Ecological Components of Ecosystems

Project Brief for Work Package 1 (WP1)

Overview

Humans perceive the natural world in many different ways. Inherent in these different perceptions are assumptions about the structure of natural systems and how they function, as well as about the intentions that underlie the management and governance of these systems. Governance of water resources is no different, where a range of views and assumptions are brought to bear on management practice. The aim of work package 1 (WP1) researchers is to assess how stakeholder perceptions of ecosystems affect water governance under conditions of climate change to inform practice and policy.

CADWAGO consists of 10 international case studies of different water dilemmas. Project researchers in WP1 will investigate each case in order to: 1) describe how stakeholders perceive their water resource system, and 2) explain emerging water governance in the context of climate change. Researchers will draw upon the concept of resilience to understand how the system is perceived in relation to water governance. Results from each case will be compared to identify common and unique implications of stakeholder perceptions for water governance.

Looking through the lenses of resilience

WP1 draws upon different interpretations of resilience to illuminate how stakeholders in the case study sites perceive their situation with respect to how water resources are governed. We have identified four main interpretations of resilience from relevant literature to inform our inquiry.

Engineering resilience is based on the view that ecological systems are stable, and therefore resilience is defined and measured by the amount of time it takes for a system to return to equilibrium following a disturbance. In this view, ecological systems operate within a single domain of stability, and relationships among elements are linear and predictable. It is claimed that systems can be objectively known and managed via control for a specific goal.

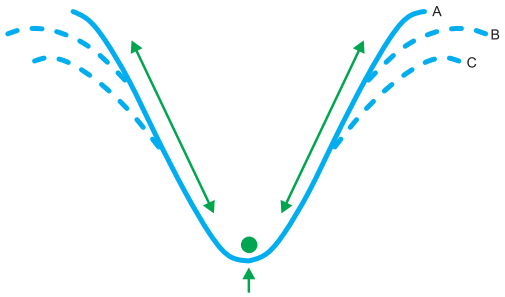

Figure 1: Engineering resilience

Ecological resilience pertains to ecological systems specifically where system elements are seen as dynamic and non-linear. Ecological resilience is measured as the amount of disturbance a system can absorb before structural changes occur. In this view multiple stable states exist and a disturbance of sufficient magnitude may cause a transition from one to another (Folke, 2006). Systems can also be objectively known, and decisions are made through adaptive management in acknowledging the need for flexibility, adaptability, and experimentation.

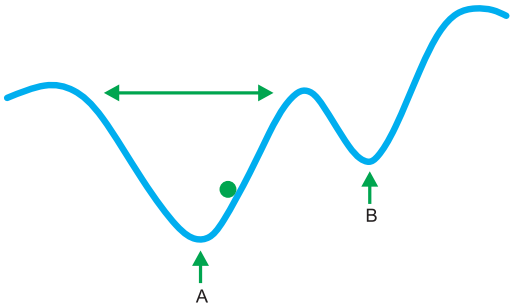

Figure 2: Ecological resilience

Social-ecological resilience is associated with integrative and complex adaptive systems. Uncertainty, integrated system feedbacks, and dynamic interactions across scales are highlighted in this view (Gunderson and Holling, 2002; Folke, 2006). Social-ecological resilience is defined as "(1) the amount of disturbance a system can absorb and still remain within the same state or domain of attraction, (2) the degree to which the system is capable of self-organization (versus lack of organization, or organization forced by external factors), and (3) the degree to which the system can build and increase the capacity for learning and adaptation" (Folke, 2006: 259-260). It introduces social and ecological linkages, emphasizes adaptive capacity, and prioritizes governance and management that is adaptive, collaborative and learning oriented, through approaches such as adaptive governance and adaptive co-management.

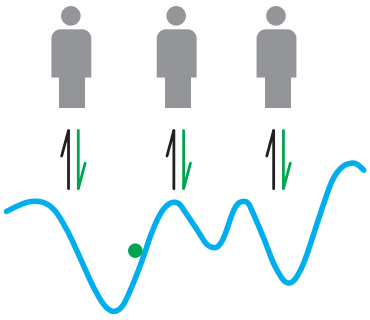

Figure 3: Social-ecological resilience

Epistemic resilience embraces social constructivism epistemology and post-normal science. From this perspective, systems are seen as dynamic, nonlinear, complex and inherently unstable. Working under the assumption that there are multiple realities, this view of resilience recognizes that systems are defined by individuals or groups for specific purposes and, as such, systems must be understood in the context of the observer and power relations among observers. Humans and the environment are viewed as structurally coupled and each shapes, and is shaped by, the other. From this perspective,

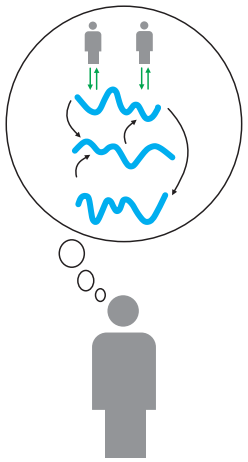

Figure 4: Epistemic resilience

CADWAGO Statement

CADWAGO stands for "climate change adaptation and water governance: reconciling food security, renewable energy and the provision of multiple ecosystem services". The project aims to improve water governance by developing a more robust knowledge base and enhancing capacity to adapt to climate change. CADWAGO is led by SEI and brings together 10 partners from Europe, Australasia and North America with extensive experience in climate change adaptation and water governance issues, and will extend the global knowledge base by sharing methods and findings. CADWAGO builds on lessons from ongoing case research to create a forum and dialogue between researchers and stakeholders at different scales. Lessons from the cases will be synthesized and used to adapt European decision-making that has a global impact.

systems are "epistemological devices" that can be used to understand situations. Systems exist as subjective interpretations where system boundaries are contested and negotiated by stakeholders, rather than being objectively identifiable. To balance power relations, this interpretation emphasizes agency, the promotion of public participation, and dialogue.

Our approach

We will take the following steps to achieve the aim of WP1.

- We will ask partners in each CADWAGO case to submit key documents focussed on their respective water resource dilemma, including policy documents, plans and scientific reports that capture stakeholder perceptions of the water resource system and the manner in which it is governed.

- Content analysis will then be used to qualitatively analyze each document. In the first pass of coding, the four resilience typologies will be used to understand how stakeholders perceive the system and governance. In the subsequent round of coding, we will examine relationships between system perceptions and water governance. A "fingerprint" will be developed to illustrate differing perceptions of the system and how it is governed.

- Analysis across CADWAGO cases will then be completed. Comparisons of how perceptions of the system influence water governance will be made using the technique of pattern matching.

- Member check interviews will subsequently be conducted with case study leaders to corroborate findings for each case study.

Outputs and outcomes

- A summary report for each case.

- A report on findings across all CADWAGO cases.

- Increased awareness of ecosystem perception and climate change in each case and advanced understanding of its influence on water governance across jurisdictions.

Links to other work packages and CADWAGO questions

- Gaining greater insight into how different perceptions of ecosystems shape water governance will enable us to better understand: 1) changes required to existing framings in order to enable systemic and adaptive responses to climate change; 2) the social barriers and opportunities for adaptive and systemic responses to climate change within existing water governance regimes; and, 3) the practices and processes that foster systemic and adaptive responses in water governance.

- Documenting how ecosystems are perceived will also inform the analytical frameworks used in work package two (context-structure-process-outcomes [CSPO] and the capitals framework).

- Exploring the relationship between perceptions of ecosystems and water governance will inform work package three, because our views shape institutions, and institutions mediate our relationship with the earth.

References

Folke, C. (2006). Resilience: The emergence of a perspective for social-ecological systems analysis. *Global Environmental Change*, 16, 253-267.

Gunderson, L.H. & Holling, C.S. (Eds.). (2002). *Panarchy*. Island Press: Washington.

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CADWAGO Website: **www.cadwago.net**