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Research Note

The Futures Wheel: A Method for Exploring the Implications of Social–Ecological Change

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Change in social–ecological systems often produces a cascade of unanticipated consequences. Natural resource professionals and other stakeholders need to understand the possible implications of cascading change to prepare for it. The Futures Wheel is a "smart group" method that uses a structured brainstorming process to uncover and evaluate multiple levels of consequences resulting from all types of change. The output is a map of possible direct and indirect, positive and negative impacts that can be analyzed to develop strategies to promote desirable consequences and avoid undesirable ones. The Futures Wheel can help natural resource planners and decision makers anticipate unforeseen consequences of social–ecological change and become more proactive.

Keywords Futures Wheel, Implications Wheel, participatory, smart group, social–ecological change, structured brainstorming, unforeseen consequences

Social–ecological systems are constantly changing, often in surprising ways. Major changes produce a cascade of direct, indirect, and unanticipated consequences, like ripples in a pond. Natural resource professionals and other stakeholders need to understand the possible implications of cascading change and prepare for them by creating policies and management actions designed to promote desirable consequences and avoid undesirable ones. The direct, or first-order, impacts of change may be fairly easy to discern. But second- and third-order consequences are less obvious, often contain surprises, and may be the most important.

The Futures Wheel is a participatory "smart group" method that uses a structured brainstorming process to uncover multiple levels of consequences resulting from all types of change. Originally proposed by futurist Glenn (1972) as a way to help students understand the implications of change, the method has since been developed and extensively applied in many fields. Corporate, military, public sector, and nongovernmental organization (NGO) planners and decision makers have used it to identify and analyze unforeseen consequences of emerging trends, new policies, technological innovations, and other types of change. Applications of the Futures

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Wheel include helping students understand the potential consequences of science-related developments (BouJaoude 2000), exploring the impacts of trends affecting tourism (Benckendorff 2008), and examining the implications of European integration (Potůček 2005).[1]

Outline of the Method

There are several alternative approaches to designing and carrying out a Futures Wheel exercise, but all include the following basic steps.

Define the Center

The process begins by carefully defining and describing the change to be examined, called the center because it is placed in the center of the Futures Wheel. This could be a social trend affecting natural resources, an innovation in wildfire management, a new policy, or any significant change. Enough detail must be given for nonexpert participants to clearly grasp the nature of the change. In most cases, one page or less of bullet points summarizing the center and key assumptions is sufficient. Defining the center is done prior to the group process by the research or leadership team.

Select Participants

Individuals representing a diversity of cultural and ethnic perspectives, knowledge, experiences, gender, and age should be included. A Futures Wheel exercise is unlikely to produce valuable insights if all of the participants think alike. A core principle is that complex problems can be investigated more effectively with a diverse team than by the best individual experts (Surowiecki 2004; Page 2007). A Futures Wheel focusing on a scientific or technical topic will need to include participants with specialized knowledge. But nonspecialists and stakeholders with diverse perspectives should also be included.

An informal or highly exploratory Futures Wheel can be carried out with a single small group of four to six participants. But to produce robust results, multiple groups of this size should be employed. Large Futures Wheel exercises may involve hundreds of participants divided into many small groups that are conducted simultaneously.

Identify First-Order Consequences

When the participants are assembled and have been briefed about the change of interest, the group process begins by the facilitator placing a short statement summarizing the change in the center of the Futures Wheel diagram (Figure 1). The group is asked, ''If this occurs, then what might happen next?'' Each participant in turn offers ideas, which are added to the diagram, branching out from the center. The facilitator's job is to ensure that the first-order consequences generated by the group follow directly from the change without any intervening events, that they are clear and specific, and that discussion is kept to a minimum to keep the process moving forward. Both positive and negative first-order consequences should be identified, and the process should be open to even low-probability consequences—the idea is to identify possibilities, however remote. As the process unfolds, participants build on each other's ideas and see the Futures Wheel grow in real time.

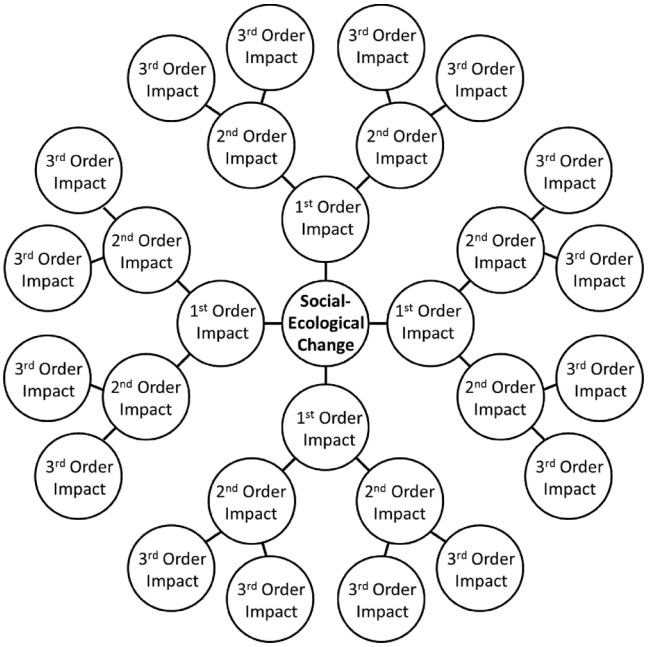

Figure 1. Simplified Futures Wheel structure. A complete wheel typically has about five second-orders for each first-order, and five-third-orders for each second-order.

The number of first-order consequences generated is highly variable, but typically ranges from around 5 for a narrowly defined and relatively simple change, to 15 to 20 or more for a broad and complex change. To save time and ensure that key dimensions are included, first-order consequences are sometimes identified by a leadership team before the group process.

Identify Second-Order Consequences

Once the group has identified the most significant first-orders, the process is repeated to identify a set of possible second-order consequences. For each first-order, the facilitator again asks, ''If this occurs, then what might happen next?'' Positive and negative second-order consequences should be identified for each first-order. It is important to complete all first-orders before going on to the second-orders, and all second-orders before adding any third-orders. Going directly from one specific first- to second- to third-order consequence results in a linear thinking pattern that will produce lower quality insights.

Identify Third-Order Consequences

The process is repeated once more to identify positive and negative third-order consequences for each second-order. This will take the group longer than the preceding round because of the geometric increase in the number of consequences, but not proportionately longer: By this point the group should be adept at quickly thinking about and generating consequences. The group process usually ends with third-order

consequences—going beyond this level becomes too tenuous. Once all levels have been completed, a map of possible direct and indirect, positive and negative consequences emerges (Figure 1).

Score the Consequences

Some approaches to the Futures Wheel use the groups to subjectively rate each of the consequences in terms of their importance, uncertainty, and other factors. For example, the Implications Wheel® is a refined version developed by futurist Joel Barker that includes a group scoring process for desirability and likelihood (Schreier 2005). Scoring a completed wheel provides significant additional information and facilitates the analysis by highlighting important consequences and suggesting potential opportunities and pitfalls. Scoring can be done by different stakeholder groups and from different points of view.

Analyze and Interpret Results

Identifying important insights and their significance begins with debriefing the groups immediately after scoring. Participants usually enjoy the Futures Wheel method and are eager to talk about the process, what they learned, surprising consequences that emerged, and insights for planning and policy, as well as to learn what members of other groups discovered. After the group process, however, a thorough analysis is carried out by the research team. The large number of possible consequences—often in the hundreds—combined with the ratings of importance, desirability, and likelihood can result in a significant amount of data. Inductive thematic analysis may be performed to identify broad themes (Benckendorff 2008), but more in-depth analysis aims to discover:

- Highly desirable, low-likelihood consequences (and policies or management actions designed to increase their likelihood).
- Highly undesirable, high-likelihood consequences (and policies or management actions designed to decrease their likelihood).
- Surprising consequences, including those that could have catastrophic or extraordinarily positive impacts.
- Differences in scoring from alternative points of view.
- Information and monitoring needs for developments that are highly uncertain.

Analyzing the results of large Futures Wheel exercises can be facilitated with computer support, such as computer-assisted qualitative data analysis software[2] and the software developed for the Implications Wheel (Barker 2011). Deeper analysis can be carried out with techniques such as the cross-impact method (Chao 2008) to systematically assess interactions among key consequences, or impact/likelihood assessment (Bengston 2013) to identify which consequences may be of greatest importance to decision makers.

See Benckendorff (2008) and Glenn (2009) for additional detail on the Futures Wheel method.

Strengths and Limitations

The Futures Wheel has a number of strengths. It is easy for participants to learn and quickly begin exploring the future implications of change (Glenn 2009) and can be

carried out with minimal training and equipment (flip charts and markers). The method is flexible and can be adapted or extended to accommodate a variety of needs and situations (e.g., see List 2004; Schultz, Crews, and Lum 2012). A visual map is produced that concisely summarizes a large amount of creative thinking, complex interactions, and emergent patterns. The Futures Wheel is a way to collect rich data sets rapidly relative to methods such as focus groups and the Delphi technique (Benckendorff 2008).

Most importantly, the process stimulates nonlinear thinking and shifts the mind away from simplistic, linear patterns. This facilitates the detection of unforeseen implications of change that are difficult to perceive. For example, a Futures Wheel exploration of the trend "Northern forests lack age-class diversity and will uniformly grow old"[3] identified five possible first-order implications, 26 second-orders, and 122 third-orders. Examples of potentially important and nonobvious third-order implications from this Futures Wheel include "More political influence on forest management decisions," "Reduced watchable wildlife tourism [due to habitat change]," and "Tribal connections to spiritual values of big trees strengthened and protected."

Like all research methods, the Futures Wheel has weaknesses. One limitation is that it works best with relatively narrow, well-defined changes. Using the Futures Wheel to explore possible consequences of broad and large-scale changes will produce a large number of first-order consequences and many more second- and third-orders, which may result in an unwieldy and difficult-to-analyze final product. Because it is based on a group process, the results will be no better than the collective judgments of participants. Including participants with diverse perspectives and having a skilled facilitator are therefore essential. Another potential weakness is the danger of misinterpreting the results, that is, seeing the consequences of change that are identified as representing what will happen, rather than as a set of possibilities to be considered in planning.

Concluding Comment

The Futures Wheel can help natural resource planners and decision makers anticipate unforeseen consequences of social–ecological change and become more proactive. Most analyses of the implications of change don't go beyond the obvious direct consequences. But the higher order consequences may be the most significant. The smart group process, graphic structure, and nonlinear thinking of the Futures Wheel make it a powerful tool for identifying and evaluating possible implications of social–ecological change.

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Notes

1. Contact the author for a Futures Wheel bibliography.
2. See the CAQDAS Networking Project: http://www.surrey.ac.uk/sociology/research/researchcentres/caqdas.
3. This was one of five anthropogenic trends shaping forest conditions and management needs identified in Shifley et al. (2014).

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