

APPENDIX 1. POTENTIAL FUTURES: VULNERABILITIES, TRAJECTORIES, TRANSFORMATIONS

In context of the adaptive cycle, we have tried to estimate the current phase of development for each of these social-ecological systems and speculate on its future.

At present, Wisconsin's Northern Highlands Lake District (NHLD) system seems to have a multiplicity of alternative futures; the only untenable state seems to be the traditional past one. Scenarios generated from a series of workshops (<http://lakefutures.wisc.edu>) sketch some of the potential futures. People in the region are concerned about the prospect of massive degradation of ecosystems through economic growth that would lead to a situation referred to as "Anaheim North" or through some exogenous disaster that somehow entrains the NHLD, i.e., the "Refugee Revolution." Although there is fear of some consequences of economic growth, there is also concern that the bubble might burst and throw the region back toward an impoverished condition something like the situation shortly after deforestation, only with more severe environmental problems, i.e., the breakdown that sets the stage for Walleye Commons. Others see hope that the conflict over economic growth could lead to a transformational kind of problem solving and a sort of lake triage, catalyzed by the energy and skill of "silver panther" retirees, i.e., the Northwoods Quilt.

The NHLD is vulnerable because there is a narrow economic base, the ecosystems can readily be degraded by certain kinds of perturbations, and the sources of innovation, e.g., tribes, lake associations for perhaps 100 of the 7500 lakes, and a handful of think-tank or research organizations, are poorly networked and spread thinly. On the other hand, there is some convergence in thinking about aspects of the past that people would like to preserve, and most of the ecosystems are diverse and resilient so far.

In Kristianstads, a richness of institutions, networking, and economic opportunity has emerged that seems not to be found in the NHLD. Nevertheless, the ecosystems are far more transformed and, in some cases, degraded. Exogenous forces such as a rising sea level and climate change could bring new and very different challenges to the resilience of the region. At present, there is a resilience developing in the ecosystems through the innovations of well poised institutions, collaborative processes, and progressive leadership.

The Everglades also has a richness of institutions, networking, and economic opportunity. However, the ecosystems are massively degraded and vulnerable on grand scales. Institutions are highly networked but focus on self-maintenance and the promotion of large-scale techno-fixes. There is a cycle of crisis, followed by infusions of massive amounts of public money. Threats of sea level rise and climate change lurk in the background, with the potential to obliterate, literally, the entire system.

The systems can be described in different phases of change (Fig. A-1). The NHLD is in the α stage of an adaptive cycle; it is underconnected, with small islands of innovation and novelty but little coalescence. Kristianstads is in an early successional stage (the r phase) in which a social-ecological system becomes more connected and effective in developing and spreading innovation through wise leadership. The Everglades is in a hierarchical trap. By this, we mean that the system is being maintained in a mature (K) stage using large-scale, expensive technologic fixes supported by a confounding bureaucracy. The Everglades is overconnected, innovation is suppressed, and the status quo is fiercely sustained.

Fig. A-1. Current status of Northern Highland Lakes District (NHLD), Kristianstads Vattenrike (KV) and Everglades SES's with respect to position on an adaptive cycle.

