis. *Conserv. Lett.* 11, e12600. doi: 10.1111/conl.12600
- Bodin, Ö., Mancilla García, M., and Robins, G. (2020). Reconciling conflict and cooperation in environmental governance: a social network perspective.

Vulnerability in EPA-designated Areas of Concern and the University of Illinois Urbana-Champaign Graduate College Focal Point Initiative Urban Environmental Equity. The opinions and findings presented here are those of the authors alone.

## 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.

## Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/frsc.2022.826326/full#supplementary-material>

*Ann. Rev. Environ. Resour.* 45, 471–95. doi: 10.1146/annurev-environ-011020-064352

Braun, V., and Clarke, V. (2012). "Thematic analysis," in *APA handbook of research methods in psychology, Vol. 2. Research designs: Quantitative, qualitative, neuropsychological, and biological*, eds P. M. Cooper, D. L. Camic, A. T. Long, D. Panter, D. Rindskopf, and K. J. Sher (Washington, DC: American Psychological Association), 57–71.

Breyer, B. (2019). *From subprime loans to unwanted greenspace: an urban political ecology of economic crisis in Cleveland, Ohio* (Unpublished PhD dissertation). University of Illinois at Urbana-Champaign.

Bulkeley, H. (2005). Reconfiguring environmental governance: towards a politics of scales and networks. *Political Geography* 24, 875–902. doi: 10.1016/j.polgeo.2005.07.002

Bullard, R. D. (2007). *Smart growth meets environmental justice. Growing smarter: achieving livable communities, environmental justice, and regional equity*. Cambridge: MIT Press, p. 23–50. doi: 10.7551/mitpress/3375.003.0006

Canada and the United States (1987). *Great Lakes Water Quality Agreement 1972, 1978, 1987. Annex 1, November 17, 1987*. International Joint Commission. Available online at: <http://www.ijc.org/rel/agree/quality.html> (accessed August 29, 2022).

Chantrill, C. (2015). *Grand calumet: the linkages between environmental justice, vulnerability and environmental governance* (Unpublished MS thesis). University of Illinois at Urbana-Champaign.







- Mullenbach, L. E., Breyer, B., Cutts, B. B., Rivers, I. I. I., L., and Larson, L. R. (2022). An antiracist, anticolonial agenda for urban greening and conservation. *Conserv. Lett.* 15:e12889. doi: 10.1111/conl.12889
- Nevers, M. B., Whitman, R. L., and Gerovac, P. J. (1999). History and environmental setting of the grand calumet river. *Proc. Indiana Acad. Sci.* 108, 3–10.
- Newig, J., and Fritsch, O. (2009). Environmental governance: participatory, multi-level—and effective? *Environ. Policy Governance* 19, 197–214. doi: 10.1002/eet.509
- Nightingale, A. J. (2016). Adaptive scholarship and situated knowledges? Hybrid methodologies and plural epistemologies in climate change adaptation research. *Area* 48, 41–47. doi: 10.1111/area.12195
- Northouse, P. G. (2014). *Introduction to Leadership: Concepts and Practice*. Sage. Available online at: <https://scholarworks.wmich.edu/books/249>
- Ozmy, J., and Jarrell, M. L. (2021). Predicting the US environmental protection agency's criminal enforcement outcomes, 1983–2019. *Environ. Polit.* 30, 1237–1258. doi: 10.1080/09644016.2021.1877046
- Palamar, C. (2010). From the ground up: why urban ecological restoration needs environmental justice. *Nat. Culture* 5, 277–298. doi: 10.3167/nc.2010.050304
- Pellow, D. W. (1999). Negotiation and confrontation: environmental policymaking through consensus. *Soc. Nat. Resour.* 12, 189–203. doi: 10.1080/089419299279696
- Pineda-Pinto, M., Frantzeskaki, N., and Nygaard, C. A. (2021). The potential of nature-based solutions to deliver ecologically just cities: lessons for research and urban planning from a systematic literature review. *Ambio* 51, 1–16. doi: 10.1007/s13280-021-01553-7
- Pulido, L., and de Lara, J. (2018). Reimagining 'justice' in environmental justice : radical ecologies, decolonial thought, and the black radical. *Tradition* 1, 76–98. doi: 10.1177/2514848618770363
- Sauder, M., and Espeland, W. N. (2009). The discipline of rankings: tight coupling and organizational change. *Am. Sociol. Rev.* 74, 63–82. doi: 10.1177/000312240907400104
- Schlosberg, D. (2013). Theorising environmental justice: the expanding sphere of a discourse. *Environ. Polit.* 22, 37–55. doi: 10.1080/09644016.2013.755387
- Schweitzer, L., and Kim, S. (2009). Environmental justice and collaborative governance: building a socio-spatial perspective for facility siting. *Int. Rev. Public Admin.* 13: 45–59. doi: 10.1080/12294659.2009.10805139
- Shilling, F. M., London, J. K., and Liévanos, R. S. (2009). Marginalization by collaboration: environmental justice as a third party in and beyond CALFED. *Environ. Sci. Policy Collaborat. Governance Adapt. Manage. California's CALFED Water Program*. 12, 694–709. doi: 10.1016/j.envsci.2009.03.003
- Sirriani, C. (2009). *Investing in Democracy: Engaging Citizens in Collaborative Governance*. Washington DC: Brookings Institution Press.
- Tan, Y., and Geng, Y. (2020). Coupling coordination measurement of environmental governance: case of China. *Environ. Ecol. Stat.* 27, 253–272. doi: 10.1007/s10651-020-00444-6
- Toxopeus, H., Kotsila, P., Conde, M., Katona, A., van der Jagt, A. P., and Polzin, F. (2020). How 'just' is hybrid governance of urban nature-based solutions? *Cities* 105, 102839. doi: 10.1016/j.cities.2020.102839
- USEPA—US Environmental Protection Agency (1985). *Master Plan for Improving Water Quality in the Grand Calumet River-Indiana Harbor Canal*. BiblioGov.
- USEPA—US Environmental Protection Agency. (2022). *Great Lakes AOCs*. Available online at: <https://www.epa.gov/great-lakes-aocs/list-great-lakes-aocs> (accessed June 29, 2022).
- USFWS—US Fish and Wildlife Service (2003). *An Assessment of Injury to Human Uses of Fishery Resources in the Grand Calumet River and Indiana Harbor Canal, the Grand Calumet River Lagoons, and Indiana Harbor and the Nearshore Areas of Lake Michigan: Volume 1—Technical Report*. Available online at: <https://www.fws.gov/Midwest/es/ec/nrda/GrandCalumetRiver/documents/Volumel.pdf> (accessed June 29, 2022).
- Vadén, T., Lähde, V., Majava, A., Järvensivu, P., Toivanen, T., Hakala, E., et al. (2020). Decoupling for ecological sustainability: a categorisation and review of research literature. *Environ. Sci. Policy* 112, 236–244. doi: 10.1016/j.envsci.2020.06.016
- Van Horne, Y. O., Alcalá, C. S., Peltier, R. E., Quintana, P. J., Seto, E., Gonzales, M., et al. (2022). An applied environmental justice framework for exposure science. *J. Exposure Sci. Environ. Epidemiol.* 8, 1–11. doi: 10.1038/s41370-022-00422-z
- Vilá, O. F. (2022). *Environmental justice in disaster recovery and hazard mitigation: the role of recognition and leaders* (Unpublished PhD dissertation). North Carolina State University.
- White, R. (2017). Reparative justice, environmental crime and penalties for the powerful. *Crime Law Soc. Chang.* 67, 117–132. doi: 10.1007/s10611-016-9635-5aw
- Wu, F., Geng, Y., Tian, X., Zhong, S., Wu, W., Yu, S., et al. (2018). Responding climate change: a bibliometric review on urban environmental governance. *J. Clean. Prod.* 204, 344–354. doi: 10.1016/j.jclepro.2018.09.067
- Yamamoto, E. K., and Lyman, J.-L. W. (2021/2001). Racializing environmental justice. *Univ. Colorado Law Rev.* 92, 1393–1441.
- Zeemering, E. S. (2018). Comparing governance and local engagement in the St. Marys River Area of Concern. *Am. Rev. Canad. Stud.* 48, 20–40. doi: 10.1080/02722011.2018.1431680
- Zeemering, E. S. (2019). An agenda for comparing local governance and institutional collective action in Canada and the United States. *Urban Affairs Rev.* 55, 858–886. doi: 10.1177/1078087417738094