Chapter 6
Positive Futures

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Abstract We describe the rationale and framework for developing scenarios of positive urban futures. The scenario framework is conducted in participatory workshop settings and composed of three distinct scenario approaches that are used to (1) explore potential outcomes of existing planning goals (strategic scenarios), (2) articulate visions that address pressing resilience challenges (adaptive scenarios), and (3) envision radical departures from the status quo in the pursuit of sustainability and equity (transformative scenarios). A series of creative and analytical processes are used to engage the community in imagining, articulating, and scrutinizing visions and pathways of positive futures. The approach offers an alternative and complement to traditional forecasting techniques by applying inspirational stories to resilience research and practice.

Keywords Scenario development · Sustainability visioning · Anticipatory resilience · Co-production · Urban futures

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The dominant discourse about the future is dystopian. The stories told through cinema, novels, journalism, and research are full of dire warnings of catastrophes and visions of dark futures. These forecasts, predictions, and projections do provide insight. It is essential that we understand the consequences of current trends and are able to anticipate signals of impending threats. It is how we explore what to avoid and even how to survive potential collapse. However, if dystopia is the only story we tell about the future, the perceived inevitability can be a barrier to action.

Thus, we develop positive futures to realize alternatives and explore radical possibilities. In contrast to forecasts, positive futures may not be the most likely trajectory or outcome and can be rife with uncertainties. Positive futures are neither templates nor fantasies of a perfect utopia free from tradeoffs or conflict. Positive futures are stories—sometimes called scenarios—of the plausible pathways needed to achieve desirable outcomes. They are stories of possibilities to inspire and improve efforts toward achieving more sustainable, equitable, and resilient futures.

Given vast possibilities and opportunities for the future, there is a need to consider multiple, alternative future scenarios (Iwaniec et al. 2014). Neither creative nor analytical skills alone can provide the substance required for developing complex future scenarios (Wierzbicki 2007). A combination of creative and analytical skillsets is needed to craft positive futures (Wiek and Iwaniec 2014).

Visioning approaches often rely heavily on creative and unstructured processes. The creative processes lead to visions that might be inspirational, but that are not necessarily consistent, evidence-based, or plausible (Shipley 2002). At the same time, advanced visioning requires abstract reasoning, such as incorporating resilience and sustainability principles (Chap. 8). Visioning processes also require specifications to make visions tangible, for instance, by means of visualizations (Chap. 10).

In contrast to visioning, forecasting approaches can be modeled from first principles, basic assumptions, and use information about past trends and current and previous conditions to make inferences about the future. Forecasts are a suitable approach when we expect the structure of a social–ecological–technological system (SETS) to generally persist rather than fundamentally change. Positive futures, however, are intended to explore radical departures of the status quo—when small tweaks are not enough to overcome wicked problems or rapid, trend-breaking changes, and when deliberate sustainability transformations are imperative to achieve a desirable future.

A key goal of positive futures is to create space to question the limits of what is normally considered possible, desirable, or inevitable. Developing scenarios for the long term (e.g., time horizons of 50 years and longer) allows participants to navigate multiple values and explore innovative ideas for an unpredictable future. This opens up the solution-space to explore radical innovations that might require longer time horizons to unfold. Through these extended time horizons, barriers to change the current governance structure or existing infrastructure are reframed as opportunities to reimagine how urban SETS could and should work.

An emerging urban systems science, at the intersection of urban resilience, sustainability transitions, and scenario research, is beginning to focus on the crucial question of how urban SETS dynamics can be guided along more resilient, equitable,

and sustainable trajectories. Cities and urban areas are complex; further, long-term futures are uncertain, subject to non-stationarity, and therefore difficult to predict and prepare for. To address this complexity, we need to challenge the dominant dystopian discourse by exploring novel, alternative, positive visions (McPhearson et al. 2017).

6.1 Approach

We describe here a framework for developing scenarios of positive urban futures. This participatory approach has been applied in nine Latin and North American cities at multiple spatial scales—neighborhood, municipal, and metropolitan region—as part of the Urban Resilience to Extreme Events Sustainability Research Network (UREx SRN; https://URExSRN.net). Scenario development for this project focuses on articulating and exploring the implications of positive future pathways to the year 2080 for urban resilience to climate extremes (e.g., flood, drought, and heat). The emphasis on climate resilience, however, is not to limit the scope of the visions but instead to serve as a boundary condition that provides an entry point to engage in broader sustainability and resilience discussions.

6.1.1 A Framework for Positive Futures

Scenario development of positive futures is enabled by a series of steps and activities. The scenario development framework opens space to explore sustainable, resilient pathways toward SETS innovation and transformational change (Iwaniec et al. 2020a). In this chapter, we outline the sequence of key processes and activities applied in the UREx SRN project to develop multiple, alternative positive future scenarios. Further description of the rationale and methods is also provided in other chapters: analyses of past and existing vulnerabilities are presented in Chaps. 2 and 4; production of anticipatory knowledge, politics of urban resilience, and communication of climate uncertainties are explored in Chaps. 5 and 11; incorporation of existing municipal and community planning on climate resilience is described in Chap. 3; scenario co-production activities are outlined here, but further descriptions of the co-production workshop setting and approaches for stakeholder recruitment, facilitation, and addressing power dynamics are provided in Chap. 7; and evaluation and visualization approaches to explore scenario implications and assess tradeoffs are detailed in Chaps. 8–10.

The framework to develop positive futures uses three distinct scenario approaches (scenario logics; Fig. 6.1). Each of the scenario logics can be usefully applied to different contexts. Together they allow for comparative analyses among the scenarios to explore differences, evaluate tradeoffs, and build anticipatory capacity.

The key feature of this framework is the development of multiple, alternative, positive future scenarios among three distinct scenario logics.
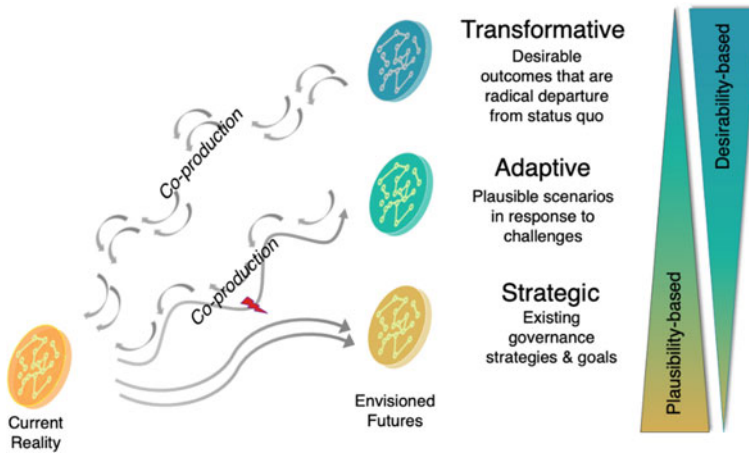
Fig. 6.1 The positive futures framework comparing strategic, adaptive, and transformative scenarios on a plausibility–desirability gradient (image modified from Iwaniec et al. 2020a). Gray arrows represent projected and backcasted scenario pathways. The red glyph indicates social, ecological, or technological disturbance(s) to address along the transition pathway. Note that the strategic scenarios are validated and explored in the workshop setting, whereas the adaptive and transformative scenarios are fully co-produced in participatory workshops

- **Strategic scenarios** are developed from existing goals and targets extracted from current plans and policies. These scenarios focus on developing long-term futures extrapolated from existing visions and plans (forecasting).
- **Adaptive scenarios** are co-produced scenarios that focus on producing social–ecological–technological innovations to address big challenges (e.g., extreme climate events). These scenarios are framed by a problem, and interventions are developed and sequenced to explore potential outcomes and tradeoffs of the scenario pathway (forecasting and backcasting).
- **Transformative scenarios** are co-produced visions and pathways that represent radical departures from the status quo in the pursuit of resilience, sustainability, and equity. These scenarios start by co-developing a vision of a desirable future and then identifying solutions and pathways linking the vision to the current state (backcasting).

All three scenario logics belong to and produce different representations of positive futures. However, there are limits to what is perceived as credible. While unexpected social changes, ecological tipping points, and technological innovations seemingly define and surprise our modern society, we generally expect current trends to persist. The scenario logics are deliberately sequenced in this framework to allow for transformative thinking—the ability to think critically about transformative change (Wolfram 2016; Iwaniec et al. 2019). The strategic, adaptive, and transformative scenarios—each with their own assumptions, concepts, translation modes, and needs for evidence-based data—vary in the production approach and the vision

and pathways produced. Scenario activities are ordered such that participants first explore long-term SETS implications of their existing plans (i.e., strategic scenarios), then build on this knowledge to develop scenarios that address pressing challenges (adaptive scenarios), and scenarios that represent radical visions of sustainability, resilience, and equity (transformative scenarios).

Strategic scenarios employ an extrapolative approach to exploring long-term implications of stakeholders' existing formalized goals and targets (typically shorter-term targets, e.g., <5 years) (Iwaniec et al. 2020b). From a content analysis, strategies and actions are coded from city governance, planning, and visioning documents then clustered into distinct scenarios pathways (Chap. 3). Strategic scenarios allow participants to start from a common framing around existing formalized goals and to explore and evaluate whether these actions are sufficient to address long-term persistent and emergent challenges. These scenarios allow for exploration of the hypothesis that existing plans and policies are insufficient to address the most pressing challenges faced by cities. Participants are encouraged to understand current targets and consider the need for more ambitious solutions.

Adaptive scenarios are co-produced to explore SETS interventions that address pressing challenges (Iwaniec et al. 2020a). In this project, the adaptive scenarios focus on addressing climate change-driven extreme events (e.g., flood, drought, heat, multi-hazard disturbances). Adaptive scenarios help to build capacity for anticipatory resilience thinking (Chap. 11) through the development of novel social–ecological–technological solutions. Development of these scenarios creates space to push the boundaries of what is possible, forcing participants to ask, "Is this enough?" That is, are these futures representative of what their city should be?

Transformative scenarios are co-produced to explore radically different futures that depart from a city's current social, ecological, and technological systems (Iwaniec et al. 2020a). Although transformative scenarios among the UREx SRN cities vary greatly, they generally explore diverse and hybridized imaginaries (e.g., eco-cities, equitable cities, livable cities, self-sufficient cities, smart cities) in the context of their respective communities. The ability to think critically about transformative change can be enhanced by first (a) understanding the suite of vulnerabilities and uncertainties, (b) exploring long-term implications of existing planning goals, and (c) addressing the most pressing challenges.

6.1.2 Development of the UREx SRN Scenarios

The workshop setting brings together diverse transdisciplinary activities meant to enable detailed descriptions of scenario pathways and their constituent SETS intervention strategies. The scenario co-production process begins with a broad view needed to envision the future condition. Through iterative revision and refinement, the scenario pathways are then elaborated on to ensure coherence and tangible representations of the social-ecological-technological systems that undergo change, along with the implications of that change.

6.2   Scoping and Framing

To incorporate diverse knowledges, perspectives, and visions, scenarios may be developed in transdisciplinary and participatory settings that range from consultation to co-production (Jahn et al. 2012; Lang et al. 2012). In the case of UREx SRN, scoping and framing begins prior to the scenario development workshops. Core stakeholders help identify project-related scenario themes, potential participants, additional collaborators (see stakeholder recruitment in Chap. 7), key challenges and goals, and the temporal and spatial boundaries and scope of the scenarios.

We deploy surveys to elicit responses from a diversity of city governance actors about their perceptions of climate risks, the solutions they prefer for integration into public policy and investment decisions, how actors frame climate resilience in different contexts, and what tools and methodologies they use to collect and use climate resilience data and knowledge. The surveys also identify existing collaborations and new partnerships needed to more effectively coordinate climate resilience work across sectors. These data are used to inform workshop development and stakeholder recruitment.

In the workshop setting, we explore current vulnerabilities and projected future trends, as well as the past actions responsible for these conditions. The objective is not to create agreement at this stage but rather to identify and create a common framing around core issues. The co-production of a historical timeline of these issues is used to further build capacity for anticipatory resilience by reflecting on how the problems we face today are products of past decisions.

6.3   Goals and Intervention Strategies

In the scenario workshops, participants work in small groups to co-produce the positive future scenarios. The process is initiated by first defining the challenges and goals to be addressed in each scenario. Participants then identify initial intervention strategies needed to address these challenges and goals. Activities in this phase—such as conducting systems mapping, identifying megatrends (i.e., large, slow-moving changes) and weak signals (i.e., indicators of potentially emerging issues), and eliciting vision statements of a desirable future state—allow for rapid prototyping and brainstorming. System maps help participants refine their understanding of the relationships among the initial strategies they are considering, enabling them to brainstorm new systemic strategies and scrutinize tradeoffs among identified strategies—moreover, to produce more holistic visions. These activities are conducted both individually and as collective discussions to provide time for reflection and deliberation. Examples are provided to seed the activities with an initial pool of diverse SETS strategies and considerations. Initial seeding may represent innovations from different sources. For example, participants may look to other places

facing similar challenges, scan for global megatrends that might affect their community, identify weak signals with potential for transformational change but that have not yet been scaled-up or scaled-out (Bennett et al. 2016), or inspiration from creative and fictional works. The development of radical, aspirational goals and strategies for transformative scenarios can be further facilitated by asking probing questions; for instance: Would this still be transformative/desirable in 2080? Could this be accomplished within just the next five years? What structures or power dynamics is the intervention challenging?

6.4 Scenario Specificity

Activities in this phase are designed to add details to the scenario pathway (Fig. 6.2). A key outcome is to provide enough spatial, temporal, and other key details to delineate a scenario pathway and parameterize subsequent modeling and assessments (Table 6.1).

Mapping strategies for *Resilient city to urban flooding* scenario, Harlem

Negotiating the pathways and timeline to achieve each strategy and target in *Resilient city to coastal flooding* scenario, San Juan

Narrative and future visions of 2080 *Innovative city* scenario, Valdivia, visualized by design student

Fig. 6.2 Photos from scenario workshops of participants engaging in spatial and temporal specificity activities

Table 6.1 Description of activities carried out in the scenario specificity phase

Activity	Description	Example
Target specificity	Defining targets, indicators, and metrics for the strategies	A shade infrastructure strategy might describe a target of 30% canopy cover of native trees and 10% cover with solar energy-producing shade structures—this may also include indicators and metrics for achieving targets associated with heat mitigation, biodiversity, and access to greenspace.
Spatial specificity	GIS-based participatory mapping of the locations and other spatial characteristics (e.g., size, configuration, amount of centralization/decentralization) that identify where and for whom particular strategies will be implemented	Participants draw the specific locations, size, and configuration of new greenspace on a map. However, since not all strategies can be easily represented this way; they are also articulated as rules (e.g., trees are to be sited along auxiliary streets in the poorest neighborhoods).
Temporal specificity	Sequencing the strategies as a scenario pathway along a timeline—new SETS strategies are often added during this activity to detail what is needed to enable or support the intended changes or how to maintain it once implemented	Details are provided for when the tree planting initiative starts (e.g., 2020), the rate of implementation and corresponding intermediate targets, and when the implementation of the strategy is to be completed (e.g., 2045).
Governance specificity	Identifying key actors and institutions responsible for implementing each strategy	New partnerships and institutions, and their roles and actions may be detailed. More transformative examples describe radical reconfiguration of power regimes, new governance structures, changes in culture, and empowered communities.
Normative specificity	Describing the multiple value-laden objectives and implications of the envisioned strategies	A "day in the life" narrative describes what a future person in 2080 experiences and how they interact with the vision.

6.5 Evaluation and Dissemination

The scenarios co-produced through subsequent steps of the workshop represent future visions and the pathways to reach them. The outcome is a diverse suite of alternative, plausible visions. These scenarios may be represented and evaluated through qualitative assessments (Chap. 8), quantitative modeling (Chap. 9), design-based
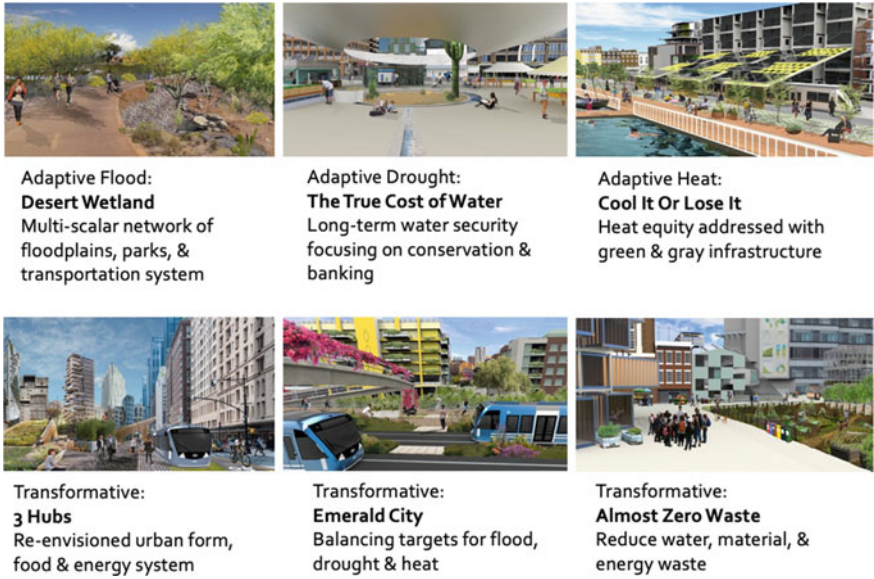
Adaptive Flood:
Desert Wetland
Multi-scalar network of
floodplains, parks, &
transportation system

Adaptive Drought:
The True Cost of Water
Long-term water security
focusing on conservation &
banking

Adaptive Heat:
Cool It Or Lose It
Heat equity addressed with
green & gray infrastructure

Transformative:
3 Hubs
Re-envisioned urban form,
food & energy system

Transformative:
Emerald City
Balancing targets for flood,
drought & heat

Transformative:
Almost Zero Waste
Reduce water, material, &
energy waste

Fig. 6.3 Design-based renderings of positive future scenarios from Phoenix, USA (for more details
on these scenarios, see https://sustainability.asu.edu/future-scenarios/)

renderings (Fig. 6.3), and data visualization tools (Chap. 10) to explore potential
implications and compare tradeoffs of the alternative visions. Through iterative eval-
uation of the diverse outcomes, the scenario pathways can be refined to better reflect
desired outcomes.

Dissemination of positive futures entails more than just meaningfully conveying
the final products. Dissemination activities should occur throughout the process so
as to open dialogue and involve a broader community to further elicit diverse prefer-
ences, check representativeness, develop opportunities for further engagement, and
support transparency. Chapter 10 describes dissemination approaches to democra-
tize decision-making through data visualization tools. Implementation programs can
vary greatly in scope. They may focus on incorporating the goals, strategies, and
targets from this work into formal planning documents. Alternatively, an implemen-
tation program may focus on more bottom-up processes, such as supporting existing
community initiatives that align with the transition pathway or developing cham-
pions for new initiatives that serve as a key leverage point for change. Chapter 11
concludes with a discussion on embedding future scenarios into current planning
practices toward resilient urban futures.

6.6   Conclusion

The approach described in this chapter offers various options for co-producing scenarios of positive futures that may be applied across organizational units (e.g., municipal, private, non-profit institutions), sectors (e.g., housing, energy, water, transportation, food, health), spatial scales (from global to local), and temporal scales (10 to >100 years into the future). Although the activities described in this chapter may not all be appropriate in all contexts, the activities are meant to be flexible and crafted to match the varied needs, available resources, capacities, and objectives of the project. For example, project objectives may include overcoming conflicts between long-term ambitions and short-term concerns. Such conflicts call for additional emphasis on developing anticipatory and long-term thinking capacities. Similarly, an objective of the project may include the need to address conflicts among divergent city and community preferences or priorities. To address this divergence, the workshops may require broader engagement and activities that further emphasize the development of normative capacities.

A critical tension in positive futures is the need for evidence-based representations of an envisioned future and the ability to portray radical transformations of novel conditions. Various approaches exist to bridge these needs, such as descriptive, empirical, and modeling work from other places, as well as the application of concept proofs, pilot projects, and experimentation. Moreover, a portfolio of diverse scenarios can also help address this tension. Multiple alternative scenarios of different types and degrees of change can be used in a participatory setting to evaluate what is "too radical" and what is "not transformative enough" to achieve a desired future state.

Fundamentally, the process of co-producing scenarios of positive futures can help to build anticipatory, long-term, normative, and systems thinking capacities. With these key capacities, cities can increase their agency to successfully implement future resilience, sustainability, and transformational change initiatives (Romero-Lankao et al. 2016; Wolfram 2016; Iwaniec et al. 2019). However, regardless of how motivating the positive futures are, alone, they are generally not sufficient for catalyzing transformational change; they need to be incorporated into dissemination and implementation programs. In some cases, "windows of opportunities" can arise when a positive vision of a sustainability transition has been developed prior to a disaster, and its uptake is enabled by the disaster (Birkmann et al. 2010; Brundiers and Eakin 2018; Solecki et al. 2019). The central goal of this emerging urban systems science, however, should be to guide and facilitate anticipatory change without loss to human well-being, ecological integrity, and critical infrastructure.

The framework for positives futures integrates three distinct scenario logics into a structured transdisciplinary research-practice approach to develop future scenarios. The development of strategic, adaptive, and transformative scenarios is used to envision innovative solutions and interventions, contrast plausible-desirable visions and pathways of the future, address future challenges, realize opportunities, and explore radical possibilities.

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