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Analysis

Giving birds a starting date: The curious social solution to a water resource issue in the U.S. West

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ABSTRACT

Examining a natural resource management system, we show that what first looks like rigid path dependency is actually stepped incremental change. The theoretical question then arises of whether it is possible to predict when a natural resource governance system will follow such an incremental path of institutional change. Our investigation of the prior appropriation water rights system as administered in the state of Wyoming reveals that mental models, based on factors such as strong personal connections with administrators, plus strong confidence in the system, tend to favor incremental change. We note that choosing incremental change is not without risk. While systems that undertake wholesale and rapid change risk a good deal – exposing themselves to a potential shower of unanticipated consequences – systems that follow the path of incremental change also take risks. Incremental change may mean successful accommodation of new needs that demand attention, or it may be "too little too late," ultimately allowing the pent-up pressure of unmet needs to push the system over a threshold into collapse.

1. Introduction

Water rights systems in the Western U.S. can be a challenge for ecologists and economists because of their very strong tie to historic uses. Priority access to water, taken out of a stream and used primarily for irrigated agriculture, is often determined not by efficiency, need for cropping patterns but by the date that the water right was initially claimed. Seventeen Western states subscribe to some version of this "prior appropriation" (PA) system (Dunbar, 1983, pp. 73–85; Langridge et al., 2006; Libecap, 2011).

One of the pressing questions in the U.S. West is whether such a system can adjust to upcoming environmental challenges and to society's increased awareness of the importance of meeting ecological needs by leaving more water in streams. We examine that issue by presenting a case from Wyoming, where in just the past 10 years an accommodation of the water needs of endangered birds was accomplished, in part, by a rather elaborate arrangement to give the birds a high-priority water right dated some 100 years earlier.

Based on this recent example, we studied the historical development of Wyoming's water rights system and we ask whether Wyoming water authorities and users are ready to make similar adjustments on a potentially larger scale or for other uses. How suitable do Wyoming water authorities and users find their current water rights and governance system, in a world likely to demand increasing adaptation to environmental challenges? Under the PA system, water is distributed by the date of initial request for or use of the right to take water out of a stream, in a society that initially recognized only agricultural, urban, or industrial uses as legitimate demands for water. There is no charge for the water, and the quantity of water taken from the stream is limited by the type of use (for instance, the acreage of land irrigated), and the water flows available. One hundred and twenty years ago, Wyoming established an administrative system for such water rights — a system then considered a model for other states in the U.S. West (Dunbar, 1983, p. 113, pp. 123–124, p. 132).

The question today is whether Wyoming water authorities and users see a need to move away from that system. Societal recognition of the birds' water needs, empowering action by the U.S. wildlife agency, precipitated two decades of negotiations among state governments, federal agencies, and interest groups whose concerns ranged from restoration of river wildlife habitat to agricultural prosperity. The final deal did not change the PA system in Wyoming, but instead gave birds a priority water right within that system. The paper suggests what the "birds case" contributes to an understanding of the nature of institutional change in traditional resource management regimes, where the "insiders" or "privileged" in the system face unexpected environmental challenges, from the "outsiders" or "unprivileged" hitherto left out. The privileged inside a system play a major role in whether and how that system will adapt to address new needs; up until now, there has been no empirical investigation of the opinion of the inside actors in Wyoming on whether their PA system needs to change. We present these actors' responses and information on the Wyoming system that may explain their views and suggest reasons for their approach to

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adaptation issues. Whereas the study of the historical development of the water rights system serves as a basis for our study, such additional empirical inputs serve to support some of our theoretical argumentation.

Our study contributes to theoretical debate on institutional change by analyzing the close connection between path dependency and incremental change. Under certain conditions, which we will discuss, an institution facing an unexpected challenge tends to respond with incremental change. Such change addresses the challenge while allowing the institution to continue operating as closely as possible along its original path. But it is not exactly the same path. So incremental change slowly, but surely, bends the path that the institution follows. In this way incremental change is a course of successful adaptation, indicating resilience. We note that this course may risk a build-up of pressures that are left un-addressed and could force a collapse and radical change later. Nonetheless the route of incremental change does have the potential to satisfy the pressure for change sufficiently to allow the institution to adapt rather than collapse, simply through the slow bending of the path the institution takes.

2. Path Dependency and Incremental Institutional Change

A scholarly work on institutional change has lately discussed how path dependency in institutions can be completely distinct from incremental change and moreover from "actual" change (Mahoney and Thelen, 2010, p. 4). We will argue, by contrast, that the Platte bird case suggests instead that there is a strong relationship between path dependency and institutional change.

North, who helped focus scholarly attention on path dependency in institutions, does not see incremental change as distinct from path dependency. For him, institutional change is typically both incremental and path-dependent (North, 1995, p. 18). Path dependence is what makes the change incremental (North, 2005, p. 2). This is because the organization of a society depends on the existing institutional matrix and the interdependent contracts and relationships built within it. As Lindblom (1959) expressed it: "Democracies change their policies almost entirely through incremental adjustments." Further, many of the organizations that arise depend for their survival on the perpetuation of the institution as it is. Therefore they devote resources to prevent alterations of the institution that would threaten their survival (North, 2005, p. 51).

The Platte birds case, presented in the next section, leads us to agree with North that path dependency need not exclude change. The actors in an institution that has followed a certain path for a long time may realize that new challenges facing their institution require it to change. But their dependence on their past path may prompt them to choose incremental change, a slight tweaking of existing rules and standards. Lindblom (1959, p. 84) explains why, for complex problems – as the described challenge for the water rights system surely is – administrators often choose alternative policies that differ only marginally. They even have to find ways to drastically simplify, focusing on small variations, as this makes best use of available knowledge (Lindblom, 1959, p. 85).[2] A preference for incremental change does not mean that institutions choosing it will never be fundamentally changed. It simply means that such institutions will most commonly be changed slowly, almost imperceptibly, by incremental steps.

In choosing incremental change, according to North (2005, p. 27), the role of mental models is essential. Denzau and North (1994) have argued that mental models are necessary decision-making tools for actors in many situations. In the most common situations, people have to make decisions in the midst of uncertainty and sparse information. In that situation they have to rely on mental models. Those models are knowledge structures arrived at through induction, built up over time from particular experiences to form general understanding of the surrounding environment (Denzau and North, 1994, pp.7–12). Faced with a new problem, the first choice is to respond as in the past; the second choice is to solve the problem by analogy; and only the third choice would be to invest time and effort in a completely new solution (Mantzavinos et al., 2004, p.76). In forming and pursuing ideas, the brain most often works by pattern recognition not step-by-step logic. So, people understand an idea best if it fits or is similar enough to a pattern already known (North, 2005, p. 27). Further, key decisions are often collective. "Institutions are anchored in the minds of people as shared solutions to social problems" (Mantzavinos et al., 2004, p. 79) — but the fact that a group shares a mental model may make it even more difficult to embrace and adopt a new model (Denzau and North, 1994, p. 3, p. 11, pp. 21–27).

Indeed, the recent scholarship in institutional change has noted that a series of incremental changes over a long period of time can cumulate in very significant changes in institutions and their outcomes — but there are not many theories explaining such gradual change (Lindblom, 1959, p. 86; Mahoney and Thelen, 2010, pp. 3–4).

The Platte birds case, described in Section 4, addresses that problem. "The Platte River agreement", i.e. the policy agreement that we studied, documented an incremental change to the existing system. Dating the birds' claim to water is new, but it imitates the dating of human claims to water as a basis for water rights. In Section 5, we ask what kind of actor behavior or properties of institutions lead to avoidance of more immediate change. The answer that the Platte case provides can contribute an important step in theory on when a system will adopt very slow incremental change.

On the other end of the spectrum, it is clear that complex management systems do, sometimes, move counter to the interests of key actors, and head for drastic overhaul rather than incremental change. Roland (2004, pp. 117–123), like North and Weingast (1989, p. 830), describes that phenomenon in contrasting the chaotic downfall of kings and nobility in the French Revolution with the slow transformation of the English monarchy and aristocracy. Roland theorizes that what happens to make an overhaul like the French revolution occur is cataclysmic interaction between a slow-moving, endogenous institution (cultural beliefs) and fast-moving, exogenous institutions (a political system). Their interaction, he says, can be like what causes earthquakes in geology: change builds up slowly, but continuously, in the slow-moving institution until it reaches the point where it suddenly provokes rapid and dramatic "earthquake" change in the fast-moving institution.

Slow incremental change can however also allow the long-term survival of an institution, so it remains recognizable even as it is transformed. At least that can be true if the incremental change successfully addresses the challenges the institution faces over time, as in Roland's example of the English aristocracy.

The differentiation between incremental change and fundamental shifts is much the same as that proposed in the resilience literature. Resilience, the concept borrowed from ecology, is indicated by the speed with which a system recovers from a shock, copes with stress, and the size of shock that can be absorbed without changing the fundamental processes that control a system's behavior (Gunderson and Holling, 2001; Holling, 1973, 1986; Langridge et al., 2006, p. 18). Adaptation and transformation are two of the core concepts of resilience thinking. Adaptability is the capacity to adjust responses to changing external drivers and internal processes and thereby allowing for development along the current trajectory, whereas transformability is the capacity to cross thresholds into new development trajectories (Folke et al., 2010, p. 20); thus, adaptation is the analog to incremental change, and transformation represents a fundamental shift (Folke et al., 2010; Walker et al., 2006, p. 15).

Resilience thinking draws on an adaptive cycle, which is a general model of systemic change in four phases. In that model, over time a system cycles through phases: first of rapid growth and then conservation

[2] Lindblom (1959, p. 81) calls such kind of incremental changes "the branch approach".