Participatory Scenario Development

An effective tool to support Sustainability Transitions

Scenarios and Scenario Development Processes can provide valuable contributions to efforts for navigating sustainability transitions. To be effective, scenarios must be perceived as scientifically credible, politically salient, procedurally legitimate and inherently creative.
By Christian Albert

Participatory Scenario Development is increasingly applied in efforts for addressing the complex and long-term challenges of navigating social-ecological transitions towards sustainability. However, the level of effectiveness achieved in actually influencing the public debate and political decision making often leaves room for improvement.

This article investigates both the limits and opportunities of scenarios' contributions to sustainability transitions and the attributes of influential scenarios and scenario processes. The research design included a comprehensive review of relevant literature to identify and compare the requirements of transition support with the possible contributions of scenario development, and a theory-based content analysis of scenario publications to identify criteria of effective scenarios.

Scenarios for Supporting Sustainability Transitions

Progress towards sustainable development requires dealing with the high degree of complexity and uncertainty of social-ecological systems and integrating the various perspectives of experts, decision makers, stakeholders, and lay citizens. Thus, sustainable development is increasingly interpreted not as a clearly determinable goal but rather a process of adaptive management and social learning. Adaptive management addresses complexity and uncertainty through systematic efforts to learn from practical experience. The concept proposes to phrase policies as hypotheses, to consider management actions as experiments to test them, to implement monitoring systems for acquiring reliable information about the consequences of the experiments, and to develop effective management institutions for learning from successes and failures (Clark 2002). The idea of social learning is to enhance the joint capacity of the relevant actors to manage the environment effectively and includes procedures for deliberation, conflict resolution, joint decision making, collaborative implementation and continuous learning (Pahl-Wostl/Craps et al. 2007).

Based on these concepts, recently a number of approaches emerged that attempt to effectively support sustainability transitions. While the specific designs and emphases of the approaches vary, most of them contain the following five basic elements, or modules. The Comprehensive Assessment module includes the development of an integrated understanding of the structure and dynamics of the social-ecological system under consideration and an exploration of the causes and effects of current problems. The assessments must consider past and current trends and the interrelations both within the system and across its scales. The second element, Policy Development, comprises efforts for exploring alternative future developments and their potential consequences, discussing policy options, future threats and opportunities, deciding on goals and exploring ways to attain these, and finally defining policy measures that are to be implemented. The Implementation module encompasses the execution of actions. Following the idea of adaptive management, the interventions need to be considered as experiments for learning about the system's reactions. Evaluation and Monitoring as third element is essential for learning about the impacts of interventions. Appropriate indicators must be monitored over time to both detect emerging threats and opportunities and acquire reliable data about the effects of particular policy actions. This feedback must be used to iteratively evaluate and, if necessary, alter the ends and means of the navigation. The need for Transdisciplinary Participation of experts, decision makers, stakeholders, and lay citizens in problem-solving processes on issues of environmental management and sustainable development is widely acknowledged as another element. Participation of diverse groups of actors can help incorporating the wide range of perspectives, improve the quality of decisions, resolve conflict between competing interests, and lead to better educated and informed audiences.

Scenario elements and steps

On sustainability issues, scenarios are usually not employed as predictions but rather descriptions of how the future might unfold. As such, they are based on assumptions about the evolutions of trends, the effects of uncertainties, and emerging influences (UNEP 2002). Methods for developing scenarios are numerous, but can be synthesized to four main steps that may have different emphases in particular scenario processes ➔

(Jäger/Rothman et al. 2007). The first step, Clarifying the Purpose and Structure of the Scenario Exercise, consists of the definition of the scope and issue of the scenarios, the selection of the stakeholders and participants, and the identification of themes, targets, indicators, and potential polices. Laying the Foundations for the Scenarios is the second step. It is comprised of the identification of the driving forces and critical uncertainties and the creation of a scenario framework. The third step, Development and Testing of the Actual Scenarios, involves the elaboration of the scenario narratives, the quantitative analysis, and an exploration of policy options. Finally, Communication and Outreach includes the dissemination of the results.

The steps of scenario development can well be integrated into the modules for navigating sustainability transitions, as figure 1 illustrates. Steps one and two of scenario development can be considered parts of the comprehensive assessment component in that they help eliciting and comparing the stakeholders' understanding and mental maps of the relevant system, its main impact factors, interconnections, and dynamics. The remaining steps that include the actual development, evaluation, and dissemination of the scenarios can clearly provide significant contributions to the policy development module. Furthermore, having both qualitative and quantitative aspects make scenarios well-suited for facilitating the inclusion of divergent actors in the collaborative discussion, decision making, and learning processes of transdisciplinary participation.

However, scenarios and scenario development are not the only appropriate tools applicable in these three modules and they cannot provide direct support for the Implementation and the Evaluation and Monitoring modules. Nevertheless, scenarios can contribute to these modules indirectly by enhancing the social capacities of the actors to effectively manage change amid uncertainty and complexity.
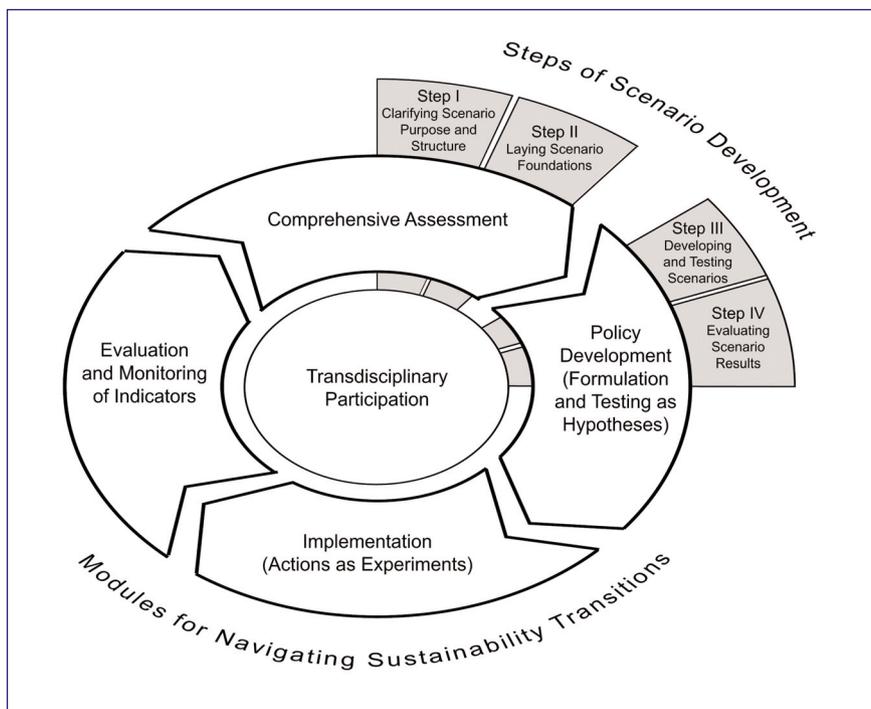
Criteria of Effective Scenarios

Science-policy studies remain skeptical on the effectiveness of scientific advice on policy making. On the one hand, the influence of scientific information in decision making processes seems to be limited since political decisions often are neither based solely on science nor entirely rational. On the other hand, many studies have shown that cognitive and normative uncertainties sometimes create contexts of so called policy windows or fluid moments in history, in which innovative and creative ideas are considered and decision makers are receptive to and interested in new information (Kingdon 1984). The Global Environmental Assessment Project went further in asking how environmental assessments must be designed and conducted to be most likely to make use of such policy windows and, in effect, influence decision making in public policy (Mitchell/Clark et al. 2006). On the basis of a number of empirical case studies from national and international environmental assessments, the authors concluded that environmental science is more likely to be influential on policy if the assessment process is perceived as not only scientifically credible but also politically salient and procedurally legitimate by the assessment's audiences. Scenarios however can be perceived as a special kind of assessments in that their future orientation dramatically increases the degree of complexity and uncertainty involved. To reflect the need for innovative thinking about possibilities and surprises in scenario-based studies, Alcamo et al. (2006) proposed creativity as an additional criterion. Based on these findings from the literature, the hypothesis became: Scenarios tend to be influential in policy to the degree that they are perceived as simultaneously credible, salient, legitimate, and creative by the scenario users.

A content analysis of scenario literature empirically validated this hypothesis and lead to the more sophisticated framework of criteria for influential scenarios, which is shown in figure 2. Credibility describes the degree to which the audiences consider the scenarios as correct and its argumentation and conclusions as adequate. It is an often cited attribute of effective scenarios for which four distinct qualities can be identified. Most importantly, a scenario's credibility is determined by the degree to which it is perceived plausible by the audiences. Plausible sce-

Figure 1: Contributions of Scenarios to Sustainability Transitions

Source: own conceptualization

narios are considered feasible and attainable within a given timeframe and are based on a sound and empirically verified analysis of the existing conditions. Internal consistency both within each scenario and among the set of scenarios is the second quality. It requires that the assumptions and interrelations are consistent with current information. Another aspect is comprehensiveness, the degree to which the set of scenarios produced covers the range of available alternatives. Although there seems to be consensus that scenarios need to be comprehensive, it is not clear if the range of considered scenarios needs to include all options, a wide range of possible or plausible options, or at least the extremes of the assumed future alternatives. Enhancing credibility requires a highly transparent and sufficiently documented scenario development process. Since sustainable development allows for multiple perspectives and mental models, the rationales for choosing a particular set of assumptions must be clear.

A framework for effective scenarios

Saliency is another crucial requirement that asks if a scenario is relevant to its audience and if the objectives are adequately addressed. One aspect of saliency, goal directedness, asks if the scenarios are explicitly attuned to address the issues at stake and prove useful for evaluating alternatives. Relevance, another aspect, includes that scenarios must be tailored to the knowledge, cognitive abilities, current concerns and mental maps of scenario users. Scenario salience can be enhanced by designing and conducting the scenario development process explicitly according to the needs of the users, specifically adapted to the temporal and financial resources available, and with a constant focus on the decisions to be made. Linking scenario exercises into current ongoing visioning, planning, and implementation processes and facilitating constant exchanges and collaboration between scenario developers and users can heighten saliency through harmonization of the scenario agenda, its goals and expected results.

Legitimacy concerns the degree to which scenarios are perceived as legitimate and procedurally fair to the divergent perspectives and interests of various stakeholders. The importance of legitimacy is noted mostly implicit in publications on scenario methods by highlighting the need for joint scenario development. Much similar to the credibility criterion, the legitimacy of scenarios can be enhanced by making the process of information production, evaluation and dissemination open and
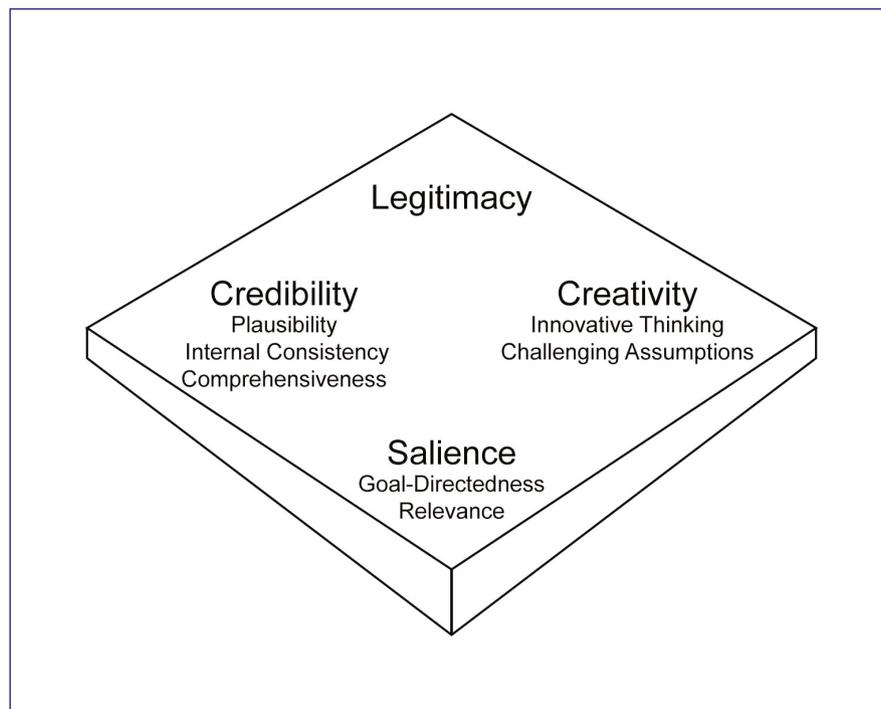
„Enhancing the criteria of scenarios can be performed through boundary management between divergent actors."

transparent. Fostering interactions between users and producers of scenarios in a transdisciplinary setting and being explicit in the values and assumptions underlying the scenarios is assumed to further improve the scenarios' scores on the legitimacy criterion. Participation should begin at an early stage of the process, include representatives with disparate sets of interests, and employ a simple framework for facilitating communication and collaboration.

Creativity evaluates to what extend the process provokes unconventional and innovative thinking. It was found particularly important in scenarios and scenario development for imagining future surprises and non-linear trends. Its first quality is innovative thinking, the degree to which scenarios initiate and facilitate exploring the effects of nonlinear, interrupted, and unprecedented trends. Challenging assumptions refer to the need to recognize, question, and alter their mental models of future developments, in case such modification is justified and necessary.

The content analysis of scenario publications further suggests that significant trade-offs exist between the criteria, a finding that is consistent with the results of the Environmental ➜

Figure 2: Framework for Influential Scenarios

Source: own conceptualization, based on Cash et al. 2003; Mitchell et al. 2006 and Alcamo et al. 2006.

Assessment Project. Commentators see the criteria as tightly coupled so that efforts to enhance one of them will often occur at the cost of another. One example of these interdependencies is that scenarios should be salient in resonating with current mental models, but at the same time creative and surprising for challenging and influencing the users' thinking.

Conclusion

The difficult task of simultaneously enhancing the criteria of effective scenarios can most promisingly be performed through sensible boundary management between divergent actors in the process of collaborative problem solving (Guston 1999). For heightening credibility, salience, and legitimacy, three basic functions have been suggested: Active, iterative and inclusive communication among the actors, translation to facilitate mutual understanding across disciplines and professions, and mediation to resolve situations in which strong conflicts persist among the actors that cannot be resolved with mere communication and translation (Cash/Clark et al. 2003; Mitchell/Clark et al. 2006). For enhancing creativity, the function of inspiration is required to reflect the need to involve imaginative people and to create an open and receptive climate in which unconventional ideas are embraced.

Practical approaches for facilitating such boundary management in scenario development processes involve participatory methods to develop system understanding, conduct visioning exercises, construct and explore the effects of scenarios of environmental changes and alternative policy options, and discuss various ways to attain a particular goal. Promising tools are semi-quantitative methods such as causal loop diagramming or fuzzy cognitive mapping that help connecting scenario narratives with formal models to explore and evaluate future changes. How participatory methods can best be integrated into processes of scenario development to most effectively enhance the scenario criteria and ultimately scenario influence on sustainability transitions is an important question for further research.

Literature

Alcamo, J. / Kok, K. et al.: Searching for the Future of Land: Scenarios from the Local to Global Scale. In: Lambin, E. F. / Geist, H. (Hrsg.): Land-Use and Land-Cover Change, Local Processes and Global Impacts. Berlin/Heidelberg 2006. S. 137-155.

Cash, D. W. / Clark, W. C. et al.: Knowledge systems for sustainable development. In: Proceedings of the National Academies of Sciences 100, 14/2003, S. 8086-7091.

Clark, W. C.: Adaptive management, heal thyself. In: Environment 44, 2/2002.

Guston, D. H.: Stabilizing the Boundary between US Politics and Science: The Role of the Office of Technology Transfer as a Boundary Organization. In: Social Studies of Science 29, 1/1999, S. 87.

Jäger, J. / Rothman, D. et al.: Training Module 6, Scenario development and analysis. In: Pintér, L. / Swanson, D. / Chenje, J. (Hrsg.): GEO Resource Book: A training manual on integrated environmental assessment and reporting. Winnipeg/Geneva 2007.

Kingdon, J. W.: Agendas, Alternatives, and Public Policies. Boston 1984.

Mitchell, R. B. / Clark, W. C. et al.: Global environmental assessments: information and influence. Cambridge 2006.

Pahl-Wostl, C. / Craps, M. et al.: Social Learning and Water Resources Management. In: Ecology and Society 12, 2/2007.

UNEP – United Nations Environment Programme: Global Environmental Outlook-3: Past, present and future perspectives. London 2002.

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