

A Just Transition Framework for Resilience

Evaluating Strategies for Seattle's Duwamish Valley Resilience District

Christoph Von Strouse

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Jan Whittington

Catherine De Almeida

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Christoph Von Strouse

University of Washington

Abstract

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Christoph Von Strouse

Chair of Supervisory Committee:
Jan Whittington
Department of Urban Design & Planning

This thesis develops a framework for evaluating policies that advance climate justice within the emerging Duwamish Valley Resilience District in Seattle, Washington. The Duwamish Valley is a legacy industrial area and environmental justice community facing cumulative pollution burdens and increasing climate impacts. The Resilience District aims to pilot policies, investments and projects that equitably respond to local priorities for health, housing, economy, environment, and culture. This research examines the question of how effective are city-community led urban planning policies and investments that aim to advance priorities such as a just-transition, a clean circular economy and climate resilience in urban industrial districts. Utilizing an exploratory case study approach, this research develops an evaluation matrix to analyze the policies of the Duwamish Valley Action Plan through the lens of just transition, the circular economy and resilience. The original analytical framework that's developed integrates these concepts into a set of nine criteria to evaluate the plans alignment with the three overarching goals of Seattle's One Climate Justice Agenda. This comparative analysis of planning policies and initiatives examines city commitments and the funding associated with implementation of this plan and agenda. This research provides a model for evaluating climate and resilience planning policies in cities against a set of just transition, circular economy and resilience evaluative criteria. It contributes a replicable, qualitative method to align sustainability and climate justice planning policies with the proposed dimensions of a just transition, circularity and resilience. Lessons learned aim to inform replication of resilience planning processes centered on justice in similarly positioned industrial neighborhoods nationwide pursuing a more sustainable, and just way forward.

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1. Introduction

As climate change intensifies the pressures on cities worldwide, developing effective strategies for urban climate justice, resilience, and regeneration has become an urgent priority. However, responses to converging social and ecological disruptions often fall short of addressing root causes and can reinscribe inequities unless consciously centered in justice. This thesis explores community-driven pathways for just, regenerative urban transformation in the context of America's urban industrial districts through a case study of Seattle's Duwamish Valley Action Plan. It investigates opportunities for resilience planning processes to proactively advance climate justice aims in legacy industrial neighborhoods impacted by historical environmental racism.

The Duwamish Valley Action Plan is a cross-sectoral, community-engaged initiative led by the City of Seattle's Duwamish Valley Program to coordinate investments and policies towards equitable climate resilience and sustainability in the industrial neighborhoods of South Park and Georgetown. These neighborhoods, comprising the ancestral homelands of the Coast Salish Duwamish Tribe, have experienced disproportionate environmental burdens from polluting infrastructure due to legacy zoning as industrial "sacrifice zones." South Park and Georgetown are frontline working class communities of color facing cumulative health impacts and climate vulnerabilities from ongoing industrial emissions, contaminated soils, illegal dumping, frequent flooding, lack of green space, and urban heat island effects. Residents also grapple with increasing displacements and affordability challenges accompanying sustainability investments and green gentrification.

Context

Seattle arguably stands at the forefront of cities endeavoring to tackle climate change in the US through justice-centered community collaboration and action. Located in the Puget Sound region of King County Washington, Seattle has long been heralded as one of the most livable, yet expensive cities and a sustainability leader; though it faces rising scrutiny around enduring racial, economic, and health disparities that compromise this reputation. The Duwamish Valley, situated south of downtown Seattle, epitomizes this tension. Its low-lying and heavily industrialized urban fabric bears flooding risks from sea level rise alongside some of King County's greatest pollution burdens and vulnerability to displacement. Increasing investments reveal Seattle's continued pursuit of reconciling equity and climate resilience within the Duwamish Valley.

Spearheaded by the Duwamish Valley Program in 2016, the Duwamish Valley Action Plan signifies the 2018 collaborative community-city vision for regenerating South Park and Georgetown through an environmental justice lens. This plan laid the foundations for Seattle's designation of the Duwamish Valley Resilience District in 2020, securing funding to pilot infrastructural interventions and community capacity building to buffer against climate and displacement impacts. Paralleling these efforts, Seattle's 2021 One Climate Justice Agenda established policy

pillars around just transitions, environmental justice, and frontline community resilience. Analysis of these integral policies and plans will be essential in assessing Seattle's goals of embedding climate resilience equitably. These policies are addressed in the Policy Evaluation Methodologies section of the Literature Review under Seattle Climate Policy. The subsequent methodology will outline the techniques employed to evaluate strengths, gaps, interconnections, and opportunities between these three initiatives with specific focus on the Duwamish Valley Action Plan.

Thesis Overview

This thesis employs a single exploratory case study approach using qualitative methods to examine urban planning policies and investments in Seattle's Duwamish Valley. This research method involved the development of an analytical framework which used qualitative policy evaluation measures to assess the effectiveness of the Duwamish Valley Action Plan in establishing the Duwamish Valley Resilience District and its alignment with Seattle's One Climate Justice Agenda. The analysis also examines the funding and investments from city programs and departments, notably the 2022 Capital Improvement Program, the Office of Planning and Community Development, and the Office of Sustainability and Environment.

To support the analysis, the literature review synthesizes scholarship on just transitions, circular economies, resilience and policy evaluation methods. This provides vital theoretical insights for development of the analytical framework established for the methodology. The methods section then outlines the exploratory case study approach, policy document analysis techniques, and the integrated analytical framework encompassing just transition, sustainability, and resilience indicators. Framework development to evaluate interconnections between planning and investments across just transition, sustainability, and resilience dimensions was central to the analysis. The results stem directly from findings of the planning document comparative analysis using this evaluative framework. The discussion section then utilizes the framework to closely review the Duwamish Valley Action Plan. The conclusion summarizes contributions and implications for urban climate governance, advocating for a just transition to circularity aligning with frontline communities. The goal is to inform resilience planning processes centered on justice within comparable industrial neighborhoods nationwide.

Chapter 1: Introduction

The introductory chapter opens by establishing the background context and significance of the research topic. The introduction chapter highlights relevant debates in existing literature and gaps in knowledge to be addressed through this study. The introduction clearly states the aims, research questions, and contributions of the thesis. It provides an overview of key concepts, theories and frameworks that inform the analytical approach. The chapter concludes by outlining the structure and organization of the full thesis document.

Chapter 2: Literature Review

This chapter provides a comprehensive review of scholarly literature relevant to the research questions and area of study. It synthesizes major theories, arguments, debates and conceptual frameworks from diverse disciplines that inform the project's analytical approach. The literature review contextualizes this study within wider academic conversations, while highlighting opportunities for new contributions to knowledge. Relevant topics, themes and lenses may include urban resilience, climate justice, circular economy, just transitions, environmental racism, community development, sustainability planning, and more. The chapter critically analyzes how existing literature has approached these issues, identifying limitations, disagreements, gaps in research and promising new directions that this work aims to address.

Chapter 3: Methodology & Analytical Framework

The methodology chapter describes and justify the research design and specific methods chosen to conduct the study. It details the approach to data collection, sampling strategies, protocols for analysis and any limitations of the methods. This chapter also clearly presents the original analytical framework developed to evaluate and interpret the case study data, explaining key dimensions, indicators or criteria for assessment. The analytical framework integrates relevant theories, concepts and measures synthesized from the literature review into a cohesive tool to guide analysis. The framework aligns with the research questions and aims of the study.

Chapter 4: Results & Findings

This chapter comprehensively presents the empirical findings that emerged from systematic collection and analysis of policies from the methodology. Findings are organized thematically to address each component of the research questions, blending results from document analysis, interviews, surveys, focus groups and any other data sources. Trends, patterns, correlations and divergent views are highlighted using the literature review for illustrative examples where appropriate. The results chapter provides an evidence-based factual account of the key findings without interpretation or attempt to contextualize within wider debates.

Chapter 5: Discussion & Analysis

The discussion chapter interprets the empirical findings in depth by contextualizing and analyzing results in relation to the review of relevant literature. It explains how key findings confirm, contradict, complicate or advance knowledge in the field based on theories and concepts from prior research. The chapter elucidates the significance of results, articulates how they address gaps in understanding, and explicate their implications for scholarship and practice. Different policies are triangulated with the framework to provide a robust, multidimensional analysis. Provisional explanations for patterns in the policies are also offered. Limitations, unanswered questions and future research needs are also considered.

Chapter 6: Conclusion

The concluding chapter summarizes the overall aims, approach and key findings of the study, reiterating its scholarly contributions and applied implications. It articulates how the central

research question has been addressed through systematic inquiry. The conclusion reflects on the limitations as well as strengths of the research design and methods. It suggests practical recommendations resulting from the analysis that could inform urban policy and governance. Finally, this chapter discusses promising directions for future research to build on the contributions of this thesis.

Research Question

This study aims to assess the effectiveness of the Duwamish Valley Action Plan in facilitating a just transition towards a circular economy model and equitable resilience for the proposed Duwamish Valley Resilience District encompassing the South Park and Georgetown neighborhoods in Seattle. The central research question is, *To what extent does Seattle's Duwamish Valley Action Plan implement planning policies and funding for a just transition, a sustainable circular economy, and climate resilience that advances the One Seattle Climate Justice Agenda and the establishment of the Duwamish Valley Resilience District?*

The following specific questions stem from this primary research question. These questions were asked to evaluate the policies and investments of the Duwamish Valley Action Plan.

Just Transition: Ensuring a just transition away from fossil fuels

- Do those who are, or may be, affected by the just transition policy action have input in shaping those policies?
- Are the benefits of the just transition policy action intended to be equitably distributed to those most impacted by their implementation?
- Are the outcomes of just transition policy action and investments designed to restore and regenerate frontline communities & workers?

Circular Economy: Building an equitable clean energy economy

- Does the policy action support equitable access to green collar jobs that decarbonize the economy?
- Does the policy action support equitable retraining programs that transition from carbon intensive jobs to green jobs?
- Does the policy action reduce resource use, extend the lifecycle or recovery of resources?

Resilience & Health: Investing in healthy, resilient and well connected communities

- Does the policy action support a healthy and regenerative community or environment?
- Does the policy action increase the resilience of infrastructures to climate change or disaster?
- Does the policy action support community cohesion before, during or after a disruptive event?

City Funding: Evaluating if the policy was funded for Fiscal Year 2022

- Does the policy have funding from the City of Seattle Capital Improvement Program (CIP) to support its implementation?
- Does the policy have funding from the City of Seattle Office of Sustainability & Environment (OSE) to support its implementation?
- Does the policy have funding from the City of Seattle Office of Planning & Community Development (OPCD) to support its implementation?

Hypothesis

The effective realization of urban planning policies hinges on the integration of concrete evaluation measures deeply rooted in relevant theoretical frameworks and harmonized with normative planning objectives. This hypothesis posits that the development and application of robust qualitative indicators, aligned with established ethical principles and conceptual models defining the ideal urban functionality, play a pivotal role. If such evaluative measures are adequately designed to scrutinize the outcomes of planning decisions and investments against these ethical and conceptual benchmarks, then urban governance processes can be held accountable for progressing towards planning objectives aimed at fostering fair and sustainable living environments for all residents.

To test this hypothesis, the following thesis undertakes a multifaceted approach. First, I review and analyze prevailing theoretical paradigms in urban planning, distilling an integrated set of normative priorities crucial for the establishment of just cities. Subsequently, I systematically identify and articulate qualitative evaluation criteria intrinsically linked to these priorities. The analysis then proceeds through an in-depth assessment of urban development policies and their discernible impacts on critical facets such as equitable access to housing, transportation, economic opportunities, and other dimensions emblematic of inclusive and resilient communities.

The anticipated findings bear significant implications for the theoretical refinement of urban planning processes and the strategic guidance of policy interventions. By optimizing the alignment between theoretical foundations, normative objectives, and evaluative mechanisms, this research endeavors to pave the way for the realization of ethically sound and functionally effective planning visions. Ultimately, this study seeks to underscore the imperative of grounding urban governance in comprehensive and accountable measures aligned with ethical imperatives, fostering cities that are not only equitable but also sustainable and resilient for all residents, now and into the future.

Research Objective

This thesis develops a framework to evaluate how a just transition to a circular economy might be achieved in the industrial district of the Duwamish Valley in Seattle. This research seeks to answer the question of how the just-transition could advance the circular economy and resilience in urban industrial manufacturing districts. It does this by developing an analytical framework designed

around just transition, circular economy and resilience evaluation measures to examine the Duwamish Valley Action Plan. The circular just-transition framework that was developed for this project also aligns with Seattle’s carbon reduction and climate resilience goals of the One Seattle Climate Justice Agenda. Under the One Seattle Climate Justice Agenda, Seattle is investing in policies and programs aimed at: Building An Equitable Clean Energy Economy; Ensuring a Just Transition Away from Fossil Fuels; Investing in Healthy, Resilient, and Well Connected Communities (City of Seattle 2023) The outcome of this project aims to support viable just transition pathways toward a circular economy in the Duwamish Valley that align with the stated goals of the One Seattle Climate Justice Agenda. Moreover, the framework developed in this project may be generalizable to other cities and industrial districts as they begin their just-transition toward more circular practices that reduce GHG emissions, eliminate waste and create jobs in the emerging carbon neutral economy.

Research Contributions

This research intends to contribute theoretical insights, analytical evaluation techniques and actionable recommendations to inform the emerging Duwamish Valley Resilience District. The analysis intends to strengthen initiation of this pilot initiative to proactively center justice across interconnected social, economic, and ecological dimensions of the district. Lessons intend to inform replication of community-grounded resilience planning processes in similarly positioned industrial neighborhoods pursuing climate justice. Ultimately, it examines how municipalities might better implement district level climate resilience planning initiatives in collaboration with communities, which address their needs while aligning with citywide climate justice goals.

Urban climate resilience planning processes represent critical opportunities to proactively shape more just, sustainable futures if communities are centered in developing solutions that meet their needs. The Duwamish Valley Action Plan and Resilience District signifies an important attempt within this arena to pilot community-driven climate adaptation and regeneration pathways in neighborhoods historically sacrificed at society's economic expense. By examining the initiative's implementation through a multicriteria analytical framework, this research aims to inform progressive urban planning policy which illuminate possibilities for enacting “Just Sustainability” planning processes grounded in just transition, the circular economy and community resilience. It also reveals openings for frontline communities to collectively build power and direct city resources towards community health, ecological regeneration, and self-determined resilience within municipal planning processes. Inevitably, the future entails long-term city-community collaborative challenges, yet harbors hope for solutions equal to the scale of those challenges. If successful, the Duwamish Valley Resilience District and its Action Plan could inform urban planning and policy beyond just Seattle, inspiring efforts to advance holistic resilience initiatives rooted in justice for other industrial neighborhoods. This thesis hopes to contribute to these initiatives and offers insights on shaping locally situated processes that integrate just transition, sustainability, and resilience into the adaptive fabric of communities at the frontlines of climate change, historic environmental injustices and accelerating urban development.

Positionality Statement

I would like to acknowledge my privilege and positionality as a white male from an upper-middle class background while examining urban sustainability and climate justice issues as a non-resident immersed in an elite university also situates me within broader societal inequities. In this research, I strove to approach discussions rooted in community needs and perspectives through primary and secondary sources, while providing synthesizing insights as an outside academic observer. Throughout this project, I aimed to elevate and accurately represent community voices and scholarship by frontline authors, continually interrogating my own privileges and assumptions. This work represents my imperfect effort to mobilize academic resources accessible towards advancing climate justice aims, in solidarity with, though not equivalent to, disproportionately impacted communities on the frontlines of broader historic and systemic societal inequities.

2. Literature Review

Introduction

In response to the pressing challenges of climate change, resource depletion, and social inequity, the need to transition towards a more sustainable and equitable economic system has become paramount. As a result, the concept of a circular economy has gained increasing prominence as a potential solution to address these complex issues. Concurrently, the imperative to achieve a just transition toward a carbon neutral society has also become an integral part of the discourse, aiming to ensure inclusivity and justice in the process of decarbonizing the economy, particularly for communities and sectors dependent on traditional carbon intensive industries. This literature review examines scholarship on foundational paradigm shifts and evaluative approaches needed to advance urban planning practice and policymaking towards realizing just sustainability transitions that are socially equitable, culturally inclusive, economically diversified and ecologically regenerative.

An exploration of the nexus between a just transition, the circular economy, resilience and policy evaluation methodologies provides evidence informed theory for examining how a just transition could advance the circular economy in urban industrial manufacturing districts. That question is explored through analysis of Seattle's Duwamish Valley Action Plan. The action plan is now being implemented within the larger city agenda of establishing a Resilience District in the Duwamish Valley and through the framework of the newly created One Seattle Climate Justice Agenda. Therefore, this research is specifically interested in examining how a just transition to circularity, could support Seattle's One Climate Justice Agenda as applied to the Duwamish Valley Resilience District. By analyzing existing research and theoretical frameworks, this review aims to elucidate how a just transition toward a circular economy can serve as a transformative force to catalyze regenerative and equitable communities in industrial districts such as the Duwamish Valley.

The review begins by exploring the concept of just transition as a bridge between climate action and social justice, grounding analysis in frameworks proposed by seminal scholars. Core dimensions of distributional, procedural and restorative justice are examined, emphasizing just transition as multi-scalar, context-sensitive and adaptive. Social and employment implications of low-carbon policies are investigated, cautioning transitions risk replicating past inequities without transformative change.

Circular economy scholarship is then critically reviewed, assessing the integration of justice principles into a circular economy, how this could support decarbonizing efforts, and the literature on circular cities, infrastructure and built environment. Tensions between urgency and participation are highlighted, underscoring needs to build circularity upon plural values and empower marginalized actors.

The third section of this literature review synthesizes key perspectives from urban planning, public health, environmental justice and resilience scholarship to elucidate pathways for enhancing health equity and holistic community resilience in the context of converging climate change impacts. It examines conceptual frameworks, evidence, and policy recommendations offered across sources to inform context-sensitive planning processes and interventions. The review finds substantial convergence around principles of collective leadership, systems approaches, transformative policies, distributive justice, and ecological public health as foundations to advance climate resilient communities and health systems prepared to equitably meet escalating needs. Together, these sources provide vital guidance to inform collaborative action advancing climate justice, adaptation and wellbeing within marginalized neighborhoods on the frontlines.

The final section evaluates planning and policy evaluation methods, including ex-ante and ex-post policy assessment methods, social cost-benefit analysis, multicriteria analysis methods and the use of indicators. Strengths and limitations are elucidated, arguing for mixed techniques incorporating social priorities. Context-appropriate indicator frameworks spanning neighborhood to national scales are examined, emphasizing localization and linking assessment to community-defined goals.

By synthesizing scholarship on just sustainability transitions, circular economy, resilience and policy evaluation, this review illuminates pathways to advance urban planning practice and research capable of catalyzing the scale of equitable, socially-just transformation needed. The paradigm shifts outlined here offer guideposts for scholars and practitioners seeking to move beyond technocratic sustainability visions, towards just cities, where holistic prosperity, inclusion and ecological regeneration become foundations of urban life rather than lofty aspirations. If realized through collaborative innovation and political will, cities can seed more equitable, decarbonized and nature-integrated societies offering improved wellbeing for all within planetary boundaries. While also offering generalizable insights for policymakers, researchers, and municipal stakeholders to navigate the path toward a more just and regenerative urban industrial landscape and economy.

Just Transitions

Introduction

In tracing the evolution of the concept of a just transition, various scholarly definitions of a "just transition," emerge which may be framed as an evolving, multi-dimensional framework that operationalizes equity, fairness, and justice in the transformation toward a low-carbon and sustainable economy. A "just transition" refers to an equitable shift from an extractive and unsustainable, fossil fuel-based economy to a more regenerative and carbon neutral one. This transition is characterized by a commitment to social justice and labor rights, ensuring that the burden and benefits of transforming our economic and energy systems is distributed equitably and does not disproportionately impact vulnerable workers, communities or marginalized groups. The concept of a just transition emerged from the recognition that tackling climate change and environmental injustices requires systemic changes that go beyond environmental considerations to also address social, economic, and equity disparities.

Originating from global trade and labor unions in the 1980s, the concept has evolved to transcend its initial focus on labor issues and clean technology to now encompass a broad range of social, economic, and environmental considerations. These multifaceted concerns coalesce around three predominant forms of justice: distributional, procedural, and restorative. At its core, a just transition seeks the equitable distribution of benefits and burdens across social groups, sectors, and regions, thereby directly addressing spatial justice and distributional equity. This involves the creation of quality employment opportunities, particularly in areas that are disproportionately affected by the transition, to prevent the exacerbation of existing inequalities and deprivations (Garvey et al., 2022; McCauley and Heffron, 2018; Sharpe and Martinez-Fernandez, 2021).

Simultaneously, procedural justice is highlighted as an essential component in which public participation in decision-making processes is deemed pivotal (Lamb et al, 2018; Abram et al., 2022). This democratic approach emphasizes the need for a whole-system perspective that is reflexive, adaptable, and recognizes the interconnectedness of transition processes (Caughman, 2020; Abram et al., 2022). Indeed, this type of governance strategy necessitates an equilibrium between long-term vision and short-term policy design, with continuous evaluation allowing for ongoing learning and adaptation.

The concept of restorative justice is also integrated, aiming to redress historic social injustices through transformational policies (McCauley and Heffron, 2018). This dovetails with the need to examine not just what kinds of jobs are created but also the conditions under which they are generated, to ensure they contribute to community resilience and welfare (Healy, Noel, and Barry, 2017; Dwarkasing, 2023).

Moreover, the transition is further nuanced by its scale and technological aspects, affecting the generation, distribution, storage, and consumption of energy at micro, meso, and macro levels (Garcia-Garcia, Carpintería and Buendía 2020). This implies that a just transition is a public matter that requires robust instrument choice and instrument change, resonating with the need for policy adaptability and multi-dimensional challenges (Garcia-Garcia, Carpintería and Buendía 2020; Caughman, 2020).

In summary, a just transition can be conceived as a comprehensive, multi-scale governance strategy that aims for an equitable, fair, and just transformation from a high-carbon to a low-carbon economy. It synergizes climate, energy, and environmental justice paradigms and adopts a whole-system approach that is reflexive and adaptable. Emphasizing distributional, procedural, and restorative forms of justice, it actively involves multiple stakeholders, especially marginalized communities, in its processes. Furthermore, the just transition is neither a static nor a monolithic construct but is dynamically informed by various sectors and scales, thus necessitating a range of policy instruments that are coherent with the multi-dimensional challenges that society faces in this critical transformation.

Dimensions of Justice

The ongoing scholarly dialogue surrounding a Just Transition (JT) towards a sustainable future has enriched the conceptual repertoire of justice dimensions that emerge across three influential papers. This section examines and compares the key frameworks set forth by McCauley and Heffron (2018), Abram et al. (2022), Garvey et al. (2022), and Lamb et al. (2018). The objective is to illuminate the multi-faceted nature of justice inherent in JT dynamics.

Distributional justice refers to the equitable allocation of costs, benefits, and vulnerabilities. All three papers emphasize the uneven spatial distribution of transition burdens and the need to assess geographical disparities. McCauley and Heffron (2018) are vocal about its indispensability, specifically highlighting the global scope of equitable distribution. This focus allows for a macroscopic lens through which global inequities are discerned, especially in the distribution of vulnerabilities that are both spatial and social (McCauley and Heffron 2018). Garvey et al. (2022) bring a nuanced perspective to this narrative by emphasizing that distributional justice must be critically engaged with spatial or regional disparities (Garvey et al. 2022). Meanwhile, Abram et al. (2022) enriched this intellectual exchange by linking the concept of distributional justice to extant social inequalities, arguing that these disparities should be actively redressed as part of the JT process (Abram et al. 2022).

Procedural justice involves the fairness of the methods and processes used in resource allocation and decision-making. Both McCauley and Heffron (2018) and Abram et al. (2022) advocate for a more expansive approach to procedural justice. They assert that the concept extends beyond the boundaries of legality and incorporates qualitative dimensions such as trustworthiness and the inclusion of marginalized communities in the decision-making apparatus (McCauley and Heffron

2018; Abram et al. 2022). Garvey et al. (2022) amplify this discussion by identifying the spatial dimensions of procedural justice, accentuating the need to contemplate regional disparities in democratic infrastructures as potential obstacles to community participation (Garvey et al. 2022). All the papers advocate for inclusive engagement, particularly of marginalized communities, and overcoming uneven democratic capacities across regions.

Restorative justice aims to heal relationships and restore socio, environmental and economic systems that have suffered due to inequities. McCauley and Heffron (2018) articulate the need for embedding restorative justice within legal frameworks like environmental impact assessments prior to initiating new programs. In contrast, Abram et al. (2022) view restorative justice as a critical facet of a multi-dimensional approach to justice, one that encompasses various forms in a synchronous manner.

Garvey et al. (2022) contribute a unique angle to the justice discourse by introducing the dimensions of spatial justice—advocating for an equitable distribution of social goods across geographic spaces—and recognition justice—calling for an acknowledgment of diverse identities and cultural histories (Garvey et al. 2022). Lamb et al. (2018) enrich the discourse by focusing on the tangible social impacts of climate policies, ranging from poverty alleviation to employment creation. They underscore the salience of public participation in policy-making to mitigate exacerbation of social inequities and to uphold the principles of procedural justice (Lamb et al. 2018).

Discussion

While the papers take complementary approaches to analyzing justice, McCauley and Heffron propose an overarching justice framework for assessing transitions, where Garvey et al. introduce and apply the specific concept of spatial justice through literature analysis compared with Abram et al. who use COVID-19 response as an illustrative case study of a whole-systems approach. While all recognize multi-scalar challenges, Garvey et al. specifically interrogate the vertical dimension of spatial scale and its role in obscuring subnational inequities. McCauley and Heffron place greater emphasis on restorative justice and supply chain impacts. Abram et al. highlight procedural justice and democratic engagement.

Together, the papers demonstrate the value of a multi-dimensional justice lens spanning various scales to analyze rapid decarbonization. While distributional justice remains foundational, its interpretation varies depending on geographic and social contexts. Procedural justice, universally acknowledged, yet warrants nuanced understandings that incorporate both spatial and demographic peculiarities. Restorative justice, though less universally discussed, lends invaluable ethical insights into post-injustice reconciliation processes. The concepts of spatial and recognition justice, as introduced by Garvey et al., break new intellectual ground. Finally, the focus on the social outcomes of climate policies by Lamb et al. provides a compelling empirically-grounded dimension, underlining the tangible repercussions of JT initiatives. Key areas for further study include embodied energy justice issues, differentiation of regional capabilities and responsibilities, long-term temporalities, and participatory governance.

Underlying them is the need to align climate action with equity principles to secure broad social legitimacy in the transition to sustainable, low-carbon economies.

Social Impacts of a Just Transition: A Planning Perspective

The challenge of transitioning to a more sustainable urban environment is a multifaceted task that touches upon economic, social, and environmental domains. This discussion evaluates the insights provided by Markkanen and Anger-Kraavi (2019), as well as Dwarkasing (2023), both of whom explore the social repercussions of climate change mitigation policies, but from different vantage points. Markkanen and Anger-Kraavi (2019) offer an intricate understanding of the social consequences arising from climate mitigation initiatives. They present a balanced view, acknowledging both the benefits and drawbacks of such policies. Importantly, they argue that the effects of these initiatives on social inequality are context-sensitive and may vary depending on policy design and implementation (Markkanen and Anger-Kraavi, 2019). Within an urban planning context, this translates to the necessity of tailoring strategies to local conditions, engaging with communities, and aligning mitigation efforts with broader social objectives such as poverty reduction and gender equality.

Dwarkasing (2023), on the other hand, expands the dialogue by examining systemic structural inequalities as pre-existing conditions that intersect with climate and low-carbon transition policies. The researcher posits a more expansive lens, taking into consideration different sectors and geographic regions where these policies are or could be operational. Dwarkasing suggests that these transitions can impact a wide range of social outcomes from livelihoods and poverty to health and gender disparities (Dwarkasing, 2023). For urban planners, this advocates for a more holistic and integrated approach that goes beyond conventional sectors like energy and transport to address underlying inequalities.

Both researchers agree that the social impacts of climate change mitigation are complex and influenced by a variety of factors. Where they differ is in how they perceive inequality. While Markkanen and Anger-Kraavi (2019) view it as an outcome that can be modified by policy adjustments, Dwarkasing (2023) sees it as a systemic issue that must be addressed at the foundational level. In the urban planning realm, this distinction is crucial: it reflects the difference between making adjustments within existing frameworks and rethinking those frameworks entirely.

Transitioning to a low-carbon urban environment is not solely an environmental undertaking but a comprehensive project that requires significant social considerations. Both Markkanen and Anger-Kraavi, and Dwarkasing provide valuable insights for urban planners. They collectively indicate that achieving a truly just transition will require a combination of tactical adaptations to current policies and more radical, systemic changes. As such, urban planners should aim for a dual approach: implementing immediate strategies that align with broader social goals while also advocating for structural transformations that address the root causes of inequality.

Energy Justice

The realm of energy transitions is fraught with challenges that are not merely technical or economic, but central to the question of justice in the transition. This chapter engages in a nuanced analysis of two pioneering works in the field of Just Transition—Garcia-Garcia, Carpintería and Buendía (2020) and Healy, Noel, and Barry (2017)—to dissect their conceptual underpinnings and contributions. In doing so, it aims to highlight the complexity and multidimensionality inherent in the pursuit of just energy transitions.

Garcia-Garcia et al. (2020) offer a comprehensive review that underscores the systemic nature of just energy transitions. Their work identifies key principles such as flexibility, equity, and respect for local communities, as well as the technological and socio-economic shifts required for such transitions. According to the researchers, just transitions must be capable of adapting to an uncertain and socially complex environment, ensuring equitable distribution of costs and benefits, especially for disadvantaged communities (Garcia-Garcia et al., 2020, pp. 64, 67-68). Their focus on decarbonization and renewable energy reveals a nuanced understanding of how shifts in energy systems can affect broader socio-economic matrices (Garcia-Garcia et al., 2020, p. 4).

In contrast, Healy et al. (2017) advance a more politicized perspective on just energy transitions. For them, any discourse on transition must foreground the power dynamics and inequalities that permeate energy systems. Their work introduces innovative concepts such as "full energy lifecycles" and "injustice over justice" to deepen our understanding of the systemic underpinnings of energy transitions (Healy et al., 2017). By focusing on the "upstream" elements, such as extraction and distribution, they shine a light on the root causes of injustice and urge for a more radical transformation, grounded in 'global justice' considerations (Healy et al., 2017).

Discussion

Both works call for a systemic approach but differ in their focal points and methodologies. While Garcia-Garcia et al. (2020) adopt a somewhat technocratic lens, emphasizing instrument choice and adaptation, Healy et al. (2017) engage more directly with the inherently political nature of energy transitions. This includes questioning established paradigms and emphasizing the role of grassroots movements in effecting change (Healy et al., 2017).

This analysis reveals a complex tapestry of approaches to just energy transitions. Garcia-Garcia et al. (2020) contribute a detailed framework that could be perceived as more pragmatic, offering pathways for immediate policy implementation. Healy et al. (2017), however, press for a more radical, politicized discourse that questions the very foundations of existing systems. Both perspectives are invaluable, yet they also expose the tensions and trade-offs that policymakers, activists, and scholars must navigate. To realize a truly just energy transition, one must engage in a multidimensional exploration that accounts for both the technical and socio-political intricacies involved. The task is not just to adapt existing systems, but to transform them in ways that are

both equitable and just, acknowledging the diversity of challenges that different communities face in the quest for a sustainable future.

Urban Transitions

The juxtaposition of key thematic elements from two seminal works on just transition frameworks serves to illuminate the intricacies and complexities involved in implementing equitable transitions in different urban and industrial contexts. At one end of the spectrum, Caughman's 2020 dissertation brings forth an interrogation of sustainability and resilience planning in urban locales, arguing against the limitations of conventional transition management (TM) approaches. The research emphasizes the insufficiency of top-down, vertical methodologies, advocating instead for interdisciplinary collaboration across various realms. This not only widens the ambit of stakeholder involvement but also facilitates more comprehensive and inclusive planning processes. Caughman further accentuates the importance of iterative learning, feedback, and adjustment as mechanisms to mitigate the potential for disproportionate impacts on vulnerable communities. Central to this discourse is the positioning of just transition (JT) as an approach rooted in procedural and distributional justice, which, according to Caughman, has the potential to bring about more transformative systemic changes than conventional transition management approaches.

In contrast, the work of Upham et al. (2022) pivots towards the domain of industrial clusters, delineating a just transition framework designed to navigate the multifaceted justice concerns arising from the decarbonization efforts within these clusters. The researchers compartmentalize their inquiry into three core thematic arenas. First, they scrutinize the nexus of politics, space, and institutions, identifying a complex interplay between democratic governance, financial involvement, and justice considerations. Second, they expound on the imperative of new processes and procedures, encapsulating aspects like community-based planning and life-cycle impact assessments. This is geared towards ensuring an inclusive and participatory planning approach that transcends mere tokenism. Finally, the researchers focus on the correlates of acceptance and resistance, a psychosocial dimension that delves into the factors influencing public sentiment, ranging from pre-existing political orientations to perceptions of fairness.

Despite the seemingly divergent focus of the two works, there is an underpinning harmony in their acknowledgement of the cardinality of procedural and distributional justice in effecting a just transition. Caughman underscores the urgency of incorporating diverse voices and equitable decision-making at the planning stage, while Upham et al. add nuance to this discourse by introducing 'recognition justice' as a third pillar. This encapsulates the need to acknowledge and validate the lived experiences and identities of those most affected by industrial and environmental transitions. Hence, while both pieces enrich the scholarly discussion on just transitions from their specific vantage points—urban planning for Caughman and industrial clusters for Upham et al.—they both convene on the indispensability of a multidimensional understanding of justice for achieving the transformative change that both Transition Management and Just Transition frameworks ostensibly seek.

A Global Framework Toward a Just Transition

The transition to a low-carbon economy necessary to address climate change brings not only technological and economic shifts, but also profound social implications. Ensuring this shift is just, equitable and inclusive has become a growing focus in climate policy circles, as evidenced by the increasing attention to Just Transition. Two recent influential reports that demonstrate the rising prioritization of Just Transition while revealing contrasting conceptualizations are “How Just Transition Can Help Deliver the Paris Agreement” from the United Nations Development Programme (UNDP) and “Mapping Just Transition(s) to a Low-Carbon World” from the Just Transition Research Collaborative. Comparing their framing and recommendations offers insights into debates on the role of social justice in climate action.

UNDP’s Concept of Just Transition

In its 2022 report, UNDP defines Just Transition as fundamentally about “principle, process, and practice” (UNDP, 2022, p. 8). The principles involve recognition that economic transitions can be disruptive and require deliberate efforts to be smooth and non-disruptive. The processes encompass building country awareness of Just Transition principles, strengthening abilities to engage in Just Transition processes, and developing capacities to implement Just Transition in practice. UNDP conceptualizes Just Transition from a state-centered perspective, focusing on government leadership in creating enabling environments for a just shift to net-zero emissions across all sectors.

UNDP portrays Just Transition as bringing public buy-in, supporting a green jobs revolution, laying groundwork for net-zero economies, driving localized solutions, and reinforcing climate action urgency. With this multi-dimensional view, UNDP advocates for whole-of-government and whole-of-society approaches to Just Transition to maximize development co-benefits and minimize risks of increasing inequality. UNDP’s conception of Just Transition is reformist, improving existing systems through inclusive processes and targeted policy measures, rather than transforming underlying political-economic structures.

Just Transition Research Collaborative’s Framing

In contrast, the Just Transition Research Collaborative in its 2018 report proposes a spectrum of Just Transition interpretations spanning from status quo to transformative (Just Transition Research Collaborative, 2018, p. 12). Status quo Just Transition compensates affected groups like workers or communities but does not alter power dynamics. Managerial reform Just Transition seeks greater equity through public investment and social dialogue without economic model changes. Structural reform Just Transition implies institutional evolution and democratic participation in governance and ownership. Transformative Just Transition entails grassroots mobilization to dismantle interconnected systems of oppression and imagine alternative futures.

For the Just Transition Research Collaborative, transformational change through climate justice movements offers the ideal Just Transition. It foregrounds community and labor leadership in

catalyzing paradigm shifts, rather than state-led actions. This conception treats Just Transition as an integrated socio-economic and political transformation entwined with struggles against marginalization based on gender, race, class and other axes of oppression. Rather than a policy problem requiring technocratic solutions, the Just Transition Research Collaborative frames Just Transition as a “narrative of hope, tolerance and justice” interlinked with visions for “profoundly different human-environment relations” (Just Transition Research Collaborative, 2018, p. 4).

Discussion

Stemming from these divergent orientations, UNDP and the Just Transition Research Collaborative propose contrasting recommendations on how to operationalize Just Transition. UNDP offers a Framework for Incorporating Just Transition into NDCs and Long-Term Strategies structured around four components: 1) assessment modeling to estimate socio-economic impacts; 2) social dialogues for consensus-building; 3) institutional capacity building and policy support focused on government; and 4) public and private investment for implementation. This institutional approach is state-centric, utilizing technical assessment tools and tripartite consultation processes common in labor relations to inform government policy, although emphasizing participation by marginalized groups.

By contrast, the Just Transition Research Collaborative advocates coalition-based approaches rooted in civil society, social movements and community leadership. It argues for community-driven transition plans addressing specific socio-economic needs. For the energy transition, it promotes public or cooperative ownership and democratic control of new energy systems to redistribute power. It recommends economic localization and cultural approaches grounded in traditional knowledge. Instead of tripartite dialogues, it sees transition arising through diverse alliances between organized labor and environmental, climate and community justice groups mobilizing for systemic change. Rather than institutional capacity building, it envisions grassroots empowerment, participation and leadership as driving Just Transition through ongoing struggle against marginalization.

The UNDP and Just Transition Research Collaborative represent two major streams within the evolving nuance of perspectives on what constitutes a Just Transition and how to achieve it. While both foreground equity and inclusion, UNDP positions the state as the driving force for reformist change to correct climate policy gaps through assessment, consultation and investment. In contrast, the Just Transition Research Collaborative situates civil society, social movements and community activism as the catalysts for paradigm shifts towards ecological sustainability, well-being and justice. These divergent approaches reveal tensions between expert-driven policymaking and community-centered change pathways. Together, they offer policymakers and practitioners a spectrum of options to maximize social and climate justice within economic transitions by blending top-down supportive structures with bottom-up transformative visions.

Labor & Frontline Organizations

International Labor & Trade Unions

Planning and implementing a fair, equitable transition to sustainable, low-carbon economies is an urgent priority globally. Several major international organizations have developed frameworks and recommendations on “just transition” for policymakers. This chapter will compare and analyze the key concepts and advice on just transition put forth by three influential institutions: the International Labour Organization (ILO) in its 2015 “Guidelines for a Just Transition Towards Environmentally Sustainable Economies and Societies for All;” the International Trade Union Confederation (ITUC) in its 2017 report “Just Transition – Just What Is It?;” and the Organisation for Economic Co-operation and Development (OECD) in the 2017 paper “Just Transition: A Report for the OECD.”

Key Concepts and Recommendations

All three documents highlight social dialogue among governments, employers, workers, and other stakeholders as vital for devising and implementing socially acceptable, effective transition strategies. The ILO guidelines focus on formal tripartite processes for building consensus on sustainability pathways and policies (ILO, 2015). The ITUC report stresses workers’ central role advocating for just transition through social dialogue at all levels, from workplaces to international agreements (ITUC, 2017). The OECD paper provides case studies showing diverse, context-specific approaches to social dialogue for transition planning.

There are notable differences regarding the scope of recommended policies and investments. The ILO guidelines cover multiple areas – macroeconomic, industrial, enterprise, skills, occupational safety and health, social protection, labor market, and rights – promoting economy-wide strategies to generate decent jobs across sectors through public and private investment steering (ILO, 2015). The OECD report also uses sector-wide case studies ranging from cement to education. In contrast, the ITUC report concentrates on the transition for fossil fuel workers and communities specifically, demanding alternative regional jobs and substantial public funds for economic redevelopment (ITUC, 2017).

All three documents emphasize social protection, training, and labor market policies to support workforce transitions. However, the ILO and OECD papers stress skilling and employability for new jobs more heavily than the ITUC report does. The ITUC demands income guarantees, pensions, and monitoring of legally binding agreements for affected workers along with just transition funds – similar to the OECD’s call for expanded social protection, but going beyond the ILO’s focus on skills and activation policies (ILO, 2015; ITUC, 2017; OECD, 2017). While the OECD and ILO highlight steering public and private investment toward sustainable activities, the ITUC report focuses more on holding companies and investors accountable through requiring disclosed climate plans and just transition commitments. The ITUC principles suggest making these conditions for accessing investment, rather than relying on voluntary market shifts (ITUC, 2017; OECD, 2017; ILO, 2015).

Discussion

These three international organizations' reports reveal important similarities but also key differences in perspective regarding just transition policies. All concur on the fundamental role of social dialogue for devising nationally appropriate transition strategies. However, the ILO and OECD take a broader approach focused on aligning policies to generate decent sustainable jobs economy-wide. In contrast, the ITUC concentrates specifically on justice for fossil fuel workers facing job loss, emphasizing direct job replacement and community redevelopment.

The ILO's tripartite process-oriented guidelines offer a model for consensus-building and policy integration on sustainability. But the ITUC's demands for proactive public policy efforts and researchers focused on affected workers are crucial reminders that ambitious climate action requires justice and solidarity. Synthesizing these global institutions' insights suggests that just transition requires collaborative yet proactive government-led planning and investment to transform work, production, and infrastructure in equitable ways that overcome resistance through inclusion and support. Combining the strengths of the ILO's holistic approach, the ITUC's worker advocacy, and the OECD's attention to implementation strategies and funding can inform development of impactful national frameworks worldwide for environmental sustainability, decent work, and social justice.

Labor and Frontline Organizations in the U.S.

The concept of a "Just Transition" (JT) is increasingly acknowledged as a multi-layered construct that resists simplification, requiring an interdisciplinary and intersectional approach for a nuanced understanding. This complexity is undergirded by foundational frameworks proffered by organizations such as the Climate Justice Alliance, the Just Transition Alliance, the United Frontline Table, and the Indigenous Environmental Network. Additionally, burgeoning scholarship from seminal texts by C40 Cities (2021), Blue Green Alliance (2021), and the Labor Network for Sustainability (2021) further enriches the discourse by offering diverse perspectives on the operational challenges and normative foundations of JT. As urbanization and governance emerge as pivotal themes in the literature, these scholarly works collectively serve to broaden the scope of academic inquiry into JT. This literature review on national organizations in the U.S. aims to synthesize these contributions, distilling key theoretical constructs, empirical challenges, and strategic recommendations. By doing so, this review seeks to map out the intellectual landscape of the JT paradigm, emphasizing its multifaceted nature, which encapsulates economic, social, and political dimensions. In merging these varied perspectives, the review will contribute to the evolving scholarly conversation on JT, helping to translate theoretical constructs into practical tools for equitable and sustainable transformation.

Labor and Sustainability Organizations

Major national organizations across the labor, environmental, and policy sectors have developed positions and recommendations for achieving a just transition from fossil fuels to a low-carbon economy. This thesis section will compare and contrast the perspectives outlined in three

influential recent reports: “Workers and Communities in Transition: Report of the Just Transition Listening Project” by the Labor Network for Sustainability (Brecher et al., 2021), “National Energy Transition Policy Framework” by the BlueGreen Alliance (2021), and “Exploring the Just Transition: United States” by the Urban Sustainability Directors Network (2022).

Key Concepts and Principles

While differing in emphasis and scope, the reports coalesce around certain core concepts and principles. All three argue that past economic transitions driven by deindustrialization, automation, and other structural forces have been profoundly unjust, leaving workers and communities to bear the burden of disruption and job losses with little support or planning. They concur that the coming transition away from fossil fuels has the potential to replicate these injustices on an even larger scale unless proactive, ambitious policies are implemented to protect workers and transform extractive systems. The reports emphasize principles of justice, equity, and community empowerment as central to a just transition. They also highlight the need for holistic, coordinated action encompassing social, environmental, and economic policies rather than narrow, siloed initiatives.

However, divergences emerge in the framing and scope of just transition. The Labor Network for Sustainability conceptualizes it most expansively as requiring fundamental changes to build an egalitarian society where people’s basic needs are met through robust public programs and institutions rather than private employment benefits (Brecher et al., 2021). The BlueGreen Alliance focuses more narrowly on policies to support energy sector workers and communities in transition (BlueGreen Alliance, 2021). The Urban Sustainability Directors Network emphasizes city-level perspectives and solutions while also covering economy-wide transitions (2022).

Discussion

Despite differences in orientation, the recommendations share many common themes. All three reports call for establishing national coordinating offices to guide federal agency collaboration, increased funding and staffing for economic development and workforce training programs, and attaching strong labor standards to public investments to ensure quality job creation. Unique proposals include providing wage replacement, pension contributions, and relocation support for displaced energy workers (BlueGreen Alliance, 2021); empowering community-led planning processes (Urban Sustainability Directors Network, 2022); and launching universal basic income pilot programs (Urban Sustainability Directors Network, 2022).

While the BlueGreen Alliance (2021) focuses on federal policies and programs, the Labor Network for Sustainability and Urban Sustainability Directors Network highlight the importance of locally-driven solutions tailored to community needs and assets (Brecher et al., 2021; Urban Sustainability Directors Network, 2022). The Labor Network for Sustainability stands out in its transformative vision, calling for changes to the social contract centered on fundamental social, economic, and environmental rights rather than employment-based benefits (Brecher et al., 2021).

Together, these reports provide valuable insights into the concepts, challenges, and potential policy pathways for achieving a just transition in the United States context. They demonstrate the necessity of ambitious, well-funded, coordinated efforts across levels of government and economic sectors. The principles of justice, equity, community empowerment, and workers' rights resonate prominently. While differing in emphasis and details, the reports largely converge around the need for systemic change to proactively plan, invest in, and support the coming economic transition rather than leaving people and places behind as in the past. This synthesis can inform advocacy efforts to develop comprehensive national just transition policies reflecting these shared goals and priorities.

Frontline Organizations

Achieving a Just Transition away from the current extractive, exploitative and ecologically damaging economy towards a more regenerative, equitable and sustainable economic system is a central focus for several key national frontline organizations in the U.S. The policy reports by Climate Justice Alliance (CJA 2018), Just Transition Alliance (JTA 2022), Indigenous Environmental Network (IEN n.d.), Movement Generation (MG n.d.), and Labor Network for Sustainability (LNS 2016) provide valuable insights into the shared principles and policy approaches needed to enable a genuine Just Transition. While differing somewhat in emphasis and details, these reports coalesce around common perspectives on the deep flaws with the existing extractive economy and capitalist system, as well as the general directions and solutions needed to transition towards a more just, equitable and sustainable economic system centered on thriving communities, restoration of nature, and radical democracy.

The Climate Justice Alliance frames a Just Transition as moving away from the “extractive economy” of profit-driven resource exploitation, wealth concentration and ecological destruction towards a “regenerative economy” founded on principles of ecological sustainability, social equity, economic democracy and deep community self-governance (CJA 2018). Similarly, the Just Transition Alliance conceives a Just Transition as transitioning communities, workers, workplaces and environments away from dependence on ecologically damaging, unhealthy extractive industries towards sustainable livelihoods and resilience (JTA 2022).

The Indigenous Environmental Network grounds Just Transition in Indigenous “Original Instructions” to restore holistic balance, reciprocity and harmony between human communities and nature based on the “Natural Laws” and sacred ecology of Mother Earth and Father Sky (IEN n.d.). Core principles highlighted in their report include Indigenous food sovereignty, honoring women’s leadership, healing historical trauma, rejecting market mechanisms that commodify nature such as carbon trading, and restoring Indigenous guardianship and self-determination over ancestral lands and territories.

A central shared principle emphasized across the groups is that frontline and frontline communities most directly impacted by pollution, toxic contamination, climate change and economic disruption should be centered as leaders in shaping Just Transition visions, policies,

projects and narratives (CJA 2018; JTA 2022; MG n.d.). As the Movement Generation report explains, these frontline communities hold invaluable place-based experiential expertise on how to transition society away from exploitative extractivism and “dig, burn, dump” practices towards democratically governed, cooperative, zero-waste and ecologically regenerative economies that heal communities, sustain dignified livelihoods and nurture mutual aid (MG n.d.). The Labor Network for Sustainability adds a reminder that workers in affected industries should also receive support through Just Transition in the form of pension protections, re-training programs and opportunities to shift to more sustainable livelihoods so that the transition is just and equitable for all (LNS 2016).

Discussion

In terms of specific policy recommendations and solutions, the Climate Justice Alliance calls for stopping public investments and subsidies for fossil fuels, industrial agriculture and other polluting, extractive industries and instead massively shifting these public dollars to support community-led projects, cooperative enterprises and democratized utilities that advance social equity and ecological regeneration (CJA 2018). Examples include investments in affordable green housing, clean energy systems, local food sovereignty, ecosystem restoration, public healthcare infrastructure and other community-led initiatives. Similarly, the Just Transition Alliance advocates decentralizing and diversifying economic governance and activity, dampening overconsumption and concentrations of wealth, and shifting control over researchers to empower frontline communities to build resilience and sustainable livelihoods (JTA 2022).

The Indigenous Environmental Network's demands include requiring governments and corporations to provide substantial funding for economic transition programs, toxic site remediation, ecological restoration and Indigenous-led development on Native lands (IEN n.d.). The Movement Generation report offers an overarching strategic organizing framework for Just Transition that integrates stopping extractive and exploitative practices, changing cultural narratives, exercising rights to restore commons, building international solidarity, advancing ecological healing and practicing inclusive, democratized mutual aid and self-governance (MG n.d.).

Investing in Decarbonization

Achieving a rapid transition to a low-carbon economy is critical to address climate change, yet this transition risks adverse impacts on workers and communities dependent on carbon-intensive industries. The concept of “Just Transition” has emerged as an approach to ensure the transition is fair and inclusive. This section compares and contrasts the key principles and recommendations on Just Transition proposed by two major international organizations – the Stockholm Environment Institute (SEI) and the Climate Investment Funds (CIF).

Both SEI and CIF highlight the urgency of decarbonization and warn against delaying climate action in the name of a Just Transition. SEI states “nothing justifies postponing the first principle:

the decarbonization imperative” (Atteridge and Strambo 2020, 4). Similarly, CIF argues “delaying or slowing the transition away from the extraction and use of fossil fuels is fundamentally unjust” (A Framework for Just Transitions 2021, 6). At the same time, both promote principles to ensure the transition is just and does not leave communities behind. A core focus of both reports is supporting economic diversification and new opportunities in affected regions and communities. SEI calls for strategies that “emphasize re-employability of workers” and investments to “generate economic vitality and stability” (Atteridge and Strambo 2020, 10). CIF advocates for “finance, technical assistance and policy engagement that promotes diversification” and “support[ing] the private sector” through assistance to SMEs (A Framework for Just Transitions 2021, 10).

Regarding fair treatment of workers, SEI and CIF again share common ground on key principles. SEI stresses the need for retraining programs and income support where re-employment is not possible (Atteridge and Strambo 2020, 10). CIF focuses on assistance for skills development and job seeking, as well as social protections for displaced workers (A Framework for Just Transitions 2021, 10). Both reports emphasize the importance of social inclusion and dialogue in Just Transition planning. SEI calls for “wide local engagement” and warns that locally-driven transitions tend to fare better than national government-led transitions (Atteridge and Strambo 2020, 12). CIF highlights “participatory development” of plans and inclusive decision making that empowers marginalized groups (A Framework for Just Transitions 2021, 5).

There are some notable differences between the SEI and CIF principles as well. A major theme in the SEI report is avoiding further “carbon lock-in” through ongoing investments or subsidies to carbon-intensive industries (Atteridge and Strambo 2020, 10). The CIF report does not directly address carbon lock-in. Another key focus for SEI is ensuring polluters pay for environmental cleanup rather than passing these costs to the public sector (Atteridge and Strambo 2020, 10). CIF does not discuss environmental legacy issues. The SEI and CIF reports also differ in their discussion of pre-existing inequalities. SEI emphasizes Just Transition as an opportunity to “tackle socio-economic inequity and gender inequality” (Atteridge and Strambo 2020, 10). CIF takes a narrower approach, focusing on the impacts of transition itself rather than broader societal inequities. Finally, the two organizations offer different perspectives on the role of international cooperation. SEI calls for wealthier countries to provide financial assistance to poorer countries to enable Just Transitions globally (Atteridge and Strambo 2020, 11). CIF instead focuses its principles on the national and local levels without addressing international support.

While some differences exist, the SEI and CIF share a common understanding on several core components of a Just Transition. Both urgently promote decarbonization while ensuring protections for affected groups. They agree on the need to support economic diversification, assist displaced workers, and engage stakeholders through inclusive processes. Yet some distinctions also emerge regarding the extent to which Just Transition should address pre-existing inequities and involve international cooperation and assistance. Overall, these two international perspectives provide a rich basis for further developing Just Transition policies and frameworks globally.

Discussion

While differing somewhat in emphasis, these reports and principles from national frontline organizations demonstrate strong alignment on the need for transformational system change away from the current unjust, extractive, and ecologically destructive capitalist economic system towards one grounded in socio-economic and climate justice, deep democracy, thriving living economies and healthy communities integrated within balanced, regenerative ecosystems.

Their shared perspectives include rejections of the endless growth imperative, wealth concentration, commodification of nature, and extraction of profits at the expense of people and planet. Instead they advance visions founded on principles of reciprocity, solidarity, caring, cooperation, equity, sustainability, bottom-up self-determination, and participatory self-governance. Core policy recommendations emphasize stopping investments in fossil fuels, industrial agriculture and other damaging industries, decentralizing political and economic decisions to empower local communities, restoring Indigenous sovereignty over lands, investing heavily in grassroots-led sustainable community redevelopment projects for clean energy, transit, ecological agriculture, housing, healthcare and other needs, and providing substantial support for marginalized communities and affected workers through reparations, re-training programs and opportunities to transition to more meaningful and sustainable livelihoods.

Despite some variations, these frontline organizations demonstrate strong thematic unity on the fundamentally unjust and ecologically untenable nature of the status quo extractive economy as well as the contours and principles of the types of radical, holistic solutions needed for a genuinely Just Transition. Their perspectives offer a compelling shared analysis and collaborative policy platform. Achieving the Just Transition so urgently needed will require building and scaling up political power from these frontline communities to fundamentally transform the underlying social and economic structures, power relations and cultural narratives in society that are driving ecological breakdown and injustice. Their reports provide hopeful guidelines and inspiration for this transformative work.

Circular Economy

Introduction

This chapter provides a critical examination of scholarly literature and literatures of practice on the circular economy. A "circular economy" is an economic model that aims to redefine how resources are produced, used and consumed, moving away from the traditional linear "take-make-waste" approach and towards one which keeps products in use longer and closes material resource loops. In a circular economy, waste is designed out of the system and resources are managed in a regenerative and restorative manner, allowing products, materials, and resources to retain their value and functionality for as long as possible through multiple cycles of use, maintenance, repair, remanufacturing, and recycling. The ultimate goal is to reduce the

consumption of finite resources, minimize waste, and mitigate the environmental impact of production and consumption while promoting regenerative economic growth and innovation.

The chapter is structured into three main sections. First, it explores principles and recommendations for enabling just circular transitions that are socially equitable and inclusive. Several seminal papers are analyzed to elucidate key tensions around participation, unintended consequences, and distributional justice. Core principles are proposed, including inclusive engagement, recognizing rights, avoiding unequal outcomes, and providing social protections. Potential pathways are outlined.

The second section reviews findings from major reports on decarbonizing the circular economy and its role in climate change mitigation. Reports from diverse institutions provide coherent evidence on the urgency of scaling circular systems to reduce emissions, outlining consistent strategies and policy priorities. However, challenges remain regarding implementation, trade implications, and conceptual boundaries.

Finally, the literature on advancing circular cities and built environments is examined, taken as two separate sections. Subsections compare scholarly contributions on circular city frameworks, built environment transitions, and bridging theory with practice. While cities are recognized as central circular economy hubs, pathways forward require transcending tensions around voluntary versus mandatory mechanisms and local versus global action. Principles of climate justice, community participation, and holistic assessment are emphasized.

In synthesis, this chapter maps the diverse scholarly discourse on enabling just circular transitions across scales, from products and companies to cities and nations. It reveals circularity as a complex adaptive process requiring multi-stakeholder collaboration, policy integration across domains, participatory processes, impact monitoring, and financial mechanisms. By outlining key debates, assessment needs, and policy priorities, this review provides a knowledge foundation to guide equitable and sustainable circular economy planning and governance.

Towards a Just Circularity

The transition to a circular economy has gained momentum globally as a strategy to reduce waste, pollution, and resource consumption. However, research increasingly recognizes that circular policies and business models alone cannot guarantee socially just and equitable outcomes. The four papers analyzed here by Schroeder (2020), Schroeder & Barrie (2022), Vanhuysse et al. (2021), and Vanhuysse et al. (2022) highlight crucial principles, tensions, and recommendations for advancing a just circular transition that supports environmental sustainability, decent work, poverty reduction, and social inclusion.

Key Tensions and Considerations

A core tension identified is between the urgency of environmental action and the time required for inclusive, participatory processes (Schroeder, 2020; Schroeder & Barrie, 2022). While rapid transitions may be needed to meet climate goals, social acceptance and legitimacy require engaging affected communities in deliberative planning. Similarly, the papers note possible trade-offs between transition speed and justice. Prioritizing frontrunner industries may accelerate circularity but entrench disparities, whereas enhancing inclusion often moves slower (Schroeder, 2020; Schroeder & Barrie, 2022).

All four papers emphasize considering unintended consequences across social impact areas. Schroeder (2020) notes circular business models like digital sharing platforms can worsen economic security. Vanhuyse et al. (2021) find limited assessment of negative social impacts in circular city research. Vanhuyse et al. (2022) identify numerous potential adverse effects in Umeå across dimensions like employment, participation, and cultural awareness. A core tenet is transition policies should anticipate and mitigate negative externalities.

The papers also highlight the distributional justice implications of the circular transition nationally and internationally. Vanhuyse et al. (2021) note informal workers often carry the waste burden in developing countries. Schroeder & Barrie (2022) stress addressing existing environmental injustices while supporting regions and workers negatively affected by industrial restructuring in Europe. All argue for targeted assistance and social protection schemes for disadvantaged groups.

Principles for a Just Circular Transition

To align circular economy transitions with justice and equity, the papers put forward several key principles. A multifaceted approach underscores the comprehensive strategies essential for fostering resilience in communities facing industrial shifts and ecological changes. Anchored in a foundation of inclusive participation, the initiative prioritizes engagement with all stakeholders, notably marginalized communities, workers, and civil society, employing deliberative processes as highlighted in works by Schroeder (2020), Schroeder & Barrie (2022), and Vanhuyse et al. (2022). Moreover, a critical facet involves recognizing the rights of vulnerable populations, encompassing their economic, health, and civil rights amidst industrial transitions, as elucidated by Vanhuyse et al. (2021) and Schroeder & Barrie (2022). A core tenet of the approach is distributive justice, ensuring an equitable distribution of costs, risks, and benefits across diverse regions, income groups, genders, and generations nationally and internationally, as corroborated by Schroeder (2020), Vanhuyse et al. (2021), and Schroeder & Barrie (2022). Further, the initiative places emphasis on the establishment of social protection schemes, offering retraining, financial supports, and transition packages to mitigate risks for displaced workers and marginalized communities, as advocated by Schroeder (2020) and Schroeder & Barrie (2022). Additionally, a pivotal focus lies in preventing unequal outcomes, necessitating the design of policies and interventions to preclude discriminatory impacts on disadvantaged social groups, as articulated by Vanhuyse et al. (2022) and Schroeder & Barrie (2022). Finally, acknowledging the global nature of these challenges, the initiative advocates for international support through assistance programs

and financial mechanisms to aid countries adversely affected by shifting trade patterns and reduced export revenues, aligning with the insights presented by Schroeder (2020) and Schroeder & Barrie (2022).

Discussion

The corpus of literature under scrutiny, predominantly those by Schroeder (2020), Vanhuysse et al. (2022), and Schroeder & Barrie (2022), suggests a multi-pronged strategy to engender the transition to circular economies while simultaneously foregrounding social equity and environmental sustainability. A salient feature of these papers is the emphasis on multi-stakeholder collaboration, which calls for the amalgamation of public, private, and civil sectors in the formulation of circular economy visions and national roadmaps. The scholars argue that such collaboration is quintessential for integrating diverse viewpoints and fostering collective action that transcends parochial interests (Schroeder, 2020; Vanhuysse et al., 2022).

Another critical intervention these works propose is the mainstreaming of justice and social equity in the conceptual frameworks and operational policies associated with circular economies. Schroeder (2020) and Schroeder & Barrie (2022) specifically propose that unless issues of justice are fully integrated across local, national, and international policies, circular economy initiatives risk exacerbating existing social disparities. The third mechanism proposed is the utilization of social impact evaluations, designed to identify and monitor the well-being of affected communities. Vanhuysse et al. (2022) contribute to this discourse by presenting a methodological framework for evaluating social impacts across various dimensions of well-being, thereby ensuring that the transition to a circular economy does not inadvertently inflict social harm.

Additionally, a pivotal proposition posited by Schroeder (2020) and Schroeder & Barrie (2022) involves targeted investments and financial instruments such as just transition funds. These are intended to ameliorate the socio-economic ramifications of this transition, particularly focusing on vulnerable regions, low-income countries, and marginalized workers. Further, the literature acknowledges the international character of waste management and resource governance, thereby calling for global initiatives to combat illegal waste dumping and promote economic diversification in producer countries. Such internationalization of the circular economy agenda not only addresses waste and resource allocation at a global scale but also serves to mitigate issues of environmental justice and trans-boundary externalities (Schroeder, 2020; Schroeder & Barrie, 2022).

Lastly, the papers argue for extensive educational, communicational, and community initiatives that empower citizens and civil society to actively participate in the circular economy. According to Vanhuysse et al. (2022), such bottom-up approaches are essential for the realization of circular economies that are not merely theoretical constructs but lived realities.

These scholarly works collectively present a rigorous and comprehensive roadmap for policymakers, business leaders, and civil society organizations that aspire to enact circular

economies that are environmentally regenerative, socially equitable, and economically inclusive. While the body of literature significantly advances our understanding and provides actionable insights, it also implicitly underscores the necessity for continued research and multi-sectoral collaboration. Adhering to the principles and pathways elucidated in these works could act as a safeguard against the inadvertent social or environmental externalities that might arise during the transition to a circular economy, thereby ensuring that such transitions are genuinely inclusive and leave no one behind.

Decarbonizing the Circular Economy

Achieving sustainable development and addressing global environmental challenges like climate change requires a transition to a circular economy model. This thesis section provides an overview and analysis of key findings from four recent influential reports on the circular economy and its role in sustainability: The Circularity Gap Report 2023 (Circle Economy, 2023), Resource Efficiency and Climate Change: Material Efficiency Strategies for a Low-Carbon Future (IRP, 2020), Completing the Picture: How the circular economy tackles climate change (Ellen MacArthur Foundation & Material Economics, 2021), and Squaring the Circle: Policies from Europe's Circular Economy Transition (World Bank Group, 2022). Together, these reports provide comprehensive evidence on the need, strategies, and policies for advancing circularity globally.

Overview of Key Findings

The Circularity Gap Report 2023 demonstrates that the global economy is currently only 7.2% circular, measured by secondary material usage (Circle Economy, 2023). This is far below the level needed for sustainability. The report models circular solutions across four key sectors that could reduce virgin material extraction by 34% and bring multiple planetary boundaries back to safe limits (Circle Economy, 2023). It also categorizes countries into "Build," "Grow," and "Shift" profiles based on development levels, tailoring circular economy recommendations accordingly (Circle Economy, 2023).

Similarly, the International Resource Panel report stresses the significant potential of material efficiency strategies like circularity for climate change mitigation (IRP, 2020). It estimates that strategies such as building lifespan extension, recycled content usage, and end-of-life recycling could substantially reduce emissions from construction and transportation (IRP, 2020). The report calls for greater policy attention towards material efficiency alongside renewable energy for comprehensive, low-carbon solutions (IRP, 2020).

The Ellen MacArthur Foundation report also emphasizes the critical role of the circular economy in climate change action, estimating it could eliminate almost half of remaining greenhouse gas emissions from key industries (Ellen MacArthur Foundation & Material Economics, 2021). It highlights circular strategies like reuse, product lifespan extension, waste elimination, and regenerative models that can transform production and usage patterns across sectors (Ellen MacArthur Foundation & Material Economics, 2021). The report argues the circular economy

provides a systematic framework for reducing emissions and building resilience (Ellen MacArthur Foundation & Material Economics, 2021).

Finally, the World Bank report analyzes policy barriers and reforms needed for the circular transition, especially in the European context. It outlines how policy coherence, incentives, information, and financing can enable the transition across institutions, governments, businesses, and society (World Bank Group, 2022). The report also examines trade implications, arguing international policies should align to prevent circularity leakage (World Bank Group, 2022).

Discussion

Despite originating from diverse institutions, these four reports present coherent evidence on the importance, strategies, and policies for advancing a global circular economy transition. All argue scalable circularity is indispensable for sustainability, with immense potential to reduce virgin material usage, greenhouse gas emissions, and environmental impacts. The reports outline complementary circular economy solutions spanning multiple sectors and systems, including buildings, transportation, food, and manufacturing. These include both broad strategies like lifespan extension, improved efficiency, recycling, regeneration, and waste elimination, as well as tailored applications across industries, countries, and value chains.

On policy, the reports consistently emphasize the need for multi-level interventions engaging businesses, consumers, governments, and financial systems. Proposed reforms align around removing barriers, redirecting incentives, improving metrics and information flows, ensuring policy coherence, and mobilizing public and private capital. The European policy analysis provides a useful framework of institutions, incentives, information, and financing for circular transition. Several reports note implementation must consider varied national contexts and development levels. Overall, the reports signal an urgent need to rapidly scale circular solutions through coordinated efforts across societies.

These influential reports comprehensively demonstrate the environmental necessity, feasibility, and multiple co-benefits of transitioning towards a global circular economy model. They outline coherent strategies and policy priorities to enable this transition across diverse countries and sectors. Key measures include improving resource efficiency, extending product lifespans, eliminating waste, increasing recycling and regeneration, removing linear incentives, and realigning institutions, information systems, and financing. While further research is needed in areas like trade implications, resilience impacts, and policy monitoring, these reports provide a robust knowledge foundation to guide circular economy transition efforts for sustainability. Their findings underscore the critical importance of rapidly scaling and mainstreaming circular systems globally across production, consumption, and governance.

Circular Cities

The burgeoning discourse on circular cities, an urban offshoot of the broader circular economy paradigm, serves as an important fulcrum for both policy and academia. It strives to provide solutions for sustainable urban planning and resource management. The research papers by Gravagnuolo et al. (2019), Paiho et al. (2020), and Lakatos et al. (2021) serve as pivotal contributions to this discourse, complemented by practical guidelines such as the Circular Cities Declaration Report 2022 and the European Investment Bank's 15 Steps for Circular Cities (2018). This comparative analysis aims to synthesize the academic contributions with the reports to offer a consolidated view, identifying gaps and synergies that could inform future research and policy formulation.

Empirical Analyses Versus Conceptual Models

The two major research approaches showcased in the papers by Gravagnuolo et al. (2019) and Paiho et al. (2020) represent a form of epistemological dichotomy often encountered in social science research: the tension between empirical and theoretical work. Gravagnuolo et al. (2019) venture into the empirical landscape, scrutinizing the circular economy implementations in eight historic European port cities. Their findings, grounded in practical data, add a layer of empirical credibility to the discourse on circular cities. Their research provides policymakers and scholars alike with tangible examples and measurable outcomes, thereby elevating the discourse from abstract theorization to actionable insights.

In contrast, the works by Paiho et al. (2020) and Lakatos et al. (2021) tread on the theoretical canvas. These papers focus on building an intellectual framework to understand, define, and conceptually organize circular cities. Paiho et al. (2020) dissect various definitions and analyze the constraints and enablers in the system, synthesizing these into a comprehensive definition. Lakatos et al. (2021) go a step further to propose an innovation-focused framework that can guide cities in their transition to circularity. These theoretical models play an essential role in setting the conceptual boundaries within which empirical analyses can be interpreted and evaluated.

While empirical studies provide evidence-based recommendations, theoretical frameworks offer the scaffold on which such evidence can be systematically placed. The empirical evidence, rich in contextual specificity, benefits from the generalizability and systematic rigor of the theoretical models. Conversely, theoretical models can be validated, critiqued, or refined based on empirical observations. Therefore, both approaches are not only complementary but also mutually reinforcing in constructing a comprehensive understanding of circular cities.

Bridging Theory with Implementation Guidelines

The implementation guidelines offered by the Circular Cities Declaration Report 2022 and the European Investment Bank's 15 Steps for Circular Cities serve as valuable bridges between theoretical constructs and empirical data. These reports translate the academic language into a pragmatic lexicon accessible to policymakers, urban planners, and industry stakeholders. For

instance, Gravagnuolo et al. (2019), with their focus on empiricism, offer substantive input on the actual projects and initiatives taken by cities. These can be directly translated into actionable steps under the "Act" stage as outlined by the European Investment Bank's 15 Steps (European Investment Bank, 2018, pp. 5-8). This bridge helps in contextualizing academic research in the realities of policy and administrative action, lending empirical research a pathway to inform practice.

Similarly, the theoretical constructs developed by Paiho et al. (2020) and Lakatos et al. (2021) can inform the planning phase ("Plan" stage) of the 15 Steps framework. Their comprehensive definitions and frameworks can help policymakers set well-defined goals and targets, while their identified enablers and constraints can inform the challenges to anticipate and the researchers to mobilize. The step-by-step guidelines in these reports thus act as an intermediary, helping to translate theoretical concepts into tangible policies and actions.

Discussion

All the works analyzed converge on some overarching themes. Firstly, they all recognize the crucial role that cities play in the transition to a circular economy. Given the concentration of researchers, capital, human potential, and innovation, cities emerge as natural hubs where circular economy principles can be most effectively implemented. Secondly, the multi-stakeholder approach is a recurring theme, emphasizing the need for cooperation among government bodies, private enterprises, and communities. Lastly, all works acknowledge the complexity inherent in transitioning to a circular economy, whether in terms of policy challenges, business models, or consumer awareness.

Despite these commonalities, the works diverge in their focus and methodologies. Gravagnuolo et al. (2019) offer a granular analysis of existing city projects, Paiho et al. (2020) provide an overarching theoretical landscape, and Lakatos et al. (2021) offer a specialized framework focusing on innovation. The practical reports, too, differ in their approach—the Circular Cities Declaration Report 2022 offers a panoramic view of ongoing practices, while the European Investment Bank's 15 Steps offer a step-by-step guide for implementation. These divergences are not detrimental but rather enhance the richness of the discourse. They provide multiple entry points for academics, policymakers, and practitioners to engage with the subject, ensuring that the concept of circular cities is explored in its entirety, from theory to practice and everything in between.

The research papers and practical reports collectively offer a rich tapestry of ideas, methodologies, and focus areas in the field of circular cities. By acknowledging the mutual reinforcement between empirical analyses and theoretical models, and understanding the bridging role of implementation guidelines, we can integrate these diverse perspectives into a more coherent and actionable framework. Such a synthesis would not only elevate academic discourse but would also enable cities to transition to circularity more effectively and sustainably.

Circular Built Environment

Achieving a sustainable and regenerative built environment necessitates a transition to a circular economy model that radically reforms current linear production and consumption systems. However, scholarship on circularity in the construction sector reveals divergent perspectives and strategies regarding how to enable this system change in policy and practice. The following analysis critically examines and compares six recent publications on infrastructuring circularity in the urban context to elucidate key debates, limitations, and pathways forward.

Nogueira et al. (2020) adopt a pragmatic analytical approach focused on resource allocation optimization and coordination. Their proposed “Innovation Lenses Framework” and “Four I’s Model” aim to map and direct flows of capitals across infrastructure systems. However, their technocratic emphasis on monitoring and directing material cycles overlooks power dynamics and risks perpetuating top-down control. Sala Benites et al. (2022) address this gap through a more holistic model integrating governance and community. Yet their conceptual approach lacks grounded application.

Pearlmutter (2019) provides an applied perspective on technical integration of nature-based solutions like biocomposite materials and green roofs to reduce construction waste. But the article lacks systemic analysis of political economic structures enabling linear resource flows in the first place. The technical focus misses opportunities for cultural and behavioral shifts from grassroots experimentation and social learning.

The Circular Buildings Coalition (2023) report recognizes systemic barriers in finance, policy, and cultural preferences. It recommends reforms aimed at infrastructure, regulation, and alternative economic models like product-service systems. However, the report lacks critical examination of power dynamics between government, industry, and communities. Its top-down policy prescriptions risk overlooking marginalized voices and reproduction of existing inequities.

The World Green Building Council (2023) provides an extensive toolkit and case studies for circular construction and design. Yet its emphasis on voluntary corporate adoption of circularity principles evades the need for binding national and international regulatory frameworks to disrupt the dominant extractive linear economy. Leffers et al. (2022) address this gap in analyzing the Dutch government’s policy mandates, public procurement rules, and targets for climate neutral infrastructure. But the focus on national initiatives overlooks the vital role of international cooperation and local experimentation.

Finally, the Urban Agenda Partnership (2019) handbook stands out in its attention to grassroots involvement, community activation, and temporary reuse projects led by entrepreneurs and activists repurposing vacant urban spaces. However, the researchers share a common limitation in their insufficient attention to justice and equity concerns in envisioning a circular built environment.

Discussion

Several key debates emerge across these researchers. First is the balance between top-down mandates versus bottom-up innovation. Second is the question of whether circularity is driven by policy or technology. Third is the divide between voluntary versus regulatory mechanisms. Finally, is the issue of national versus global action. An integrated approach must bridge these binaries by linking local experimentation to national regulation and international cooperation. Moreover, principles of climate justice, wealth redistribution, and post-colonial equity need centering in circular economy visions and policies. Rather than optimization and control, enabling circularity requires systemic co-creation through democratic participation of marginalized communities in envisioning and crafting regenerative built environments. Through bridging diverse knowledge systems and anti-oppressive circular design, cities can lead transitions toward just and regenerative material futures.

This analytical comparison reveals ongoing tensions in scholarship on navigating transitions toward a circular built environment, including debates over policy versus technology, top-down versus bottom-up drivers, voluntary versus mandatory mechanisms, and national versus global action. However, pathways forward require transcending these binaries through multi-scalar collaboration, democratic participation, climate justice, and emancipatory system redesign. Cities provide fertile testbeds for pilot projects that can spark the policy reforms and paradigm shifts needed to fundamentally transform construction patterns and infrastructure systems from linear to circular.

Resilience and Health

Introduction

As climate change brings intensifying shocks and stressors, urban resilience has become an urgent priority worldwide to protect community health and wellbeing. However, cities face complex, interconnected risks from rising seas, heatwaves, storms, and other impacts exacerbated by unchecked emissions and environmental exploitation (ARUP, FEMA & EPA, 2019). Without an explicit focus on health equity, urban resilience strategies risk perpetuating harms and marginalization of vulnerable communities.

This chapter provides a multilayered synthesis of seminal interdisciplinary perspectives on frameworks, strategies, challenges, and opportunities for enhancing city resilience capacities to equitably strengthen adaptation and nurture community health. It examines key sources encompassing practical guidance, assessment tools, and case studies of district-based approaches spanning New Orleans, New York, Boston and beyond.

Specifically, the chapter closely explores the City Resilience Index, a rigorous measurement framework developed by Arup with support from the Rockefeller Foundation, encompassing health, economy, infrastructure, environment, and leadership dimensions essential to systemic urban resilience. This index assists cities worldwide in comprehensively evaluating resilience strengths and weaknesses across interconnected factors. It also enables resilience progress tracking through refined strategies and renewed assessments over time. Additionally, the chapter analyzes the Regional Resilience Toolkit, offering practical guidance coordinated by FEMA and EPA with tools for U.S. local governments to conduct inclusive resilience planning, project implementation, and impact evaluation. This toolkit provides a participatory process emphasizing community engagement, climate justice, nature-based solutions, and measurement of outcomes.

This chapter also examines infrastructure resilience examining The American Planning Association report *Planning for Infrastructure Resilience* (2019) and *Planning for Urban Heat Resilience* (2022) which both provide a professional planning perspective to the challenges of urban climate resilience. Additionally the topic of social and environmental health are addressed with a particular focus on the social determinants of health. Sources from *Healthy People 2030* (Health & Human Services, 2023) and *Urban Planning for Resilience and Health* (WHO, 2022) are examined which demonstrate how broader social, economic, and environmental contexts fundamentally shape population health patterns and equity.

US District-based urban resilience approaches are analyzed, revealing pioneering implementations of the resilience district concept in cities like New Orleans, New York, and Boston. These cases reveal multifaceted lessons around resilient landscape systems, community wisdom, investment coordination, policy integration, and transformative design for realizing district-scale climate adaptation. Importantly, Seattle's work to establish the Duwamish Valley Resilience District is examined to understand how municipal efforts are aligning in support of community needs and concerns regarding climate justice and adaptation to flooding, wildfire smoke and urban heat island effects in the Duwamish Valley.

In synthesis, these diverse sources exhibited by the chapter provide integrated, complementary interdisciplinary insights towards actionable knowledge on pathways for cities worldwide to equitably strengthen adaptation capacities and nurture collective well-being in the face of converging threats. The chapter distills their vital contributions into pragmatic guidance for policymakers, planners, designers and communities seeking to enhance urban resilience.

Urban Climate Resilience

As climate change accelerates, building urban climate resilience has become an urgent priority worldwide. Cities face complex, multifaceted risks from rising seas, heatwaves, storms, and other impacts intensified by unchecked emissions and environmental exploitation. The sources provided offer valuable interdisciplinary perspectives on frameworks, strategies, challenges, and opportunities for enhancing city resilience and adaptation capacities in the face of climate

uncertainty. While diverse in approach and emphasis, they substantially agree on key principles like equity, flexibility, community leadership, and transformational thinking as foundations for just, systemic urban climate resilience. This review synthesizes their core concepts, methodologies, recommendations, and contributions towards actionable knowledge on pathways for cities to equitably strengthen adaptation and nurture collective well-being.

The City Resilience Index (ARUP, 2019) provides a rigorous global measurement framework encompassing health, economy, infrastructure, and leadership dimensions essential to urban resilience. The index assists cities worldwide in comprehensively assessing weaknesses and strengths across these interconnected factors, facilitating knowledge exchange for mutual learning, and tracking progress over time through refined strategies.

The Regional Resilience Toolkit (FEMA & EPA, 2019) offers coordinated practical guidance with tools and resources to assist local and regional governments in the United States in building disaster resilience. It provides a participatory process for resilience assessment, planning, strategy identification, project funding, and impact evaluation with a strong emphasis on community engagement, climate justice, and measurement of outcomes.

Urban Resilience: A Vague or Evolutionary Concept? (Amirzadeh et al., 2022) explores varying interpretations and applications of the concept of urban resilience across diverse fields like engineering, ecology, sociology, and disaster studies. It identifies key dimensions framing urban resilience as adaptive systems, agents, and institutions and notes differing conceptual approaches prioritizing recovery, adaptation, or transformation.

From Progressive Cities to Resilient Cities (Shi, 2021) reviews recent guidance documents on equitable climate change adaptation through a historical lens. It calls for centering racial justice in resilience and suggests proposed reforms align with past progressive political movements in their goals of redistributive justice, procedural justice, and structural reforms.

Measurement Frameworks and Indicators

A major point of convergence across the sources is the use of comprehensive indicator frameworks to systematically define, benchmark, monitor, and enhance urban climate resilience over time. The City Resilience Index consists of 52 qualitative and quantitative indicators distributed across four categories examining health and well-being, economy and society, infrastructure and environment, and leadership and strategy (ARUP, 2019). This extensive index assists cities not only in conducting initial assessments to reveal strengths and weaknesses across these interconnected factors, but also in tracking progress through refined strategies and renewed assessments. The index facilitates mutual learning and knowledge exchange through the process of cities coming together to share results and insights globally.

Similarly, the Regional Resilience Toolkit provides guidance on the strategic selection and implementation of appropriate metrics to evaluate resilience efforts (FEMA & EPA, 2019). It

recommends choosing indicators that are simple, useful, and clear to stakeholders and decision-makers. It advises developing metrics aligned with defined goals and timelines that enable regular re-examination and iterative improvement of plans. The sources demonstrate the vital role thoughtfully developed indicator frameworks play in enabling cities worldwide to systematically benchmark current resilience, identify priority areas for bolstering weaknesses, plan context-specific strategies, monitor and adjust implementation over time, and mutually learn from peer cities.

Multidimensional Systems Thinking

Furthermore, the sources emphasize urban resilience necessitates flexible, integrative systems thinking that recognizes cities as multidimensional, interconnected ecosystems. Urban Resilience identifies three key dimensions framing urban resilience - systems, agents, and institutions - that must be understood in relationship (Amirzadeh et al., 2022). It notes urban settlements, infrastructure networks, metabolic flows, ecosystems, individuals, communities, governance bodies, and norms are ultimately interdependent and must have qualities like diversity, modularity, and adaptability in order to foster resilience (Amirzadeh et al., 2022).

Likewise, the City Resilience Index encompasses 12 goals and 52 indicators spanning interconnected social, economic, infrastructural, and leadership factors, illuminating the complex systemic nature of cities (ARUP 2019). The Regional Resilience Toolkit provides guidance on assessing hazard impacts across integrated human, economic, and environmental systems (FEMA & EPA, 2019). The sources coalesce around the imperative for integrated strategies that enhance resilience across interconnected urban systems and institutions rather than siloed solutions.

Equity Considerations and Community Leadership

Moreover, the sources converge on the necessity of prioritizing equity and community leadership as vital to socially just resilience and adaptation. The Regional Resilience Toolkit emphasizes meaningfully engaging vulnerable, underserved, and historically marginalized communities throughout the resilience planning process and prioritizing environmental justice (FEMA & EPA, 2019). It notes resilience strategies must aim to redistribute resources to those with highest need. From *Progressive Cities to Resilient Cities* argues resilient adaptation must actively remedy past and present racial injustices through redistributive policies, inclusive democratic processes, and structural reforms (Shi, 2021). It advocates coalition building across government, community organizations, and the private sector to advance racial justice in resilience policy making.

The sources mutually reinforce that urban resilience efforts must empower and center communities experiencing social marginalization and climate vulnerabilities to accurately assess risks and needs, determine priorities, implement solutions, and ultimately take ownership over resilience and adaptation. Top-down, technocratic approaches imposed without community guidance risk perpetuating harms, while participatory planning enhances responsiveness, legitimacy, and collective action. The sources offer reminders that pathways to resilience must address historic oppression, heal trauma, and nurture cooperative power.

Transformational Thinking and Action

Additionally, the sources point to the necessity of transformational thinking and action in order to substantively enhance urban climate resilience rather than just make incremental improvements. Urban Resilience notes transformational approaches involve long-term, systemic changes that fundamentally alter the underlying structures, relationships, and functions of urban systems to enable cities to better withstand, adapt to, and evolve amidst disruptions (Amirzadeh et al., 2022). From Progressive Cities to Resilient Cities suggests truly equitable adaptation and resilience requires scaling beyond local action to pursue broader reforms at state and federal levels (Shi, 2021). It emphasizes the need for coalitions and policy platforms pursuing fundamental political-economic transformations.

The sources together indicate merely technical solutions are insufficient. Instead, cities must foster the collective imagination to re-envision urban systems and institutions and further cultivate the political and social will to realize these visions. Just resilience requires evolving beyond reactive, technical risk management toward proactively building shared capacities to thrive together in the face of turbulence. The sources suggest this necessitates long-term, human-centered approaches.

Discussion

While substantially aligned on many core principles, some divergence between the sources stems from their distinct objectives, scopes, and intended audiences. The City Resilience Index focuses in-depth on developing a global measurement methodology for cities (ARUP, 2019), while the Regional Resilience Toolkit provides practical planning guidance contextualized for local governments in the United States (FEMA & EPA, 2019). Urban Resilience offers a conceptual analysis of the evolution and interpretation of resilience across academic disciplines (Amirzadeh et al., 2022), whereas From Progressive Cities to Resilient Cities reviews applied policy documents through a historical lens (Shi, 2021).

Only From Progressive Cities to Resilient Cities offers extensive discussion of racial justice and equity, while the other sources touch on these principles without extensive elaboration. The sources also place varying emphasis on the role of communal systems compared to governance institutions. However, these divergences ultimately yield complementary offerings that enrich a multifaceted understanding of pathways to advance just, systemic urban climate resilience.

The City Resilience Index provides a sophisticated global benchmarking methodology along with a comprehensive framework illuminating the qualities of resilient cities (ARUP, 2019). The Regional Resilience Toolkit translates resilience principles into democratized, actionable recommendations for U.S. local governments (FEMA & EPA, 2019). Urban Resilience supplies essential conceptual foundations spanning disciplinary interpretations of resilience (Amirzadeh et al., 2022). From Progressive Cities to Resilient Cities contextualizes resilience in past and present struggles for racial equity and justice (Shi, 2021). Together, the sources integrate measurement, planning,

theory, and policy perspectives that inform multidimensional, just processes to assess and strengthen urban climate resilience. Blending empirical monitoring tools, stakeholder engagement guidance, multidisciplinary analysis, and attention to equity enriches understanding of how to build urban climate resilience that cares for people and the planet.

In synthesis, these diverse sources substantially converge on principles like systems thinking, flexibility and adaptability, prioritization of social equity, community-driven planning and action, and transformative vision as fundamental to enhancing urban climate resilience in the face of converging social and environmental uncertainties. While varied in emphasis, they largely agree on the necessity of holistic, participatory frameworks that center historical justice, reimagine urban systems, redistribute resources to communities most in need, and nurture collective liberation - both from oppression and climatic upheaval.

By bridging measurement, planning, theory, policy, and action across disciplines, sectors, and scales, these sources provide integrated, complementary insights to inform the emergence of cities resilient enough to weather turbulent futures while equitably strengthening adaptation capacities, social bonds, and ecological health. Together they point towards pragmatic pathways for urban climate resilience that overcomes injustices, adapts to changing realities, and fosters hope against gathering storms. Their contributions illuminate difficult yet hopeful steps cities can undertake when joined in common purpose despite daunting odds, connected through bonds of mutual care and commitment to realize their full potential to equitably adapt to disruption, nurture inclusive communities, and enable all residents to thrive.

Infrastructure Resilience

Planning for resilient infrastructure is an increasingly urgent priority as communities worldwide face growing climate risks. The sources provided offer valuable guidance for incorporating future hazards into infrastructure decision-making, drawing from the perspectives of urban planning, economics, and resilience theory. While varied in approach, they cohere in emphasizing the need for long-term, systems-thinking that accounts for uncertainty, sustainability, equity and environmental impacts in infrastructure planning.

Understanding and Incorporating Future Climate Risks

A key point of alignment is the necessity of utilizing scientific data and projections to understand and integrate future climate conditions into infrastructure planning. The American Planning Association report *Planning for Infrastructure Resilience* (2019) stresses assessing future flood risks by using climate science to inform planning contexts, balancing certainty and uncertainty in projections. It advises selecting flood scenarios aligned with infrastructure lifespans and building in redundancies to enable adaptation. Similarly, Whittington and Young (2013) argue resilience theory helps address distortions in cost analyses by encouraging long-term perspective. They suggest it can guide evaluations of infrastructure by modeling long-term collapse and reconstruction cycles.

The American Planning Association report *Planning for Urban Heat Resilience* (2022) provides guidance on assessing urban heat impacts using metrics like Heat Index and Wet Bulb Globe Temperature. It recommends gathering comprehensive data on differential heat risks and uncertainties across communities to inform strategies. Across sources, incorporating projected climate impacts and uncertainties into planning emerges as key to avoiding costly consequences of uninformed infrastructure decisions.

Coordination Across Sectors, Plans and Stakeholders

Additionally, the sources emphasize integrating infrastructure goals across government activities and stakeholders. The American Planning Association's infrastructure resilience report (2019) notes challenges aligning hazard mitigation, climate adaptation and infrastructure resilience plans. It advises collaboration across government and stakeholders when adopting infrastructure standards. Similarly, its urban heat resilience report (2022) stresses interdisciplinary coordination between planners, health professionals, utilities and others in addressing heat. It also highlights inclusive community participation, especially among marginalized groups. Whittington and Young (2013) propose applying transaction cost economics to compare infrastructure governance arrangements involving public, private and nonprofit entities. This reveals the relative cost-effectiveness of partnerships and contractual relationships in infrastructure delivery. Across sources, cross-sector and stakeholder coordination and participatory, equitable planning arise as critical to effective, integrated infrastructure resilience.

Sustainability and Environmental Impact Assessment

The sources also cohere around the need to account for sustainability and environmental factors in infrastructure planning. Whittington and Young (2013) argue incorporating environmental externalities into transaction cost analyses reveals the long-term value of sustainable infrastructure. They suggest resilience theory highlights environmental feedback loops impacted by infrastructure. The American Planning Association's infrastructure resilience report (2019) advises requiring climate resilience considerations in infrastructure grant proposals. Its heat resilience report (2022) includes sustainability strategies like urban greening and renewable energy in planning recommendations. Together, the sources point to cost-benefit analyses encompassing sustainability and environmental impacts as key to sound, far-sighted infrastructure decisions.

Discussion

While largely aligning, some divergences stem from the sources' distinct disciplinary perspectives. The American Planning Association reports (2019, 2022) focus on providing practical urban planning guidance and frameworks. In contrast, Whittington and Young (2013) emphasize theoretical economic analyses to reveal cost and institutional effectiveness. Additionally, the urban heat resilience report (2022) uniquely centers equity concerns through its planning framework. However, these varied lenses make complementary contributions to furthering infrastructure resilience planning scholarship. The economics-grounded analysis of Whittington

and Young (2013) lends rigor in quantifying sustainability and climate change considerations often left unvalued. Meanwhile, the American Planning Association reports (2019, 2022) translate resilience principles into actionable recommendations customized for on-the-ground urban planning contexts. Blending these perspectives allows for implementing resilience in policy and practice while maximizing social benefits through rigorous impact valuation.

These sources provide a rich interdisciplinary basis for enhancing infrastructure resilience amidst rising climate uncertainty and impacts. They substantially agree on key priorities like utilizing climate projections, enabling cross-sector collaboration, and integrating sustainability into planning. While diverse in emphasis, the sources largely cohere around the need for foresight, coordination and environmental responsibility as foundations for infrastructure that can withstand and adapt to accelerating climate shifts while serving communities equitably and sustainably. By bridging theory, policy and practice, these sources offer invaluable guidance for planning processes addressing infrastructure resilience and climate justice.

Social & Environmental Health

Achieving health equity and improving population health outcomes requires addressing the social, economic, and environmental determinants that shape health across the life course. The sources provided offer valuable perspectives on building resilience at the individual, community, and health system levels in the context of adverse social and environmental conditions. While diverse in disciplinary origins, they substantially converge on the primacy of understanding and mitigating contextual impacts, coupled with strengthening community capacities, organizations, and planning systems to enable resilience and social justice. This review synthesizes the key concepts, recommendations, and contributions of these sources towards developing holistic frameworks bridging health resilience and equity.

The Social Determinants of Health: It's Time to Consider the Causes of the Causes (Braveman and Gottlieb, 2014) provides an extensive overview of epidemiological evidence demonstrating the powerful influence of socioeconomic factors on a wide range of health indicators and disparities. It describes the complex multifactorial causal pathways through which social determinants shape outcomes over lifetimes and generations. This encompasses behavioral mechanisms and biological pathways like chronic stress physiology. The authors argue current knowledge on social determinants is sufficient to inform systemic interventions, which must be rigorously evaluated.

Healthy People 2030 (HHS, 2023) offers a broad health policy perspective, outlining priority areas and recommendations related to addressing social determinants of health and promoting health equity in the US. It identifies key social and economic factors that cumulatively shape health outcomes and disparities across the life course. It provides guidance on multi-faceted policies, community participation approaches, and equitable resource allocation to achieve public health goals.

Urban Planning for Resilience and Health (WHO, 2022) explores the crucial role of urban planning policies and practices in building disaster resilience, mitigating climate change impacts, and protecting public health. It offers concrete recommendations on governance, community involvement, nature-based solutions, and regulatory measures to reduce urban vulnerability to crises. The report advocates for alignment of local policies with international sustainability and resilience agendas.

Social & Environmental Conditions as Health Determinants

A major point of convergence across the sources is the emphasis on adverse social, economic, and environmental conditions as fundamental drivers of population health patterns, disparities, and vulnerabilities. Braveman and Gottlieb (2014) argue that social determinants of health (SDOH) like poverty, education, neighborhood conditions, and racial discrimination shape a “wide range of health indicators, settings, and populations” through complex causal pathways. They note socioeconomic factors demonstrate consistent graded relationships with health outcomes across the lifespan.

Likewise, Healthy People 2030 (HHS, 2023) states that intertwined social and economic determinants—including healthcare access, education, employment, housing, and neighborhood conditions—can cumulatively and profoundly impact wellbeing over the life course. Urban Planning for Resilience and Health (WHO, 2022) similarly notes that inadequate urban planning and governance often exacerbate vulnerability of communities to disasters, infectious disease outbreaks, and other disruptive shocks. Together, the sources converge in demonstrating how broader social, economic, and environmental contexts fundamentally shape population health patterns and equity.

Policy & Planning Interventions to Modify Harmful Conditions

Furthermore, the sources largely agree on the vital role of policy, planning, and systems-level interventions to mitigate harmful population health impacts of adverse social and environmental conditions. Healthy People 2030 (HHS, 2023) recommends comprehensive policy actions across sectors to address determinants like education, employment, housing, and neighborhood conditions. It notes multifaceted strategies are needed to remedy complex and interconnected determinants.

Likewise, Urban Planning for Resilience and Health (WHO, 2022) offers detailed urban planning policy guidance and tools to alleviate population vulnerabilities and foster resilience through measures like climate-conscious infrastructure, nature-based solutions, and inclusive governance. The Social Determinants of Health (Braveman and Gottlieb, 2014) also advocates interventions like improved housing and neighborhood conditions to reduce exposures and stressors. While varying in scale, the sources converge on systemic modifications to social, economic, and built environments as essential to mitigate adverse upstream determinants of health.

Community-Based Resilience Approaches

Additionally, the sources point to building individual and community psychosocial resilience capacities as a complementary approach alongside policy and planning reforms. Healthy People 2030 (HHS, 2023) observes that strong social ties and community engagement can counter isolation and create solidarity, thereby mitigating some health impacts. The Social Determinants of Health (Braveman and Gottlieb, 2014) similarly notes that protective factors like social support may buffer certain effects of poverty and adversity on individual mental and physical health. The sources agree on the need for both macro-environmental and micro-social interventions to address determinants at multiple levels.

Reinforcing Organizational & Infrastructure Resilience

Moreover, the sources emphasize the need to reinforce organizational and infrastructure systems to effectively support resilience initiatives. Urban Planning for Resilience and Health (WHO, 2022) advocates incorporating resilience considerations into land use planning and infrastructure regulatory frameworks. It notes coordination across agencies and sectors is essential but challenging. While distinct in focus, the sources converge on the necessity to strengthen planning processes, governance, and organizational capacities as foundations to implement resilience strategies on the ground.

Discussion

Some divergence between the sources stems from their varied disciplinary perspectives. The Social Determinants of Health (Braveman and Gottlieb, 2014) offers an extensively referenced public health discussion framed around epidemiological evidence on socioeconomic factors. In contrast, Healthy People 2030 (HHS, 2023) provides a broad health policy overview of strategic priorities, goals, and recommendations. Meanwhile, Urban Planning for Resilience and Health (WHO, 2022) focuses specifically on technical guidance for implementing resilience through urban planning policies and tools.

However, these diverse lenses make complementary contributions that together provide a richer understanding of creating holistic frameworks to strengthen resilience in the context of social and environmental challenges. Healthy People 2030 (HHS, 2023) offers a high-level conceptual synthesis of key determinants along with comprehensive policy guidance. The Social Determinants of Health (Braveman and Gottlieb, 2014) grounds the discussion in robust empirical population health evidence from decades of research on socioeconomic factors. Finally, Urban Planning for Resilience and Health (WHO, 2022) translates resilience principles into detailed, practical urban planning recommendations to tangibly implement supportive environments.

The sources' integration of policy, research, and practice perspectives allows for a multilayered depiction of resilient systems spanning upstream socioeconomic conditions, community capacities, and downstream institutional processes. While differing substantially in frame and emphasis, the sources cohere around principles of evidence-based planning, participatory

processes, systems thinking, and social justice as foundations for equitable public health resilience frameworks.

In synthesis, these sources converge considerably on the priority of addressing adverse social, economic and environmental conditions and strengthening communities, organizations, and planning systems in order to build resilience capacities and enable health equity. Together they provide integrated, complementary insights spanning from upstream determinants to on-the-ground interventions. The sources largely agree on the necessity of multifaceted, context-sensitive approaches that engage impacted populations in modifying harmful conditions and reinforcing protective factors across individuals, communities, and institutions. This emergent understanding offers invaluable guidance for researchers, planners, providers, policymakers and communities seeking to promote wellbeing, self-determination, and collective liberation in the face of injustice.

Community Cohesion

As climate change and disasters threaten communities worldwide, developing effective strategies for resilience and cohesion is imperative. The sources provided offer valuable interdisciplinary insights into strengthening communities' capacities to withstand crises and foster collective well-being. While originating from diverse perspectives, they exhibit substantial overlap regarding core elements of community resilience frameworks. This review synthesizes their key recommendations, areas of convergence and divergence, and contributions towards equitable, grassroots pathways for enhancing societal resilience.

Centering Community Leadership and Assets

A major convergence across the sources is the emphasis on community-driven processes as vital to effective resilience building. The National Academies of Sciences, Engineering, and Medicine report *Enhancing Community Resilience Through Social Capital and Connectedness* (2021) focuses its research agenda on community initiation and ownership in developing social infrastructure. It advocates methods like community-based participatory research that enable communities to identify resources and direct solutions tailored to their needs. Similarly, the Democracy Collaborative briefing *Action Guide for Advancing Community Wealth Building in the U.S.* (2023) centers local governance and grassroots groups as drivers of its Community Wealth Building model for inclusive, distributive economics. It outlines strategies for communities to leverage anchor institutions and build cooperative infrastructure meeting local priorities.

Likewise, the Climate Resilience Planners briefing *Community Driven Climate Resilience Planning* (2017) provides a framework for active engagement of impacted residents in assessing climate challenges, developing solutions, and shaping policies for their communities. It uplifts vulnerable neighborhoods undertaking participatory visioning, vulnerability mapping, and asset reclamation to enhance local resilience. Across these sources, community-led planning emerges as essential to

responses that address context-specific needs and empower the most impacted to control solutions.

Centering Social Equity as a Foundation

The sources also cohere around the necessity of prioritizing social equity as integral to resilience. The National Academies of Sciences, Engineering, and Medicine report (2021) identifies equity as a guiding principle vital to ensuring social capital and connectedness are strengthened across groups, given capital can concentrate among privileged communities. It advocates research questions assessing how marginalized groups can be supported to lead resilience building. Similarly, the Climate Resilience Planners briefing (2017) states community-driven processes must actively rectify disparities exacerbating climate vulnerability. It provides examples like New York City environmental justice groups leading planning processes to advance equitable outcomes. Likewise, the Movement Generation anthology *Pathways to Resilience* (2015) calls for addressing historical oppressions and incorporating social justice throughout climate resilience efforts. It uplifts human rights and environmental justice groups challenging discriminatory policies through advocacy and law. While differing in scope, the sources consistently recognize that resilience strategies must proactively dismantle barriers and empower marginalized communities to be truly effective and ethical.

Harnessing Narratives and Culture Shifts

The sources also exhibit consensus around the influential role of narrative and cultural change in generating collective action for resilience. The National Academies of Sciences, Engineering, and Medicine report (2021) advocates studying lessons from social science on effective storytelling and placemaking in spurring connectivity and capital building. It suggests participatory digital storytelling could catalyze inclusive networks and infrastructure across groups. The Democracy Collaborative briefing (2023) identifies political education as vital local governance for its economic empowerment model, highlighting the need to shape discourse. The Movement Generation anthology (2015) puts forth narrative strategy as essential to building constituencies and empathy for climate justice goals and policies. It recommends unmasking opposing narratives while uplifting solutions enabling public participation. Across perspectives, the sources point to strategic use of stories, media, education and the arts as impactful avenues for growing inclusive social movements and political will for systemic reforms that enhance community resilience.

Building Local Systems of Mutual Aid

Additionally, the sources highlight the potential to cultivate resilience through localized networks strengthening communal ties and meeting collective needs. The Democracy Collaborative briefing (2023) advocates institutions leveraging purchasing power to grow community-centered business and finance systems. It envisions an ecosystem of cooperatives, credit unions and local enterprises circulating resources within communities. Similarly, the Climate Resilience Planners briefing (2017) uplifts neighborhood projects that reclaim vacant land and reimagine public spaces to enhance local assets and resilience. Similarly, the Movement Generation anthology (2015) calls for

solidarity economies and ecologically regenerative practices that decentralize resources to the local level and foster self-sufficiency. While differing in focus, the sources exhibit consensus around networked, distributive systems on the neighborhood level as a pathway to resilience that enhances social cohesion and collective self-governance.

Discussion

While largely cohering around these central themes, areas of divergence among the sources stem from their varied origins and aims. For instance, the National Academies of Sciences, Engineering, and Medicine report (2021) stands out in its research-centered approach. It mainly provides suggestions for participatory study of community-building and capital flows rather than hands-on resilience initiatives. By contrast, the Democracy Collaborative briefing (2023) and Movement Generation anthology (2015) focus on laying out tangible economic and political programs for transformative system change. Additionally, the Movement Generation anthology (2015) heavily emphasizes environmental justice using a radical systemic critique, while the National Academies of Sciences, Engineering, and Medicine report (2021) utilizes more institutional, scientific rhetoric.

However, these contrasting orientations make for complementary offerings enriching the overall scholarship. The National Academies of Sciences, Engineering, and Medicine report (2021) helpfully frames specific research questions and participatory methods to scientifically strengthen the empirical basis for community-led resilience initiatives. Meanwhile, the Democracy Collaborative briefing (2023) and Movement Generation anthology (2015) provide bold visions and pragmatic schemes for community empowerment and solidarity economics that inspire social change. Blending these approaches allows harnessing the rigor of social science, on-the-ground community knowledge, and creative radical thinking to advance equitable resilience frameworks with meaningful impact.

These sources provide a rich interdisciplinary understanding of how to foster community resilience and cohesion in the face of disruptive crises. By outlining core elements like community leadership, social equity, narrative strategies and local systems, they map complementary pathways for enhancing social connectivity and grassroots resilience. While varying in emphasis, the sources largely cohere around principles of inclusive collaboration, participatory decision-making, and empowerment of marginalized groups as foundations for just societies able to withstand turbulence and flourish collectively. This emergent framework offers vital insights and inspiration for cultivating resilience across communities facing complex challenges in an uncertain future.

Resilience Districts

As the climate crisis intensifies pressures on urban communities worldwide, the concept of resilience districts has gained increasing traction as a strategy to enhance neighborhood-scale adaptation and sustainability. This chapter provides an in-depth examination of resilience district

approaches, implementation examples, and priorities for the proposed Duwamish Valley Resilience District in Seattle.

The chapter closes with detailed policy recommendations that may be relevant to the formation of Seattle's Duwamish Valley Resilience District. It synthesizes key concepts and best practices from the urban climate resilience literature, guidance documents, and case studies to inform effective, equitable pathways for resilience district development.

The first section introduces the resilience district concept as an integrated spatial planning framework to scale climate adaptation to the neighborhood level. The second section explores implemented resilience districts in U.S. cities like New Orleans, New York, and Boston, illuminating models at various stages of development. The third section closely examines planning processes and priorities for Seattle's Duwamish Valley Resilience District. The last section provides policy recommendations on centering racial equity, applying community wisdom, coordinating investments, and policy integration to holistically strengthen adaptation capacities and nurture collective thriving.

Together, these sections provide a multilayered depiction of considerations, challenges, and opportunities in resilience district implementation aimed at equitably enhancing community resilience. This chapter offers synthesized guidance for policymakers, planners, designers, advocates, and community leaders working to develop contextualized, participatory pathways to neighborhood resilience and regeneration.

The Resilience District Concept

As climate change exacerbates urban flood risks, heat waves, storms, and other converging social and environmental stressors, cities worldwide are exploring resilience districts as an integrated strategy to promote climate adaptation at the neighborhood scale. Resilience districts involve creating coordinated initiatives in defined geographic areas that address interconnected social, economic, infrastructural, ecological, and disaster vulnerabilities through participatory planning and implementation processes.

Resilience districts build on related models like ecodistricts and climate adaptation zones while placing explicit emphasis on social equity, community leadership, and holistic resilience thinking. They move beyond individual sites or sectors to engage broad stakeholders in reimagining entire systems encompassing housing, infrastructure, economy, ecology, mobility, energy, public health, and disaster management together.

Guidance documents outline key frameworks, indicators, and planning processes to develop effective, equitable districts. The City Resilience Index provides a comprehensive benchmarking system with qualitative and quantitative indicators distributed across health, economy, infrastructure, ecology, and leadership domains (ARUP, 2019). This tool assists cities worldwide in assessing district resilience capacities, monitoring progress over time, and enabling mutual learning through knowledge exchange.

The Regional Resilience Toolkit supplies coordinating guidance with tools and resources to assist local and regional governments in conducting participatory resilience assessments, project planning, funding acquisition, and impact evaluation with a justice lens (FEMA & EPA, 2019). It emphasizes community engagement, measurement, climate justice, and nature-based solutions.

While configurations vary across contexts, common principles and practices underpin effective district development. These encompass landscape and nature-based solutions as multifunctional protective infrastructure, inclusive community-centered governance, bolstering of social infrastructure, transformative design adaptations, and regenerative resource use fostering holistic and equitable resilience (Berger et al., 2020; City of New Orleans, 2023; FEMA & EPA, 2019).

U.S. Resilience District Case Studies

New Orleans, New York City, and Boston offer instructive models of district-based resilience planning and implementation at various stages of maturity. These cases reveal multifaceted considerations, accomplishments, and remaining challenges for leveraging districts as platforms to equitably strengthen community climate adaptation and urban regeneration.

New Orleans Gentilly Resilience District

New Orleans' Gentilly Resilience District, initiated in 2016 with funding from the National Disaster Resilience Competition, provides an exemplar of holistic resilience integration (City of New Orleans, 2023). The district coordinates flood mitigation infrastructure investments along the London Avenue Canal with economic revitalization, sustainability programs, workforce development, and affordable housing initiatives. Catalytic projects involve developing extensive green corridors, urban wetlands, water gardens, and canal greenways that seamlessly integrate flood control with ecological restoration and creation of vibrant, inclusive public green spaces accessible to surrounding neighborhoods.

The district also encompasses community adaptation programs assisting homeowners with flood mitigation retrofits, reliable energy and smart systems investments to strengthen critical infrastructure resilience, and workforce training to prepare residents for employment in water management and sustainable construction. It further coordinates resilience programming with schools and nonprofits. The comprehensive approach strives to model replicable strategies for enhancing adaptation and quality of life across districts and cities through synergistic systems thinking.

New York City's Resilient Neighborhoods

New York City's Resilient Neighborhoods initiative emerged as a key component of the city's resilience strategy following Hurricane Sandy's devastation in 2012 (NYC, 2021). It focuses on collaborative community-based planning across impacted neighborhoods in all five boroughs. The planning process engages residents and stakeholders to assess risks, set priorities, and develop recommendations tailored to enhance neighborhood climate resilience and equitable development.

The initiative encompasses potential strategies such as zoning innovations that support coastal protections, stormwater absorption, housing affordability, and small business continuity; land use changes expanding climate-adaptive affordable housing and green space; distributed green infrastructure investments; and capital projects strengthening flood protections and climate readiness, along with economic vibrancy, public space, and services. By facilitating participatory localized planning, the initiative aims to coordinate resilience investments and policies responsive to community needs and priorities within diverse waterfront neighborhoods across the city.

Boston Harbor Resilience District

Theorizing the Resilience District proposes a conceptual planning and design framework for Boston focused on equitably adapting coastal zones to increasing flood risks (Berger et al., 2020). It envisions dividing coastal areas into three tiers based on flooding exposure levels, enabling targeted design adaptations appropriate for each level of risk. The model advocates for transformative planning and design approaches guided by landscape ecology and resilience thinking, such as floating amphibious neighborhoods along highly vulnerable waterfronts. It positions multifunctional landscape systems as essential protective green infrastructure and calls for bold governance innovations activating professionals like landscape architects and designers as leaders in district-scale climate adaptation.

This visionary model provides critical conceptual guidance and principles, which require further grounding through neighborhood-level community engagement to tailor interventions to localized priorities and turn ideas into on-the-ground realities. However, it powerfully reveals the district scale as an opportunity to nurture holistic systemic transformation towards just, regenerative urban futures attuned to the ecosystems they inhabit.

Kalundborg Industrial Symbiosis District: A Circular Model of Resource Exchange

Industrial symbiosis, as exemplified by the Kalundborg Symbiosis in Denmark, represents a paradigm shift in industrial production, emphasizing collaboration, resource efficiency, and sustainability. In the small city of Kalundborg, Denmark, major industrial entities have been engaging in a unique symbiotic relationship for over 50 years. This collaboration involves the exchange of excess resources, including energy, water, and materials, across various sectors and businesses. The physical proximity of public and private companies enables the surplus resources of one entity to add value to another, fostering a circular system that significantly reduces waste. Currently, more than 30 streams of excess resources flow between these interconnected companies, creating a resilient and profitable ecosystem.

The symbiosis has resulted in substantial economic and environmental benefits for both the partners involved and the local community. Beyond the quantifiable metrics, the Kalundborg Symbiosis model creates an intangible surplus — the trust and power of innovation within the community. This surplus extends its benefits to employees, students, and researchers, promoting a culture of sustainability and fostering climate resilience. The community-driven efforts within the

symbiosis contribute to the reduction of thousands of tons of CO2 emissions annually, aligning with the vision of sustainability and profit going hand in hand.

Kalundborg Symbiosis stands as a pioneering example of industrial symbiosis, showcasing the viability of circular production models. The collaborative exchange of resources not only contributes to economic resilience and environmental sustainability but also fosters trust, innovation, and community economic development. As the model continues to inspire globally, its success suggests a transformative shift towards circularity, where partnerships and innovation lead the way to a more sustainable and prosperous future.

Together, these "Resilience District" cases shed light on key lessons around resilient landscape systems, community leadership and wisdom, coordinated cross-sector investment, policy integration, and transformative design as pivotal foundations for contextualizing districts as testbeds for multifaceted urban climate adaptation. They provide models at different phases spanning community-grounded implementation, policy translation, and conceptual visioning that could be applied to the Duwamish Resilience District initiative.

Seattle's Duwamish Valley Resilience District

The Duwamish Valley in south Seattle faces interconnected environmental justice challenges including industrial pollution, flooding, lack of parks, and displacement pressures (LILP, 2021). In 2021, the city of Seattle began coordinating with community organizations and residents to explore creation of a Duwamish Valley Resilience District integrating climate adaptation with equitable development and anti-displacement strategies.

The Duwamish Valley comprises the neighborhoods of South Park and Georgetown, low-lying communities sandwiched between the polluted Duwamish River Superfund site and highways crisscrossing older residential areas intermingled with warehouses and light industrial businesses. South Park and Georgetown are predominantly working class communities of color facing drastically shortened life expectancy and disproportionate chronic health conditions due to generations of environmental racism and industrial impacts (DEOHS, 2022). The area also increasingly experiences climate vulnerabilities, with flooding projected to become a frequent occurrence within the next two decades as storms intensify and sea levels rise (LILP, 2021).

In recent years, proposals for major environmental infrastructure upgrades to manage flooding have raised intense concerns about accelerating gentrification and displacement given the rapid pace of development and influx of more affluent residents (LILP, 2021). Similarly, plans for substantial new parks have stoked anxieties about gentrification in a city with constantly escalating housing costs and few protections for low-income renters. In 2016, the City of Seattle launched a Duwamish Valley Program to coordinate priorities and investments across city departments and build climate resilience initiatives through partnership with community-based organizations and residents (LILP, 2021). Exploratory planning has encompassed community

listening sessions, needs assessments, visioning exercises, and lessons from global resilience districts working to equitably strengthen community adaptive capacities.

Through these planning processes, several vital priorities have emerged: the Duwamish Valley Resilience District must be firmly rooted in racial justice and actively remedy legacies of environmental racism concentrated locally; it must prioritize robust affordable housing expansion, tenant protections, and anti-displacement policies to ensure existing residents equitably benefit rather than bear burdens; the district must encompass community-driven visioning and planning where solutions directly reflect lived experiences and stated needs of residents; and investments as well as policies must be proactively coordinated across agencies and sectors to catalyze holistic, regenerative neighborhood development centering community health (LILP, 2021; DEOHS, 2022).

Additionally, the Duwamish Valley Resilience District vision has coalesced around several pivotal dimensions: centering community wisdom, assets, and leadership; directing investment towards cooperatively-owned housing, jobs, clean energy, and childcare to build community wealth and advance a solidarity economy; blending policy tools spanning climate resilience, environmental justice, affordability, cooperative development, health equity, and good jobs to address root causes underlying risk; developing distributed neighborhood resilience hubs offering critical services during disruptions while fostering social connections; maximizing urban greening and just transition investments; and focusing planning on healing harms, restoring life-sustaining relationships between people and place, and realizing liberatory potential against converging storms (LILP, 2021; DEOHS, 2022).

Discussion

As climate change gathers force, urban communities worldwide face converging crises and uncertainties that demand new pathways to resilience. Holistic community-grounded frameworks like resilience districts hold promise as platforms to pilot bold, equitable solutions equal to the scale of the challenges. Key principles distilled across literature, case studies, and context-specific priorities provide invaluable guidance to steer this complex process with care, justice and hope.

Fundamentally, resilience building must actively center racial justice and environmental justice, proactively remedying historic marginalization amplified in disasters. Initiatives must apply community wisdom through inclusive vulnerability assessments, visioning, and planning processes that lift up grassroots expertise and direct community-defined solutions. Coordinated investment and policy integration across sectors is necessary to address interconnected risks and maximize synergies.

Landscape and nature-based solutions offer multifunctional infrastructures for climate adaptation grounded in place. Transformative design thinking is vital to reimagine human ecologies and realize liberatory futures. At heart, holistic regeneration prioritizes healing, cooperation, and self-determination to nurture collective health across people and ecosystems.

The road ahead is long, but it is walked together step-by-step. While profound obstacles persist, the Duwamish Valley Resilience District harbors hope for piloting creative responses that restore life-sustaining relationships amidst disruption. By courageously applying principles of equity, democracy, and care illuminated through collaborative learning, this initiative can chart restorative pathways toward environmental justice, adaptation, and community flourishing in the face of converging threats.

As a living laboratory, the project has potential to illuminate replicable models of resilience grounded in social solidarity and ecological wisdom. The Duwamish Valley's resilience leaders today can inspire multiplier effects across neighborhoods and generations working to realize liberatory, cooperative, and climate just societies. Through struggle and collective growth, the Duwamish Valley Resilience District aims to prove resilience is possible when communities unite to bravely face gathering storms, embrace regenerative futures, and never stop fighting for each other's survival and joy.

Policy Evaluation Methodologies

Introduction

Evaluation is a critical component of effective urban planning, yet it remains an underdeveloped and evolving practice. Assessing the implementation and outcomes of plans can provide key insights to improve practice, demonstrate value, and inform policy decisions. However, urban planners face numerous obstacles in evaluating their work, resulting in a lack of formal assessment. Reasons range from the complexities of attributing causality in dynamic urban environments, to the costs and politics involved, to uncertainty about whether plans actually impact development patterns. While academic literature offers some guidance on evaluation models, textbooks provide limited concrete methods and plans themselves incorporate minimal provisions for assessment.

The multifaceted challenges lead most evaluations to consist of informal case studies, with few rigorous quantitative evaluations of goal achievement. However, it can be argued that planners may have an ethical imperative to implement evaluative thinking throughout all project stages, using such methods to align planning with community values and economic trade offs. Collaborative development of practical evaluations could strengthen the link between planning research and on-the-ground results, producing vital feedback for improving outcomes. Overall, advancing systematic assessment of plan implementation and outcomes is an essential step to enhance evidence-based planning.

This chapter provides a critical review of scholarly literature on policy and planning evaluation frameworks applicable to urban contexts. Effective evaluation is essential for evidence-based decision-making, yet assessments focused on outcomes remain limited in urban planning and

policy. The chapter is structured into five sections examining common approaches, climate assessments, cost-benefit and social cost benefit analysis, life cycle assessment, multicriteria analysis, and indicators.

The first section synthesizes sources discussing the uncertainties and limitations of evaluation approaches for plans and policies. Key debates include the focus and rigor of assessments, disincentives for evaluation, and implications of uncertainty around whether plans shape development. The second section reviews frameworks for evaluating climate planning integration and assessing climate policy impacts. Tailored, context-appropriate indicators are shown as vital for meaningful assessment. Recommendations include addressing geographical gaps, incorporating qualitative understandings, and analyzing mitigation co-benefits.

Cost-benefit analysis is then examined as a prevalent yet contested method for environmental valuation and policy decisions. Critiques of its narrowness are weighed against arguments regarding transparency and objectivity. Potential refinements are proposed to improve incorporation of social factors and local values. Next, multicriteria analysis is analyzed as an approach suited for complex urban decisions involving multiple sustainability objectives. Reviews exhibit its versatility across contexts from solid waste to water management. Participatory design, sensitivity analysis, and communication of uncertainty are highlighted as areas for improvement. Finally, the use of indicator frameworks to track progress, guide interventions, and enable comparisons is discussed. Customization, balancing complexity with usefulness, and collaboratively advancing measurement capabilities are emphasized.

Together, these sections illuminate opportunities to tailor evaluative approaches to community values, utilize mixed methods, and focus assessments on enhancing social equity. This knowledge synthesis informs urban planning and policymaking seeking transformative change through evidence-based, socially just sustainability transitions.

Approaches Toward Evaluation

This analysis examines three scholarly sources that discuss general evaluation approaches used in urban and regional planning contexts. Shefer and Kaess (1990) provide an overview of classic quantitative methods like cost-benefit analysis as well as newer techniques like multi-criteria analysis. Talen (1996) argues for increased focus on empirically evaluating the implementation success of plans. Waldner (2004) surveys evaluation models used by city planners and advocates for more research on informal practices.

Shefer and Kaess (1990) present an overview of various quantitative evaluation methods that hold significance within the realm of urban and regional planning. Among these methodologies, they delineate cost-benefit analysis, which factors in the social implications of investments; planning balance sheets, which aptly incorporate considerations of equity; the goals achievement matrix, which systematically evaluates against explicit objectives; and multivariate analysis, particularly

relevant for addressing multi-dimensional planning problems. Their exposition emphasizes that the choice of evaluation method should hinge upon practical considerations such as budget constraints, data availability, and overarching strategic concerns.

In contrast to Shefer and Kaess, Talen offers a distinct perspective on planning evaluation. While the former duo predominantly focuses on quantitative techniques, Talen asserts that planning evaluation often fails to adequately emphasize the assessment of plan implementation. In her argument, she advocates for the incorporation of quantitative evaluation of plan implementation success to bolster planning theory's empirical foundation within the context of "real" urban conditions. Her viewpoint underscores the importance of bridging the gap between theoretical constructs and tangible urban outcomes.

Meanwhile, Waldner (2004) delves into the realm of planning textbooks and the guidance they provide—or rather, lack—in terms of post-hoc evaluation. After an extensive survey of plans and literature, Waldner arrives at the conclusion that formal evaluations are a rarity, typically manifesting as case studies rather than comprehensive quantitative assessments. Waldner also brings to light the notion of informal evaluation through techniques such as inventories and checklists, thereby shedding light on a less conventional yet pragmatic approach to the evaluation process.

A notable theme that emerges from these researchers' works is the significance of context and practicality in planning evaluation. Shefer and Kaess underscore the importance of matching evaluation methods to specific cases and advocate for making these tools readily accessible. In a similar vein, Talen contends that evaluative criteria should form an integral part of plans, complete with clearly defined activities and outputs, facilitating the measurement of conformance. Waldner, while not explicitly focusing on accessibility, nevertheless underscores the need for a more practical approach to evaluation within the constraints of planning practice.

Another noteworthy dimension that these scholars explore is the diverse ways in which evaluation methods address critical aspects like efficiency, equity, and feasibility. Shefer and Kaess, for instance, highlight the nuanced differences in how techniques such as cost-benefit analysis and multivariate analysis tackle the dual facets of efficiency and equity. Talen, on the other hand, raises a compelling argument regarding the uncertainty surrounding the extent to which plans shape development and its consequent influence on the avoidance of evaluation. Nonetheless, she maintains that measuring goal achievement remains a viable avenue for evaluation, thus emphasizing the importance of goal-oriented assessments. Waldner, in her analysis, delves into disincentives for evaluation, identifying factors such as costs and political considerations that hinder robust evaluation efforts within planning processes.

Discussion

In comparing and contrasting these perspectives, it becomes evident that Shefer and Kaess provide a strong foundation in terms of a comprehensive overview of evaluation methods, with an

emphasis on matching methods to cases and ensuring accessibility. Talen's viewpoint, however, stands as a critical counterbalance, drawing attention to the dearth of empirical assessment of plan implementation success and the need for a more practical link between planning theory and urban reality. Waldner complements these views by offering a holistic examination of the factors that hinder evaluation and by suggesting potential avenues for further research.

To synthesize these perspectives, it is apparent that there exist opportunities to enhance planning evaluation practices. The integration of evaluative thinking throughout all planning stages, as advocated by Shefer and Kaess, using customized and accessible tools can serve as a transformative step. Furthermore, the amalgamation of quantitative and qualitative techniques, as hinted at by these researchers, holds potential in enriching the evaluation process. Additionally, the emphasis on community-defined goals, as implied by Waldner, can contribute to more relevant and meaningful evaluations. However, to advance evaluation in planning, it is imperative to address the uncertainties surrounding plan implementation and to find ways to mitigate the disincentives, as illuminated by Talen and Waldner. Collaborative learning and knowledge sharing among practitioners and researchers can play a pivotal role in surmounting these challenges and aligning research and practice to ultimately improve planning outcomes.

In conclusion, the collective insights offered by Shefer and Kaess, Talen, and Waldner provide a multifaceted view of planning evaluation. While each researcher brings a unique perspective, they collectively underline the need for a more holistic, context-aware, and practically oriented approach to planning evaluation. By considering their insights in conjunction, planners and researchers alike can work towards refining the evaluation process, thereby fostering better-informed decision-making and ultimately enhancing the quality of urban and regional planning.

Ex Ante & Ex Post Evaluation

Policy evaluation is a critical tool for governments to assess the effectiveness and impact of their regulations and programs, both before implementation (ex ante) and after (ex post). Recent scholarship has been devoted to exploring the challenges and opportunities associated with bridging the gap between these two types of evaluations to enhance evidence-based policymaking. In this discussion, we will examine the insights provided by various researchers regarding policy evaluation frameworks and their application in the context of energy and sustainability initiatives in both the European Union (EU) and China.

Scheer et al. (2022) introduce the Integrated Policy Package Assessment (IPPA) approach, which focuses on the ex ante evaluation of urban mobility policies. Their research demonstrates the utility of this approach in capturing the multifaceted and real-world impacts of policies that span multiple disciplines. However, they acknowledge challenges in aligning the assessments with the specific details of policy implementation. In essence, their work highlights the potential of ex ante

evaluation to anticipate complex, cross-cutting impacts, which can serve as an early warning system for policy limitations and inconsistencies.

Ancapi (2023) contributes a framework designed to analyze the coherence of circular built environment policies in an ex ante context. By applying this framework to campus development, Ancapi uncovers certain blind spots in policy formulation when compared to the overarching goals of circular cities. Notably, this analysis reveals a focus on material looping over regeneration, limited policy integration, and a lack of regulatory measures. Ancapi's work underscores the potential of ex ante analysis in identifying gaps and shortcomings in policy design, particularly when aiming for integrated and ambitious policymaking.

In contrast, Qiu et al. (2020) undertake a retrospective analysis of China's energy intensity and SO₂ policies. Their research findings highlight the limited impacts of the energy intensity policy and the substantial emissions reductions achieved through the SO₂ policy. Moreover, they compare ex ante projections with actual outcomes, revealing the tendency for generic assumptions in ex ante modeling to overestimate policy benefits. This discrepancy underscores the need for grounding projections in granular baseline data and accounting for variations in policy effects across firms and locations. Smismans (2015) provides a comprehensive overview of the EU's approach to linking ex ante and ex post appraisals, with a focus on enhancing accountability, coherence, and burden reduction. While acknowledging the challenges posed by data requirements and the division between ex ante and ex post evaluations, Smismans emphasizes the benefits of this integrated approach in aiding decision-making and policy design.

Discussion

In comparing these researchers' perspectives, it is evident that they collectively emphasize the value of both ex ante modeling and ex post empirical analysis in policy evaluation. Scheer et al. and Ancapi highlight the potential of ex ante assessment in uncovering complex impacts and identifying policy limitations. However, Qiu et al.'s findings reveal the importance of grounding ex ante projections in detailed, context-specific data to ensure accuracy. Smismans' overview of the EU approach underscores the importance of coherence between ex ante predictions and ex post outcomes.

These researchers also offer valuable recommendations for improving policy evaluation. Qiu et al. advocate for incorporating empirical baselines and firm/location-specific data in ex ante modeling to enhance the realism of projections. Ancapi suggests that their coherence framework could serve as a valuable tool for integrated policymaking in the ex ante phase. Scheer et al. propose that integrated science approaches are best suited to capture the complexities of real-world policy impacts. Smismans recommends long-term planning and tailored dissemination of findings to enhance the EU's evaluation efforts.

However, it's important to acknowledge certain limitations in these studies. Scheer et al. and Ancapi note difficulties in aligning their assessments with specific policy details, which can limit

the precision of ex ante evaluations. Ancapi also highlights the narrow scope of their analysis, primarily focused on explicit policy documents, while Qiu et al. stress the importance of accurate data and robust measurement. Smismans observes that ex post evaluations could benefit from a greater incorporation of empirical data on outcomes.

In summary, these sources collectively underscore the complementary value of ex ante and ex post evaluation, as well as the potential of integrated, evidence-based approaches in policy analysis. While ex ante modeling provides valuable projections, empirical findings reveal the on-the-ground impacts and limitations of assumptions. The pursuit of coherence between predictions and outcomes remains an ideal to strive for. To improve policy evaluation, the sources recommend enhancing the realism of ex ante analyzes with granular, context-specific data and broadening the scope of ex post assessments. Ultimately, they envision evaluation frameworks that embrace complexity and specificity, aligning detailed measurement with integrated assessments across disciplines. Further efforts to link ex ante and ex post appraisals through long-term planning and ongoing stakeholder engagement can strengthen accountability, visibility, and policy improvement over time.

Evaluating Sustainability Planning and Policies

Addressing decarbonization and complex sustainability challenges requires effective policy and planning interventions. However, the success of such interventions depends on rigorous evaluation frameworks to assess outcomes, inform decisions, and guide refinements. Recent scholarship has examined methodological approaches for evaluating climate change and sustainability planning and policies across scales. This literature review synthesizes insights from three sets of researchers focused on: evaluating climate planning integration, assessing climate policy and co-benefits, and analyzing sustainability policy and urban development.

Climate Planning Integration Frameworks

Grafakos et al. (2019) outline an analytical framework to gauge integration of climate adaptation and mitigation in cities' climate action plans (CCAPs). The methodology assesses CCAPs across planning stages and variables with quantitative scoring indicators and qualitative analysis of adaptation-mitigation linkages. The framework was applied specifically to European cities, given limited similar assessments. Raymond et al. (2020) present an impact evaluation framework for nature-based solutions (NBS) projects and advise selecting customizable indicators tied to expected impacts and objectives, using quantitative measurements and qualitative assessments appropriate to project scale and context.

These researchers demonstrate how structured frameworks aligned to program goals can further climate planning integration and systematic assessment. Furthermore, tailored indicators tied to desired outcomes are essential for meaningful evaluation. Assessments should combine subjective judgments through qualitative techniques with empirical monitoring via quantitative methods. Frameworks must also consider geographic scale, social context, and unintended effects. Together,

these researchers suggest evaluations can be strengthened by addressing geographical gaps, as with Grafakos et al.'s focus on Europe, and leveraging mixed methods. Overall, integrated frameworks assessing adaptation and mitigation co-benefits through qualitative and quantitative methods can enhance climate planning and outcomes.

Review of Climate Policy and Co-Benefits Evaluation

Ürge-Vorsatz (2015) discusses methodologies to quantify the co-benefits of climate mitigation actions to better incorporate positive co-impacts into cost-benefit analysis and decision frameworks. However, they note measurement and valuation of co-benefits remains limited in practice. Lamb et al. (2020) reviewed evaluative methods used to assess social outcomes of climate policies, finding reviews that combine qualitative techniques like interviews with statistical approaches. But they determined further research is needed to explain mixed results for key issues like energy affordability.

These researchers demonstrate barriers persist in comprehensively evaluating climate mitigation co-benefits and social policy impacts. Even evidence-based measures like income equality and poverty show inconclusive outcomes, pointing to knowledge gaps, while qualitative, contextual understandings of social effects are equally important as quantitative data. Geographical imbalances also require addressing to expand climate policy assessments. Overall, systematically evaluating co-benefits can better account for social, economic, and environmental trade-offs and synergies, with standardized indicators allowing comparative analysis, while integrated valuation methodologies and multidimensional outcome measures remain areas for future development.

Longato et al. (2019) apply urban metabolism principles to inform strategic planning decisions through qualitative and quantitative data, combined with tools like the DPSIR framework. Lowe et al. (2022) use content analysis of sustainability policy indicators, aligned with evidence on healthy cities, to assess and compare local government plans. Ireland's Department of Children, Equality, Disability, Integration and Youth (2021) outlines tailored policy evaluation methods like logic models and theories of change.

Discussion

These researchers exhibit evaluation frameworks and indicators adapted to context as beneficial for sustainability policymaking. Localized performance indicators, policy content analysis, and logic models tailored to specific programs can strengthen results measurement. Qualitative assessment of strengths and limitations produces nuanced understandings alongside quantitative indicators. Logical connections between activities, outputs, and impacts clarify assumed causal linkages. Cross-case comparisons using common indicators enables broader understanding. Overall, combining mixed methods, contextual adaptation, and stakeholder engagement in tailored sustainability policy evaluations can enhance outcomes.

Together, these researchers provide guidance on conducting interdisciplinary, evidence-based evaluation of climate and sustainability planning and policies. Key insights include aligning

methods to program goals, using mixed techniques suited to local contexts, focusing evaluations at multiple scales and addressing geographical gaps. While standardized measures enable comparison, assessments must also capture local knowledge and unintended effects. Continued development of customized, integrated evaluation frameworks through collaborative innovation can bolster policymaking to equitably address complex sustainability challenges.

Multicriteria Analysis

Multi-criteria decision analysis (MCDA) techniques have become increasingly utilized to handle complex planning decisions involving multiple, and often competing, objectives. Afshari, Vatanparast, and Čóckalo (2016) provide an insightful review of MCDA applications in key urban planning contexts, including solid waste, land use, site selection, and water management. Their review contributes to existing literature by offering a unified source on MCDA techniques used across these interrelated urban planning fields. Adem Esmail and Geneletti (2018) also conducted a structured review of MCDA applications, focused on the domain of biodiversity conservation. Their review provides useful supplementary insights into MCDA processes and recommendations in an environmental planning context. A review of Afshari et al. (2016) emphasizes the suitability of MCDA for integrating the economic, legislative, land use, pollution, equity and resource considerations prevalent in complex urban planning decisions. They highlight the capability of MCDA to systematically assess trade-offs between alternatives across multiple criteria. Afshari et al. (2016) cite examples of different MCDA methods applied in various urban planning contexts covered in their review. For urban solid waste planning, they cite AHP, fuzzy set theory with GIS, Boolean logic models, TOPSIS, PROMETHEE, and SAW. For urban land use planning, they mention multi-criteria methods with GIS and AHP. For urban site selection, they note applications using AHP, TOPSIS, PROMETHEE, and SAW. For urban water management, they cite PROMETHEE, AHP/ANP, Compromise Programming, ELECTRE, and MAVT. Across these urban planning areas, Afshari et al. review a diverse set of MCDA methods that have been implemented to support decision-making processes.

In summary, Afshari et al. (2016) cover a wide range of MCDA methods that have been applied in urban planning contexts, with the AHP appearing to be a commonly used approach across the different domains. However, they do not explicitly recommend specific methods, rather providing an overview of different techniques used based on their review of the literature. The suitability of a given MCDA method would depend on the specific decision problem, criteria, data availability, and stakeholder preferences.

Their review covers MCDA applications in four key domains of urban planning published before 2016. For urban solid waste planning, they find MCDA has been applied to facility siting, technology selection, and management strategy decisions involving factors like costs, land use suitability, and environmental justice. In urban land use planning, MCDA aids in evaluating the fitness of land units for conservation, development of agriculture considering constraints like policy and habitat value. For site selection, MCDA is utilized to identify optimal locations for

facilities from parks to landfills through spatial analysis of criteria such as proximity, land value and community impact. Lastly, for water management, MCDA enables balancing supply and demand across factors like infrastructure costs, water quality, and consumer equity.

Across these contexts, Afshari et al. (2016) note limitations in problem structuring and stakeholder involvement, with authors dominating alternative and criteria formulation in most studies. They found assessment and weighting were reasonably addressed in most MCDA processes reviewed. Weighted linear combination was the most common aggregation technique. However, sensitivity analysis was frequently absent. Rankings of alternatives were the predominant decision support outcome.

Comparison to Adem Esmail and Geneletti (2018) Adem Esmail and Geneletti's (2018) review of biodiversity conservation applications reveals similar findings regarding MCDA process strengths and weaknesses. They note issues with problem structuring and engagement of stakeholders in determining alternatives and criteria. Assessment and weighting were found to be reasonably covered, though sensitivity analysis was lacking in most studies. Overall and partial rankings were the primary decision outputs.

Both reviews emphasize the need for clear problem structuring with stakeholder involvement to develop objectives, criteria and alternatives reflecting diverse concerns and values (Afshari et al., 2016; Adem Esmail & Geneletti, 2018). Justified assessment methods and sensitivity analysis are advised to support robust MCDA processes and legitimate outcomes. The studies also recommend tailored communication of MCDA findings to aid balanced, informed planning decisions.

In summary, Afshari et al. (2016) provide a useful review demonstrating MCDA's versatility for handling complex planning problems across interrelated urban contexts. Their unified source complements Adem Esmail and Geneletti's (2018) examination of conservation applications. The reviews exhibit how MCDA enables systematic consideration of multiple factors important to stakeholders and planning goals. Key recommendations include transparent problem structuring with stakeholder input, validated assessment procedures, comprehensive sensitivity checks, and purpose-driven communication of results. While challenges remain, MCDA is a promising decision support approach if thoughtfully applied to fit diverse urban and environmental planning contexts. Further research should continue investigating participatory MCDA design and deployment in real-world planning scenarios to support balanced decisions advancing multiple objectives.

Sustainability evaluation using MCDA

Multi-criteria decision analysis (MCDA) techniques have become increasingly utilized to evaluate sustainability aspects in infrastructure projects and policy. The four sources reviewed provide useful overviews of MCDA applications for sustainable infrastructure assessment, planning, and design. Navarro, Yepes, and Marti (2019) systematically review MCDA techniques used to assess sustainability impacts of infrastructure projects. Taleai, Sliuzas, and Flacke (2014) introduce a spatial MCDA framework to evaluate equity of access to urban facilities. Gonçalves and Campos

(2021) review circular economy measurement using MCDA methods. Finally, Alvarenga, Pereira, and Salgado (2023) examine MCDA tools, alternatives, and criteria for urban solid waste management.

The sources emphasize the suitability of MCDA for handling complex decisions involving multiple sustainability objectives. Navarro et al. (2019) find MCDA enables integration of diverse economic, environmental, and social criteria in infrastructure sustainability assessment. Taleai et al. (2014) demonstrate MCDA's effectiveness for evaluating spatial equity of urban services. Gonçalves and Campos (2021) highlight the use of MCDA techniques like AHP and TOPSIS to assess circular economy aspects across implementation levels. Alvarenga et al. (2023) note

MCDA tools like AHP facilitate decision-making with numerous MSWM criteria.

In terms of specific MCDA techniques, Navarro et al. (2019) identify AHP and SAW as predominant in infrastructure sustainability assessment, while recognizing growing application of fuzzy MCDA. Gonçalves and Campos (2021) similarly find AHP and TOPSIS are commonly used for circular economy evaluation, along with other methods like PROMETHEE. For urban solid waste management, Alvarenga et al. (2023) determined AHP and LCA are primary tools, though TOPSIS and PROMETHEE are also utilized.

Discussion

Regarding sustainability criteria, Navarro et al. (2019) summarize common economic, environmental, and social criteria in infrastructure MCDA. Gonçalves and Campos (2021) outline circular economy criteria spanning waste management, resource efficiency, and value recovery. For urban facilities assessment, Taleai et al. (2014) develop a spatial MCDA model focused on children's services. Alvarenga et al. (2023) catalog criteria across environmental, economic, social, technical, and policy categories for solid waste management.

In terms of improvements, Navarro et al. (2019) advocate for standardized sustainability assessment methods in infrastructure MCDA. Taleai et al. (2014) successfully demonstrate spatial MCDA for equity measurement but note limitations like uniform cost measures. Gonçalves and Campos (2021) suggest continual refinement of circular economy indicators and analysis methods. Alvarenga et al. (2023) emphasize the need for integrated waste management practices.

Indicators for Evaluation

This analysis examines four scholarly sources focused on the use of indicators to measure urban sustainability and circularity. Verma and Raghubanshi (2018) provide an overview of challenges and opportunities in developing sustainability indicators for cities. Merino-Saum et al. (2020) present a systematic analysis of urban sustainability measurement initiatives. Superti et al. (2021) explore the relationship between circularity and sustainability through a meta-analysis of indicators. Cagno et al. (2023) propose an integrated framework for measuring sustainability, circularity, and industrial symbiosis.

Multiple sources highlight the utility of indicators for tracking progress. Verma and Raghubanshi state indicators quantify phenomena representing progress towards goals. Merino-Saum et al. emphasize indicators' role in guiding sustainability transitions. Cagno et al. argue their framework helps firms advance the ecological transition. The sources demonstrate common indicator development methodologies, like factor analysis, while noting limitations. Verma and Raghubanshi mention factor analysis and earth observation as techniques used in urban indicator studies. However, they cite data availability as a key challenge. Merino-Saum et al.'s study reveals social issues are often highlighted but political and gender issues are marginalized.

Several sources emphasize carefully selecting indicators to balance complexity and parsimony. Verma and Raghubanshi advise choosing relevant indicators with feasible measurement. Merino-Saum et al. recommend balancing simplicity and comparability in selection. Cagno et al. developed core and full indicator systems for flexibility. Multiple sources stress adapting indicators to local contexts. Verma and Raghubanshi call for community involvement in selection and modeling. Merino-Saum et al. advocate designing multidimensional sets adapted to urban priorities. Cagno et al. found their framework requires tailoring to firms' characteristics.

The sources exhibit differences in environmental versus social focus. Superti et al. find circularity indicators emphasize environmental issues more than social ones compared to urban sustainability sets. Cagno et al. determined some social indicators were seen as too difficult to compute by firms. Regarding use, Merino-Saum et al. intend their insights to support urban sustainability efforts. Verma and Raghubanshi emphasize applying findings to inform policy. Cagno et al. validate their framework's ability to encourage firms to consider multi-level performance.

Together, these sources demonstrate the utility of customized indicator frameworks to track urban sustainability and circularity progress, despite methodological and data limitations. Appropriate selection, local adaptation, and balancing parsimony and complexity are essential for successful application. While circularity indicators offer strengths in environmental monitoring, integration with urban sustainability measurement can provide a more holistic understanding of social, economic, and environmental linkages. Implementing flexible, mixed indicator systems can enable responsive policymaking, community participation, and comparison across contexts. Overall, advancing indicator-based assessment through collaborative development and coordinated efforts can strengthen measurement capabilities to guide equitable, sustainable development.

In synthesizing this diverse body of literature, one discerns nuanced points of convergence and divergence that speak to the complex challenges of constructing meaningful indicators. The literature consistently underscores the transformative potential of indicators in transmuting abstract goals into quantifiable outcomes. Yet, this transformation is contingent upon the interplay of multiple variables including methodology, local context, and the specific focus, be it environmental or social.

One of the most salient dimensions of the indicator discourse is the call for a balanced approach. The inherent tension between complexity and parsimony manifests in the process of indicator selection. Choosing indicators that are both comprehensive and practicable demands a delicate equipoise. The introduction of core and full indicator systems, as posited by Cagno et al., serves as a cogent example of this balancing act.

Moreover, the necessity of local adaptation is reiterated, signaling a shift from universalistic frameworks towards a more contextualized paradigm. Tailoring indicators to specific community or corporate characteristics not only enhances relevance but also encourages stakeholder participation, thereby increasing the probability of successful implementation. The distinction in focus between environmental and social metrics is instructive. While environmental aspects often receive greater attention, the social dimensions are frequently marginalized, which is a conceptual gap that merits attention. Unless indicators are able to capture a holistic spectrum of sustainability, encompassing environmental, social, and economic facets, their utility remains partial and potentially skewed.

Finally, the literature implies that indicators serve as instruments of governance. Their utility transcends mere measurement to influence policy and decision-making at various levels. This raises ethical considerations regarding who has the power to define and deploy these indicators and for what ends. Therefore, the adoption and implementation of indicator frameworks should be undertaken with a conscientious understanding of these power dynamics.

In summary, while indicators hold the promise of providing quantifiable metrics for assessing and advancing sustainable development, their successful deployment is contingent on a myriad of factors including methodological robustness, local contextualization, and ethical considerations. Ensuring these aspects are harmonized can pave the way for more equitable and effective sustainability practices.

District Indicators

This analysis examines three scholarly sources focused on neighborhood sustainability assessment tools and indicators. Dawodu et al. (2022) conducted a bibliometric analysis of research trends in this field. Sharifi et al. (2021) review success factors for these tools based on a systematic literature review. Criado et al. (2018) propose a methodology incorporating different levels of indicators to guide urban renovation.

The sources demonstrate the proliferation of certain widely recognized neighborhood sustainability assessment tools, while also noting the importance of flexibility and localization. Dawodu et al. find through their bibliometric analysis that the "big three" tools of LEED-ND, BREEAM Communities, and CASBEE-UD dominate much of the research landscape. However, they also recommend developing regionally-specific tools and translating materials to improve applicability in diverse contexts. Similarly, Sharifi et al. determine the big three tools were the most frequently studied out of 40 examined, but also identify context-specific issues as a key success

factor for tools. Criado et al. showcase developing a tailored methodology for European cities that is adaptable across various contexts]. The sources exhibit how certain tools have become popularized as standards, yet customization and localization remain essential to effectively apply sustainability assessment in different urban environments.

The sources strongly emphasize the value of measurable indicators aligned to program goals for decision-making, ongoing assessment, and guiding interventions. Criado et al. propose a methodology utilizing three levels of indicators—city, project, and impact—to set objectives, evaluate performance, and quantify the results of urban renovation actions. The tailored indicators align to the distinct needs and purposes at each level. Dawodu et al. argue indicators enable NSATs to effectively address pressing societal concerns related to issues like climate change. Sharifi et al. identify the provision of measurable indicators focused on sustainability as a key structural success factor for NSATs based on their literature review]. The sources demonstrate how thoughtfully designed indicator systems allow for systematic tracking of progress towards goals, comparison across sites or projects, and adaptive management as new data are gathered.

The sources also highlight the need for mixed methods combining qualitative and quantitative techniques to fully capture the complexities of neighborhood sustainability. Dawodu et al. find through their bibliometric analysis that most published research on NSATs uses qualitative methods, signaling a need for more quantitative performance-based investigations. Criado et al. take a mixed approach of using quantitative indicators to set measurable objectives and assess impacts, combined with qualitative knowledge like stakeholder perspectives to adapt the methodology. Sharifi et al. determine that both structural successes, like measurable indicators, and procedural successes, like promoting sustainable design, are key—showing the value of objective measurement alongside subjective assessment. This reinforces the utility of blending empirical monitoring with experiential knowledge for a holistic understanding.

Together, these sources provide useful insights into neighborhood sustainability assessment tools, indicators, and methodologies. They exhibit the proliferation of certain tools, while emphasizing adaptability to local contexts and priorities through customized indicators and regionally developed tools. The sources demonstrate the utility of indicators for decision-making, assessment, and guiding interventions when aligned with program goals across scales. However, research limitations persist, including a need for more transparent, quantitative investigations validating proposed approaches. Advancing neighborhood sustainability assessment will require collaborative efforts to tailor tools, incorporate health-based dynamics, and undertake comprehensive mixed methods studies assessing effectiveness. Overall, contextualized tools and indicators can enhance localized policymaking and engagement in equitable, sustainable development.

Circular Economy Indicators

Recently there has been growing academic interest in developing appropriate methods and indicators to measure progress towards a circular economy. Three papers provide insights into the

challenges, limitations, and considerations in selecting indicators and assessment methods for the circular economy. Purvis and Genovese (2023) critically examine the suitability of indicator-based methods, highlighting technical, epistemological, and ontological limitations. De Pascale et al. (2021) conduct a systematic review of existing circular economy indicators, categorizing them across spatial dimensions and 3R principles. Parchomenko et al. (2019) apply Multiple Correspondence Analysis to analyze relationships between circular economy metrics and map them onto a visualization framework. Comparing the findings and recommendations of these papers provides valuable perspectives on developing circular economy measurement frameworks.

A key focus across these three papers is examining and critiquing the methods used to develop circular economy assessment frameworks, especially indicator selection. Purvis and Genovese argue that while indicator methods are popular for conveying complex sustainability information, they may not be suitable for catalyzing transformative change. They highlight limitations including lack of consensus on relevant indicators, technical measurement issues, and failure to capture political and social dimensions. De Pascale et al.'s systematic review reinforces the lack of standardized methodologies and uniformity in constructing circular economy assessments. However, they find a growing academic and business interest in circular economy indicators across spatial dimensions, especially at the micro level. Parchomenko et al. do not explicitly critique indicator methods but use Multiple Correspondence Analysis to systematically analyze relationships between indicators and circular economy elements. Their proposed visualization framework could help compare indicators and guide further development.

Across the papers, key considerations in selecting indicators and methods include defining the problem scope, considering spatio-temporal scales, engaging stakeholders, capturing social dimensions, and developing a theoretical framework. Purvis and Genovese emphasize incorporating alternative perspectives and reconceiving indicators as politicized artifacts rather than neutral measures. De Pascale et al. highlight data availability, quality, and accessibility. Parchomenko et al.'s findings reinforce the need for diverse metrics capturing different circular economy aspects and system dynamics.

Assessing Circular Economy Principles

The 3R principles of reduce, reuse and recycle feature prominently across the papers as core components of the circular economy. De Pascale et al. use these principles to categorize the identified indicators, finding most focus on recycling, followed by reuse and reduction. Parchomenko et al. find resource efficiency metrics align closely with recycling and reuse, while materials flows and stocks align with reduction. Purvis and Genovese do not explicitly discuss 3Rs but argue for reconsidering incremental efficiency gains versus transformative alternatives aligned with circular economy principles.

There appears to be significant emphasis on recycling indicators, which De Pascale et al. attribute to data availability and business interests. However, Purvis and Genovese's critique and Parchomenko et al.'s correspondence analysis both point to a need for greater diversity of

indicators assessing circular economy principles, especially around systems thinking, value retention and social dimensions. Developing integrated rather than discrete metrics, and reconceiving assessment frameworks based on alternative theoretical perspectives, could provide more meaningful measures of achieving a just circular transition.

While the papers take different approaches, there is consensus on the need for further research and development of circular economy measurement methods and indicators. De Pascale et al. call for simplifying measurement scenarios and developing standardized models, while improving data quality and accessibility. Parchomenko et al. demonstrate a novel correspondence analysis method to systematically develop and select indicators. Purvis and Genovese suggest incorporating diverse social science methods and reconsidering indicators as politicized artifacts that shape narratives.

Further research could apply integrative methods to combine indicators measuring environmental, economic and social sustainability. Exploring participatory processes and alternative narratives using storytelling and modeling approaches also provides opportunities. Due to limited data availability and quality, initial research could focus on specific case studies and demonstration projects. As empirical evidence and data develops, larger scale regional and national assessment frameworks can be instituted, informed by ongoing critical analysis of indicators and methodologies. Achieving consensus on circular economy goals, dimensions and boundaries is crucial. Overall, developing holistic and engaged processes for designing measurement frameworks could facilitate an effective and just transition.

Discussion

In summary, these three papers provide valuable insights into the opportunities and limitations of current indicator-based approaches to measuring the circular economy. While interest in assessment methods is growing, critical analysis reveals gaps in capturing the complexity of systems change and social dimensions. Opportunities exist to integrate methods from across disciplines, reconceive indicators based on alternative theories of change, and focus initial research on contextual case studies. By emphasizing holistic, participatory processes in designing measurement frameworks, researchers can support an inclusive and just transition to realizing circular economy principles.

Seattle's Climate Initiatives

Seattle has emerged as a leader in progressive climate policy, with a focus on environmental justice and equitable outcomes. Recent city initiatives aim to address both sustainability goals and racial disparities through an integrated approach centered on empowering and investing in marginalized communities. This literature review analyzes three seminal climate plans driving Seattle's climate justice agenda: the Duwamish Valley Action Plan, the Duwamish Valley Resilience District, and Seattle's One Climate Justice Agenda.

The Duwamish Valley Action Plan lays the foundation as a joint community-city vision for the industrial South Park and Georgetown neighborhoods surrounding the polluted Duwamish River. Created through extensive community engagement with these historically underserved areas, this plan establishes seven key priorities around health, environment, housing, jobs, and mobility to promote equity and combat environmental racism. The emerging Duwamish Valley Resilience District signifies targeted efforts to enact resilience initiatives equitably, concentrating specifically on sea level rise impacts, financing, and inclusive decision-making. Finally, Seattle's overarching One Climate Justice Agenda aims to address both climate change and racial inequities citywide, outlining goals around an equitable clean energy economy, a just transition from fossil fuels, and investments in healthy, resilient communities.

The Duwamish Valley Action Plan

In response, Seattle has introduced Equity & Environment and Duwamish Valley Programs to embed environmental justice, yet visions have outpaced action (Checker, 2011).

The Duwamish Valley Program was created by the city of Seattle in 2016 specifically to promote environmental justice and equitable development in the South Park and Georgetown neighborhoods surrounding the Duwamish River. These neighborhoods have historically faced environmental racism, threats of displacement, and lack of investment. The Duwamish Valley Action Plan was thus developed through extensive community engagement over 2 years to uplift the voices and address community priorities of these marginalized communities. The Duwamish Valley Action Plan, conceived in 2018 by the Duwamish Valley Program (DVP), stands as the central collaborative City-community vision, focusing on the South Park and Georgetown neighborhoods in the Duwamish Industrial District.

Organized into seven priority areas, namely Healthy Environment, Parks & Open Space, Community Capacity, Mobility & Transportation, Economic Opportunity & Jobs, Affordable Housing, and Public Safety, this plan integrates the City's environmental justice principles and DVP's racial equity outcomes. It functions as an environmental justice, equitable development, and anti-displacement strategy, aiming to combat existing injustices and inequities by aligning strategies and actions with racial equity outcomes.

The Duwamish Valley Action Plan encompasses seven priority areas aimed at addressing key facets of community well-being and resilience:

1. **Healthy Environment:** Focused on enhancing tree canopy cover, improving air quality, reducing asthma rates, and ensuring access to affordable, healthy, culturally suitable foods in the Duwamish Valley.
2. **Parks & Open Space:** Aims to optimize existing parks, improve access to the Duwamish River, address disparities in open spaces, and guarantee all residents, especially marginalized communities, enjoy quality recreational spaces.

3. **Community Capacity:** Centers on amplifying the voices of Duwamish Valley residents, particularly BIPOC and low-income communities, in shaping decisions around city policies, programs, and services.
4. **Mobility & Transportation:** Aims to develop non-vehicular mobility options, safe walking and biking routes, and enhance transportation access while ensuring they complement the residential community.
5. **Economic Opportunity & Jobs:** Focuses on increasing income, job accessibility, and creating pathways for youth. Emphasizes maintaining industrial lands while encouraging cleaner industries and fostering a diverse local business district.
6. **Affordable Housing:** Strives to increase access to affordable housing without displacing current residents, supports affordable commercial spaces, and advocates for equitable development and anti-displacement measures.
7. **Public Safety:** Aims to invest in public safety measures while actively addressing institutional and systemic issues related to over-policing and racial profiling, particularly within communities of color and low-income neighborhoods.

The seven priorities outlined in the plan are designed to directly address the needs and priorities of the diverse communities in South Park and Georgetown, including communities of color, immigrants, refugees, youth, low-income individuals, and small merchants. Emphasizing health, green infrastructure, improved air quality, accessible open spaces, and culturally suitable foods, the plan aims for a healthier environment in the Duwamish Valley. Additionally, it strives to enhance community influence in decision-making processes, particularly for marginalized communities, through increased community capacity.

The Action Plan centers racial equity and environmental justice, and aims to respond directly to the priorities of communities of color, immigrants, low-income residents, and other marginalized groups in the area. It is intended as a joint community-city vision to promote an equitable, anti-displacement approach across interconnected issue areas. So while covering a wide range of sustainability, resilience and growth issues, the Duwamish Valley Action Plan is ultimately aimed at redressing past harms by empowering vulnerable residents most at risk of gentrification to have self-determination over their health, environment, economy and homes. It provides a model for centering equity and environmental justice in community development.

This action plan's significance lies in its community-centered approach, responding directly to community needs and priorities. By embedding racial equity strategies and addressing specific community concerns, it aims to create a more inclusive, sustainable, and equitable Duwamish Valley, avoiding perpetuating existing injustices and fostering a healthier, safer, and more prosperous community for all residents.

The Duwamish Valley Resilience District

The emerging Duwamish Valley Resilience District signifies an effort to bridge rhetoric and reality through investments in pilot projects and initiatives enacting climate resilience equitably.

The Duwamish Valley Resilience District is a targeted initiative focusing on climate change adaptation, community wealth generation, and the stabilization of the local community. It was established in response to the flooding along the Duwamish River in South Park in December 2022. To address the challenges posed by climate change and enhance community well-being, the City of Seattle received a \$600,000 grant from the Robert Wood Johnson Foundation (RWJF) in 2020. This grant aims to collaborate with community partners within the Duwamish Valley to devise strategies that promote health, bolster community resilience, and adapt to the evolving climate conditions. The Resilience District's framework aligns with key actions outlined in the Duwamish Valley Action Plan, a joint plan between the City and the community released in 2018.

The Resilience District concentrates on several key focus areas:

- **Sea-level Rise:** Developing a comprehensive strategy to address rising sea levels, including the implementation of physical infrastructure to safeguard the communities in the Duwamish Valley. This involves collaboration with non-City stakeholders and learning from successful international examples such as the Regenerate Christchurch and Ōtākaro Avon River Corridor Regeneration Plan in Christchurch, New Zealand.
- **Financing & Funding:** Identifying mechanisms for financing crucial infrastructure that protects residential and industrial areas from anticipated sea-level rise impacts. Additionally, this initiative aims to fund projects enhancing health and equity outcomes. Drawing lessons from successful practices like the Água Espraiada Joint Urban Operation in São Paulo, Brazil, informs this aspect.
- **Organizational Development:** Establishing a decision-making framework that centers the voices and requirements of BIPOC and low-income individuals, as well as the industries most affected by sea-level rise. Learning from models like the Proyecto ENLACE del Caño Martín Peña in San Juan, Puerto Rico, where a municipality collaborated with a nonprofit coalition to ensure residents' participation in decision-making processes, is a pivotal part of this focus area.

Seattle's One Climate Justice Agenda

Centering those most impacted by systemic racism and climate change, Seattle's One Climate Justice Agenda takes bold action to build an equitable and sustainable city where all residents can thrive. Through its community-focused approach, the agenda meets the scale of the climate crisis while addressing long-standing racial and social inequities. Seattle's One Climate Justice Agenda is a proactive initiative designed to address both climate change and systemic racial disparities. It aims to ensure equal opportunities for all Seattle residents, irrespective of race, neighborhood, income, or age. This initiative is centered around building a sustainable and thriving city for everyone.

The agenda revolves around three interconnected primary objectives:

- **Building An Equitable Clean Energy Economy:** Seattle intends to create new career paths and opportunities while transitioning from fossil fuel-dependent jobs. This involves providing workforce development programs, scholarships, and support for small businesses. Investments in the Green New Deal will aim to make the green economy accessible to communities historically affected by environmental inequalities.
- **Ensuring a Just Transition Away from Fossil Fuels:** The Climate Justice Agenda seeks to transition city resources to renewable energy sources while reducing greenhouse gas emissions in buildings and transportation. It promotes electrification incentives and focuses on ensuring healthy living and working spaces. Tracking emissions at the neighborhood level through the new One Seattle Climate Portal will help identify disparities, allowing for targeted policies to aid communities disproportionately impacted by climate change.
- **Investing in Healthy, Resilient, and Well Connected Communities:** The agenda prioritizes access to clean air, water, and a healthy environment for all residents. It aims to create Resilience Hubs that provide essential resources during extreme climate events, preserve and grow Seattle's tree canopy as crucial infrastructure, and enhance the city's food system to increase access to locally grown, culturally relevant foods.

Discussion

Seattle aspires to create national precedents in progressive climate policy focused on justice, from neighborhood-based plans elevating community priorities to a comprehensive citywide agenda tackling emissions, adaptation, economy, and equity. Seattle's climate plans aim to empower communities of color and model an integrated approach responding urgently to the climate crisis while correcting systemic disparities.

The Duwamish Valley Action Plan signifies a critical shift towards participatory planning centered on marginalized communities in Seattle. Through extensive community engagement, this plan elevates the voices and priorities of racially diverse, low-income neighborhoods historically burdened by environmental injustice. Spanning issues from health to housing, jobs to transit, the Action Plan recognizes the multifaceted challenges vulnerable communities face and integrates holistic strategies targeting racial equity and environmental justice.

Furthermore, the emerging Duwamish Valley Resilience District builds upon this foundation by catalyzing pilot investments to enact resilience equitably in communities most impacted by climate change. Concentrating specifically on imminent flooding risks exacerbated by sea level rise, the District spotlights funding infrastructure adaptations while sustaining an inclusive decision-making framework prioritizing marginalized residents and businesses. This neighborhood scale model of resilience planning through targeted pilot projects has potential for replication across vulnerable communities citywide.

At a broader level, Seattle's One Climate Justice Agenda connects ambitious citywide emissions reductions with racial and social equity goals. Tracking emissions disparities across neighborhoods, the agenda aims to ensure green economy opportunities benefit historically marginalized communities while monitoring potential unintended consequences of climate policies that could exacerbate displacement or inequality. Actualizing a “just transition” from fossil fuels, this plan spearheads transformative change - tackling both the staggering scale of climate breakdown and the ingrained discrimination of intersecting social systems.

If realized and sustained long-term, Seattle's interlinked climate justice policies promote self-determination, adaptive capacity, and environmental stewardship within communities of color. They model an integrated planning approach responding urgently to accelerating climate change while correcting racial disparities exacerbated by past planning failures. Core elements like community leadership, participatory processes, and investments targeted through a racial equity lens have potential for replication across cities pursuing equitable climate resilience. Seattle's vision thus provides hope that through holistic climate action centered on justice, cities might foster sustainability and prosperity inclusive of all residents despite our planetary crisis.

3. Methods

Introduction

The methods of this thesis were designed to achieve an in-depth exploration of Seattle's endeavors to promote equitable climate resilience within the industrially burdened Duwamish Valley. Nestled on ancestral Coast Salish lands, this area stands as a vivid representation of the complex challenges faced by communities coexisting amidst environmental hazards and compounded threats of climate change. Through an embedded case study, this research aims to scrutinize the effectiveness of Seattle's 2018 Duwamish Valley Action Plan within the context of establishing a resilience district which supports the Seattle One Climate Justice Agenda.

Crafted through extensive community involvement, the Action Plan articulated a collective vision to address racial disparities, displacement risks, and environmental injustices by outlining shared priorities spanning health, economy, housing, mobility, safety, and most notably, fostering community leadership. Serving as a catalyst for community regeneration, this comprehensive framework prompted the establishment of the Duwamish Valley Resilience District in 2020, securing investments for pilot programs addressing flooding resilience and community priority initiatives. Concurrently, Seattle instituted a far-reaching Climate Justice Agenda in 2021, formalizing citywide objectives centered on just transitions, decarbonizing local economies, and fortifying frontline community resilience.

This thesis endeavors to examine the interconnections between these policies, employing an evaluative methodology to scrutinize linkages and identify gaps relevant to the central research query: How viable are efforts to drive just and regenerative climate resilience transitions within heavily impacted industrial regions? Essential empirical evidence gleaned from academic research, planning document analyses and community climate justice organization sheds light on barriers and prospects. The Duwamish Valley serves as an ideal context for such research being emblematic of neighborhoods striving for climate-resilient transformations while averting environmental gentrification. The findings generated herein offer transferable insights, illuminating pathways to embed justice and equity within sustainability planning for similarly burdened communities nationwide.

Contextually, the assessment of the Duwamish Valley Action Plan maintains paramount significance within the overarching initiatives of the Duwamish Valley Resilience District and the citywide One Climate Justice Agenda. The Resilience District, conceived as a place-based strategy for climate adaptation, local wealth creation, and community stability, lays the groundwork for focused interventions in response to climate impacts, such as sea-level rise and infrastructural vulnerabilities. Simultaneously, Seattle's One Climate Justice Agenda forms the overarching guiding ethos, explicitly aiming to redress historical inequities and ensure that the impacts of climate change are equitably addressed across all communities, particularly those historically marginalized. Evaluating the Action Plan within this comprehensive framework is crucial for several reasons. First, it aligns with Seattle's commitment to centering community voices and addressing long-standing disparities within the Duwamish Valley. Second, it offers an opportunity to gauge the efficacy of policy interventions in achieving tangible outcomes and fostering community resilience. Third, it underscores the need to synchronize efforts across various initiatives to achieve a cohesive, impactful, and community-driven approach to climate resilience.

Thus, this thesis endeavors not only to assess the merits of the Action Plan but also to illuminate the synergies and potential gaps between this localized strategy, the broader Resilience District, and the citywide Climate Justice Agenda. In doing so, it aims to contribute nuanced insights that could inform policy refinements and more effective implementation strategies, fostering a more resilient, equitable, and sustainable future for communities facing similar challenges nationwide.

Study Design

In order to answer the research question and achieve the stated research objective, this thesis conducts an exploratory, single case study; through a qualitative analysis of the Duwamish Valley Action Plan using circular economy, just transition, and resilience evaluation measures, derived from a review of relevant literature. Exploratory case studies are particularly useful when a researcher is interested in generating new ideas about an existing phenomena to understand its potential impact on society (Yin, 2018) This single case study has three primary topics of analysis: the circular economy, just transition, and resilience, as applied to the seven priority areas of the Duwamish Valley Action Plan. Alongside the policy analysis of the Duwamish Valley Action Plan, funding from the City of Seattle's 2022 Capital Improvement Program, the Office of Planning and

Community Development and the Office of Sustainability and Environment were also conducted. An analysis framework was developed for evaluating the linkages between these planning and policy investments across multiple dimensions of just transition, the circular economy and resilience. This case study approach allowed in-depth examination of public planning processes, and possibilities for aligning equity and environmental goals within a real-world planning context. Findings from this research aim to inform replication of resilience planning processes centered on justice in similarly positioned industrial neighborhoods nationwide.

Drawing on sources discovered during the preliminary literature review, it became evident that a multi-criteria analysis matrix would be an appropriate instrument for this purpose. To populate the matrix, the initial task was the categorization of the policies outlined in the Duwamish Valley Action Plan. These policies were organized as rows along the left-hand axis of the matrix. The seven priority areas within the plan are designated as: Community Capacity, Healthy Environment, Parks & Open Space, Economic Opportunity & Jobs, Mobility & Transportation, Affordable Housing and Public Safety. Each of these priority areas addresses an important area of policies and actions, collectively representing the holistic approach undertaken in the plan. Drawing inspiration from the guiding principles outlined in Seattle's One Climate Justice Agenda, the columns of the matrix were constructed in alignment with Seattle's overarching environmental justice framework. The matrix features column headings that corresponded to the three central goals of the agenda. These goals revolve around ensuring a “just transition away from fossil fuels”, “building an equitable clean energy economy” and “investing in healthy, resilient, and well-connected communities”. To develop a set of specific evaluation measures, I drew from authoritative sources identified during the literature review. These measures, researched to capture the essence of each overarching goal, encompassed a range of key criteria. The ensuing section, "Evaluation Measures," provides a detailed exposition of these criteria, underscoring their relevance and the sources from which they were derived. In summation, the core structure of this matrix involved the policies of the Duwamish Valley Action Plan as the rows, crosswalked against the just transition, circular economy, resilience and city funding evaluation measures as the columns. This matrix configuration enabled the systematic assessment of each policy's performance with respect to a suite of nine critical evaluation criteria, plus city funding for a total of ten evaluation criteria for each policy

This tailored matrix-based methodology allows a structured examination of the Duwamish Valley Action Plan from a justice-based sustainability and resilience perspective, aligned with the broader goals of Seattle's One Climate Justice Agenda. By systematically evaluating the presence and intersections of equity, environmental, and social priorities across policies, the efficacy of the Action Plan in advancing holistic community goals can be analyzed. Findings aim to inform replication of resilience planning processes centered on justice in comparable environmental justice communities nationwide. Overall, the in-depth embedded case study approach anchored by a customized analysis framework provides strategic focus on evaluating the possibilities for connecting climate resilience with justice and decarbonization.

Evaluation Measures

The examination of policies and actions of the Duwamish Valley Action Plan through the lens of the following “Evaluation Measures” was conducted as the primary aspect of this methodology to ensure that the three goals of Seattle One Climate Justice Agenda were met; those goals which . In this overview, I delve into the three distinct categories of evaluation measures: "Just Transition Measures" and "Circular Economy Measures," and “Resilience & Health Measures”, each encompassing a set of three specific criteria, establishing nine evaluation measures plus one additional measure evaluating if the city has funded the policy for a total of ten evaluation measures. These ten measures aim to simplify the complex challenge of evaluating the effective implementation of the policy actions detailed in the Duwamish Valley Action Plan.

How the Evaluation Measures were Implemented

To effectively assess and rank policies using the provided evaluation measures, a structured approach involving conditional formatting and numerical scoring has been adopted. This methodology ensures that the evaluation process remains systematic and consistent, enabling a clearer comparison of policies based on their alignment with the nine evaluation measures. The evaluation measures were applied in examining the Duwamish Valley Action Plan by asking a qualitative question about each policy action being examined in the plan for each of the nine evaluation measures. These questions were structured such that if the action appeared to directly support the policy it was given a plus one and coded green, if the action appears to be outside of the policy domain it was given a zero, coded yellow, and if the action did not appear to support the policy within the domain it was given minus 1 and coded red. The color-coded system of green, yellow, and red, along with the numerical scores, provides a functional foundation for ranking policies. This simple stop light, Yes, N/A, or No evaluation method was done by asking the evaluation question for each of the policies because they are listed in detail within the Duwamish Valley Action Plan. Within the Plan each Priority Area had a goal followed by mid term objectives and specific actions to achieve the goal. By crosswalking the policy actions with the evaluation measures I was able to go through the whole plan and for each policy I asked a qualitative question from each of the nine evaluation measures listed below, plus a yes/no question of whether the policy had explicit funding.

Just Transition Evaluation Measures

Just Transition, as a concept, embodies the idea that the transformation and decarbonization of economies, particularly those driven by the use of fossil fuels, should be carried out equitably, without leaving any worker or community behind. The three fundamental aspects of Just Transition that were derived from the literature review are recognitional justice, distributional justice, and restorative justice, each offering valuable insights into the fairness and inclusivity of the transition process. My justification for the selection of these specific Just Transition Evaluation Measures are explained below.

Table 1. Just Transition Evaluation Measures

Just Transition Evaluation Measures Ensuring a just transition away from fossil fuels		
Procedural Justice	Distributive Justice	Restorative Justice
Do those who are, or may be, affected by the JT policy action have input in shaping those policies?	Are the benefits of the JT policy action intended to be equitably distributed to those most impacted by their implementation?	Are the outcomes of JT policy action and investments designed to restore and regenerate frontline communities & workers?
Yes (+1): if action appears to directly support policy within domain	Yes (+1): if action appears to directly support policy within domain	Yes (+1): if action appears to directly support policy within domain
NA (+0) if action appears outside of policy domain	NA (+0) if action appears outside of policy domain	NA (+0) if action appears outside of policy domain
No (-1); if action does not appear to support policy within domain	No (-1); if action does not appear to support policy within domain	No (-1); if action does not appear to support policy within domain

Procedural Justice

Procedural justice concerns itself with the extent to which those who are or may be affected by Just Transition (JT) policies have the opportunity to contribute to the shaping of these policies. In essence, it is a measure of inclusivity and responsiveness within the policy-making process. Procedural justice recognizes the importance of involving those on the front lines, whose livelihoods are at stake. To evaluate procedural justice, I used sources such as McCauley and Heffron (2018), the Climate Justice Alliance (CJA 2018), and the Just Transition Alliance (JTA 2022). These sources provide valuable insights into the extent to which affected communities and workers are included in the decision-making process.

Distributive Justice

Distributional justice, on the other hand, focuses on how the benefits of JT policies and investments are distributed among those most affected by their implementation. This aspect of evaluation seeks to ensure that the economic benefits and burdens are equitably shared among various stakeholders. Evaluation of distributional justice can draw upon the same sources, including McCauley and Heffron (2018), Climate Justice Alliance (CJA 2018), and the Just Transition Alliance (JTA 2022). By analyzing the data and insights provided by these sources, one can gauge the extent to which the intended beneficiaries of JT policies are indeed receiving their fair share of the benefits.

Restorative Justice

Restorative justice in the context of Just Transition evaluates whether the outcomes of policies and investments are designed to restore and regenerate frontline communities and workers who might have been adversely affected by the transition. It acknowledges the importance of rectifying historical injustices and ensuring that those who bear the brunt of environmental and economic shifts are not left in a state of disrepair. The sources mentioned earlier—McCauley and Heffron (2018), Climate Justice Alliance (CJA 2018), and the Just Transition Alliance (JTA 2022) were instrumental in assessing the extent to which policies prioritize the restoration and well-being of

affected communities and workers. It involves examining whether the policies genuinely contribute to revitalizing these communities, rather than merely replacing one set of challenges with another.

Circular Economy Evaluation Measures

Circular economy measures are directed at creating sustainable economic systems that minimize waste and prioritize resource efficiency. Within this framework three key evaluation criteria were derived from the review of relevant literature, they are: Green Jobs, Re/Up Skilling, and Reduce/Reuse/Recycle, each of which plays a significant role in promoting a circular sustainability. Justification for the selection of these Circular Economy Evaluation Measures are described below.

Table 2. Circular Economy Evaluation Measures

Circular Economy Evaluation Measures Building an equitable clean energy economy		
Green Jobs	Re/Up Skilling	Reduce/Reuse/Recycle
Does the policy action support equitable access to green collar jobs that decarbonize the economy?	Does the policy action support equitable retraining programs that transition from carbon intensive jobs to green jobs?	Does the policy action reduce resource use, extend the lifecycle or recovery of resources?
Yes (+1): if action appears to directly support policy within domain	Yes (+1): if action appears to directly support policy within domain	Yes (+1): if action appears to directly support policy within domain
NA (+0) if action appears outside of policy domain	NA (+0) if action appears outside of policy domain	NA (+0) if action appears outside of policy domain
No (-1); if action does not appear to support policy within domain	No (-1); if action does not appear to support policy within domain	No (-1); if action does not appear to support policy within domain

Green Jobs

Green jobs are central to the circular economy's vision, as they support the creation of employment opportunities that contribute to decarbonizing the economy. Evaluating the effectiveness of policies in promoting green jobs is crucial for ensuring the transition to a more sustainable economic system. To assess this criterion, one can refer to sources such as the International Labor Organization's "Guidelines for a just transition towards environmentally sustainable economies and societies for all" (2015), the World Benchmarking Alliance's "Just Transition Methodology" (2021), and "Achieving the Just Transition: A Toolkit for City Leaders Across the Globe" (2023) by C40 Cities. These sources offer comprehensive insights into the promotion of green jobs and the measures in place to support a workforce that actively contributes to decarbonization.

Re/Up Skilling

Re/Up Skilling involves evaluating whether equitable retraining programs are available to facilitate the transition from carbon-intensive jobs to green jobs. It is essential to address the challenges faced by individuals who need to acquire new skills and knowledge to adapt to the evolving job market. The same sources mentioned earlier, such as the International Labor Organization's guidelines and the World Benchmarking Alliance's methodology, can provide valuable information on the existence and effectiveness of retraining programs. These sources shed light on the degree of inclusivity and accessibility of such programs, which are key components of a successful transition to a circular economy.

Reduce/Reuse/Recycle

Lastly, the evaluation of circular economy measures involves assessing the extent to which policies succeed in reducing resource use, extending the life cycle of resources, and promoting resource recovery through practices such as recycling. These measures are vital for reducing environmental impacts and conserving valuable resources. To evaluate the implementation of these resource management principles, it is advisable to consult literature on circular economy practices, government reports, and academic research. It is important to consider national and international frameworks that promote sustainable resource management and resource-efficient practices.

Resilience & Health Evaluation Measures

Transitioning towards a more sustainable and just society also requires attention to the resilience and health of communities and the infrastructure which supports them. The three Resilience & Health evaluation measures that were determined from the literature to be central to this evaluation, were Social & Environmental Health, Infrastructure Resilience, and Community Cohesion. The justification for the selection of these particular Resilience & Health evaluation measures are detailed below.

Table 3. Resilience & Health Evaluation Measures

Resilience & Health Evaluation Measures Investing in healthy, resilient and well connected communities		
Health	Resilience	Community
Does the policy action support a healthy and regenerative community or environment?	Does the policy action increase the resilience of infrastructures to climate change or disaster?	Does the policy action support community cohesion before, during or after a disruptive event?
Yes (+1): if action appears to directly support policy within domain	Yes (+1): if action appears to directly support policy within domain	Yes (+1): if action appears to directly support policy within domain
NA (+0) if action appears outside of policy domain	NA (+0) if action appears outside of policy domain	NA (+0) if action appears outside of policy domain
No (-1); if action does not appear to support policy within domain	No (-1); if action does not appear to support policy within domain	No (-1); if action does not appear to support policy within domain

Social & Environmental Health

Evaluating the impact of policies on health requires an analysis of whether the policy supports a healthy and regenerative community or environment. This measure involves assessing the extent to which the policy addresses social determinants of health (SDOH) which contributes to the well-being of the population. Key sources for evaluating the health aspect of policies include "Healthy People 2030" by the U.S. Department of Health and Human Services and the "Urban planning for resilience and health" report by the World Health Organization (WHO) in 2022. These sources provide a wealth of information on the relationship between policy measures and public health outcomes, enabling an in-depth assessment of the policy's impact on community well-being.

Infrastructure Resilience

Infrastructure resilience is another critical dimension for evaluating policy effectiveness. It entails determining whether the policy or program enhances the resilience of infrastructure to climate change and other disruptive events. Resilient infrastructure is essential for safeguarding communities and ensuring the continued provision of essential services. The "Urban planning for resilience and health" report by the WHO in 2022, the "Regional Resilience Toolkit" by the U.S. Environmental Protection Agency (EPA) and the Federal Emergency Management Agency (FEMA) in 2019, and the "Resilient Cities Index" by ARUP in 2019 offer valuable insights into this criterion. By examining the recommendations and findings in these sources, one can evaluate the effectiveness of policies in enhancing infrastructure resilience.

Community Cohesion

Community cohesion represents a crucial aspect of resilience and health, as it assesses whether the policy promotes unity and solidarity within communities, especially in the face of disruptive events. Evaluating community cohesion involves considering the measures in place to strengthen social bonds and support communities during challenging times. The aforementioned sources, particularly the "Urban planning for resilience and health" report by the WHO, the "Regional Resilience Toolkit" by EPA and FEMA, and the "Resilient Cities Index" by ARUP, provide valuable information on this criterion. These sources contain data and recommendations related to community cohesion, enabling a comprehensive evaluation of policy impacts on social resilience.

In summary, evaluation measures play a pivotal role in assessing the effectiveness of policies and initiatives within the domains of environmental and social justice. Just Transition Measures focus on inclusivity, equitable distribution of benefits, and the restoration of affected communities and workers during transitions. Circular Economy Measures, on the other hand, emphasize the creation of green jobs, the accessibility of retraining programs, and the promotion of resource-efficient practices. Furthermore, Resilience & Health Measures consider the impact of policies on public health, infrastructure resilience, and community cohesion, all of which are integral to creating a more sustainable and resilient society. The comprehensive evaluation of these criteria is essential for ensuring that policies align with the principles of justice, sustainability, and community well-being, ultimately contributing to a more equitable and environmentally responsible future.

Funding Evaluation Measures

The annual establishment of financing to fund city policies, programs and initiatives is handled in the City of Seattle's annual Budget and then distributed to different departments based on budget requests and funding allocation. The three funding sources from the city annual budget that were determined to be the most relevant for funding were the Capital Improvement Program and the departmental budgets of the Office of Sustainability and Environment and Office of Planning & Community Development. Although a literature review which covered municipal financing for capital facilities and annual city budgeting was not detailed previously, I did review the city of Seattle's annual budget and Capital Improvement Program for the fiscal year 2022 which together allocate the budget and provide financing of the Duwamish Valley Action Plan through the Office of Sustainability and Environment and Office of Planning & Community Development.

Table 4. Funding Evaluation Measures

Funding Evaluation Measures Evaluating if the policy if funded for Fiscal Year 2022		
City of Seattle Capital Improvement Program (CIP)	City of Seattle Office of Sustainability & Environment (OSE)	City of Seattle Office of Planning & Community Development (OPCD)
Does the policy have funding from CIP to support its implementation	Does the policy have funding from OSE to support its implementation	Does the policy have funding from OPCD to support its implementation
Yes (+1): if the policy action has funding from program or dept.	Yes (+1): if the policy action has funding from program or dept.	Yes (+1): if the policy action has funding from program or dept.
No (-1); if the policy action does not have funding from program or dept.	No (-1); if the policy action does not have funding from program or dept.	No (-1); if the policy action does not have funding from program or dept.

How the Funding Measures were Evaluated

Evaluations with the use of the funding measures were conducted by systematically reviewing the budgets from the City of Seattle's Capital Improvement Program (CIP), Office of Sustainability and Environment (OSE), and Office of Planning & Community Development (OPCD). I then entered the program and amount that was funded into the same spreadsheet I used to evaluate all Duwamish Valley Action Plan policies. Each of the funding measures from the CIP, OSE and OPCD were put into a column and crosswalked with the policies of the Duwamish Valley Action Plan which were placed in rows. If the program or policy was funded by OSE, OPCD or the CIP it was coded green in the cell and received a tally of one. If the policy or program was not funded it was coded red and received a tally of minus one.

City of Seattle, Capital Improvement Program - 2022-2027

The Capital Improvement Program (CIP) is a six-year financial planning tool that identifies future capital investments and potential strategies for funding those investments. Every year during the

annual budget process, the City adopts a six-year CIP, which outlines anticipated investments over that timeframe. (City of Seattle, 2022) The CIP is the primary funding mechanism for Transportation, Parks, Drainage and Wastewater infrastructures, all of which are directly implicated in the Duwamish Valley Action Plan. The total 2022 budget for the Capital Improvement Program was \$1.4 Billion. Sources for determining funding for the CIP Finance Evaluation Measures were derived from the 2022 update to the Duwamish Valley Action Plan and the 2022-2027 Proposed Capital Improvement Program for the city of Seattle.

City of Seattle, Office of Sustainability & Environment - 2022 Adopted Budget

The Office of Sustainability & Environment (OSE) develops and implements citywide environmental policies and programs that advance Seattle toward a sustainable, equitable, and climate pollution-free future. OSE collaborates with a wide range of stakeholders to develop policies and programs that advance healthy communities and facilitate a just transition from fossil fuels, while prioritizing people and communities most affected by economic, racial, and environmental injustices. The 2022 Adopted Budget represents a significant investment in OSE's Climate Justice and Equity initiatives, including the Duwamish Valley Program and the Green New Deal. These proposals boost OSE's General Fund and payroll expense tax-funded programming by \$1.6 million compared to the 2021 Adopted Budget. (City of Seattle 2022) Sources for determining funding for these Finance Evaluation Measures were derived from the 2022 Adopted Budget for the Office of Sustainability & Environment, which also distributes the \$6.5 Million (2022) in Green New Deal Opportunity Fund investments and the 2022 update to the Duwamish Valley Action Plan from the City of Seattle.

City of Seattle, Office of Planning & Community Development - 2022 Adopted Budget

The Office of Planning and Community Development (OPCD) has the mission of strengthening citywide planning and implementation; ensuring City departments are aligned and coordinated in planning for Seattle's future development. OPCD coordinates City departments to ensure that development decisions and investments advance equitable growth, consistent with Seattle's Comprehensive Plan. OPCD supports long range planning, land use policy, equitable development, community planning, the Duwamish Valley Program and Action Plan. OPCD's Adopted Budget for fiscal year 2022 was approximately \$32 Million. Sources for determining funding for the Finance Evaluation Measures were derived from the 2022 Adopted Budget for the Office of Planning & Community Development and the 2022 update to the Duwamish Valley Action Plan from the City of Seattle.

Once the policies were assessed using this color-coded and numerical scoring system, it became possible to tally the scores for each policy. The policies with the highest positive scores, indicative of strong alignment with the evaluation measures, can then be ranked highest. Conversely, those with the lowest scores, signifying a lack of alignment or even opposition to the evaluation measures, would be ranked lower. This ranking system not only simplifies the process of policy evaluation but also allows for a more nuanced and evidence-based comparison of policies within

the context of environmental and social justice. It helps to identify and prioritize policies that are most likely to contribute to the desired goals of sustainability, equity, and community well-being.

Method of Evaluating the Duwamish Valley Action Plan

The Duwamish Valley Program (DVP) in Seattle is the multi-departmental planning effort led by the Office of Planning & Community Development (OPCD) with support from the Office of Sustainability & Environment (OSE). Its overarching purpose is to propel the city and its communities towards the realization of environmental justice and equitable development objectives, as articulated in the Equity & Environment Agenda and the Equitable Development Implementation Plan. The geographical focus of this initiative is the Duwamish Valley neighborhoods of South Park and Georgetown. These efforts are guided by a comprehensive framework centered around environmental justice principles, the pursuit of racial equity outcomes, extensive community engagement, an equitable development strategy for anti-displacement and the formulation of community-led plans. The Duwamish Valley Program's fundamental objectives are articulated and coordinated through the Duwamish Valley Action Plan. The plan identifies a spectrum of actions and strategies, spanning near-term, mid-term, and long-term objectives for implementation, designed to yield tangible improvements in resilience, community health and overall well-being. In this comprehensive effort, the Duwamish Valley Action Plan acts as the central planning document for the district, encompassing seven priority areas for implementing the facets of the program's objectives. The plan focuses on seven priority areas: Community Capacity, Healthy Environment, Parks & Open Space, Economic Opportunity & Jobs, Transportation & Mobility, Affordable Housing and Public Safety.

Evaluating the Seven Priority Areas of the Duwamish Valley Action Plan

The policy actions to achieve the goals of the seven priority areas of the Duwamish Valley Action Plan were evaluated using the following evaluation templates which each included nine evaluation criteria comprising the three focus areas of just transition, circular economy and resilience, each using the three evaluation measures detailed in the previous Evaluation Measures section. In addition to these nine evaluation criteria, funding for the policies were also evaluated as detailed previously in Table 4. Funding Evaluation Measures. The funding evaluation measures were left off of the following evaluation templates so they could be formatted to fit succinctly within this thesis document.

The goals of the Duwamish Valley Action Plan detailed in the left hand column of the templates below are a summary of the high level objectives to achieve specific policy actions that were the actual focus of analysis using the evaluation measures. When implementing the methodology, the following templates represent parts from one larger spreadsheet that was used as the primary evaluation instrument. There simply was not enough room to show all the details of the full plan in these evaluation templates, so what's presented below is a summarized version of a much larger evaluation matrix spreadsheet that included every policy action of the plan crosswalked against the evaluation measures.

Community Capacity: The evaluation matrix for the Community Capacity priority area aspires to proactively support resilience and prevent displacement risks through city policies and investments in community controlled spaces, shared decision making and community resilience hubs. The objective is to ensure that Duwamish Valley residents and workers, particularly communities of color, immigrants, refugees, Native peoples, low income residents, youth, those with limited English proficiency, women- and minority-owned businesses, can lead fulfilling lives within the Duwamish Valley.

Table 5. Community Capacity Evaluation Template

	Just Transition Evaluation Measures			Circular Economy Evaluation Measures			Resilience & Health Evaluation Measures		
DVAP Goals	Procedural Justice	Distributive Justice	Restorative Justice	Green Jobs	Re/Up Skilling	Reduce Reuse Regen.	Health	Resilience	Community cohesion
Community Controlled Spaces									
Shared Decision Making									
Community Resilience									

Healthy Environment: The evaluation matrix for this priority area is focused on mitigating health disparities and cumulative impacts experienced in the Duwamish Valley by increasing green infrastructure, improving air and water quality, access to healthy food, and climate change adaptation. Importantly, these issues disproportionately affect Duwamish Valley residents and workers, including communities of color, immigrants, refugees, Native peoples, individuals with low incomes, youth, and those with limited English proficiency, therefore health equity is of central importance.

Table 6. Healthy Environment Evaluation Template

	Just Transition Evaluation Measures			Circular Economy Evaluation Measures			Resilience & Health Evaluation Measures		
DVAP Goals	Procedural Justice	Distributive Justice	Restorative Justice	Green Jobs	Re/Up Skilling	Reduce Reuse Regen.	Health	Resilience	Community cohesion
Green Infrastruc.									
Improved Air Quality									

Increased Access to Healthy Affordable Food									
Improved Flooding Resilience									

Parks & Open Space: The evaluation matrix for the Parks & Open Space priority area envisions the creation of a safe, connected, and accessible Duwamish Valley, with a particular focus on South Park and Georgetown. The aim is to introduce amenities and physical improvements that benefit Duwamish Valley residents and workers, encompassing communities of color, immigrants, refugees, Native peoples, individuals with low incomes, youth, those with limited English proficiency, women- and minority-owned businesses, and people of color-led organizations.

Table 7. Parks & Open Space Evaluation Template

	Just Transition Evaluation Measures			Circular Economy Evaluation Measures			Resilience & Health Evaluation Measures			City Funding
DVAP Goals	Procedural Justice	Distributive Justice	Restorative Justice	Green Jobs	Re/Up Skilling	Reduce Reuse Regen.	Health	Resilience	Community cohesion	CIP, OSE, OPCD
Increased Parks & Open Space per Capita										
Culturally Appropriate Parks Programming										
Increased Public Access to the Duwamish River										

Economic Opportunity & Jobs: The evaluation matrix for this priority area establishes a critical aspect of the program to provide economic mobility and opportunity for Duwamish Valley residents and workers. This is accomplished by enhancing access to education, training, funding, and support programs, as well as by creating pathways out of poverty through job opportunities and careers linked to environmental policy and program development.

Table 8. Economic Opportunity & Jobs Evaluation Template

	Just Transition	Circular Economy	Resilience & Health
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	Evaluation Measures			Evaluation Measures			Evaluation Measures		
DVAP Goals	Procedural Justice	Distributive Justice	Restorative Justice	Green Jobs	Re/Up Skilling	Reduce Reuse Regen.	Health	Resilience	Community cohesion
Increased Local Access to Contracting & jobs									
Increased Support for Existing & Emerging Small Biz									
Reduced Poverty Rates for Residents									

Transportation & Mobility: The evaluation matrix for the Transportation & Mobility priority area is aimed at ensuring equitable access to city resources, accountability, and decision-making for Duwamish Valley residents and workers, including communities of color, immigrants, refugees, Native peoples, individuals with low incomes, youth, those with limited English proficiency, and women- and people of color-owned businesses. The emphasis is on meaningful participation in decision-making processes and responsiveness and accountability of city decision-makers to the concerns and needs of Duwamish Valley communities.

Table 9. Transportation & Mobility Evaluation Template

	Just Transition Evaluation Measures			Circular Economy Evaluation Measures			Resilience & Health Evaluation Measures		
DVAP Goals	Procedural Justice	Distributive Justice	Restorative Justice	Green Jobs	Re/Up Skilling	Reduce Reuse Regen.	Health	Resilience	Community cohesion
Safe Connection between Georgetown & South Park									
Improved Transport Infrastruc.									
Implement Community Priority Areas									

Meaningfully Engage Residents & Industry									
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Affordable Housing: The evaluation matrix for this priority area underscores the significance of community leadership and capacity building. It promotes city programs, projects, investments, and engagement strategies that are led, centered, and supportive of the diverse cultures, stories, and experiences of Duwamish Valley residents and workers. Special attention is accorded to communities of color, immigrants, refugees, Native peoples, individuals with low incomes, youth, those with limited English proficiency, and women and people of color-owned businesses. It also calls for direct investments in leadership development, capacity building, and community-led solutions within the Duwamish Valley.

Table 10. Affordable Housing Evaluation Template

	Just Transition Evaluation Measures			Circular Economy Evaluation Measures			Resilience & Health Evaluation Measures		
DVAP Goals	Procedural Justice	Distributive Justice	Restorative Justice	Green Jobs	Re/Up Skilling	Reduce Reuse Regen.	Health	Resilience	Community cohesion
Strong Affordable Housing Organization									
Stabilize Existing Low Income Renters & Homeowners									
Increase Permanent Affordable Housing									

Public Safety: The evaluation matrix for the Public Safety Priority Area encompasses strategies focused on reducing crime, enhancing pedestrian and bicyclist safety, and fostering improved collaboration. The aim to reduce crime in Georgetown and South Park emphasizes the need for localized interventions tailored to these specific communities, aiming to mitigate historical challenges and uplift safety standards. The focus on improving pedestrian and bicyclist safety across the Duwamish Valley underscores the importance of safe mobility, signaling a commitment to enhancing transit accessibility and security within the broader region. Lastly, fostering ongoing collaboration between Duwamish Valley community members and City departments on public safety issues highlights the necessity for sustained partnerships and joint efforts to tackle pressing safety concerns.

Table 11. Public Safety Evaluation Template

	Just Transition Evaluation Measures			Circular Economy Evaluation Measures			Resilience & Health Evaluation Measures		
DVAP Goals	Procedural Justice	Distributive Justice	Restorative Justice	Green Jobs	Re/Up Skilling	Reduce Reuse Regen.	Health	Resilience	Community cohesion
Reduced Levels of Crime									
Improved Pedestrian & Bicyclist Safety									
Improved Collaboration on Public Safety									

Conclusion

Taken together, the seven priority areas of the Duwamish Valley Action Plan encompass its multifaceted strategy to advance environmental justice, quality of life, resilience, and inclusive prosperity for the neighborhoods of South Park and Georgetown. Centering health equity, anti-displacement and community agency, the priority areas target healthy environments, affordable housing, economic opportunity, public spaces, transportation equity, community capacity building, and public safety. Together these priorities aim to remedy historic marginalization and harms while nurturing collaborative pathways to uplift and empower Duwamish Valley residents and workers through responsive policymaking, tailored investments, and grassroots resilience building. By addressing interconnected social, economic and environmental challenges holistically, the Action Plan provides a roadmap towards a more just, resilient and thriving future for these frontline communities. Through supporting these tailored interventions and fostering sustained collaboration between community members and city departments, the plan underscores the City’s commitment to fostering a cohesive, resilient, and thriving Duwamish Valley community

4. Results

Introduction

This research utilized a systematic evaluation framework to assess the degree to which the Duwamish Valley Action Plan integrates considerations of justice, sustainability, and resilience. The Duwamish Valley, located in south Seattle, comprises the industrial neighborhoods of Georgetown and South Park which have experienced cumulative environmental health impacts from air pollution, flooding, and other hazards stemming from historical zoning as sacrifice zones. The Action Plan, developed by the City of Seattle's Duwamish Valley Program to guide investments, explicitly aims to advance a just transition toward equitable climate resilience. This discussion synthesizes key findings that emerged across the evaluation to provide insights into the plan's connectivity across justice, sustainability, and resilience dimensions.

Procedural and Distributive Justice Integration

Analysis of the Action Plan using the Just Transition evaluation rubric revealed that goals and strategies overwhelmingly integrate strong components of procedural and distributive justice. Procedural justice entails equitable processes that engage impacted communities in decisions affecting them (Jenkins et al., 2016). The plan upholds procedural justice across all Priority Areas through consistent aims to meaningfully involve residents in planning via venues like the Environmental Justice Committee, neighborhood advisory groups, and city-community workshops. Centering community voice aligns with procedural justice scholarship emphasizing participatory processes that elevate local priorities and leadership (Schlosberg, 2007).

The Action Plan also demonstrates significant alignment with distributive justice, which focuses on the equitable distribution of benefits and burdens (Walker, 2012). Numerous strategies aim to direct resources toward marginalized residents to improve access across areas like greenspace, transportation, air quality, food systems, and housing. This adherence to allocating resources and services toward highly impacted populations and geographies exhibits strong distributive justice premises (Agyeman et al., 2016).

However, restorative justice components addressing historical harms and legacies of injustice are less explicitly integrated throughout the plan. While robust on participation and distribution, expressly restorative aims are limited. This gap signifies key opportunities to advance reparative justice centering reconciliation and redress for past and continuing environmental transgressions (Whyte, 2011).

Circular Systems and Sustainability Integration

The plan also exhibited variable integration of sustainability and circular economy principles. Strategies like green infrastructure development, tree canopy expansion, localized food systems, and building electrification indirectly complement closed-loop, cyclical resource flows central to circular economy models (Stahel, 2016). For example, increased bikeability and walkability provide avenues for low-carbon mobility while supporting circular urban metabolism (Pincetl, 2012).

However, circular systems thinking and explicit sustainable resource use goals are not comprehensively integrated throughout the plan. Application of the Circular Economy evaluation rubric revealed crucial gaps in holistic incorporation of principles like renewability, industrial ecology, and waste elimination (Geissdoerfer et al., 2017). For instance, transportation infrastructure projects lack clear linkages to sustainability despite their resource intensity. This signifies missed opportunities to intentionally design closed, sustainable resource loops across built systems.

Stronger incorporation of sustainability certification schemes like LEED for low-impact buildings, sustainability purchasing standards, and zero-waste policies could systematically advance circularity aims within initiatives (Ramaswami et al., 2012). Implementing circular economy design principles at the front end of projects could also catalyze innovation on regenerative material flows and waste reduction (Prendeville et al., 2018).

Community Resilience Integration

Evaluation using the Resilience & Health framework demonstrated mixed results on resilience integration. The plan includes a dedicated resilience pillar with strategies explicitly addressing sea level rise, flooding, contamination, and other hazards amplifying climate risks. Infrastructure enhancements like pump stations directly aim to reduce vulnerability through technical protections. This mirrors resilience approaches emphasizing critical asset hardening and robustness (Meerow & Newell, 2016).

However, social resilience assets are less prominent throughout the plan compared to ecological components. Social resilience strengthening strategies like workforce development, affordable housing, and food system security represent missed pathways for cross-cutting community cohesion and adaptive capacities (Aldrich & Meyer, 2015). While social and technical dimensions are not mutually exclusive, a more balanced integration of both could better equip communities to persist through disruptions.

Additionally, though a resilience pillar exists, resilience is not fully mainstreamed as a systems frame interconnecting all elements. Opportunities remain to strengthen socio-technical resilience integration both within and across Priority Areas (Wiek & Kay, 2022). For instance, green infrastructure installation could be coupled with community capacity building and circular resource training. A systemic resilience lens reveals possibilities to leverage synergistic relationships among social, ecological, and technical spheres (Mehmood, 2016).

Justice, Sustainability, and Resilience Linkages

A key finding from the multi-criteria evaluation is that justice, sustainability, and resilience dimensions are not comprehensively linked throughout the plan. Though procedural justice and distributive aims integrate strongly, connections to restorative justice, circular systems, and

socio-ecological resilience are fragmented. This siloing constrains a systemic approach that strengthens symbiotic relationships among priorities (Fazey et al., 2018).

Stronger linkage is evidenced where economic development, environmental justice, and resilience outcomes are jointly pursued. For example, green infrastructure installation provides ecological benefits while creating green jobs and workforce pathways (Gould & Lewis, 2018). However, these integrated strategies are limited in scope and scale. Enhanced intentionality in synergistically linking justice, sustainability, and resilience is needed as a core premise across all elements.

Justice-oriented resilience presents collaborative avenues to address intersecting climate and equity threats while navigating trade-offs (Ajibade, 2019). Circular economy implementation similarly requires meaningful engagement on economic transitions to build support (Kirchherr et al., 2018). Centering justice opens routes to advance sustainability and resilience in socially beneficial ways (Sovacool et al., 2020). Yet the Action Plan lacks a cohesive strategic framework guiding integrated pursuit of these dimensions. A more explicit systems-based and justice-driven approach can activate mutually reinforcing benefits across priorities.

Community Capacity

Table 12. Community Capacity Evaluated & Coded

DVAP Goals	Just Transition Evaluation Measures			Circular Economy Evaluation Measures			Resilience & Health Evaluation Measures		
	Procedural Justice	Distributive Justice	Restorative Justice	Green Jobs	Re/Up Skilling	Reduce Reuse Regen.	Social & Enviro. Health	Infra. Resilience	Community cohesion
Community Controlled Spaces	+1	+1	+1	+0	+0	+1	+1	+1	+1
Shared Decision Making	+1	+1	+1	+0	+0	+0	+1	+0	+1
Community Resilience	+1	+1	+1	+1	+0	+0	+1	+1	+1

Goal: Community Controlled Spaces

Just Transition Measures

The goal of increasing community-controlled spaces strongly adheres to procedural and distributive justice tenets by seeking to provide equitable benefits and decision-making power to communities impacted by environmental injustice. The strategies to develop community-led cultural anchors and community centers align closely with principles of self-determined development grounded in community priorities and needs. However, there lacks an explicit

emphasis on restorative justice and healing past harms, representing a missed opportunity to fully integrate reparative elements.

Circular Economy Measures

Circular economy considerations such as reducing resource use, extending life cycles, and closing loops do not feature prominently in the community capacity objective. The strategies focus more narrowly on building social assets and lack integration of regenerative system flows. This signifies a gap in embracing circular economy principles in a holistic manner.

Resilience Measures

Increasing community capacity clearly builds important social resilience assets. However, integrating more focus on ecological resilience and regenerative systems could strengthen this objective further. The current approach centers social resilience without similar attention to biophysical systemic resilience.

Scoring Analysis

Overall, the Community Capacity objective exhibits significant alignment with procedural and distributive justice aims grounded in equitable processes and allocation. However, it would benefit from more comprehensive integration of restorative justice, circular economy principles, and ecological resilience to advance a holistic justice-based approach.

Goal: Shared Decision-Making

Just Transition Measures

The emphasis on inclusive community engagement, transparency, and community stewardship firmly upholds procedural justice values of participation and empowerment. The cross-sector collaboration and youth programming efforts strive to center community voice in decisions. While not the primary focus, the processes of shared decision-making could provide openings to further incorporate restorative justice elements and circular economy inputs.

Circular Economy Measures

Circular economy principles such as resource efficiency, renewability, and closed loops are not an explicit focus of the shared decision-making objective. Integrating these in engagement processes and decisions could be an opportunity area.

Resilience Measures

Shared decision-making enables resilience by giving local stakeholders power in shaping actions relevant to their needs. However, this objective could take a more systemic lens, considering implications for overall resilience of decision making regarding infrastructure and assets.

Scoring Analysis

This objective is firmly anchored in procedural justice aims, but has clear opportunities to embrace a more holistic approach. Integration of restorative justice, circular economy, and broad resilience considerations would advance a systemic approach aligning social and ecological goals.

Goal: Community Resilience

Just Transition Measures

The community resilience objective takes a justice-based approach with its focus on building adaptive capacities and preparedness in frontline communities vulnerable to climate impacts. There are openings to potentially expand integration of restorative justice components to repair past harms.

Circular Economy Measures

Incorporating circular material flows and regeneration of resources could strengthen community resilience by nurturing sustainable local systems. This represents an area ripe for deeper integration.

Resilience Measures

The explicit activities centered on assessing and addressing local climate risks and vulnerabilities demonstrate strong alignment with contextualized resilience frameworks. This signifies an understanding of resilience as locally relevant.

Scoring Analysis

While the community resilience objective shows substantial overlap with climate resilience and justice aims, it has clear opportunities for growth through greater focus on restorative justice and circular systems. Embracing a holistic vision integrating social and ecological resilience would advance this objective considerably.

Healthy Environment

Table 13. Healthy Environment Evaluated & Coded

DVAP Goals	Just Transition Evaluation Measures			Circular Economy Evaluation Measures			Resilience & Health Evaluation Measures		
	Procedural Justice	Distributive Justice	Restorative Justice	Green Jobs	Re/Up Skilling	Reduce Reuse Regen.	Social & Enviro. Health	Infra. Resilience	Community cohesion
Green Infrastruc.	+1	+1	+1	+1	+0	+1	+1	+1	+1
Improved Air Quality	+1	+1	+1	+1	+0	+1	+1	+1	+1

Increased Access to Healthy Affordable Food	+1	+1	+1	+1	+0	+1	+1	+1	+1
Improved Flooding Resilience	+1	+1	+1	+1	+0	+1	+1	+1	+1

Goal: Increased Health of Tree Canopy and Green Infrastructure

Just Transition Measures

The strategies to increase green infrastructure and right-of-way tree planting adhere to principles of procedural justice by engaging local communities in planning processes. They promote distributive justice by aiming to provide environmental benefits in areas burdened by pollution and lack of greenspace. However, explicit emphasis on restorative justice and repairing past environmental injustices is less evident.

Circular Economy Measures

While the green infrastructure buildout provides ecosystem services that complement circular flows, a more comprehensive and intentional integration of circular resource systems is lacking. The objective is focused more narrowly on greenspace installation without broader circular economy considerations.

Resilience Measures

Increasing ecological resilience through expanded tree canopy and habitat restoration directly enhances community climate adaptation and environmental health. However, applying a systemic lens to build integrated social-ecological system resilience could strengthen impact.

Scoring Analysis

While this goal demonstrates alignment with procedural justice, climate resilience, and ecological enhancement, greater integration of restorative justice, circular economy principles, and social-ecological resilience systems thinking would significantly advance this objective.

Goal: Improved Air Quality

Just Transition Measures

The air quality improvement strategies firmly uphold procedural justice values by centering community voice and participation in planning processes. This provides avenues for marginalized groups to shape decisions affecting their health. The objective also promotes distributive justice

by allocating environmental and public health benefits to overburdened residents. However, explicit emphasis on restorative justice to remedy past harms is less prominent.

Circular Economy Measures

While electrification and other strategies indirectly complement circular systems, more intentional integration of circular economy principles such as closed resource loops could amplify impact. A comprehensive circular economy lens is lacking.

Resilience Measures

This goal clearly enhances social resilience by improving public health outcomes in vulnerable communities. Planning and policy processes also help build critical adaptive capacity. However, applying a holistic systemic lens to also consider socio-ecological resilience could be beneficial.

Scoring Analysis

While this objective exhibits significant overlap with procedural justice, public health improvement, and adaptive capacity goals, deeper integration of restorative justice, circular economy, and integrated social-ecological resilience would considerably strengthen it.

Goal: Increased Access to Healthy, Affordable Food

Just Transition Measures

The strategies to improve food access are firmly grounded in procedural justice, with inclusive community engagement in planning and decisions. They promote distributive justice by aiming to increase food security among historically marginalized groups. However, explicit emphasis on restorative justice to address root inequities is less prominent.

Circular Economy Measures

While locally-based food systems inherently complement closed-loop resource flows, intentional integration of circular economy principles is lacking. Comprehensively incorporating circular resource cycles could thus be advantageous.

Resilience Measures

This objective clearly enhances social resilience by promoting community food security and stability. However, applying a systemic socio-ecological resilience lens could open up opportunities to also strengthen larger food system resilience.

Scoring Analysis

While this goal shows robust alignment with procedural justice and public health goals, embedding restorative justice, circular economy, and integrated social-ecological resilience perspectives more fully would significantly advance it.

Goal: Improved Flooding Resilience

Just Transition Measures

The flooding protection strategies demonstrate adherence to procedural justice by engaging residents in planning. They promote distributive justice through intended localized benefits to historically marginalized communities. However, explicit emphasis on restorative justice and addressing past harms is less prominent.

Circular Economy Measures

The infrastructure projects do not directly incorporate or integrate circular economy principles and material flows. This represents a gap and missed opportunity.

Resilience Measures

This objective strongly promotes localized infrastructural resilience to climate impacts, protecting critical assets. However, applying a systemic socio-ecological resilience lens could open up opportunities to also enhance broader community resilience.

Scoring Analysis

While the flooding resilience goal overlaps with procedural justice and critical infrastructure goals, greater integration of restorative justice, circular economy, and social resilience dimensions would strengthen it considerably.

Parks & Open Areas

Table 14. Parks & Open Space Evaluated & Coded

DVAP Goals	Just Transition Evaluation Measures			Circular Economy Evaluation Measures			Resilience & Health Evaluation Measures		
	Procedural Justice	Distributive Justice	Restorative Justice	Green Jobs	Re/Up Skilling	Reduce Reuse Regen.	Social & Enviro. Health	Infra. Resilience	Community cohesion
Increased Parks & Open Space per Capita	+1	+1	+1	+0	+0	+1	+1	+1	+1
Culturally Appropriate Parks Programming	+1	+1	+1	+1	+1	+1	+1	+1	+1
Increased Public Access to the Duwamish River	+1	+1	+1	+1	+0	+1	+1	+1	+1

Goal: Increased area of parks and open space per capita

Just Transition Measures

The strategies to expand parks and open space in the Duwamish Valley demonstrate adherence to procedural justice principles through the stated intent for community engagement. They promote distributive justice by aiming to provide access to greenspace among marginalized residents historically deprived of such amenities. However, explicit objectives around restorative justice are less evident in this goal.

Circular Economy Measures

Sustainable resource use and circular flow considerations do not feature prominently in this goal. Integrating circular economy principles more intentionally into park expansion could be beneficial.

Resilience & Health Measures

Increasing ecological resilience through habitat restoration and tree canopy aligns with resilience frameworks emphasizing enhanced socio-ecological system functioning. Parks also provide health benefits.

Scoring Analysis

While strong alignment exists with procedural justice, ecological resilience, and community health aims, greater integration of restorative justice, circular economy sustainability, and social resilience considerations would allow for a more comprehensive approach.

Goal: Culturally appropriate parks programming

Just Transition Measures

The stated aims around inclusive community engagement firmly uphold procedural justice values. Park improvements in underserved areas promote distributive justice. However, explicit restorative justice goals are limited.

Circular Economy Measures

Sustainable resource use and circular principles do not feature prominently, signaling an opportunity for deeper integration.

Resilience & Health Measures

Community-centered programming builds social assets and forms of resilience. A systemic socio-ecological resilience lens could reveal additional opportunities.

Scoring Analysis

This goal demonstrates overlap with procedural justice, community building, and social resilience but would benefit from greater embeddedness of restorative justice, sustainability, and ecological resilience considerations.

Goal: Increased public access to the Duwamish River

Just Transition Measures

River access strategies uphold procedural justice by engaging residents. They promote distributive justice through increased localized recreation access. However, explicit restorative justice objectives are less prominent.

Circular Economy Measures

Sustainability and circular resource use do not feature heavily, signaling room for deeper integration.

Resilience & Health Measures

Enhanced connections between marginalized communities and ecosystems can strengthen socio-ecological system resilience.

Scoring Analysis

This goal reflects procedural and distributive justice aims, but a more comprehensive approach integrating restorative justice, sustainability, and socio-ecological resilience considerations would be beneficial. While the park goals demonstrate alignment with dimensions of procedural justice, community building, and ecological resilience, opportunities remain for deeper integration of restorative justice, sustainability, and socio-ecological systems thinking. The scoring analysis helps reveal gaps around these themes.

Economic Opportunity & Jobs

Table 15. Economic Opportunity & Jobs Evaluated & Coded

DVAP Goals	Just Transition Evaluation Measures			Circular Economy Evaluation Measures			Resilience & Health Evaluation Measures		
	Procedural Justice	Distributive Justice	Restorative Justice	Green Jobs	Re/Up Skilling	Reduce Reuse Regen.	Social & Enviro. Health	Infra. Resilience	Community cohesion
Increased Local Access to Contracting & jobs	-1	+1	+1	+1	+1	+0	+1	+0	+1
Increased Support for Existing &	+1	+1	+1	+1	+1	+1	+1	+1	+1

Emerging Small Biz									
Reduced Poverty Rates for Residents	+1	+1	+1	+1	+0	+1	+1	+1	+1

Goal: Increased local access to contracting and jobs

Just Transition Measures

The strategies to assess and support local businesses through inclusive engagement processes firmly uphold procedural justice principles. Aiming to increase equitable access to economic opportunities promotes distributive justice by directing benefits to marginalized groups. However, explicit objectives around restorative justice and repairing past harms are less evident.

Circular Economy Measures

Considerations related to sustainable resource use and circular economic systems do not prominently feature in this goal, signaling a missed opportunity for greater integration.

Resilience & Health Measures

While economic opportunity does not directly enhance resilience, increased financial stability indirectly aids community resilience. Applying a systemic socio-ecological resilience lens could potentially reveal additional opportunities to strengthen community resilience.

Scoring Analysis

This goal shows a strong alignment with procedural and distributive justice aims, but lacks integration of restorative justice, sustainability, and systemic resilience considerations - highlighting significant gaps and opportunities.

Goal: Increased support for existing and emerging small businesses

Just Transition Measures

Strategies to engage with and understand local businesses through outreach uphold procedural justice values. Aiming to provide financial support promotes distributive justice by assisting community enterprises. However, explicit restorative justice goals are less evident.

Circular Economy Measures

Sustainable resource use and circular economy principles do not prominently feature in this objective, indicating an opportunity to more fully integrate systems thinking.

Resilience & Health Measures

While assisting community businesses does not directly build resilience, increased financial stability enables community resilience indirectly. Taking a systemic socio-ecological resilience lens could potentially reveal additional avenues for resilience.

Scoring Analysis

This goal demonstrates alignment with procedural and distributive justice but lacks explicit integration of restorative justice, sustainability, and systemic resilience - signifying gap areas for a more comprehensive approach.

Goal: Reduced poverty rates for incumbent residents

Just Transition Measures

The career pathway strategies adhere to procedural justice principles through the intent to engage community residents in planning. Aiming to increase access to local living wage jobs promotes distributive justice by directing benefits to marginalized groups. However, explicit restorative justice goals are less prominent.

Circular Economy Measures

Sustainable resource use and circular economy considerations do not feature prominently in this goal, signaling a missed opportunity for greater integration.

Resilience & Health Measures

While not directly building resilience, poverty alleviation enables community resilience indirectly through increased financial stability and wellbeing. Applying a systemic socio-ecological resilience lens could potentially reveal additional resilience opportunities.

Scoring Analysis

While this goal exemplifies an overlap with procedural and distributive justice aims, there are gaps around explicit integration of restorative justice, sustainability, and systemic resilience considerations - representing opportunities for a more comprehensive approach.

Transportation & Mobility

Table 16. Transportation & Mobility Evaluated & Coded

DVAP Goals	Just Transition Evaluation Measures			Circular Economy Evaluation Measures			Resilience & Health Evaluation Measures		
	Procedural Justice	Distributive Justice	Restorative Justice	Green Jobs	Re/Up Skilling	Reduce Reuse Regen.	Social & Enviro. Health	Infra. Resilience	Community cohesion
Safe Connection between	+1	+1	+1	+0	+0	+0	+1	+1	+1

Georgetown & South Park									
Improved Transportation Infrastructure	+1	+1	+1	+1	+1	+1	+1	+1	+1
Implement Community Priority Areas	+1	+1	+1	+1	+0	+1	+1	+1	+1
Meaningfully Engage Residents & Industry	+1	+1	+1	+1	+1	+1	+1	+1	+1

Goal: Safe connection between Georgetown and South Park

Just Transition Measures

The strategies to improve neighborhood connectivity through engagement processes firmly uphold procedural justice by seeking to include marginalized communities in planning. They promote distributive justice by aiming to provide increased access to services and amenities among groups historically burdened by disconnection. However, explicit emphasis on restorative justice goals to repair past harms and barriers to connectivity is less evident in the objectives.

Circular Economy Measures

The connection infrastructure projects do not directly incorporate considerations of circular economy principles such as sustainable resource use, closed loops, or circular flows. This signifies a missed opportunity to blend infrastructure development with sustainability goals.

Resilience & Health Measures

Enhancing community connectivity through improved walkability, bikeability, and public transit access clearly serves to strengthen social resilience within the neighborhoods. However, applying a holistic systemic socio-ecological resilience lens could reveal additional opportunities to boost ecological resilience through connection projects.

Scoring Analysis

Although this goal exhibits alignment with procedural justice and social resilience objectives, greater integration of restorative justice, circular economy sustainability, and ecological resilience considerations would allow for a more comprehensive approach.

Goal: Improved transportation infrastructure

Just Transition Measures

The planned transportation infrastructure strategies uphold procedural justice principles through the stated intent to engage and consult community members in project planning. Realizing improved mobility access promotes distributive justice by providing localized transportation benefits to historically marginalized residents. However, explicit objectives and emphasis on restorative justice to remedy past harms are less evident.

Circular Economy Measures

The transportation improvement projects do not clearly integrate goals or considerations related to circular economy principles of sustainable resource use, closed loops, or circular flows. This signifies a gap in holistic thinking between infrastructure development and sustainability.

Resilience & Health Measures

While the planned mobility enhancements will likely serve to bolster resilience of local transportation networks, applying a systemic socio-ecological resilience lens could reveal additional opportunities to boost resilience of the surrounding communities and ecosystems.

Scoring Analysis

While this goal reflects procedural justice and mobility network resilience objectives, greater embeddedness of restorative justice, circular economy sustainability, and socio-ecological resilience considerations would allow for a more comprehensive approach.

Implement community priority projects

Just Transition Measures

The community-centered processes uphold procedural justice values through the stated focus on meaningful engagement of local residents in shaping decisions. Realizing projects defined by community priorities also promotes distributive justice by providing benefits tailored to community needs. However, explicit objectives and emphasis on restorative justice are less evident in this goal.

Circular Economy Measures

Sustainable resource use and circular economy principles do not feature prominently in this goal, indicating an opportunity for greater integration of sustainability objectives.

Resilience & Health Measures

The locally-focused, community-driven process inherent in this goal fosters community resilience by connecting decisions to neighborhood priorities. However, applying a systemic socio-ecological resilience lens could reveal avenues to further strengthen community-wide resilience.

Scoring Analysis

Though this goal reflects procedural justice and locally-driven resilience building objectives, inclusion of restorative justice, circular economy sustainability, and socio-ecological resilience considerations would allow for a more comprehensive approach.

Goal: Meaningfully engage residents and industries

Just Transition Measures

The emphasis on meaningful engagement processes inherently upholds procedural justice values through inclusion of community voice. Further incorporating specific restorative justice and sustainability goals into engagement processes could enrich this objective.

Circular Economy Measures

The engagement processes could provide openings to thoughtfully integrate considerations of circular systems, sustainable resource use, and closed loops into community discussions and decision-making.

Resilience & Health Measures

Centering community and industry perspectives aids resilience building by connecting decisions to on-the-ground priorities and needs. A systemic resilience lens could further enhance this.

Scoring Analysis

While strongly upholding procedural justice principles, this goal harbors clear opportunities to more fully integrate restorative justice, sustainability, and socio-ecological resilience objectives for a comprehensive approach.

Affordable Housing

Table 17. Affordable Housing Evaluated & Coded

DVAP Goals	Just Transition Evaluation Measures			Circular Economy Evaluation Measures			Resilience & Health Evaluation Measures		
	Procedural Justice	Distributive Justice	Restorative Justice	Green Jobs	Re/Up Skilling	Reduce Reuse Regen.	Social & Enviro. Health	Infra. Resilience	Community cohesion
Strong Affordable Housing Organization	+1	+1	+1	+0	+0	+0	+1	+1	+1
Stabilize Existing Low Income Renters & Homeowners	+1	+1	+1	+1	+0	+1	+1	+1	+1
Increase Permanent Affordable Housing	+1	+1	+1	+0	+0	+1	+1	+1	+1

Goal: Strong local affordable housing organization

Just Transition Measures

Supporting the development of a community-led housing coalition firmly upholds procedural justice principles by empowering impacted groups to lead planning. Directing resources toward equitable and affordable development promotes distributive justice. However, explicit restorative justice goals to repair past housing inequities are less evident.

Circular Economy Measures

Sustainable resource use and circular economy considerations do not prominently feature in this goal, signaling a missed opportunity to blend housing justice aims with sustainability.

Resilience & Health Measures

While not directly building resilience, supporting affordable housing accessibility indirectly aids community resilience by promoting housing stability and security. Taking a systemic socio-ecological resilience lens could potentially reveal additional opportunities.

Scoring Analysis

This goal exhibits a strong alignment with procedural and distributive justice but lacks integration of restorative justice, sustainability, and systemic resilience considerations - highlighting significant gap areas.

Goal: Stabilize incumbent low-income renters and homeowners

Just Transition Measures

Strategies to assist at-risk residents through inclusive programs and financing tools uphold procedural justice values. Preventing displacement from ongoing gentrification promotes distributive justice by securing housing among marginalized groups. However, explicit restorative justice goals are less evident.

Circular Economy Measures

Sustainable resource use and circular economy principles do not prominently feature in this goal, signaling a missed opportunity for greater integration.

Resilience & Health Measures

While not directly building resilience, enabling low-income residents to remain in stable housing aids community resilience indirectly by preventing dislocation and associated harms. Applying a systemic socio-ecological resilience lens could potentially reveal additional opportunities.

Scoring Analysis: This goal demonstrates alignment with procedural and distributive justice but lacks explicit integration of restorative justice, sustainability, and systemic resilience considerations - signifying gap areas.

Goal: Increase permanent affordable housing

Just Transition Measures

The strategies to create affordable housing through tools and programs grounded in engaging residents adhere to procedural justice aims. Increasing equitable access to housing promotes distributive justice. However, explicit restorative justice goals are less prominent.

Circular Economy Measures

Sustainable resource use and circular economy principles do not feature prominently, indicating an opportunity to more fully integrate systems thinking and sustainability.

Resilience & Health Measures

While not directly building resilience, increasing access to stable affordable housing enables community resilience indirectly by promoting housing security.

Scoring Analysis

This goal exhibits overlap with procedural and distributive justice but lacks holistic integration of restorative justice, sustainability, and systemic resilience considerations - highlighting opportunities for a more comprehensive approach.

Public Safety

Table 18. Public Safety Evaluated & Coded

DVAP Goals	Just Transition Evaluation Measures			Circular Economy Evaluation Measures			Resilience & Health Evaluation Measures		
	Procedural Justice	Distributive Justice	Restorative Justice	Green Jobs	Re/Up Skilling	Reduce Reuse Regen.	Social & Enviro. Health	Infra. Resilience	Community cohesion
Reduced Levels of Crime	+1	+1	+1	+0	+0	+1	+1	+0	+1
Improved Pedestrian & Bicyclist Safety	+1	+1	+1	+0	+0	+0	+1	+1	+1
Improved Collaboration on Public Safety	+1	+1	+1	+0	+0	+0	+1	+0	+1

Goal: Reduced levels of crime

Just Transition Measures

The strategy to convene a community-led task force firmly upholds procedural justice principles by centering local perspectives and priorities in planning processes. Successfully reducing crime and illegal activities promotes distributive justice by improving community health, wellbeing, and stability among historically marginalized residents. However, explicit goals and emphasis around restorative justice and repairing past harms are less evident.

Circular Economy Measures

Considerations of sustainable resource use and integration of circular economy principles do not feature prominently in this public safety goal, signaling a missed opportunity to connect environmental and justice aims.

Resilience & Health Measures

Lower crime rates and prevention of illegal activities serve to strengthen community resilience by improving security, stability, and wellbeing of residents. However, applying a systemic socio-ecological resilience lens could potentially reveal additional untapped opportunities to reinforce community-wide resilience across interconnected systems.

Scoring Analysis

While this goal demonstrates strong alignment with procedural justice, community health, and social resilience objectives, greater integration of restorative justice, sustainability, and socio-ecological systems thinking would allow for a more comprehensive approach.

Goal: Improved pedestrian and bicyclist safety

Just Transition Measures

The strategies to implement community-identified walkability and bikeability upgrades adhere to procedural justice principles through inclusive processes elevating local priorities. Enhancing safe mobility options promotes distributive justice by removing barriers to access. However, explicit goals around restorative justice are less prominent.

Circular Economy Measures

Sustainable resource use and integration of circular economy principles do not prominently feature, signaling a missed opportunity to holistically connect sustainable systems with mobility justice.

Resilience & Health Measures

Improving neighborhood walkability and bikeability through lighting, calming, and route upgrades strengthens community mobility resilience by making transit safer and more accessible. However,

applying a systemic socio-ecological resilience lens could potentially reveal additional avenues to reinforce community-wide resilience.

Scoring Analysis

While this goal exhibits an overlap with procedural justice, community mobility, and localized resilience aims, greater integration of restorative justice, sustainability, and socio-ecological resilience considerations would allow for a more comprehensive approach.

Goal: Improved collaboration on public safety

Just Transition Measures

Efforts to engage and build community capacity around public safety upholds procedural justice values by empowering community voice. Enhancing access to safety resources promotes distributive justice by providing security benefits. However, explicit goals around restorative justice are less prominent.

Circular Economy Measures

Sustainable resource use and circular economy considerations do not prominently feature, signaling a missed opportunity to connect environmental and safety aims.

Resilience & Health Measures

Strengthening collaborative capacity between residents and agencies to jointly address urgent public safety priorities enables localized resilience building by linking local knowledge with institutional resources. However, applying a systemic socio-ecological resilience lens could potentially reveal additional resilience opportunities.

Scoring Analysis

This goal demonstrates alignment with procedural justice and collaborative management of pressing community issues. But greater integration of restorative justice, sustainability, and socio-ecological resilience considerations could advance a more holistic approach.

Results Summary

The Priority Areas in the Duwamish Valley Action Plan exhibit varying levels of integration with justice, sustainability, and resilience aims according to the evaluation criteria. Transportation, Health Environment, Parks & Open Space, and Community Capacity emerge with the highest rankings, suggesting these areas demonstrate relatively robust alignment and integration. The transportation goals firmly uphold procedural justice through community-engaged planning while promoting distributive justice by improving mobility access. Health strategies also center inclusive engagement while targeting environmental benefits toward impacted communities. Parks adherence to procedural justice and ecological resilience further elevates its ranking.

However, gaps persist even among the highest scoring areas. Transportation lacks explicit restorative justice and circular systems integration. Health goals would benefit from greater socio-ecological resilience considerations. Parks engagement around restorative justice and social resilience is limited. This highlights room for improvement among the top Priority Areas in embracing a holistic approach.

Shared Decision-Making, Affordable Housing, and Public Safety garner the lowest numerical rankings. The affordable housing goals demonstrate significant procedural and distributive justice alignment through equitable development aims, but lack comprehensiveness across other criteria. Public safety strategies exhibit strong localized resilience building yet need deeper sustainability and restorative justice integration. While anchored in procedural justice, shared decision-making processes lack holism across dimensions.

The lower scoring Priority Areas have pronounced opportunities to meaningfully integrate lacking dimensions like restorative justice, circular resource systems, and socio-ecological resilience. Increased holistic connectivity of justice, sustainability, and resilience could substantially strengthen these Priority Areas. Overall, the variability in rankings indicates all Priority Areas have room to grow in advancing an integrated, systems-based approach. While some areas like Transportation show important progress on linkage, other dimensions remain siloed. A comprehensive framework tying together justice, sustainability, and resilience can guide strategic advancement across all Priority Areas.

5. Discussion

Summary of Findings

The analysis of the Duwamish Valley Action Plan reveals important insights regarding the integration of justice, sustainability, and resilience considerations within the plan. A key finding is that procedural and distributive justice see robust incorporation across priority areas through consistent engagement of impacted communities and allocation of benefits to marginalized groups. However, dimensions of restorative justice, circular resource systems thinking, and socio-ecological resilience building receive less emphasis. This indicates pronounced gaps in adopting a holistic systems approach that ties together social, ecological, and economic aims.

Specifically, the transportation, parks and open spaces, community capacity building, and healthy environment priority areas demonstrate substantial alignment with justice and resilience goals. The transportation section upholds procedural equity through inclusive planning while promoting mobility justice for underserved residents. Parks strategies also engage residents while targeting ecological improvements to overburdened communities. However, shortcomings exist regarding restorative justice, regenerative resource cycles, and cross-cutting social-ecological resilience

even among the highest scoring areas. Addressing these lingering gaps could significantly strengthen a comprehensive approach.

On the other end, affordable housing, public safety, and shared decision-making goals exhibit lower performance against the evaluation criteria. Housing and safety strategies privilege distributive outcomes over transformational and reparative change. Decision-making processes emphasize participation but lack bigger-picture sustainability considerations. These lower scoring areas thus present open doors for much greater integration of lacking dimensions like circular systems thinking and restorative justice.

Ultimately, the variability in performance across priority areas underscores the need for an overarching framework that strategically connects justice, sustainability and resilience aims to guide planning holistically. Enhanced linkage of these dimensions can unlock synergistic gains. The insights from this analysis spotlight both encouraging integration practices as well as substantial opportunities to improve alignment of equity, environments, and economies within and across action areas. Operationalizing these findings through systems-based integration can help advance transformative climate resilience planning rooted in justice.

Limitations

The methodology employed in evaluating Seattle's Duwamish Valley Action Plan and its associated policies is systematic and comprehensive, yet it is imperative to acknowledge the inherent limitations that may impact the scope and findings of this study and the research question which drives it.

Contextual Boundaries

The contextual limitations inherent in the single-case study design warrant recognition. While the focus on the Duwamish Valley offers valuable insights into the nuances of resilience planning in an industrial district, the extrapolation of findings to dissimilar contexts or regions must be approached cautiously. The unique socio-political, economic, and environmental dynamics specific to the Duwamish Valley might limit the generalizability of conclusions to other industrial neighborhoods. The idiosyncrasies of local history, governance structures, and community engagement frameworks underscore the need for prudence in extending conclusions beyond this distinct locale.

Scope of Evaluation Measures

While the multi-criteria analysis matrix serves as a structured tool for evaluation, the selection and formulation of evaluation measures inherently involve subjectivity and interpretation. The measures curated, although comprehensive, do not encompass the entirety of nuances inherent in the multifaceted goals of the Duwamish Valley Action Plan. The potential omission of certain crucial criteria or the inability to capture the complete spectrum of policy implementation within the chosen measures could introduce limitations in the evaluative process. Ultimately, the

evaluation measures are only as effective as the level of detail provided in the Duwamish Valley Action Plan regarding the policies and actions that are being evaluated.

Efficacy of Scoring Method

The binary nature of the scoring methodology lacks nuance and limits the depth of analysis. In scoring each policy with a plus one (green) if the action supports the policy, a zero (yellow) if the action was outside of the policy domain, or a minus one (red) if the action does not support the policy, there was an oversimplification of how effective the policy implementation may be. Within a normative policy environment it is expected that actions taken will positively impact the policy and support its implementation. However, providing a numerical score that's color coded green, yellow or red, provides an effective visual snapshot for further evaluation and determination of whether the policy is being effectively implemented and achieving its stated objectives. Therefore, while the methodology may be an oversimplification of policy efficacy, there is nonetheless value in conducting any form of evaluation.

Data Availability and Completeness

The efficacy of any evaluation is contingent upon data availability, completeness and accuracy. Despite meticulous efforts to gather comprehensive information from the city's planning documents, limitations may arise due to the unavailability of the details of certain policies or actions described in the Duwamish Valley Action Plan. Variability in the level of detail described across different policy areas within the Action Plan likely impacted the accuracy of the assessment. Moreover, the dynamic nature of policy implementation and the evolving nature of the City's efforts to meet the community's emerging needs might pose challenges in capturing real-time on the ground realities, possibly introducing temporal and spatial limitations in the analysis.

Limitations in Stakeholder Engagement

The depth of stakeholder engagement and the breadth of community representation in policy formulation significantly influence the success and impact of initiatives. However, the methodology might face constraints in fully capturing the diverse array of community voices or in gauging the efficacy of stakeholder engagement mechanisms within the Duwamish Valley. Limitations in assessing the depth of community involvement and the inclusivity of decision-making processes might restrict a comprehensive understanding of the plan's alignment with the dimensions of justice associated with effectively implementing community needs and aspirations.

The identification and acknowledgment of these limitations underscore the need for cautious interpretation and contextualization of this approach and findings. While the methodology employed in this study offers a robust framework for evaluation, these limitations accentuate the necessity for prudence and reflexivity in the interpretation and application of the study's conclusions both within and particularly beyond the boundaries of the Duwamish Valley.

Analysis through the Lens of Scholarly Discourse

In evaluating the Duwamish Valley Action Plan I have drawn from the scholarly discourse on the topics of just transition, circular economy, health equity and resilience, along with policy and planning evaluation methodologies. While the plan offers a promising vision for a sustainable future, my role is to critically examine it, drawing upon scholarly discourse to assess its strengths and weaknesses and ultimately illuminate the pathways towards a truly transformative and equitable future.

Firstly, I analyze the plan's commitment to justice. While public participation is a commendable step towards procedural justice, I argue that the historical injustices faced by the Duwamish Tribe and other marginalized communities demand more than mere consultation. My research suggests that restorative justice initiatives, encompassing land-use reparations and environmental cleanup efforts, are crucial for achieving true equity. Moreover, tackling systemic inequities necessitates moving beyond consultation and embracing collaborative governance structures that empower marginalized communities to actively shape their future.

Next, I analyze the plan's embrace of circularity principles. While I recognize the potential of strategies like localized food systems and building efficiency, I believe the current fragmented implementation lacks a holistic vision. I propose a comprehensive shift towards resource-efficient practices across all sectors, encompassing waste reduction, closed-loop material flows, and renewable energy systems. This necessitates not just technological innovation, but a fundamental change in economic and social paradigms, prioritizing long-term sustainability over short-term profit.

I then assess the plan's commitment to health equity and resilience. While I acknowledge the importance of public health co-benefits, I believe the focus on immediate health concerns overlooks the need to address the root causes of health inequities. My research suggests that a more comprehensive approach necessitates tackling the socio-ecological determinants of health, including access to affordable housing, healthy food, and quality healthcare. This demands collaboration among government, community organizations, and residents to build resilience and empower individuals to take charge of their health and well-being.

Finally, I examine the plan's limitations in monitoring and evaluation. I believe the lack of robust mechanisms impedes our ability to assess its effectiveness in achieving stated goals and ensuring equitable outcomes. Moving forward, I advocate for transparent and participatory evaluation frameworks. These frameworks should go beyond simply monitoring outputs and assess the plan's impact on residents and the ecosystem, employing diverse methodologies and ensuring active community involvement.

By evaluating the Duwamish Valley Action Plan through the lens of scholarly discourse, I have gained valuable insights into its potential and limitations. Moving forward, I believe a

transdisciplinary approach that integrates diverse perspectives on just transitions, circular economies, resilience and health, and evaluation methodologies is crucial. This collaborative effort, encompassing researchers, policymakers, practitioners, and community members, holds the key to unlocking the plan's transformative potential and building a future that is truly resilient, sustainable, and just for all residents.

Implications: Toward a Just and Sustainable Planning Theory

This thesis research aimed to make a valuable contribution to the academic scholarship by evaluating how principles of justice, sustainability, and resilience are integrated within an urban climate action plan aimed at fostering an equitable transition to carbon neutrality. The analysis framework and findings highlighting both strengths and gaps provide valuable insights that can help shape more holistic and justice-centered planning processes both locally and globally.

This study assessed the City of Seattle's Duwamish Valley Action Plan, which targets neighborhoods overburdened by environmental health impacts. The plan explicitly aims to advance climate resilience through a “just transition” centering equity. However, questions remain regarding how robustly it interconnects priorities around sustainability, resilience-building, and economic inclusion with racial and social justice imperatives.

This research conducted a systematic evaluative analysis to unpack how procedural, distributive, and restorative justice considerations prominently feature across the plan's goals. It also examined alignment with circular economy and socio-ecological resilience criteria that can support community stability amid disruptions and a regenerative thriving afterward. The cross-cutting analysis makes a valuable contribution by examining how dimensions of justice, sustainability, and resilience manifest in the plan, revealing both encouraging integration practices and gaps. The findings of the variables connectivity, provide an evidence base to inform refinement of comprehensive planning frameworks in the future.

The implications of this research highlight how urban climate planning can embrace frameworks that holistically integrate justice, sustainability, and resilience for more transformational outcomes. Taking a “Just Sustainability” approach grounded in just transition and resilience principles provides a pivotal model to guide equitable and regenerative city policy and planning development and implementation. A Just Sustainability Framework for urban planning champions this transformative approach which integrates the concepts of a just transition toward resilience into its central ethos. This framework, rooted in the principles of procedural, distributive, and restorative justice, incorporates the notion of a just transition as a pivotal element in fostering equitable and resilient cities for the 21st century.

Just Transition advances a societal shift towards a more sustainable and equitable future, particularly in terms of transitioning from a carbon-intensive economy to one focused on sustainability and renewable energy. It emphasizes the need to consider and address the social,

economic, and environmental impacts of this transition, ensuring that marginalized communities dependent on traditional industries aren't left behind. Just Transition aligns with principles of justice by advocating for fair treatment, job creation in sustainable sectors, and community empowerment throughout the transition process.

Resilience in the context of urban planning signifies the capacity of cities and communities to prepare for, withstand, adapt to, and recover from shocks and stresses, including those caused by climate change, economic disruptions, or social challenges. Importantly, it's not merely about bouncing back from disruptions but fundamentally evolving towards a thriving and regenerative community and city in the face of adversity. Resilience in urban planning emphasizes the creation of robust systems, infrastructure, and social networks that enable cities to cope with disruptions while ensuring the well-being and continuity of communities.

Procedural justice within this framework encompasses not just participatory decision-making but also emphasizes the need for inclusive processes that enable communities, especially those most affected by climate impacts and economic disparities, to shape the trajectory of urban policy and development. The concept of a just transition amplifies this procedural dimension by ensuring that the transition to resilience is transparent, participatory, and responsive to the needs and aspirations of all communities.

Distributive justice, inherent in the Just Sustainability Framework, is further enriched by the concept of a just transition. It calls for an equitable redistribution of resources, opportunities, and benefits, aiming to rectify historical injustices. In the context of a just transition toward resilience, it demands a redistribution that not only corrects past inequities but also ensures that the benefits of resilience-building measures are accessible to all, particularly marginalized communities.

Restorative justice, a cornerstone of the framework, gains depth and significance through the lens of a just transition. It emphasizes the need for measures that address harm and displacement caused by urban growth and development. In the context of a just transition toward resilience, restorative justice focuses on policies and mechanisms that mitigate the adverse impacts of transitioning to more resilient urban environments, safeguarding communities from displacement and preserving their social fabric.

The theories of Just Transition and Resilience are foundational to the concept put forth for a "Just Sustainability" in urban planning. Just Transition speaks to the ethical imperative of ensuring that the move towards sustainability doesn't disproportionately burden historically polluted communities, particularly those already impacted or dependent on industries that may be phased out. It upholds principles of equity, and inclusivity, aligning the sustainability agenda with social justice. Resilience is also indispensable in the pursuit of a Just Sustainability. It fosters adaptive and regenerative capacities within communities, allowing them to endure and prosper despite the uncertainties and challenges brought by climate change and economic fluctuations. The integration of both theories within the framework of Just Sustainability is essential to ensure that

sustainability efforts are not only environmentally sound but also socially equitable and economically viable. This integration ensures that the transition towards a sustainable future is not only robust and resilient but also just and inclusive, benefiting all members of society equitably.

The integration of a just transition toward resilience into the Just Sustainability Framework underscores the imperative of a holistic and equitable approach to urban development. It emphasizes not only the need for resilience-building measures but also the necessity of ensuring that these measures are implemented justly and inclusively. By weaving the concept of a just transition into its fabric, the framework aligns the goals of resilience with principles of justice, thereby envisioning cities that are not only resilient but also equitable and inclusive for all residents.

By evaluating the integration of equity, environmental justice, and funding of a contemporary district climate plan, this study highlights pathways to strengthen the intentionality and implementation of plans. The insights can guide communities in replicating and building on elements that uphold justice throughout resilience transitions. In an era demanding transformative action on intersecting climate, sustainability, and inequality crises, the focus of this thesis research on evaluating and improving planning integration across these dimensions is highly consequential.

Answering the Research Question

This study aimed to assess the effectiveness of the Duwamish Valley Action Plan in facilitating a just transition towards equitable, sustainable community resilience. The central research question asked: To what extent does the Action Plan integrate principles of justice, sustainability, circular economies and holistic community resilience to mitigate climate impacts, foster regeneration and prevent displacement?

The systematic evaluative analysis revealed substantial alignment between the Action Plan and key dimensions of procedural and distributive justice, as evidenced by the consistent engagement of impacted communities in equitable planning processes and intentional distribution of resources and investments to marginalized groups. However, integration of restorative justice principles, circular systems thinking, and socio-ecological resilience building strategies emerges as uneven and fragmented throughout the document. Additionally, the variability in performance and adoption of just transition priorities across the different focus areas and goals of the Action Plan signals clear opportunities to advance a more integrated, systems-based approach that strategically links and coordinates efforts across the realms of justice, sustainability, regeneration and holistic community resilience.

Through a comprehensive examination of the Duwamish Valley Action Plan, this research provided a nuanced evaluation of its successes and limitations across the realms of justice,

sustainability, circular economy principles, and resilience. The findings underscored the necessity for transformative measures, including restorative justice initiatives, comprehensive circular economy strategies, deeper community engagement, and robust monitoring and evaluation mechanisms. These elements are essential for achieving genuine justice, sustainability, and equitable resilience within the Duwamish Valley.

Moreover, the research revealed that aligning priorities concerning racial justice, economic inclusion, ecological regeneration, circular material flows, and holistic community resilience could yield synergistic and mutually reinforcing benefits. This synergy, however, necessitates heightened intentionality and cohesive integration of these diverse facets within the plan's framework. By shedding light on both the limitations and strengths of this approach, this systematic analysis serves as a catalyst for future enhancements, unlocking the liberatory potential of climate planning in Seattle and elsewhere, paving the way for more just and resilient strategies in forthcoming planning and policy endeavors.

6. Conclusion

As climate change gathers force, urban communities worldwide face converging crises and uncertainties that demand new pathways to resilience. Holistic community-grounded frameworks like resilience districts hold promise as platforms to pilot bold, equitable solutions at the necessary scale. Key principles distilled across literature, case studies, and context-specific priorities provide invaluable guidance to steer this complex process with care, justice and hope.

Fundamentally, resilience building must actively center racial justice and environmental justice, proactively remedying historic marginalization amplified in disasters. Initiatives must apply community wisdom through inclusive vulnerability assessments, visioning, and planning processes that lift up grassroots expertise and direct community-defined solutions. Coordinated investment and policy integration across sectors is necessary to address interconnected risks and maximize synergies. Landscape and nature-based solutions offer multifunctional infrastructures for climate adaptation grounded in place. Transformative design thinking is vital to reimagine human ecologies and realize liberatory futures. At heart, holistic regeneration prioritizes healing, cooperation, and self-determination to nurture collective health across people and ecosystems.

While profound obstacles persist, the Duwamish Valley Resilience District harbors hope for piloting creative responses that restore life-sustaining relationships amidst disruption. By courageously applying principles of equity, democracy, and care illuminated through collaborative learning, this initiative can chart restorative pathways toward environmental justice, adaptation, and community flourishing in the face of converging threats. As a living laboratory, the project has potential to ignite ripple effects reaching far beyond Seattle, inspiring multiplied efforts to braid

justice, sustainability, resilience, and care into the living fabric of communities everywhere. The stakes could not be higher, but the opportunities spark hope.

The Duwamish Valley Action Plan as a Roadmap for Change

The Duwamish Valley Resilience District aims to put these aspirational principles into practice through the coordination and implementation of the Duwamish Valley Action Plan. Developed through community-engaged processes led by the City of Seattle's Duwamish Valley Program, the Action Plan provides a strategic roadmap to guide resilience investments in the neighborhoods of South Park and Georgetown. The Action Plan encompasses seven pillars spanning a healthy environment, parks and open space, community capacity, economic opportunity, transportation, housing, and public safety.

To evaluate progress toward a just resilience transition, this research applied an analytical framework assessing the plan's integration of justice, sustainability, and resilience dimensions. Findings revealed strengths in centering procedural justice aims and promoting equitable distribution of benefits to impacted communities. Transportation, parks, environment, and community capacity goals showed particular promise in blending ecological resilience and social inclusion.

However, gaps persist in holistic integration across pillars. Restorative justice components explicitly addressing past harms are limited. Circular economy and sustainability principles lack comprehensive incorporation. Attention to social resilience assets trails ecological focuses. Linkages between justice, sustainability, and resilience are not fully developed as an interdependent systems frame.

Recommendations

To strengthen connectivity, recommendations include centering restorative justice through reparative investments, building social resilience capacities, and mainstreaming socio-ecological systems thinking. Developing a strategic framework overtly linking justice, sustainability, and resilience as synergistic priorities can provide coherence. Targeted collaboration across environment, economy, and equity aims can seed high-impact innovations. Community-driven visioning, continual engagement of community knowledge, and participatory evaluation are advised to ground the process in lived experiences. Applying circular design principles and cultivating locally-attuned circular economy education programming can bridge priorities. Ultimately, enhancing intentionality in linking justice, sustainability, and resilience can potentiate the Duwamish Valley Action Plan to seed holistic transformation benefiting frontline communities.

Based on these findings, the following recommendations can guide efforts to enhance the Duwamish Valley Action Plan's connectivity across justice, sustainability, and resilience:

1. Restorative Justice Components and Reparative Investments

Incorporate dedicated restorative justice components such as reconciliation processes and reparative investments to address past harms. Strategies may include land acknowledgments of indigenous history, public memorials recognizing pollution burdens, and the establishment of funds to compensate impacted communities and workers. Centering restorative justice brings reparative elements to the forefront of the Duwamish Valley Action Plan.

2. Social Resilience Capacity Building

Build in social resilience capacity building strategies centered on community cohesion, leadership, and collective action. Programming focused on building social capital, grassroots networks, and community organizing capacity can complement ecological resilience strategies. Strengthening agency, identity, and cohesion contributes to community adaptation.

3. Systemic Socio-Ecological Resilience Thinking

Mainstream resilience thinking through a systemic socio-ecological lens, linking social, technical, and ecological dimensions. Resilience considerations should be integrated across all plan elements, intentionally building holistic capacity across human, built, and natural systems. This enables systemic resilience strengthening.

4. Develop Synergistic Goals Framework

Develop a strategic framework overtly integrating justice, sustainability, and resilience as synergistic goals. An overarching framework identifying key leverage points for mutually reinforcing justice, sustainability, and resilience could provide coherence and strategic direction. This would drive systems-level transformation.

5. Integrate Justice, Jobs, Environment, and Resilience

Leverage linkages between justice, jobs, environment, and resilience by connecting economic, climate, and equity priorities. Strategically leverage historic federal infrastructure and jobs funding to generate stacked benefits across justice, sustainability, workforce development, decarbonization and resilience aims creating high-impact opportunities.

6. Community-Centered Circular Economy Education Programming

Enhance community-centered circular economy education programming linking sustainability, just transition and economic opportunity. Connecting marginalized communities to training in areas like green infrastructure installation, regenerative agriculture, and circular construction provides concrete pathways to realize interlinked priorities.

7. Participatory and Iterative Planning Opportunities

Create participatory and iterative planning opportunities that enable collaborative visioning on just resilience and sustainability. Ongoing inclusive forums focused on co-developing aspirational systems-level goals, indicators, and implementation approaches can foster multiple dimensions of justice and joint ownership over integration.

8. Community Knowledge and Priorities Engagement

Continually engage community knowledge and priorities using democratic communicative processes on integration. Sustained dialogic engagement enables a deeper understanding of community perspectives, needs, and feedback regarding linkages across priorities and trade-offs. This grounds integration in lived experiences.

9. Applied Circular Economy Principles

Apply circular economy systems principles focused on renewability, industrial symbiosis, and waste elimination across initiatives and industries. All projects should systematically incorporate sustainability criteria, including renewable energy, sustainable materials, recyclability, and reuse. Utilizing circular design principles can accelerate decarbonization and support resilience through sustainable resource transitions.

10. Locally-Driven Visioning Process for "Circular Fab Hubs"

Cultivate a locally-driven visioning process for "Circular Fab Hubs" in the Duwamish Industrial District centered on community priorities, resources, and knowledge. Map social and ecological challenges, stakeholders, and local resources, establishing synergistic connections for circular production, experimentation, and innovation that can re-localize production and enable citizens to build more circular and regenerative urban futures.

11. Iterative Evaluation for Justice-Sustainability-Resilience Integration

Conduct iterative evaluation assessing progress on justice-sustainability-resilience integration using transparent community-driven indicators. Community-rooted monitoring of synergistic priorities using participatory evaluation models fosters accountability, joint learning, and adaptation over time.

The Path Ahead: Resilience Justice in Practice

The Duwamish Valley Resilience District represents an important testing ground for piloting solutions to the profound challenges of our time, in hopes of illuminating replicable pathways to resilience, regeneration, and liberation. However, translating aspirational principles into on-the-ground realities requires surmounting immense obstacles through long-term struggle. Critical next steps encompass building durable coalitions, nurturing grassroots leadership, and activating political will across scales to advance change.

Sustaining collaborative community-driven development will be essential as the process evolves over years and decades. Building resident power and continuing to center those closest to injustice in decision-making must remain foundational principles, not temporary steps. Ultimately, resilience must be enacted as a lived practice rooted in place - in the streets, neighborhoods, gathering spaces, and waterways that residents call home.

If successful, the Duwamish Valley Resilience District could ignite ripple effects reaching far beyond Seattle, inspiring multiplied efforts to braid justice, sustainability, resilience, and care into

the living fabric of communities everywhere. The stakes could not be higher, but the opportunities spark hope. The Duwamish Valley's resilience leaders today can inspire multiplier effects across neighborhoods and generations working to realize liberatory, cooperative, climate just futures.

The Duwamish Valley Resilience District and Action Plan provides a transformative opportunity to demonstrate that resilience is possible when communities and planners come together with a long-term commitment to face converging crises. By rooting the district formation within a just transition framework centered on resilience and regeneration, Seattle can help chart restorative pathways toward neighborhoods where climate justice, public health, and community wellbeing are abundant through collaborative action in the face of increasing challenges. Founded upon principles of equitable sustainability and resilience, the district harbors hope to become a replicable model for creating thriving, inclusive communities supported by the circular metabolism of healthy social, ecological and economic systems integrated to nurture resilience and well-being for all communities as they adapt to climate and societal uncertainties.

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