

Wicked Problems, Foolish Decisions: Promoting Sustainability Through Urban Governance in a Complex World

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INTRODUCTION

Why do wicked problems often give birth to bad policy choices? Put another way, why do people—in the face of complex social challenges—make misdiagnoses, ineffective decisions, or no decisions at all? Typical answers point to a plethora of suspects: impatience,

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myopia, political stalemate, narrow-mindedness, fear and risk aversion, hubris, greed, rational self-interest, ignorance, reliance on emotionally appealing but misleading anecdotal stories, misuse of evidence, and misunderstanding of uncertainty.

Amid these divergent explanations, two classes emerge: one lies in the shortcomings and mistakes of the problem solvers, and the other lies in the nature of the problem itself. One stance is to fault the ostensible problem solvers: people are not always rational, fair, patient, thoughtful, or deliberative, but instead are myopic, selfish, greedy, power hungry, or out for revenge (among other motivations). And though we call them problem solvers, many are not trying to solve problems, but rather seek gains through the process. As such, the framework that planners often assume—that the urban world presents problems and we then seek solutions—misstates how many individuals, firms, and institutions see and engage with the world: a world not as a set of problems, but rather as a set of opportunities and threats.

The second stance is to point to the nature of the problem. This is the focus of this Article. In particular, we examine how the dynamics of wicked problems¹ undermine traditional problem-solving efforts. This is not to absolve the problem solvers of responsibility for poor policy choices. It is the responsibility of policymakers to diagnose the distinctive challenges and needs of wicked problems and act accordingly. As urban planning scholars, we focus on entrenched urban problems. This focus is not accidental. Horst Rittel (an architect) and Melvin Webber (a planning theorist and transportation planner) developed the idea of “wicked problems” at the University of California, Berkeley’s College of Environmental Design in the early 1970s²—an era when the optimism of solving complex social issues through technical, scientific solutions was colliding hard with the failure of such efforts to

1. For a thorough discussion of wicked problems, see Horst W. J. Rittel & Melvin M. Webber, *Dilemmas in a General Theory of Planning*, 4 *POL’Y SCIS*, 155 (1973). Rittel and Webber describe several common characteristics of wicked problems: (1) “[t]here is no definitive formulation of a wicked problem”; (2) “[w]icked problems have no stopping rule”; (3) “[s]olutions to wicked problems are not true-or-false, but good-or-bad”; (4) “[t]here is no immediate and no ultimate test of a solution to a wicked problem”; (5) “[e]very solution to a wicked problem is a ‘one-shot operation,’ because there is no opportunity to learn by trial-and-error, every attempt counts significantly”; (6) “[w]icked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan”; (7) “[e]very wicked problem is essentially unique”; (8) “[e]very wicked problem can be considered to be a symptom of another problem”; (9) “[t]he existence of a discrepancy representing a wicked problem can be explained in numerous ways,” and “[t]he choice of explanation determines the nature of the problem’s resolution”; and (10) “[t]he planner has no right to be wrong.” *Id.* at 161–67.

2. *See id.* at 155–69.

conclusively resolve urban poverty, inequality, deindustrialization, racism, white flight, and the violence of the “Urban Crisis.”

In this Article, we build on previous research³ to demonstrate how complexity thinking can engage urban challenges at three levels: (1) describing “complexity” as a symptom of urban systems; (2) analyzing the dynamics of complex urban systems; and ultimately (3) intervening through appropriate planning strategies that account for complexity.⁴ We employ this thinking to engage the politics of sustainability at the same three levels, illustrating this at two geographic scales: the neighborhood⁵ (specifically, the challenge of ecogentrification) and the megaregion⁶ (and the resulting regional externalities and trade-offs). These scales involve actors, conflicts, and specializations within planning. Yet both represent new, hybrid patterns of urbanization that produce intractable problems of environmental unsustainability and social-spatial inequality—two core planning priorities that too often collide. Both situations also generate novel social policy challenges that conventional planning, thinking, and governance tools are ill-equipped to address. These challenges instead call for interdepartmental or intergovernmental cooperation.

The first case we examine is ecogentrification, an unexpected portmanteau of two once-separate planning concerns: threats to ecological sustainability arising from material-intensive urban lifestyles, and neighborhood displacement as both symptom and exacerbator of inequality.⁷ The unlikely alliance of green development and gentrification, amid growing income inequality, is producing affluent, exclusionary “green islands” of high livability surrounded by gray hardscapes of poverty, heat islands, unhealthy environments, and poor services.⁸ Ecogentrification exposes deep-seated tensions between

3. See Moira Zellner & Scott D. Campbell, *Planning With(In) Complexity: Pathways to Extend Planning with Complex Systems Modelling*, in HANDBOOK ON PLANNING AND COMPLEXITY 258 (Gert de Roo, Claudia Yamu & Christian Zuidema eds., 2020) [hereinafter Zellner & Campbell, *Planning With(In) Complexity*]; Moira Zellner & Scott D. Campbell, *Planning for Deep-Rooted Problems: What Can We Learn from Aligning Complex Systems and Wicked Problems?*, 16 J. PLAN. THEORY & PRAC. 457 (2015) [hereinafter Zellner & Campbell, *Planning for Deep-Rooted Problems*].

4. See *infra* Parts I & II.

5. See *infra* Section III.A (Case 1: Ecogentrification).

6. See *infra* Section III.B (Case 2: Megaregional Sustainability: A New Geography in Search of Governance).

7. See Jennifer L. Rice, Daniel Aldana Cohen, Joshua Long & Jason R. Jurjevich, *Contradictions of the Climate-Friendly City: New Perspectives on Eco-Gentrification and Housing Justice*, 4 INT'L J. URB. & REG'L RSCH. 145, 146 (2019) (noting that the term “ecological gentrification” . . . describe[s] the processes by which homeless populations are displaced from urban parks as part of ecological improvement projects”).

8. NAT'L ENV'T JUST. ADVISORY COUNCIL, UNINTENDED IMPACTS OF REDEVELOPMENT AND REVITALIZATION EFFORTS IN FIVE ENVIRONMENTAL JUSTICE COMMUNITIES 2–3 (2006),

the search for environmental equality, housing equality, and dynamic housing markets. This confluence of divergent forces generates novel forms of urbanization—a hallmark of emergent complex systems.⁹ And, characteristic of wicked problems, there is no consensus about the nature of the problem (housing, environment, income?), the jurisdiction that oversees it, or the solutions.¹⁰ This lack of consensus raises a perplexing question of governance: Who is responsible for the problem and for solving it? And if no single agency claims ownership of the problem, responsibility falls between the cracks.

The second case is megaregional sustainability, which represents a tantalizing new scale of urban development and spatial analysis.¹¹ Yet our administrative capacities and political culture have not kept up with the megaregion's conceptual idea. While the megaregion is an appealing idea of spatial organization in search of a corresponding governance structure,¹² we lack the ability to mitigate externalities, counter the negative effects of agglomeration, and address trade-offs (e.g., growth at the expense of air pollution). The megaregion presents a paradox of both promises and troubles: in theory, the scale better encompasses both environmental (watersheds, air basins, habitats) and social (city-suburb-rural, interracial) systems.¹³ Yet the megaregion also privileges consolidated economic interests over ecological and social justice interests.¹⁴

We conclude with implications for governance. Each discipline defines governance on its own terms. Urbanists view governance broadly, including both formal government institutions and a wider array of nonprofit and private entities that shape the built environment.¹⁵ The discipline of urban planning commonly views the activity of “planning” broadly, synonymous with governance (rather

<https://www.epa.gov/sites/production/files/2015-02/documents/redev-revital-recomm-9-27-06.pdf> [<https://perma.cc/2GBD-9WBA>].

9. See Rittel & Webber, *supra* note 1, at 164–65 (“Every wicked problem is essentially unique,” which means that “despite long lists of similarities between a current problem and a previous one, there always might be an additional distinguishing property that is of overriding importance.”).

10. *Id.* at 164–66.

11. See Yoav Hagler, *Defining U.S. Megaregions*, AMERICA 2050, Nov. 2009, at 1, 1.

12. Scott Campbell, *The Imperative of Growth, the Rhetoric of Sustainability: The Divergence of the Ecoregion and the Global Megaregion*, in MEGAREGIONS: PLANNING FOR GLOBAL COMPETITIVENESS 127, 127 (Catherine L. Ross ed., 2009).

13. *Id.* at 128, 132.

14. *Id.* at 132–33.

15. Nuno F. da Cruz, Philipp Rode & Michael McQuarrie, *New Urban Governance: A Review of Current Themes and Future Priorities*, 41 J. URB. AFFS. 1, 2 (2019); see also Peter Schmitt & Thorsten Wiechmann, *Unpacking Spatial Planning as the Governance of Place*, 54 DISP – PLAN. REV. 21, 25 (2019).

than an old-school, narrower view of planning as simply the drafting of land use plans).¹⁶ If planners face three stages to engage complexity and sustainability (acknowledgment, analysis, intervention), governance (intervention) is the most challenging step,¹⁷ as highlighted in Table 1. Traditional urban planning is rooted in the logic of technical rationality, including the effective translation of community knowledge and interests into goals and policies, and in the ability to connect past events, present patterns, and future trends.¹⁸ Yet with wicked problems, this rational planning model encounters complexity, uncertainty, and an intractable lack of convergence of interests. Overcoming these obstacles is a formidable task, accomplished neither through a rhetorical sleight of hand nor the panacea of new data technologies. Using our two examples, we explore how planners and stakeholders can address these complex challenges.

TABLE 1: GOVERNANCE CHALLENGES POSED BY
COMPLEX, WICKED PROBLEMS

<i>Traditional governance requires...</i>	<i>But in cases of socio-environmental wicked problems...</i>
Shared definition of the problem and need for intervention	Little consensus about the problem and the pathway to solutions
Knowledge of cause-effect and consequences	Feedbacks and interactions (complexity) make it difficult to keep track of causes and effects
Identification of key parties and interests	Interests, preferences, and authority/ability to act are diverse
Ability to imagine multiple interventions and evaluate and compare each	Existing tools do not match the need to balance rigor with accessibility, individual/local goals with collective/regional goals
Strategic knowledge of the scope and limits of public power and authority	Incentives for individual/short-term gains and uncertainty about regional/long-term effects are high

16. da Cruz et al., *supra* note 15, at 2.

17. See *infra* Table 1 (explaining governance challenges posed by complexity and sustainability).

18. See, e.g., Rittel & Webber, *supra* note 1, at 156–57 (“Goal Formulation”).

I. HOW DO PLANNERS THINK ABOUT COMPLEXITY AND WICKED PROBLEMS?

Urban and regional planners invariably engage with contested, messy urban challenges. Urban systems have distinctive characteristics that shape how planners approach complex governance challenges.¹⁹ Here are six:

1. Cities are both complicated, with many moving parts and stakeholders, and complex, due to the dynamics of surprising emergence.²⁰
2. Cities are interactive, with virtuous and vicious cycles of growth and decline that undermine the possibility of equilibrium.²¹
3. Cities are internally heterogeneous and uneven, where specialization and spatial and social divisions of labor tend to increase with city size.²²
4. Cities tend to spatially concentrate all sorts of social phenomena (both good and ill): people, power, capital, information, pollution, viruses, culture, crime, and innovation.
5. Cities are adaptive, open social-technological-environmental systems.²³
6. Cities are resistant to universal laws. Despite efforts to the contrary, there is no singular, stable, ideal form, size, density, shape, or design of a city.²⁴

Overall, despite the influence of path dependency in a city's historical development, one cannot always anticipate the outcomes based on the characteristics of the starting conditions.²⁵ You have to run the model, or let history (and urbanization) run its course, to see what

19. See Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3, at 259 (discussing characteristics of urban systems).

20. See Jo da Silva, Sam Kernaghan & Andrés Luque, *A Systems Approach to Meeting the Challenges of Urban Climate Change*, 4 INT'L J. URB. SUSTAINABLE DEV. 125, 129 (2012) (advocating for a "systems thinking" approach that considers cities "as complex 'living' systems undergoing numerous dynamic changes at any given time, constantly evolving and responding to both internal interactions and the influence of external factors").

21. *Id.* at 128.

22. See Rittel & Webber, *supra* note 1, at 167 ("[T]he high-scale societies of the Western world are becoming increasingly heterogeneous.").

23. Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3, at 259.

24. Rittel & Webber, *supra* note 1, at 165 ("In the more complex world of social policy planning, every situation is likely to be one-of-a-kind.").

25. *Id.* at 164.

emerges. From simple starting conditions emerge complex, varied, and surprising outcomes. Yes, it is tempting, in retrospect, to narrate a clear, deterministic line from a city's past to its present and to construct universal laws of urbanization, but these laws are invariably unreliable.

These characteristics create a paradox for the planning profession: cities both need and resist planning and regulation. Rather than strive for optimal efficiency and definitive solutions, planners must typically content themselves with compromise, partial answers, and the comfort of incremental improvements. Because cities are dynamic, volatile, and unpredictable, they elude tidy, technical solutions.²⁶ The term "planning" may suggest the calm, rational, and technical preparation of ideal blueprints for the good city (and this task does remain part of the job). Yet much of a planner's professional day involves mediating, listening to impatient stakeholders who are skeptical of public planning and regulation, negotiating conflict, interpreting city codes, scrounging for limited funds, and leveraging limited resources to make a difference.²⁷ Planning attracts pragmatic idealists who believe in promoting the public interest through improving the built environment. It is not a professional activity for those who need certainty, unquestioned authority, quick answers, or perfection.

It should not be surprising, then, that two urbanists developed the idea of the wicked problem.²⁸ Horst Rittel and Melvin Webber developed this concept at Berkeley during a highly productive, but lively and tempestuous, era of urban scholarship, and perhaps the era's two dynamics are connected. There were two colliding impulses. The first was planning's push to gain new scholarly rigor and scientific authority in academic and policy circles. Planning scholarship had sought academic legitimacy through embracing quantitative methods, rational problem-solving, and large-scale modelling, in part to emulate the more established disciplines on campus. In his writing, Webber was promoting a broader vision of planning as a process of decisionmaking.²⁹ He pushed against the perception, on campus and beyond, that

26. See *id.* at 160, 165 ("In the . . . complex world of social policy planning, every situation is likely to be one-of-a-kind."); da Silva et al., *supra* note 20, at 129.

27. Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3, at 259.

28. Rittel & Webber, *supra* note 1.

29. Melvin M. Webber, *The Prospects for Policies Planning*, in *THE URBAN CONDITION: PEOPLE AND POLICY IN THE METROPOLIS* 319, 320 (1963) ("[P]lanning is that process of making rational decisions about future goals and future courses of action which relies upon explicit tracings of the repercussions and of the value implications associated with alternative courses of actions, and, in turn, requires explicit evaluation and choice among the alternative matching goal-action.").

planning was a “minor profession,” inhibited by its focus on practical skills and municipal land use regulations. This effort would only be partly successful, as planning could not fully assimilate into an “applied social science” and the scientific basis sought was being attacked by the anti-professionalism and anti-expertise of the time.³⁰

The second impulse was from the streets. Many American cities reached their peak population in 1950 and, by the early 1970s, were tumbling in downward spirals of inner-city decline, white flight, racism, urban poverty, inequality, deindustrialization, declining schools and public services, and urban violence.³¹ Those who came of age only in the twenty-first century—when cities were celebrated as the lively centers of the high-tech information age (with its creative class and urban triumphalism), and the dominant worries were gentrification and congestion—may struggle to fully appreciate the sense of despair, bewilderment, and desperation in many American cities during the 1960s and 1970s.³² And here was this relatively new field of urban planning that could not “solve” wicked problems in the conventional deterministic sense. Technocratic optimism, scientific modeling, and modernist urban renewal agendas seemed ineffective in the efforts to reverse this urban decline.³³

Rittel and Webber articulated the concept of “wicked problems” during this tumultuous period of social and scientific upheaval. In doing so, they provided an alternative explanation of planning’s apparent inability to “solve” the urban crisis.³⁴ The deficiency was not that planners lacked the intelligence, methodological skills, or scientific rigor to solve urban problems. Instead, the difficulty lay in the nature of planning problems themselves. As the pair explained, “We shall want to suggest that the social professions were misled somewhere along the line into assuming they could be applied scientists—that they could solve problems in the ways scientists can solve their sorts of problems. The error has been a serious one.”³⁵ Planners’ reinterpretation of the field’s crisis was a somber recognition that urban planning faced an unruly collection of intractable challenges. But it was also a reassuring

30. See Rittel & Webber, *supra* note 1, at 156–57 (discussing the anti-professionalism movement’s opposition to the field of planning).

31. BRENT D. RYAN, *DESIGN AFTER DECLINE: HOW AMERICA REBUILDS SHRINKING CITIES* 37–38 (Eugenie L. Birch & Susan M. Wachter eds., 2012) (discussing the catastrophic changes in and declining population of major U.S. cities in the second half of the twentieth century).

32. See *id.*

33. See Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3, at 259 (discussing the frustrations of early planners in applying rational quantitative modeling to planning problems).

34. Rittel & Webber, *supra* note 1.

35. *Id.* at 160.

argument: the criticisms of the planning profession as underdeveloped and ineffective were misplaced. One should not mechanistically and inappropriately apply the scientific standards from the natural sciences and engineering to social policy. The article suggested an alternative tactic: recognizing wicked problems would lead planners to strategically reorient their problem-solving methods.³⁶

In the nearly fifty years since Rittel and Webber's work, both planning's theoretical culture and the nature of urban problems have profoundly changed.³⁷ But wicked problems are as relevant now as then. The field now uses the "wicked problem" moniker in response to an era of megacities, globalization, climate change, terrorism, sustainability, and Habermasian communicative action.³⁸ The relationship between science and planning has also changed. In the 1970s, planners experienced the frustration of translating technological and scientific progress into social planning and policy.³⁹ Today, expectations about science and urban planning are more nuanced if not contradictory. Some planners have embraced a qualitative, narrative approach to planning as discursive collaboration among a pluralistic public in pursuit of democracy and social justice.⁴⁰ Others have embraced urban informatics, geographic information systems ("GIS"), spatial analysis, "big data," and quantitative evaluation.⁴¹ Planners therefore acknowledge the persistent role of wicked problems in their work yet seek divergent strategies—both discursive and technical—to alternatively accommodate, tame, or overcome these wicked problems.

There is a risk of overusing the term "wicked problem," and one should be wary of the casual, imprecise use of the term in the literature. Authors frequently use the term when they really just want to describe a hard, difficult problem that has led to a lot of controversy and conflict.⁴² One is well advised to return to the source and review Rittel and Webber's original list of ten characteristics of wicked problems.⁴³

36. *Id.*

37. Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3, at 262–63.

38. See, e.g., FRANK P. INCROPERA, CLIMATE CHANGE: A WICKED PROBLEM (2015); C. Jotin Khisty & Steen Leleur, *Citizen Participation Through Communicative Action Towards a New Framework and Synthesis*, 31 J. ADVANCED TRANSP. 119, 129–30 (1997) (analyzing a case study for applying the Habermas communicative theory to a "wicked problem").

39. See Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3, at 262.

40. See Ralf Brand & Frank Gaffikinn, *Collaborative Planning in an Uncollaborative World*, 6 PLAN. THEORY 282, 291–92 (2007) (examining how collaborative planning can take place in a pluralist society to promote democracy and social justice).

41. Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3, at 267.

42. See *id.* at 262; John C. Camillus, *Strategy as a Wicked Problem*, HARV. BUS. REV., May 2008, at 98, 100 (explaining what makes a wicked problem different from ordinary problems).

43. See Rittel & Webber, *supra* note 1, at 161–67.

This misuse is similar to the misplaced use of the term “complex” when a situation or system is merely complicated.

Our own research explores the confluence of wicked problems and complex systems.⁴⁴ Both approaches view the urban world as diverse, pluralistic, and dynamic—a world ill-suited to traditional optimization and equilibrium modeling.⁴⁵ We observe that the complex systems underlying human settlements (encompassing their social, biological, and built infrastructure) generate wicked problems through interactions, heterogeneity, feedback, neighborhood effects, and tensions between individual and collective interests.⁴⁶ Conversely, planning can use the tools of complex systems to mitigate and adapt to these wicked problems in ways that traditional, mechanistic planning tools cannot.⁴⁷ As such, wicked problems come full circle: complexity is both the source of intractable wicked problems and a way to trace the pathway out.

We view complex systems as not simply a contemporary synonym of wicked problems, but also a needed adaptation and evolution of the 1970s wicked problem framework. This updating reflects a generational shift in planning thought: today’s planners approach complex problems with tools and cultural politics that would often be unknown to planners in the 1970s. Indeed, the shift in planning language from Rittel and Webber’s “wicked problems” to today’s “complex systems” is a proxy of the larger changes in planning theory over these fifty years.⁴⁸ Planners define problems differently, temper their belief in technical progress, and approach social justice, race, gender, and environmentalism with more integrated strategies.⁴⁹ We have explained elsewhere:

Rittel and Webber were responding to a Cold-War overconfidence in the universal applicability of scientific problem solving (and perhaps to the waning overconfidence in American political-technical dominance). Today’s planning scholarship works in a more

44. See sources cited *supra* note 3.

45. See sources cited *supra* note 3.

46. See Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3, at 259, 261.

47. See *id.* at 262, 270 (discussing how tools like big data alone or “rational, quantitative, comprehensive modeling” are ineffective for complex systems).

48. Compare Rittel & Webber, *supra* note 1, at 160 (framing planning issues as “wicked problems”), with Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3, at 262–63 (placing the discussion of planning and “wicked problems” within a “complex systems” framework).

49. See, e.g., Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3, at 267 (“Technical fixes are not the way out of wicked problems without coordination and collaboration . . .”); *id.* at 262–63 (recharacterizing “wicked problems” as complex systems); Scott D. Campbell, *Sustainable Development and Social Justice: Conflicting Urgencies and the Search for Common Ground in Urban and Regional Planning*, 1 MICH. J. SUSTAINABILITY 75 (2013) (examining urban planning’s simultaneous pursuit of both sustainability and social justice, including racial and gender justice).

bifurcated era . . . of healthy scientific skepticism (arising both from environmental and community activism), troubling anti-science (e.g., right-wing attacks on climate change modeling), and a new era of (over)confidence in information-age problem-solving (Big Data, networking, personal device connectivity, GIS, the “Internet of Things,” and so-called “Smart Cities”).⁵⁰

Complex systems cannot “solve” wicked problems in the conventional, deterministic sense. But complex systems can help redefine and unravel wicked problems while retaining their diversity, interdependence, and “messiness.” Complex systems tools—such as agent-based modeling, cellular automata, networks, and system dynamics—cannot predict the future or determine a single, optimal solution. They instead encourage both planners and citizens to explore various future scenarios, while considering interactions, feedback loops, social learning, and the emergence of innovative, new urban patterns and behaviors.⁵¹ The very characteristics of wicked problems that trip up traditional statistical and mathematical analysis become prolific ingredients for complex systems analysis.

That said, the implementation of complex systems-based planning strategies still lags far behind its potential. Planners are quick to acknowledge complexity as a characteristic of cities but so far have been slow to convert complex systems thinking into concrete planning solutions.⁵² We observe three stages: (1) a general acknowledgment of complexity as a characteristic; (2) analytically understanding the complex workings of a system; and (3) engaging complexity as a planning strategy.⁵³

The first step is simply recognizing that urban systems are complex. This is a vital but often vapid statement, since frequently it is merely the observation that urban problems are difficult, messy, and intractable. And imprecise observers too casually conflate complicatedness (many variables, large scale, long-term) with complexity (interaction, feedback, uncertainty, adaptation, emergence).⁵⁴

The second step is using complex systems reasoning and analysis to get inside the system and understand its internal workings, logic, and dynamics. This requires “thinking like an agent”: How do

50. Zellner & Campbell, *Planning for Deep-Rooted Problems*, *supra* note 3, at 459.

51. *Id.* at 461 (“Complex systems analysis cannot resolve these challenges of uneven political power and resources. But complex systems tools can assist planners with other barriers to implementing communicative action: scalability, multiple forms of knowledge, highly technical information, long-term and cumulative impacts, and unintended consequences.”).

52. See Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3, at 258–59 (“There is an enduring gap between acknowledgement of complexity and harnessing complexity . . .”).

53. See *infra* Table 2.

54. Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3, at 259.

agents (such as homeowners, employers, residents, commuters) interact, learn, cooperate, compete, and adapt with other agents in the system? What are the system-wide effects of the aggregation of individual decisions?⁵⁵

The third step is the hardest: moving from analysis to planning practice. How does one incorporate complex systems thinking into the open political world of public planning and urban development? Strategies for this third step may be as varied as planning itself, such as exploring and evaluating a set of alternative future scenarios, visualizing the system-wide effects of a change in single or multiple policies, and engaging diverse stakeholders at a public meeting in complex systems thinking.⁵⁶

We use this three-stage framework not only to suggest a pathway for planners to sequentially engage complexity, but also to explain why complexity has not been widely adopted in the profession. Planners often get stuck in the first or second step. This disconnect between description, explanation, and practical action is pervasive throughout planning and other public policy professions, though the complexity of urban systems makes this disjunction particularly acute.

II. HOW DO PLANNERS THINK ABOUT SUSTAINABILITY?

Planning has explicitly engaged sustainability since the 1980s, with a growing emphasis since the 1990s.⁵⁷ Frequently idealized, and often contested, sustainability remains for urban planning a leitmotif, core value, and go-to keyword. Alternately thoughtful and picayune voices have bemoaned sustainability's shortcomings: its vague vision of the future, its dilution through overuse, and its deference to the status quo and system maintenance. Critics have argued for the concept's dethroning, either by resilience, regenerative cultures, or environmental justice. Yet sustainability retains its hold at the center of the field.⁵⁸

This recent focus on sustainability builds on a much longer planning tradition of debating the broader tensions between urbanization and environmentalism. Urban planning, as a modern

55. *Id.*

56. *Id.*

57. *See, e.g.*, TIMOTHY BEATLEY & KRISTY MANNING, *THE ECOLOGY OF PLACE: PLANNING FOR ENVIRONMENT, ECONOMY, AND COMMUNITY* (1997); William E. Rees, *Defining "Sustainable Development,"* CHS RSCH. BULL., May 1989, at 1; SIM VAN DER RYN & PETER CALTHORPE, *SUSTAINABLE COMMUNITIES: A NEW DESIGN SYNTHESIS FOR CITIES, SUBURBS AND TOWNS* (1991).

58. *See, e.g.*, Edward J. Jepson Jr., *Planning and Sustainability, in* URBAN PLANNING IN THE 21ST CENTURY 104–05 (2009) (discussing the centrality of sustainability to systems planning).

profession, arose as a child of the Progressive Era at the end of the nineteenth century, influenced by good government movements, housing reform, the conservation movement, city beautification efforts, and sanitary reform (especially efforts to provide clean water to cities).⁵⁹ At its core, planning was a collective, reformist response to the rapid urbanization of the industrial revolution and the massive conversion of rural and small-town landscapes into dense urban centers.⁶⁰ Managing the relationship between town and countryside, and thus between human economic activity and the natural environment, has long been a central task of planning—a task recently practiced under the banner of “sustainable development,” but one with a much longer history.

Sustainable planning is thus a hybrid: a composite of old and new; of science and politics, technics and ideology; of homegrown, planning-specific ideas and many borrowed concepts from other fields; of analytical social critique, pre-industrial nostalgia, and lofty futuristic aspirations. It builds on Progressive Era garden cities and conservation, New Deal resource management, 1970s environmentalism and bioregionalism, and twenty-first century environmental justice and climate science.⁶¹ It draws heavily on broader sustainability influences—from the Brundtland Report⁶² to the Intergovernmental Panel on Climate Change⁶³—while emphasizing the local governance and spatial development dimensions. Sustainability’s emphasis on intergenerational and intergroup equity and focus on the long-range future in current decisionmaking resonate with urban planning’s core values.⁶⁴ This inclusive, composite nature of sustainability sometimes leads to semantic frustration, but it has also created a dynamic, evolving, and broadly supported agenda for planning.

Contemporary urban planning is the governance practice of reconciling tensions between divergent stakeholders over the use of space, whether zoning regulations, property rights, public space and access, spillover effects, transportation mobility, infrastructure, and so

59. Susan S. Fainstein, *Urban Planning*, ENCYCLOPEDIA BRITANNICA (July 20, 1998), <https://www.britannica.com/topic/urban-planning/The-era-of-industrialization> [<https://perma.cc/G5EB-Z2FF>].

60. *See id.* (“Giant sprawling cities developed during this era . . .”).

61. Campbell, *supra* note 49, at 77; *see also* Fainstein, *supra* note 59 (discussing how Ebenezer Howard’s utopian concept of a garden city influenced the appearance of residential areas in the United States).

62. *See* WORLD COMM’N ON ENV’T & DEV., OUR COMMON FUTURE (1987) [hereinafter Brundtland Report].

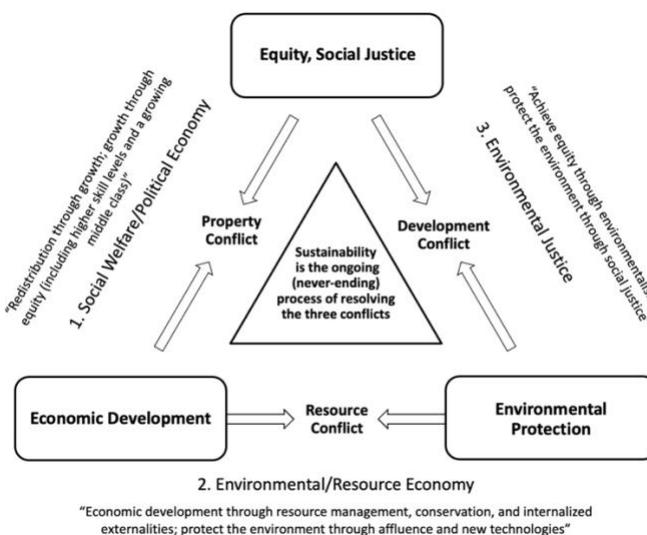
63. *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, SUMMARY FOR URBAN POLICYMAKERS: WHAT THE IPCC REPORT ON GLOBAL WARMING OF 1.5 C MEANS FOR CITIES (2018).

64. Campbell, *supra* note 49, at 88 (“Sustainability also endures because it taps into planning’s core ideas and values, and links well to other dominant themes in contemporary planning . . .”).

on.⁶⁵ In broad terms, planning manages tension between three core impulses: economic development, environmental protection, and social equity. We can call this triad the “planner’s triangle,”⁶⁶ with sustainability at its heart.⁶⁷

Promoting the green, productive, and fair city is not a simple task, yet it can be achieved through the engaged and persistent negotiation for balance in three tensions: the resource conflict (between environmental protection and economic development), the property conflict (between economic development and social justice), and the development conflict (between environmental protection and social justice). These conflicts reflect the tensions intrinsic to urban societies.

FIGURE 1: THE PLANNER’S TRIANGLE⁶⁸



The resolution of each of these three conflicts requires institutional frameworks (legal, regulatory, market-based, political).

65. See Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3, at 259 (positing that employing complexity as a planning strategy requires engaging diverse stakeholders in complex systems thinking that involves trade-offs).

66. See *infra* Figure 1 (The Planner’s Triangle).

67. Scott Campbell, *Green Cities, Growing Cities, Just Cities? Urban Planning and the Contradictions of Sustainable Development*, 62 J. AM. PLAN. ASS’N, 29, 298, 301–05 (1996) [hereinafter Campbell, *Green Cities*]; Scott D. Campbell, *The Planner’s Triangle Revisited: Sustainability and the Evolution of a Planning Ideal That Can’t Stand Still*, 82 J. AM. PLAN. ASS’N 388, 389 (2016) [hereinafter Campbell, *The Planner’s Triangle Revisited*].

68. This version of the Planner’s Triangle has been revised and updated. Compare Campbell, *The Planner’s Triangle Revisited*, *supra* note 67, at 389, with Campbell, *Green Cities*, *supra* note 67, at 298.

This leads to a distinctive history of governance for each conflict. The first conflict to be formally engaged was the property conflict, through the incremental construction of the modern social welfare state (e.g., the 1880s in Germany, the beginning of the twentieth century in the United Kingdom, the 1930s in the United States).⁶⁹ The state stepped in to address tensions between the interests of economic development (e.g., industrial capital) and social justice (e.g., labor unions, housing advocates) in an era of rapid urban industrialization. The broader institutions to engage these property conflicts are thus well established, both at the national and local levels, notwithstanding recent neoliberal austerity pushbacks. The resource conflict led to more recent elaborate institutions of environmental regulation and resource management.⁷⁰ Like the social welfare state, these arrangements vary widely by state and nation, are often woefully insufficient, and are challenged by political opposition, yet nevertheless remain “richly embedded in the institutions of the modern state and in the practices of planning.”⁷¹ The development conflict, unlike the prior two conflicts, lacks a stable and consensus governance framework:

By contrast, there is arguably no corresponding set of established, robust institutions to manage the development conflict, either internationally or domestically. Environmental justice (EJ) may be a rich area of scholarship and community organizing (such as community benefits agreements), but it remains otherwise underdeveloped and not adequately embedded in institutional practices and regulation (despite the existence, for example, of a modest-sized EPA program on EJ).⁷²

The Planner’s Triangle has been appealing for both its simplicity and its depth: a simplicity that is stable and a depth that allows for a dynamic interplay between persistence and fragility, the kind of creative destruction that C.S. Holling, Lance Gunderson, Gary Peterson, and other scholars draw from to describe resilient systems.⁷³ Although many have envisioned sustainable development as a win-win outcome to enable continued growth without environmental costs, the model’s focus on reconciling three conflicts suggested a more realistic view of the inevitability of trade-offs in a finite world.⁷⁴ Sustainability at the center of this triangle meant, perhaps, the realization of it as an

69. See Campbell, *The Planner’s Triangle Revisited*, *supra* note 67, at 389.

70. *Id.* at 392; see also Campbell, *Green Cities*, *supra* note 67, at 299 (highlighting the resource management aspect through the example of timber yields).

71. Campbell, *The Planner’s Triangle Revisited*, *supra* note 67, at 392.

72. *Id.*; see also Campbell, *Green Cities*, *supra* note 67, at 309 (arguing for an expansion in joint tasks like public-private partnerships).

73. C.S. Holling, Lance H. Gunderson & Garry D. Peterson, *Sustainability and Panarchies*, in PANARCHY: UNDERSTANDING TRANSFORMATIONS IN HUMAN AND NATURAL SYSTEMS 63, 72–74 (C.S. Holling & Lance H. Gunderson eds., 2002).

74. Campbell, *The Planner’s Triangle Revisited*, *supra* note 67, at 396.

elusive, moving target. While impossible to reach, it is the process of attempting sustainability through a purposeful planning practice that can allow us to, at the very least, bring these tensions to the forefront, make them visible, and negotiate them, which is better than the alternative of assuming these conflicts away.⁷⁵

Urban planners have thus embraced the vision and ideology of sustainability as a central organizing principle for their discipline. But how well have planners integrated sustainability into planning practice and translated these ideals into outcomes measured by environmental quality and improved public health? Twenty years ago, Phil Berke and Maria Conroy evaluated thirty comprehensive plans to assess how well cities were planning for sustainable development.⁷⁶ They found no major differences between plans that explicitly and intentionally incorporated sustainability principles and those that did not.⁷⁷ The former tended to emphasize only some principles, particularly the livable built environment, but did not offer a balanced approach among all the others identified.⁷⁸ Very little attention was given to the polluter pay principle and the responsible regionalism principle, since these would require major institutional and political changes that in the United States, at least, are not widely supported by powerful sectors of society.⁷⁹ A survey of medium and large cities found that cities were not systematic in their adoption of sustainability initiatives, and there was little evidence of a broader commitment in terms of specific sustainability plans and sustainability positions.⁸⁰ More recently, Liao et al. built on a longitudinal national data set of local plans for sustainability between 2010 and 2015 to study the relationship between planning and implementation of sustainability strategies, looking at both places where sustainability was explicitly a goal of local plans and places where it was not.⁸¹ While having plans in place was found to be correlated with higher levels of action, that effect tended to be short-lived.⁸² Both resource availability and commitment and citizen

75. *Id.*

76. Philip R. Berke & Maria Manta Conroy, *Are We Planning for Sustainable Development? An Evaluation of 30 Comprehensive Plans*, 66 J. AM. PLAN. ASS'N 21 (2000).

77. *Id.* at 26.

78. *Id.* at 27.

79. *Id.* at 29–30.

80. Devashree Saha & Robert G. Paterson, *Local Government Efforts to Promote the “Three Es” of Sustainable Development: Survey in Medium to Large Cities in the United States*, 28 J. PLAN. EDUC. & RSCH. 21, 28 (2008).

81. Lu Liao, Mildred E. Warner & George C. Homsy, *When Do Plans Matter? Tracking Changes in Local Government Sustainability Actions from 2010 to 2015*, 86 J. AM. PLAN. ASS'N 60 (2020).

82. *Id.* at 68.

participation also increased action.⁸³ This trend is confirmed by a survey administered in 2015 in which many respondents considered environmental protection a priority, though only a third reported adoption in planning documents.⁸⁴ Moreover, economic factors and priorities compete with sustainability goals and present an obstacle to sustainability planning in the form of financial constraints for implementation.⁸⁵

The above assessment underlines the highly varied levels of engagement with sustainability. We identify three levels, which parallel the three stages we identified in working with complexity (acknowledgement, analysis, implementation).⁸⁶ That is, planners face three questions in confronting sustainability: (1) What is wrong with the current situation? (2) How did our history of urbanization (and our approach to using environmental resources to build and run cities) lead to this crisis? (3) What is to be done?

The first stage is the acknowledgment of the current environmental crisis: to use the concept of unsustainability to reinterpret environmental impacts with an emphasis on rates of resource depletion and regeneration, and thus the threat to the long-term viability of natural systems.⁸⁷ The Brundtland Report codified and elevated this framework of recognizing the tensions among economic development, environment protection, and addressing the needs of the poor in undeveloped communities.⁸⁸ Sustainability becomes both a metric to identify the environmental costs of current practices and an aspirational goal for the future.

The second stage is to decipher the underlying causes of this crisis: to advance beyond seeing unsustainability as a general symptom and develop a systemic diagnosis of our unsustainable cities and their structural dynamics.⁸⁹ This incorporates in-depth analysis by building on a scientific understanding of socio-ecological systems and their feedback mechanisms. This is a challenging task since it involves not just the detailed understanding of multiple systems (nature, the economy, cities, politics), each with their own methods and logic, but

83. *Id.* at 69.

84. ICMA, SUSTAINABLE CMTYS. DIV. OF THE AM. PLAN. ASS'N., SMALL TOWN & RURAL PLAN. DIVS. OF THE AM. PLAN. ASS'N, BINGHAMTON UNIV., CORNELL UNIV. & U.S. DEPT OF AGRIC., LOCAL GOVERNMENT SUSTAINABILITY PRACTICES, 2015 SUMMARY REPORT 1 (2016), https://icma.org/sites/default/files/308135_2015%20Sustainability%20Survey%20Report%20Final.pdf [<https://perma.cc/PR7T-4T7F>].

85. *Id.*

86. *See infra* Table 2.

87. *See infra* Table 2 (Stage 1: Acknowledgement).

88. Brundtland Report, *supra* note 62, at 5–6.

89. *See infra* Table 2 (Stage 2: Analysis).

also understanding how these various systems interact and collide.⁹⁰ This is where we observe planning lagging, as the field is not particularly strong in providing the training required to build on this understanding to then propose appropriate planning strategies (the next phase, below).

The third stage is to develop planning strategies to steer these systems into more sustainable outcomes.⁹¹ Beyond knowledge of technology, design, and future scenarios modeling, this involves the ability to translate plans into effective policy and find ways to leverage resources and political alliances to overcome opposition and get these plans implemented. This also necessitates the participation of diverse stakeholders, as trade-offs are inevitable and must be negotiated. Given the lack of training required to better understand socio-ecological systems and, with that understanding, support the design of effective planning strategies, sustainability is incorporated as a concept in planning documents, but it does not always lead to progress in the fundamental approach to planning.⁹² Planning as a field is not sufficiently contributing to generating alternative solutions. Table 2 below summarizes the three stages (acknowledgement, analysis, and implementation) as they relate to both complexity and sustainability.

90. Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3, at 259–60.

91. *See infra* Table 2 (Stage 3: Implementation (Governance)).

92. *See, e.g.*, Liao et al., *supra* note 81, at 71 (“A more comprehensive and integrative set of considerations may be required to encourage continued increase in local government sustainability efforts in the long run . . .”).

TABLE 2: THREE STAGES OF ENGAGING COMPLEXITY AND SUSTAINABILITY IN URBAN SYSTEMS

	<i>Stage 1: Acknowledgment</i>	<i>Stage 2: Analysis</i>	<i>Stage 3: Implementation (Governance)</i>
Sustainability	<p>Recognition of the costs of environmental damage and the long-term unviability of the status-quo</p> <p><i>Unsustainability as a symptom</i></p>	<p>Understanding of unsustainability as the product of socio-technological-ecological systems (mass urbanization)</p> <p>An analytical diagnosis of the underlying causes and dynamics of unsustainable practices</p> <p><i>Sustainability as an analytical method</i></p>	<p>Converting this analytical knowledge into policy & practice to manage conflicting trade-offs and transform the functioning of the urban environmental system (may include SES modeling; participatory modeling)</p> <p><i>Sustainability as a planning strategy</i></p>
Complexity	<p>A view from outside looking in</p> <p>Treats complexity as a black box</p> <p>Statements such as “cities are complex!” (without advancing beyond that general observation)</p> <p><i>Complexity as a <u>symptom</u></i></p>	<p>Understanding complexity from the inside</p> <p>Using complex systems reasoning and analysis</p> <p>Encourages “thinking like an agent”— understanding the logic of agent based modeling (“ABM”)</p> <p><i>Complexity as a <u>dynamic</u></i></p>	<p>Moving from analytical observation to practice</p> <p>Using participatory modeling to connect interventions with plausible outcomes</p> <p><i>Complexity as a <u>strategy</u></i></p>

III. THE CONUNDRUM OF RECONCILING GROWTH AND SUSTAINABILITY

Urban planning's engagement with sustainability would arguably be far easier—and more straightforward—if the field's sole responsibility was to design and manage cities to protect the natural environment. The profession would single-mindedly promote the strict regulation of new construction, discourage private auto and air travel, tightly regulate polluting industries and infrastructures, and mandate smaller housing units to be clustered near urban centers with strict open space preservation beyond city limits. But urban planning has a much broader professional portfolio: promoting vibrant local economies and strong fiscal revenues with expanding job markets, advocating for the needs of the poor and marginalized, as well as fostering healthy living conditions and good urban design.⁹³ These divergent priorities pull planners in competing directions.⁹⁴ The result is an ambivalent relationship towards growth of cities, land consumption, housing, employment, natural resource consumption, and GDP.

There is a long tradition in planning of resisting excessive growth and mitigating the negative impacts of such growth.⁹⁵ And yet urban planning is an arm of local government, which has many strong motives to promote growth—increase tax revenues, improve public services, promote real estate and construction sectors, and strengthen political power—and many dire examples of the social and political costs of urban decline.⁹⁶ The critical social geographer David Harvey astutely observed this seemingly unavoidable professional mandate:

[T]he planner's task is to contribute to the processes of social reproduction and that in so doing the planner is equipped with powers vis-à-vis the production, maintenance, and management of the built environment which permit him or her to intervene in order to stabilize, to create the conditions for "balanced growth"⁹⁷

Planning's conflicted stance toward growth in turn leads to a complex and often convoluted approach to sustainability: the profession overtly professes a loyal commitment to environmental stewardship but has a tacit growth imperative. And this intrinsic contradiction creates

93. See Nikil Saval, *The Plight of the Urban Planner*, NEW YORKER (Nov. 20, 2019), <https://www.newyorker.com/books/under-review/the-plight-of-the-urban-planner> [<https://perma.cc/4R5E-MMVL>].

94. See *supra* notes 66–75 and accompanying text (discussing the Planner's Triangle).

95. See, e.g., George E.H. Gay, *State Solutions to Growth Management: Vermont, Oregon, and a Synthesis*, 10 NAT. RES. & ENV'T 13 (1996) (detailing the history of incentives and problems with rapid urban growth and attempted state regulatory solutions).

96. See Brent T. White, Simone M. Sepe & Saura Masconale, *Urban Decay, Austerity, and the Rule of Law*, 64 EMORY L.J. 1, 3 (2014) (highlighting issues facing cities like Detroit and Baltimore).

97. DAVID HARVEY, *THE URBANIZATION OF CAPITAL: STUDIES IN THE HISTORY AND THEORY OF CAPITALIST URBANIZATION* 175 (1985).

a stubborn impediment to progressing beyond the first stage of sustainability (acknowledgement) through the second (analysis) and to the third (implementation).⁹⁸ For some planners, this barrier takes the form of a general lack of understanding—or outright denial—of the existence of biophysical limits to unlimited growth that is embedded in most planning efforts.⁹⁹ For expanding cities, this growth is often a given. For struggling cities, it is an unquestioned (though often elusive) aspiration. Not growing is often interpreted not just as decline, but as failure, something to avoid at all costs. In recent years the degrowth movement has emerged, but has nevertheless been met with significant skepticism and remains more central to activism—and stronger in Europe than in the United States—than to planning scholarship or practice.¹⁰⁰ Before the degrowth movement, “shrinking cities” was a relatively marginal interest in planning, but whose focus remained the management of decline, a resignation after population is already lost, most certainly not an aspiration or a planned strategy ahead of depopulation.¹⁰¹ We still use “housing starts,” new building permits, construction employment, traffic volume, retail expansion, and GDP growth as markers of a healthy economy.

The landmark Brundtland Report revealed this conflicting role of growth as both exacerbating environmental degradation and bringing millions out of poverty:

Humanity has the ability to make development sustainable—to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits—not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities. But technology and social organization can be both managed and improved to make way for a new era of economic growth.¹⁰²

98. Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3, at 259–60 (identifying and explaining “three stages: (1) external acknowledgement of complexity; (2) understanding complexity from the inside; and (3) engaging complexity as a planning strategy”).

99. William E. Rees, *Cities as Dissipative Structures: Global Change and the Vulnerability of Urban Civilization*, in *SUSTAINABILITY SCIENCE: THE EMERGING PARADIGM AND THE URBAN ENVIRONMENT* 247, 249 (M.P. Weinstein & R.E. Turner eds., 2012) (“The growth-oriented beliefs, values, and assumptions underpinning contemporary economic models and consequential ‘environmental’ behavior are fundamentally at odds with the biophysical laws and dynamics governing vital ecosystems and geophysical systems.”).

100. Ari Aukusti Lehtinen, *Degrowth in City Planning*, 196 *FENNIA* 43, 44 (2018); François Schneider, *Housing for Degrowth Narratives*, in *HOUSING FOR DEGROWTH: PRINCIPLES, MODELS, CHALLENGES AND OPPORTUNITIES* 14, 14 (Anitra Nelson & François Schneider eds., 2019).

101. Justin B. Hollander, Karina M. Pallagst, Terry Schwarz & Frank J. Popper, *Planning Shrinking Cities*, 72 *PROGRESS PLAN.* 223, 223–24 (2009); RYAN, *supra* note 31, at 20–22; Brent D. Ryan & Shuqi Gao, *Plan Implementation Challenges in a Shrinking City: A Conformance Evaluation of Youngstown’s (OH) Comprehensive Plan with a Subsequent Zoning Code*, 85 *J. AM. PLAN. ASS’N* 424 (2019).

102. Brundtland Report, *supra* note 62, at 8.

The Commission dances a contradictory *pas de deux* around the issue of growth—both acknowledging the present-day need for limits but also diplomatically presuming that future generations will behave better and manage growth and technology in more responsible ways than past generations have.

The urgent challenge, then, is to find an alternative to the strategy of growing our way out of social inequality. We will have to come to terms with what all systems scientists know full well: unlimited growth is not possible in a finite world.¹⁰³ There is no such thing as sustainable growth.¹⁰⁴ Growth, paradoxically, leads to collapse. Our regional and global resource systems are already following that trajectory.¹⁰⁵ An alluring solution would be to promote sustainability by curbing growth, and indeed some economists¹⁰⁶ and systems thinkers¹⁰⁷ have long argued for steady state economics. It is an appealing vision of sustainability: a future where human development is driven not by the expansion of material consumption of goods and natural resources, but rather by the intensification and refinement of non-material development (in the arts, education, culture, social capital). Why, then, are these no-growth arguments (of decoupling social progress from resource exploitation) commonly dismissed or ignored? Society has developed a long-running habit of relying on the paradigm of growth as an expedient solution to social problems.¹⁰⁸ If social strife chronically arises from conflicts over limited and unequal access to property (land, housing, food, resources, capital), then society has habitually sought to

103. DONELLA H. MEADOWS, DENNIS L. MEADOWS, JØRGEN RANDERS & WILLIAM W. BEHRENS III, *THE LIMITS TO GROWTH: A REPORT FOR THE CLUB OF ROME'S PROJECT ON THE PREDICAMENT OF MANKIND* 178–79 (1972).

104. Moira Zellner, *It Is Easier to Be Smart Than to Be Green*, in *REMAKING THE URBAN SOCIAL CONTRACT: HEALTH, ENERGY, AND THE ENVIRONMENT* 87, 89 (Michael A. Pagano ed., 2016).

105. Graham M. Turner, *A Comparison of The Limits of Growth with 30 Years of Reality*, 18 *GLOB. ENV'T CHANGE* 397, 400; Graham M. Turner, *On the Cusp of Global Collapse? Updated Comparison of The Limits of Growth with Historical Data*, 21 *GAIA: ECOLOGICAL PERSPS. FOR SCI. & SOC'Y* 116, 120–21 (2012).

106. HERMAN E. DALY, *STEADY STATE ECONOMICS* (2d. ed. 1991); HERMAN E. DALY & JOHN B. COBB, JR., *FOR THE COMMON GOOD: REDIRECTING THE ECONOMY TOWARD COMMUNITY, THE ENVIRONMENT, AND A SUSTAINABLE FUTURE* (1989).

107. MEADOWS ET AL., *supra* note 103, at 156–61.

108. William E. Rees, *Globalization and Sustainability: Conflict or Convergence?*, 22 *BULL. SCI., TECH. & SOC'Y* 249, 251 (2002):

All major national governments and mainstream international agencies are united in a vision of global development and poverty alleviation centered on unlimited economic expansion fueled by open markets and more liberalized trade. At the heart of this expansionist vision (the “dominant economic paradigm”) is the belief that human welfare can all but be equated with ever-increasing material well-being (income growth).

dampen these structural tensions (i.e., “property conflicts”¹⁰⁹) by expanding the aggregate supply of property.¹¹⁰ Promoting more equitable resource distribution has long been seen as more politically acceptable (and less threatening) to elites in times of expanding GDP rather than in times of stagnation.¹¹¹ Crises of capital accumulation can be “fixed”—at least temporarily—through spatial expansion of local and regional economies.¹¹² Although systems thinking and natural sciences understand the inherent limits of a world with finite resources, business sectors continue arguing for never-ending economic expansion and supply oriented solutions. This perspective is reinforced by intense lobbying of political leaders and reliance on flawed and misleading theories (e.g., growth as a recipe to address all social ills, technological innovation as a way out of all the problems caused by growth) and metrics of success (e.g., GDP).¹¹³ Growth does not solve these crises, but merely postpones them—yet promoting growth has been an appealing strategy of “kicking the can down the road.” Growth has become a politically expedient addiction that is stubbornly hard to kick.

The governance path to urban sustainability is thus not through the avoidance of but rather through the direct engagement with core tensions in society. These tensions are also intrinsically embedded within the disciplinary tradition of urban planning. The field has two seemingly contradictory impulses. Often in the name of sustainability, planners emphasize “urban growth boundaries, sustainable development, ‘small is beautiful,’ and reducing our ecological footprint to mitigate the downsides of excessive materialism.”¹¹⁴ Yet the profession also promotes expansion through “urban growth coalitions, the expansion of jobs and tax revenues, the construction of infrastructure, and the push for more intensive land uses.”¹¹⁵ Although this tension is not a new development in planning, it has renewed exigency in an era of climate change and massive global urbanization. As a result, the marriage of sustainability and urban planning is not without internal strife.

109. *See supra* Figure 1 (placing “property conflict” between the planner’s goals of “economic development” and “equity [and] social justice”).

110. Rees, *supra* note 108, at 251.

111. *See id.* at 255–56 (detailing the inverse of this theory where under-developed and low GDP countries are least likely to see equitable wealth distribution).

112. DAVID HARVEY, SPACES OF CAPITAL: TOWARDS A CRITICAL GEOGRAPHY 246 (2001) (“Geographical expansion and geographical concentration are both to be regarded as the product of the same striving to create new opportunities for capital accumulation.”).

113. Rees, *supra* note 108, at 251.

114. Campbell, *supra* note 12, at 131.

115. *Id.*

This paradox between growth and conservation manifests itself in multiple contemporary planning situations. We will illustrate this paradox in this Article's two case studies: ecogentrification and megaregional sustainability. For ecogentrification, it is the collision between sustainability's call for urban living with a more modest ecological footprint and the persistent push (by urban residents, real estate developers, etc.) to improve urban living conditions and extract more value from property through more intensive use of land, more intensive up-zoning, and more intensive consumer activity.¹¹⁶ Ecogentrification then becomes a form of green conspicuous consumption—a commodification of sustainability that belies a growth-oriented urbanization impulse and undermines efforts to live more modestly on the land. For megaregional sustainability, this new supersized territorial system offers the promise of coordinated, ecoregional management of water, land, food, and energy systems along principles of integrated sustainability.¹¹⁷ But too often, these megaregions and their emergent governance coalitions promote regional economic growth over conservation, as these large urban settlements aggressively sprawl out and convert farmland and wilderness into exurbia, edge city office parks and “rural industrial” landscapes.¹¹⁸ Complex systems thinking may suggest ways out of this paradox.

A. Case 1: Ecogentrification

We selected “ecogentrification,” or “environmental gentrification,” as a timely case study of complex, wicked problems because it conjoins several present-day urban disputes: unsustainability, housing unaffordability and displacement, and growing inequality and segregation.¹¹⁹ Ecogentrification is therefore a portmanteau of two ongoing planning challenges: the unsustainability of human settlements and the growing inequality that expresses itself spatially in housing markets. Both issues individually have long histories. The Berlin-born, U.K.-based sociologist Ruth Glass first spoke of “gentrification” in 1964 to describe the movement of affluent new classes into formerly working-class neighborhoods of an increasingly

116. Rice et al., *supra* note 7, at 147.

117. Campbell, *supra* note 12, at 128.

118. *See id.* at 132–33.

119. Rice et al., *supra* note 7, at 146–47 (“The term has since been more widely deployed to describe the vicious cycle of economic disinvestment and environmental degradation that devalues urban space, followed by subsequent reinvestment and environmental remediation that increases property values and displaces exiting residents.”).

affluent postwar London.¹²⁰ The term eventually spread to the United States and elsewhere to describe the process of urban revitalization (often accompanied by displacement) in post-industrial cities.¹²¹ The idea of the ecological city has an even longer and more varied history (and many names), from early Progressive Era conservationist and preservationist movements, through the environmentalism of the 1970s, sustainability of the 1980s (and beyond), and now climate adaptation and mitigation.¹²² But we are only recently witnessing the interaction of these two ideologies and strategies.

What motivated the creation of this new, hybrid term? For skeptics, the rise of ecogentrification represents a hijacked and corrupted version of sustainable development in an increasingly privatized, polarized, and post-Keynesian society.¹²³ It portends the shift away from an egalitarian, public vision of sustainable cities with universal public infrastructure and public goods, including environmental quality.¹²⁴ Rather than a society-wide strategy towards sustainability for all, we will instead see increased efforts among those with resources and power to promote and occupy green islands of high environmental quality (masquerading as sustainable communities).¹²⁵ For lower-income communities fighting for less pollution, it often means being displaced by higher rents and property taxes after the environmental improvements are made.¹²⁶ Ecogentrification may represent a new variant of environmental injustice or environmental racism.¹²⁷

120. RUTH GLASS, LONDON: ASPECTS OF CHANGE, at xviii–xix (1964).

121. See, e.g., Melissa Checker, *Wiped Out by the “Greenwave”: Environmental Gentrification and the Paradoxical Politics of Urban Sustainability*, 23 CITY & SOC’Y 210, 212 (“On one hand, I argue that [environmental gentrification] marks a recent iteration of old discourses about urban reform, renewal and revitalization, which similarly masked inequitable urban development.”).

122. See *id.* at 215–16 (“The linking of ecological benefits to social uplift goes back to the turn of the 20th century.”); Rice et al., *supra* note 7, at 150–51 (describing “the rise of environmentally minded professional[s]” who “exhibit a strong desire to live an eco-friendly urban lifestyle”).

123. See Rice et al., *supra* note 7, at 146–47 (detailing the “failure” of New York City’s High Line Park, which quickly became a tourist destination and source of increased property values).

124. *Id.* at 159–60.

125. Isabelle Anguelovski, James J.T. Connolly, Hamil Pearsall, Galia Shokry, Melissa Checker, Juliana Maantay, Kenneth Gould, Tammy Lewis, Andrew Maroko & J. Timmons Roberts, *Why Green “Climate Gentrification” Threatens Poor and Vulnerable Populations*, 116 PROC. NAT’L ACAD. SCI. 26139, 26139 (2019).

126. Juliana A. Maantay & Andrew R. Maroko, *Brownfields to Greenfields: Environmental Justice Versus Environmental Gentrification*, 15 INT’L J. ENV’T RSCH. & PUB. HEALTH 2233, 2244 (2018) (“Green gentrification has implications for environmental justice because existing lower-income residents are likely to be displaced after their community is improved environmentally.”).

127. Jennifer R. Wolch, Jason Byrne & Joshua P. Newell, *Urban Green Space, Public Health, and Environmental Justice: The Challenge of Making Cities ‘Just Green Enough,’* 125 LANDSCAPE & URB. PLAN. 234, 236–37 (2014).

Yet, there is no consensus that “ecogentrification” is necessarily a negative process or that the term itself is even an accurate diagnosis. More upbeat urban observers see it as a generally positive merging of urban revitalization and sustainability strategies, including urban greening, transit-oriented development, and an emphasis on walkable and bikeable communities.¹²⁸ This compound neologism has tricky normative reverberations: the prefix “eco” generally suggests warm, positive, and publicly minded connotations, while “gentrification” typically—perhaps unfairly—has negative connotations as a proxy and scapegoat for inequality and displacement. Combining the two terms does not necessarily create an oxymoron, though it may lend a nefarious, deceptive, or camouflage quality to “eco,” similar to the criticism of corporate sustainability efforts as merely “greenwashing.”¹²⁹ The resulting tension should not come as a surprise: if gentrification is a contradictory process, then ecogentrification is too.

And so local governments may find themselves on both sides of the divide: both promoting (through subsidies, regulations, etc.) environmental improvements in their neighborhoods and, at the same time, feeling the pressure to address the inequalities and displacement that may arise from these strategies.¹³⁰ Communities may thus feel in a bind: How do we deal with the trade-offs between the benefits of environmental improvement that also make places more attractive to residents and businesses (and raise their market value), and the ensuing displacement of those who can no longer afford to live there by a new culture of middle class ecoconscious, green living? Or in the words of a recent article, “Can we green the hood without gentrifying it?”¹³¹

What makes ecogentrification a wicked problem? We see multiple characteristics present with ecogentrification: no singular definition or explanation of the phenomenon (overregulation of housing and land markets? income inequality? shifting consumer tastes? unwillingness for current tenants to relocate?); no obvious solution to the problem; solving this problem may lead to other problems; no

128. Rice et al., *supra* note 7, at 149.

129. See Bruce Watson, *The Troubling Evolution of Corporate Greenwashing*, GUARDIAN (Aug. 20, 2016, 10:00 AM), <https://www.theguardian.com/sustainable-business/2016/aug/20/greenwashingenvironmentalism-lies-companies> [<https://perma.cc/8RMY-XCK6>] (“Many companies are now working to engage customers in their sustainability efforts, even as their core business model remains environmentally unsustainable.”).

130. Jeanne Haffner, *The Dangers of Eco-Gentrification: What’s the Best Way to Make a City Greener?*, GUARDIAN (May 6, 2015, 2:29 PM), <https://www.theguardian.com/cities/2015/may/06/dangers-ecogentrification-best-way-make-city-greener> [<https://perma.cc/3K4E-LRST>]; Rice et al., *supra* note 7, at 146–47.

131. Brentin Mock, *Can We Green the Hood Without Gentrifying It?*, GRIST (Feb. 9, 2015), <https://grist.org/cities/can-we-green-the-hood-without-gentrifying-it/> [<https://perma.cc/N5NY-4DPZ>].

stopping rule for policy interventions, since housing markets are fluid and dynamic; gentrification is as much a normative as a descriptive analytical category; and gentrification is a symptom of another problem with dynamics such as income inequality and social-spatial mobility.¹³² And one might conclude that if gentrification and sustainability are each individually complex, wicked problems, then their alliance (as ecogentrification) leads to an even more complex, wicked problem.

From a sustainability perspective, ecogentrification arises from the tensions across the 3Es (environment, economy, equity) of the Planner's Triangle,¹³³ but the environmental improvement that gives rise to ecogentrification does not resolve these tensions. If anything, it worsens them. Even the ecosystem functions may be rather weak beyond the aesthetic appeal or beautification goals of the improvements. That is, many of these projects are not only displacing lower-income populations, but may also amount to little more than greenwashing as higher-income and higher-consuming populations move in.¹³⁴ Trade-offs and compensation across sectors of the population affected are not consciously and openly deliberated and addressed.¹³⁵ For this, it would be necessary to conduct fuller ecological and social studies—in addition to the more commonly thorough economic analyses—and to include stakeholder participation in these analyses and the debates they should support. These participatory studies must be conducted within a systems framework to fully grasp how economic preferences and cultural aspirations generate unintended consequences. Wolch et al. suggest the “just green enough” approach to environmental improvement, advocating for participatory, bottom-up planning processes that support small-scale improvements—as opposed to grand projects of green development—to ensure that all sectors, particularly current residents and businesses, are heard and contribute to the transformation and benefit from it.¹³⁶ Yet, the kinds of small-scale interventions Wolch et al. propose do not guarantee that gentrification will not occur if those interventions still create an overall attractive neighborhood for new residents and businesses, unless financial barriers are established in the form of rent controls or

132. Rittel & Webber, *supra* note 1, at 165.

133. See Campbell, *Green Cities*, *supra* note 67, at 301–05 (“Slowing worldwide industrial expansion may preserve more of the world’s resources for the future . . . but it may also undermine the efforts of the underdeveloped world to approach the living standards of the west.”).

134. Rice et al., *supra* note 7, at 146.

135. See *id.* at 160 (discussing the “failure of many academics and practitioners to see climate and housing justice as directly related”).

136. Wolch et al., *supra* note 127, at 241.

property tax restructuring.¹³⁷ The elephant in the room is the insistence on growth as a pathway towards development and the land speculation process that growth generates.¹³⁸ Some limits must be set. Yet this unquestioned growth is what is pushing our urban systems—and the remote systems they depend on—to socioeconomic and environmental collapse.¹³⁹ In the meantime, the environmental needs of minorities and low-income communities continue to be ignored, and the needs and wants of those with higher purchasing power are prioritized.

What kind of governance problem is ecogentrification? Governance can mean many things, but an effective public policy response to a social problem has several prerequisites: a consensus definition of the problem and acknowledgement that it is indeed a “problem” requiring intervention, knowledge of cause-effect and consequences, identification of key parties and interests, the ability to imagine multiple interventions and evaluate and compare each, and strategic knowledge of the scope and limits of public power and authority.¹⁴⁰

Here we see how ecogentrification’s nature as a wicked problem in turn creates governance challenges. There is no consensus about the nature of the problem, and thus the governance pathway to solutions. At its core, is it an environmental regulation problem? Or a housing and land use problem that might involve zoning changes or rent control? Or a problem of income and racial inequality, including segregation? Or instead a question of the uneven allocation of public services like parks and other infrastructure? This multi-faceted framework of ecogentrification raises tricky issues of whose jurisdiction the task falls into and whether the state even has the authority to intervene. In addition, who is the affected interest group or constituency? That is, who wants the “problem” to be solved? This is particularly a challenge when some groups in the region may not see “ecogentrification” as a problem at all, but rather a misnomer for a lifestyle and residential choice.¹⁴¹ The mixed blessings of ecogentrification—its contradictory blend of positive and problematic consequences—further muddle the search for a clear governance strategy.

137. *See id.* at 235 (advocating for the “just green enough” approach, which requires “planners and local stakeholders to design green space projects that are explicitly shaped by community concerns, needs, and desires rather than either conventional urban design formulae or ecological restoration”).

138. William E. Rees, *Economic Development and Environmental Protection*, 86 ENV’T MONITORING & ASSESSMENT 29, 32 (2003).

139. *See id.* at 41 (“[T]he prevailing growth-based economic ‘development’ paradigm is fundamentally incompatible with ecological and social sustainability.”).

140. *See* Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3, at 276.

141. *See* Mock, *supra* note 131.

*B. Case 2: Megaregional Sustainability:
A New Geography in Search of Governance*

We next turn to the emergence of the megaregion as a new urbanization form and as a sustainability governance challenge. The megaregion leads to complex, new intergovernmental coordination challenges (both horizontal and vertical); boundary issues; new forms of land use; and the related political cultures of new types of settlements beyond the old school typology of the traditional monocentric region (cities, suburbs, rural).¹⁴²

What distinguishes the megaregion from the traditional notion of the region? The classical definition of a region is a central city and its surrounding hinterland: inner- and outer-ring suburbs and farmland beyond.¹⁴³ One region is distinct from the next, separated by rural land uses and wilderness; the U.S. Census codifies this notion in its definition of the Metropolitan Statistical Area.¹⁴⁴ We use the modifier “metropolitan” to recognize the presence of a central city at the core of the region—as distinct from rural regions that lack an urban core.

The megaregion is understandably larger than a conventional region. But more importantly, it represents the complex evolution and expansion of traditional metropolitan regions through the overlapping and blurring of several metropolitan regions into a larger network.¹⁴⁵ Governance in traditional metropolitan areas is problematic enough given the lack of regional planning traditions and authorities in the United States.¹⁴⁶ Metropolitan planning organizations are chronically marginalized and underfunded in the United States, and they need to compete for resources and attention in an already crowded interjurisdictional field at the city, county, state, and federal level (and also townships in some states).¹⁴⁷ Megaregions also introduce possible

142. See Campbell, *supra* note 12, at 130.

143. Cheryl K. Contant & Karen Leone de Nie, *Scale Matters: Rethinking Planning Approaches Across Jurisdictional and Sectoral Boundaries*, in MEGAREGIONS: PLANNING FOR GLOBAL COMPETITIVENESS, *supra* note 12, at 11, 15.

144. 2010 Standards for Delineating Metropolitan and Micropolitan Statistical Areas, 75 Fed. Reg. 37246, 37246, 37248–50 (June 28, 2010) (notice announcing the “adoption of 2010 Standards for Delineating Metropolitan . . . Statistical Areas,” which were influenced by Census Bureau research).

145. Contant & Leone de Nie, *supra* note 143, at 15.

146. Myron Orfield & Thomas F. Luce Jr., *Governing American Metropolitan Areas: Spatial Policy and Regional Governance*, in MEGAREGIONS: PLANNING FOR GLOBAL COMPETITIVENESS, *supra* note 12, at 250 (discussing the American “tradition of local [government] control” despite the fact that the Constitution makes no mention of local governments).

147. U.S. GOV'T ACCOUNTABILITY OFF., GAO-09-868, METROPOLITAN PLANNING ORGANIZATIONS: OPTIONS EXIST TO ENHANCE TRANSPORTATION PLANNING CAPACITY AND FEDERAL OVERSIGHT 16–17 (2009) (“About 85 percent of all MPOs responding to our survey cited the lack of transportation planning funding as a challenge to transportation planning. . . . Additionally, 71

competition and tension between multiple central cities within the megaregion.¹⁴⁸

For its supporters, the megaregion represents a new, dynamic, and competitive geographic actor in the global economy—a large multicentric conglomeration that has the scale, shared infrastructure (airports, highways, housing, office, and labor markets), and diverse array of amenities to compete in the big leagues.¹⁴⁹ For its detractors, the megaregion is a sprawling mess—the latest mutation in the distinctively American proclivity to commute long distances, convert farmland into suburbia, overconsume land and open space, and obliterate the needed greenbelt boundaries between one region and the next.¹⁵⁰ As such, it represents for some the failure of American political culture to plan adequately, act as wise stewards of the land, and reign in reckless real estate markets. The rise of megaregional development has far outpaced our ability to keep up with the capacity to govern. The megaregion is an appealing spatial phenomenon, an emerging analytical category, and a set of normative aspirations that has not yet become a functioning administrative unit.

The United States currently has eleven commonly recognized megaregions, as promoted by the Regional Plan Association's work on *America 2050*.¹⁵¹ The largest is the Northeast megaregion, stretching along Interstate 95 and Amtrak's Northeast Corridor from Boston and coastal New England, through New York City, to Philadelphia and Baltimore, down through Washington, D.C., and into Virginia.¹⁵² Sixty years ago, before the popular rise of the term "megaregion," the geographer Jean Gottmann named this agglomeration "Megalopolis."¹⁵³

Some of these megaregions have a relatively coherent geographic structure—with their polycentric structure (and multiple central cities) nevertheless dominated by a large central city: the Piedmont Atlantic (with Atlanta at its core), the Front Range (Denver), Arizona Sun Corridor (Phoenix), and Southern California (Los Angeles).¹⁵⁴ Other megaregions have multiple urban cores where no one

percent of small MPO survey respondents cited competing priorities between transportation planning and other tasks related to the council of governments as a challenge.”)

148. Orfield & Luce, *supra* note 146, at 251.

149. See Campbell, *supra* note 12, at 128.

150. See *id.* at 132–33.

151. See Hagler, *supra* note 11, at 1.

152. REG'L PLAN ASS'N, NORTHEAST MEGAREGION 2050: A COMMON FUTURE 9 (2007), <https://rpa.org/uploads/pdfs/2050-Northeast-Megaregion-A-Common-Future.pdf> [<https://perma.cc/KMY7-MF6W>].

153. JEAN GOTTMAN, MEGALOPOLIS: THE URBANIZED NORTHEASTERN SEABOARD OF THE UNITED STATES 1 (1961).

154. See Hagler, *supra* note 11, at 6, 7.

city overwhelmingly dominates: Cascadia (Vancouver, Seattle, Portland, the Willamette Valley), Northern California (San Francisco, Oakland, San Jose/Silicon Valley, Sacramento), the Texas Triangle (Dallas/Fort Worth, Houston, San Antonio, Austin), the Gulf Coast (stretching from Alabama to the Texas-Mexico border), the sprawling urban conglomerations of Florida, and the physically decentralized megaregion of the Great Lakes.¹⁵⁵

This set of megaregions is notably a diverse group, with wide variation in history, size, internal structure, economic strength, ecology, and cultural identity.¹⁵⁶ Some assert their megaregional identity through shared ecological features (such as Cascadia),¹⁵⁷ while others assert their dynamic, business-friendly, and economically competitive cultures (such as the Piedmont Atlantic or the Texas Triangle).¹⁵⁸

The megaregion raises complex new challenges for sustainability governance. Geographers and systems planners understandably are attracted by the promise of the megaregion: the comprehensive scale is large enough to encompass the holistic scale of large spatial systems, be it environmental (watersheds, air basins, habitats),¹⁵⁹ socioeconomic (labor and housing markets),¹⁶⁰ or logistical (transportation and other infrastructure, supply chains within industrial clusters).¹⁶¹ Yet this large scale invariably means that planning and regulation require coordination across many jurisdictions, both horizontally (city to city, county to county, sometimes state to state) and vertically (between city, county, state, and even federal governments).¹⁶² The result is a multidimensional complexity of interjurisdictional cooperation, where mutual mistrust and a lack of a strong regional administrative tradition (or jurisprudence) in the United States often lead localities to balk at region-wide efforts—even when the resulting benefits are all too apparent, at least to planners.¹⁶³

155. *See id.*

156. *See id.* at 6.

157. AM. 2050, REG'L PLAN ASS'N, CONNECTING CASCADIA: A HIGH-SPEED RAIL VISION FOR THE PACIFIC NORTHWEST 3–4 (2010), <https://s3.us-east-1.amazonaws.com/rpa-org/pdfs/2050-Connecting-Cascadia-Briefing-Book.pdf> [<https://perma.cc/4QKF-6XPA>].

158. Ming Zhang, Frederick Steiner & Kent Butler, *Connecting the Texas Triangle: Economic Integration and Transportation Coordination*, REG'L PLAN ASS'N & LINCOLN INST. LAND POL'Y 21, 26–27 (2007), <https://s3.us-east-1.amazonaws.com/rpa-org/pdfs/2050-The-Healdsburg-Research-Seminar-on-Megaregions-2007.pdf> [<https://perma.cc/WMK2-Q8Z7>].

159. Campbell, *supra* note 12, at 128.

160. Orfield & Luce, *supra* note 146, at 252.

161. Catherine L. Ross & Jessica L.H. Doyle, *The Megaregion and the Future of American Planning*, in MEGAREGIONS: PLANNING FOR GLOBAL COMPETITIVENESS, *supra* note 12, at 280, 285.

162. *See* Orfield & Luce, *supra* note 146, at 250.

163. Contant & Leone de Nie, *supra* note 143, at 14.

Adding to this interjurisdictional complexity is the inherent complexity and uncertainty of spatial planning. Urban planning is an inherently interdisciplinary activity that has long since broken with its early twentieth-century legacy as simply architecture (focusing on the building and site) enlarged to the city scale (i.e., urban design).¹⁶⁴ Over the decades, through eras of crisis and transformation—from the Great Depression and New Deal through postwar suburbanization, 1970s deindustrialization and urban crisis, Reagan-era neoliberalism and today’s multicultural globalization and climate crisis—planning has repeatedly reinvented itself as it grew into new areas.¹⁶⁵ On the traditional foundations of physical planning (land use, zoning, and urban design), urban planning has expanded into housing, community advocacy, economic development, transportation, environmentalism, social justice, international development, and climate adaptation.¹⁶⁶ Today’s planning school graduates enter a planning workforce that extends far beyond the zoning desk and architecture firms.

This broad set of priorities and methodologies makes for an excitingly diverse professional discipline. But it also means that planning—working in an open field of problems with permeable boundaries—has an uncertain mandate and authority in its work. Rittel and Webber traced wicked problems to the dynamics of the “open societal systems” of cities, where it is difficult to definitively formulate problems, clearly articulate a set of potential solutions, test solutions, or conclusively “solve” a problem without realizing that the initial problem is merely a symptom of another problem.¹⁶⁷

So, the planner, in confronting the challenges of these emergent megaregions, faces two complexities: the spatial complexity of a large, internally diverse and unruly area sprawling over thousands of square miles and the disciplinary complexity of multiple tasks and urban systems often in the absence of clear administrative authority or adequate resources. Governance becomes less a task of the direct implementation of plans and enforcement of regulations and more the

164. Rittel & Webber, *supra* note 1, at 156.

165. See Fainstein, *supra* note 59 (tracing urban planning’s development and growth as a discipline); PETER HALL, *CITIES OF TOMORROW: AN INTELLECTUAL HISTORY OF URBAN PLANNING AND DESIGN IN THE TWENTIETH CENTURY* (4th ed. 2014) (surveying modern planning literature and providing a comprehensive overview of the discipline’s progression).

166. See Campbell, *supra* note 12, at 131–32; Bishwapriya Sanyal, Lawrence J. Vale & Christina D. Rosan, *Four Planning Conversations*, in *PLANNING IDEAS THAT MATTER: LIVABILITY, TERRITORIALITY, GOVERNANCE, AND REFLECTIVE PRACTICE* 1, 4–5 (Bishwapriya Sanyal, Michael Teitz & Christina D. Rosan eds., 2012).

167. See Rittel & Webber, *supra* note 1, at 160 (noting that “the classical paradigm of science and engineering—the paradigm that has underlain modern professionalism—is not applicable to the problems of open societal systems” presented by urban planning issues).

task of building alliances, mediating conflicts between the many stakeholders, and leveraging the limited power and resources of planning agencies. Governance also involves promoting a shared vision of regional development and identity, facilitating community participation in regional planning efforts, and helping the community translate ideas into the maps, plans, and agendas of regional development. And since building regional communities and identity is a slow-moving, never-ending process over many years, planners need to play the long game, combining patience and persistence and marking intermediate successes to boost morale.

In the end, the megaregion evokes a new, greatly enlarged spatial scale without a coherent and articulated set of institutions to manage and guide its development. The social and environmental opportunities and challenges are numerous, from massive infrastructural projects to the loss of farmland and wilderness, social inequality in access to work, public services, and amenities, and the challenges of long commutes and unaffordable housing.¹⁶⁸ The shifting emphasis on megaregions has no intrinsic stance towards sustainability. The megaregion opens up possibilities for new kinds of integrated ecological planning and land management and coordination across multiple jurisdictions.¹⁶⁹ And yet the megaregion has no intrinsic stance towards sustainability, and such large-scale development opens up new pathways to greater resource extraction, more expansive urban land uses, and exploitation.¹⁷⁰ And unless one is an ardent true believer in the ability of private markets to resolve environmental, social, and land use conflicts, the megaregion presents novel planning challenges and dynamic, complex, and unpredictable consequences that existing local and county institutions are ill-equipped to handle. Megaregions are an emerging urbanization phenomenon in search of new governance models.

IV. UNPACKING COMPLEXITY TO UNDERSTAND ECOGENTRIFICATION AND THE CHALLENGES OF MEGAREGIONAL SUSTAINABILITY

The analytical power of complex systems thinking is not simply to describe and diagnose wicked problems such as environmental

168. See Tridib Banerjee, *Megaregions or Megasprawls? Issues of Density, Urban Design, and Quality Growth*, in MEGAREGIONS: PLANNING FOR GLOBAL COMPETITIVENESS, *supra* note 12, at 83, 91–92 (“[Q]uestions of future density, affordable housing, environmental justice, equality in educational opportunity, equity in access to open space and amenities for public life, improved mobility, equal promises and possibilities for healthy living, and the like are all inextricably linked to the structure and institutions of local governance in America.”).

169. Campbell, *supra* note 12, at 128.

170. *Id.* at 131–33.

degradation and the climate crisis, but also to lead to the next step of engaging these problems and developing strategic planning responses.¹⁷¹ How might a complexity perspective and its tools help understand the unresolved tensions of sustainability and point towards paths forward to address these conflicts? In this Part we examine the potential of systems thinking, which provides tools to model the interaction of factors that perpetuate pollution and gentrification problems. In particular, we discuss the use of causal loop diagrams (several examples included below), a method to articulate how the causal interconnection of variables influences the behavior of parts of a system and how the connection across these parts into the larger system may lead to unintended consequences.¹⁷² This discussion might seem a detour into a rather detailed method, but it graphically illustrates how we can use complex systems thinking in the engagement and governance of wicked problems.

Causal loop diagrams employ several conventions. The components or variables must clearly increase or decrease.¹⁷³ The name of the variable should also always be positive or neutral in value so it is clear whether it is increasing or decreasing (e.g., “tax base” over “decreasing tax base”).¹⁷⁴ The other part of a causal loop diagram is the relationship among variables. The direction of this relationship may be direct or inverse.¹⁷⁵ In the first case, when the causal component increases, the effect it is linked to will also increase. Otherwise, when the cause increases, the effect decreases. As an illustration, as environmental quality in a lake increases, the fish population will also increase, which will in turn drive up the number of fishermen. These three factors (environmental quality, fish population, and number of fishermen) would be linked with two arrows (one originating in environmental quality towards fish population, and one from fish population to number of fishermen), showing a direct relationship (they all increase or decrease together). The increase in fishermen, however, would also decrease the fish population, so an arrow would originate from the number of fishermen to fish population, in this case an inverse relationship because as the former increases, the latter decreases, or vice versa.

171. See *supra* Table 2; Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3, at 260–61.

172. Daniel H. Kim, *Guidelines for Drawing Causal Loop Diagrams*, 3 SYS. THINKER 1, 1–3 (1992).

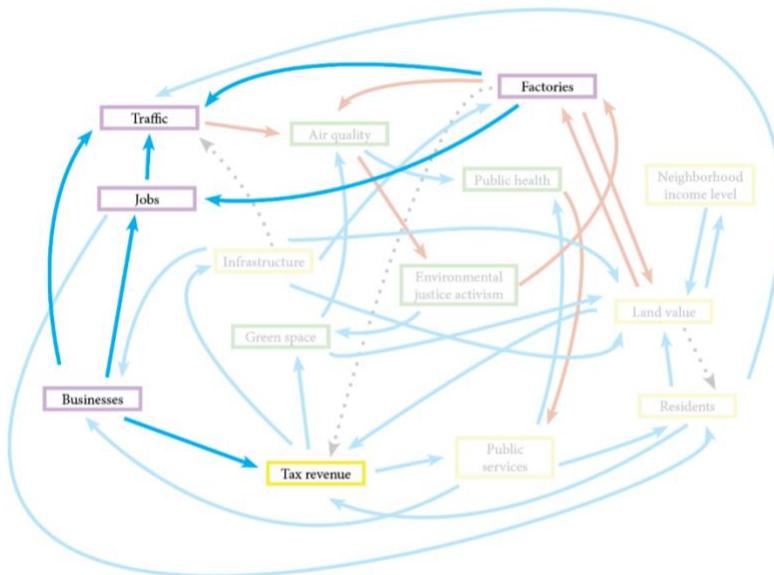
173. *Id.* at 2.

174. See *id.* (explaining best practices for choosing variable names).

175. *Id.* at 1.

them to make deals with local government to have their taxes waived in exchange for jobs (hence the dashed line).

FIGURE 2B: CAUSAL LOOP DIAGRAM OF ECOGENTRIFICATION (SUBSET)



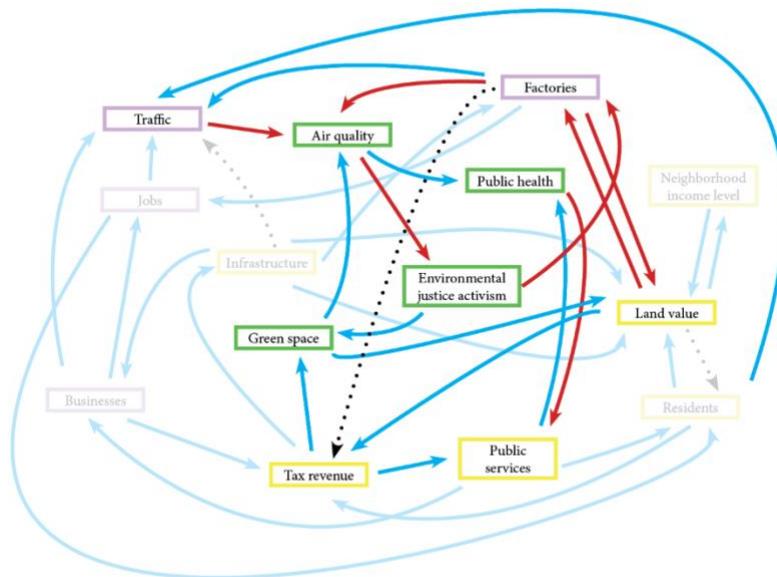
Tax revenue can also provide the resources needed to green a neighborhood by financing the development of green space. The problem is that such improvements also increase land value, like infrastructure does.¹⁷⁶ Air quality may improve with such green space, but it will have to make up for whatever pollution is still being emitted by factories, rising traffic, and the general greater consumption of an increasing population. Environmental justice groups have led many efforts towards improvements in air quality and public health, particularly in low-income neighborhoods where polluting activities tend to be located.¹⁷⁷ In some cases, they may even be successful in

176. Wolch et al., *supra* note 127, at 238 (“In addition, new studies suggest that urban greening efforts may also be inflating property values . . . potentially leading to gentrification and thus displacing lower-income earners.”).

177. ANA ISABEL BAPTISTA, TISHMAN ENV’T & DESIGN CTR., THE NEW SCH., LOCAL POLICIES FOR ENVIRONMENTAL JUSTICE: A NATIONAL SCAN 13, 19–22 (2019), <https://www.nrdc.org/sites/default/files/local-policies-environmental-justice-national-scan-tishman-201902.pdf> [<https://perma.cc/JPC2-42AN>].

removing the polluting sources from their communities.¹⁷⁸ Paradoxically, however, by triggering environmental improvements, which consequently improve public health and reduce the burden on public services, the system is set to increase land values and displace the very population that initiated the improvement. The Bloomingdale Trail in Chicago (a former elevated railway converted into a greenway) is a prime example of such transformations.¹⁷⁹ Figure 2c illustrates the mechanisms by which this displacement occurs.

FIGURE 2C: CAUSAL LOOP DIAGRAM OF ECOGENTRIFICATION (SUBSET)



As land values increase, so do taxes and the tax revenue that a local government can collect. Jobs also contribute to land value as they attract residents to the area. As land values (and taxes and rent) increase, neighborhood income levels increase, reinforcing the rise of land value as the general demand for land by higher-income

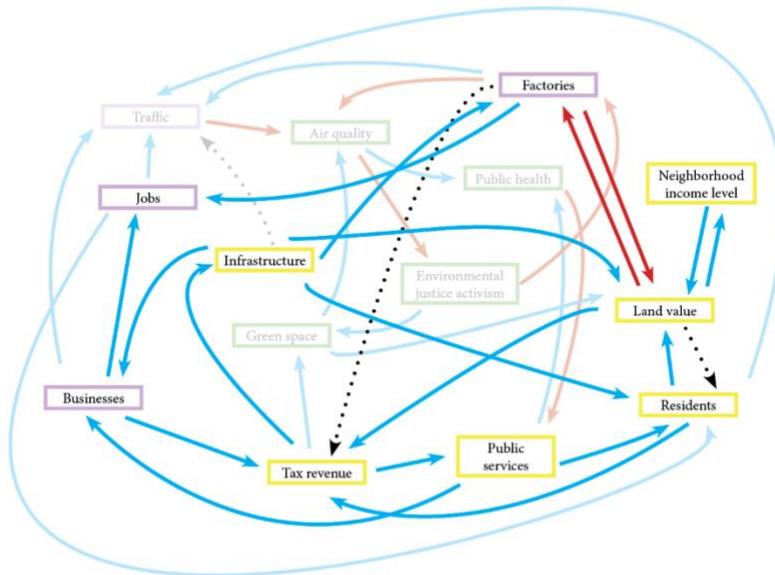
178. *Id.* at 27–28.

179. Ryan Ori, *Affordable Housing Is Vanishing as Gentrification Casts a Shadow over the 606*, CHI. TRIB. (Jan. 15, 2020, 2:57 PM), <https://www.chicagotribune.com/columns/ryan-ori/ct-biz-606-trail-housing-prices-ryan-ori-20200115-wvjgab2h2zd63ko33t2xqerkiy-story.html> [<https://perma.cc/T547-CMBJ>].

populations increases. Rising land values may increase the attractiveness of the neighborhood for higher-income residents but deter the lower-income residents (hence the dashed line). A higher tax revenue, supported by residents, increases land values, attracts businesses, and further solidifies this self-reinforcing trend, as now there are more resources to invest in infrastructure and public services, which further increases land value and attracts residents and businesses. The greater number of residents and businesses, however, will generate more consumption and pollution, in terms of traffic, energy use, and waste generation (not shown in the diagram, for simplicity). Factories in this case may have a detrimental effect and eventually be pushed out of these now more expensive neighborhoods. While this could be mostly an economic process, it can also become a political one, as observed above. With a higher-income population, there may be greater chances of success to remove the polluting sources. What this does, however, is simply move the problem elsewhere, typically to another low-income community. The move of General Iron Industrial Inc. (a scrap metal processor) from Lincoln Park to the Southeast Side in Chicago is an example of such a process, which now becomes a regional problem.¹⁸⁰ Figure 2d illustrates these intricate relationships.

180. David Roeder, *Scrap Metal Recycler General Iron Reaches Deal to Vacate North Side Site*, CHI. SUN-TIMES (Sept. 11, 2019, 6:59 PM CDT), <https://chicago.suntimes.com/news/2019/9/11/20861601/general-iron-scrap-metal-labkon> [<https://perma.cc/KV44-YLF4>].

FIGURE 2D: CAUSAL LOOP DIAGRAM OF ECOGENTRIFICATION (SUBSET)



These four diagrams illustrate the complex linkage of the first of our two case studies: ecogentrification. Although not provided here, one could draw an analogous set of diagrams to examine our second case: megaregional sustainability challenges. As an illustration, we focus on regional pollution, where the factories that are displaced from an area thanks to environmental activism and economic pressures are now moved to an area that may have a similar internal systemic structure, but the new area has a very diminished tax base. That further reinforces the process of lowering land value in that area, which further diminishes any chance of investments leading to a stronger tax base. With a diminishing tax base, divestment in public services and infrastructure ensues, leading to further business and population loss. In the originating neighborhood, the added consumption that goes hand in hand with increased income levels imposes other regional burdens. For example, pollution and resource depletion increase locally, such as through traffic, depending on the way in which energy, food, and other goods are produced to support that community's consumption. As

already high-resourced areas flourish economically and win their local environmental battles (although perhaps only aesthetically), lower-income communities are further depleted in what becomes a classic case of environmental injustice.

How does applying a complex system view to this problem help inform governance questions? We can use causal loop diagrams like the ones above to identify which are the mechanisms that backfire, either by reinforcing an exclusionary mechanism, or by cancelling out any environmental or social benefits. Once identified, they can be the focus of targeted interventions to ensure environmental improvements without the social drawbacks. For example, one aspect to consider here is the role of a community's tax base in ensuring the economic sustainability of different efforts. On one hand, polluting sources, if maintained, must heavily contribute to this tax base, something that is rarely done. Providing jobs is not enough. The other is that, as land value increases, economic controls and property tax restructuring can be set in place to ensure that low-income residents can benefit from a higher quality of life and not be displaced. This, however, will only work as long as we limit the influx of new residents (growth), given that, at some level, more residents and businesses start burdening the system with increased consumption and pollution produced by higher economic activity. Without such controls in place, a neighborhood could ostensibly oscillate between cycles of economic booms and busts. The same self-reinforcing mechanisms that support a transition towards gentrification can also lead to a vicious downward cycle of disinvestment, worsening environmental quality, and outmigration (a "death spiral"), seen in too many communities where pollution is exported. Checks and balances, however, can help stabilize a system over extended periods of time.

In brief, causal loop diagrams make visible the interconnected forces of an urban system, illustrating how dynamic feedback loops can trigger vicious and virtuous cycles and exacerbate the unequal development of thriving and struggling neighborhoods. These diagrams also reveal points of potential intervention, where strategic policies and investments can leverage positive change that reverberates throughout the system. Yes, these diagrams are highly conceptual representations with unavoidable simplifications, but this simplicity also makes them more transparent and accessible. Planners can develop these diagrams collaboratively with community stakeholders and thereby support efforts to address the wickedness of urban problems. These causal loop diagrams are one of many complex systems tools, including system dynamics modeling, fuzzy cognitive mapping, and agent-based modeling.

CONCLUSION: ADAPTATION, COMPLEXITY, GOVERNANCE

This Article has explored the links between wicked problems, complex systems, sustainability, and governance from the perspective of urban planning and development, using as illustrations the two emergent spatial phenomena of ecogentrification and megaregional sustainability.

Governance of urban systems is not a straightforward, neutral task. As a result, we employ an expansive definition of governance, including both formal government institutions and a rich array of private and nonprofit organizations. The result is a pluralistic, dynamic, and complex system of urbanization and change, in which formal municipal regulatory agencies have only limited authority and resources. One therefore cannot approach cities with the same single-minded focus on efficiency, optimization, or Tayloristic management as found in operations research, civil engineering, or accounting. Cities are inherently diverse, political, resource constrained, and lacking complete information.¹⁸¹ Because cities are complex, open social systems that lead to wicked problems, urban governance is invariably the management of wicked problems. Planning engages “tame,” tractable problems as well, though these understandably generate less controversy and attention. And because cities are internally heterogeneous, with uneven development, inequality, segregation, and zones of inclusion and exclusion, addressing social justice has a long (but often uneven) tradition in urban planning.

This “open system” extends beyond the city limits into nature as well. Planners must therefore govern the interaction between the city and the countryside and between humans and the rest of the planet. This has led to the profession’s recent commitment to promoting sustainable urbanism, a broadly defined concept. Urban governance then becomes the mediation of conflicts between environmental protection, local economic development, and social equity, and ultimately a challenge to growth as a solution for socioeconomic problems.¹⁸² As a wicked complex problem, the governance of sustainable cities will not lead to a tidy, stable solution with the end result of an optimal, balanced, and sustainable city, but instead will

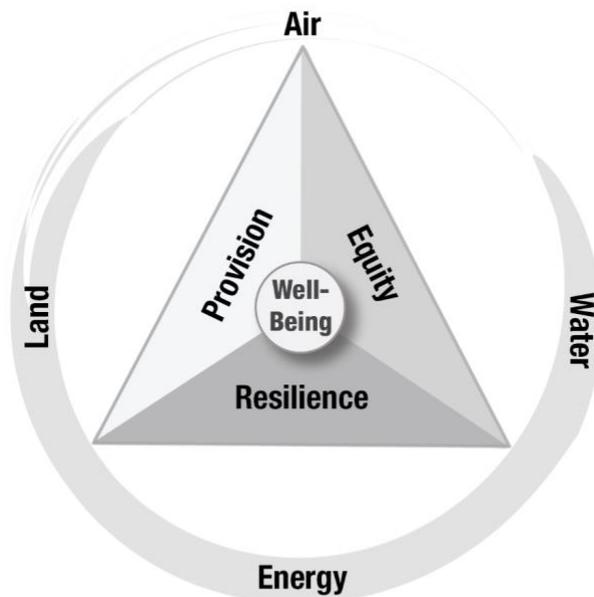
181. See *supra* Table 1.

182. See generally Campbell, *Green Cities*, *supra* note 67 (noting that traditional aims of urban planning are inherently in tension with sustainability goals and presenting “the Planner’s Triangle”); Campbell, *supra* note 49 (noting that urban planners seek to balance sustainability and social justice); Campbell, *The Planner’s Triangle Revisited*, *supra* note 67 (reexamining the Planner’s Triangle twenty years after its inception).

likely be an ongoing effort, full of trial and error, support, and opposition.

We conclude this Article with a more ambitious and speculative conception of a sustainable social order. The transition to support the governance of sustainability—moving from Stage 2 to Stage 3 in Table 2—involves reimagining the Planner’s Triangle as a more complex and multidimensional representation, as illustrated in Figure 3. While its simplicity is compelling, its two-dimensional representation limits us to binary tensions, without being able to understand the fuller depth of the system. We advocate for a stronger inclusion of complex systems thinking and analysis: from 3Es to 3D.¹⁸³

FIGURE 3: SUSTAINABILITY IN A DYNAMIC WORLD OF BIOPHYSICAL CONSTRAINTS



The triangle of social priorities, bounded by the circle of the four classical elements, represents the acknowledgment that human activity must operate within a finite biophysical world. Though a bounded world, this is not a static world, but one of creative destruction that is

183. Source cited *supra* note 3.

in constant flux—hence the fading circle of basic life elements. As long as we remain within those bounds, then we can be sustainable in the provision of goods and services, though the achievement of sustainability does not guarantee fairness or stability. Sustainable human settlements, therefore, are a necessary prerequisite but not a sufficient or complete condition for a better society.

If we therefore place well-being, rather than sustainability, at the pinnacle of our future goals, then we must collectively build the institutional, socioeconomic, and physical capital to support resilient systems to provide services equitably across the various sectors of the global population. This ambitious goal requires several crucial accomplishments: an understanding of the interconnectedness of social, economic, and environmental variables; the identification and restructuring of intervention/leverage points that trigger pernicious self-reinforcing processes; and the promotion of appropriate balancing mechanisms that can stabilize a socioecological system. We illustrated how to unpack this complexity with causal loop diagramming for our two cases (ecogentrification and megaregional sustainability). While conceptual, these are powerful tools to support dialogue, understanding, policy innovation, and resolution of trade-offs. Causal loop diagrams can also serve as a foundation for other quantitative techniques like system dynamics and agent-based modeling, to more precisely inform policy and governance. The way to operationalize this activity within planning and governance is to rely on approaches such as participatory modeling, which can represent the biophysical limits while keeping track of the evolving complexity that society must always work with, in addition to acknowledging and building on the also evolving diversity of values and needs of different communities.¹⁸⁴ Thus, urban governance is not the process of planning a sustainable end state and permanently achieving it, but rather a never-ending process of transformation and reformulation of our social, economic, and institutional structures.

184. See generally Charles Hoch, Moira Zellner, Dan Milz, Josh Radinsky & Leilah Lyons, *Seeing Is Not Believing: Cognitive Bias and Modelling in Collaborative Planning*, 16 PLAN. THEORY & PRAC. 319 (2015); Zellner & Campbell, *Planning With(In) Complexity*, *supra* note 3.