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# Freedom and constraint: Generative expectations in the US stream restoration field

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ABSTRACT

The modern holistic wave of stream restoration was born in the 1970s from the combined support of a strong grassroots movement and new federal environmental legislation, most notably the Clean Water Act. Before holistic stream restoration could properly start, however, it was stopped in its tracks by two big issues: were the far more intensive interventions necessary to holistic restoration actually doable; and was it possible to reconcile the ecological goals of setting streams and rivers free with the powerful economic demands to minimize impacts from flooding and erosion? Taken together, these two issue called the whole project of stream restoration into doubt. But then a consultant, Dave Rosgen, stepped up with a restoration approach that promised both freedom and constraint: picturesque rivers teaming with game fish in a channel that stayed where it was put. Drawing on the sociology of expectations literature within STS, I argue that it was the expectations raised by this apparent resolution of the contradiction at the heart of stream restoration that transformed both Rosgen and the restoration field from shaky prospects into contenders, setting the stage for the exponential growth of stream restoration, and Rosgen's success within in it.



## 1. Introduction

Since the 1990s, there has been increasing cross-fertilization between STS and political ecology. Although the healthiest offspring to date has been ontological, there are other hybrids with the potential to thrive. I have argued elsewhere (Lave, 2012a, 2012b) for a political–economic cross between the two fields; here my focus is temporal, using STS to draw analytic attention to the role that expectations for the future can play in catalyzing change in environmental science and management, and thus material change in landscapes.

In this article, I draw on the sociology of expectations literature within STS to analyze a critical juncture in American stream restoration science and policy. At present, stream restoration in the US is booming. Since the 1990s, the number of projects completed each year has grown exponentially, as have the dollars spent to design and build those projects (Bernhardt et al., 2005). Scientific grants and articles on stream restoration have followed similar trajectories, with an enormous increase in research and publications on restoration (Lave, 2012a). Surprisingly, within this rapidly expanding field the most widely respected scientific authority, whose work is most broadly incorporated into policy and practice at the federal and state levels, is a consultant with little formal academic training (Malakoff, 2004). In addition to providing the field's central new knowledge claims and practical tools this consultant, Dave Rosgen, is the primary source of restoration education, having taught approximately 2/3 of the members of the stream restoration field (Lave, 2008). Despite vehement opposition from much of the academic river science community since the mid-1990s (e.g. Juracek and Fitzpatrick, 2003; Kondolf et al., 2001; Simon et al., 2007; Smith and Prestegaard, 2005), Rosgen enjoys tremendous support from both public agencies and the private consulting firms who serve them, and is widely viewed as the most authoritative scientific voice in stream restoration.

With Rosgen and the modern stream restoration movement so well-established, it is easy to forget that as recently as the mid-1980s both were in precarious positions. Rosgen had just left the US Forest Service (his employer of 20 years) under controversial circumstances. Further, he was not the only champion offering new solutions and a compelling vision of what restoration practice could become. There was another charismatic consultant, George Palmiter, receiving considerable attention whose proposed approach was even more holistic, not to mention far less costly and intensive. Further, there was tremendous uncertainty in the stream restoration field as to whether new holistic goals driven by legislation and grassroots environmentalism were achievable at all. What allowed Rosgen and the stream restoration field to move from this decidedly unpromising state to their current resounding success? Why did Rosgen triumph over Palmiter, and what were the material consequences of his victory?

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Answers to these question flow from the sociology of expectation's core thesis that we need to treat the way the future is portrayed as an analytical object, which is "mobilized in real time to marshal resources, coordinate activities and manage uncertainty" (Brown and Michael, 2003, p. 4). I argue that Rosgen and the current expansion of the stream restoration field were given their critical initial boost by the expectations he created for the possibility of a particular kind of future for stream restoration, one in which holistic stream restoration was in fact a doable project (as long as you used his design approach). Rosgen's promotion of his compelling vision of restoration's future built the foundation of the success that both and he the field currently enjoy.

I focus here on the critical decades from the early 1970s to the early 1990s during which both stream restoration and Rosgen transitioned from long shots into contenders, and during which Palmiter's star rose and then set (I have addressed the period from the mid-1990s through 2010 elsewhere (Lave, 2009, 2010, 2012a, 2012b); in effect, this article is the Rosgen Wars' prequel). To illuminate the relationship between narratives of the future and the materialities they engendered within the US stream restoration field, I draw primarily on analysis of key texts in the debates over Rosgen's and Palmiter's work, and on semi-structured interviews with founders of the earliest restoration consulting firms in the US, key federal agency staff, and academics involved in restoration since the mid-1970s. After an overview of the sociology of expectations literature, I address the uncertainty as to whether holistic stream restoration was a doable project, and then the contest between Rosgen and Palmiter.

## 2. The sociology of expectations

The sociology of expectations literature within STS analyzes how compelling visions of the future work performatively to produce that future. The central tenet of this growing body of scholarship is that discourse has material impacts, as expectations come to, "shape research questions, funding commitments, institutional orderings, ... and evoke future users," in Milne's succinct formulation (2012, p. 291). More expansively, the sociology of expectations focuses on visions of the future that successfully,

> guide activities, provide structure and legitimation, attract interest and foster investment. They give definition to roles, clarify duties, offer some shared shape of what to expect and how to prepare for opportunities and risks. Visions drive technical and scientific activity, warranting the production of measurements, calculations, material tests, pilot projects and models. (Borup et al., 2006, pp. 285–286)

Yet not every well-publicized, enticing idea creates its own future conditions of possibility. The self-fulfilling prophesy is a well-established concept in the social sciences' theoretical toolkit, but the *process* through which such a prophesy is realized is contested and uncertain; successful shaping of expectations is more exception than rule. In Brown and Michael's words, "Simply because the future is represented in a certain way, it does not follow that techno-social arrangements will uniformly concur with the futures idealized from them. Far from it... [T]he past is littered with failed futures" (2003, p. 7). Resistance is ubiquitous in the sociology of expectations literature, with expectations described as the contested product of struggle as, "different groups compete for the right to represent near and far term developments" (Brown, 2003, p. 13).

The sociology of expectations literature thus asks what differentiates the few successes from the many failures to promote visions of the future. How are successful expectations packaged and circulated? How did their primary advocates build support among experts and investors, fend off critics, and create a new marketplace for their product? Put differently:

> What is the relationship between imagination and materiality? That is, what are the routes of transmission between expectations, embodiment of materiality, and specifically the way and by what means promissory abstractions about the future take on substance, becoming materially embedded in structures, routines, systems, matters, etc.? (Borup et al., 2006, p. 292)

To investigate this "relationship between imagination and materiality," sociologists of expectations have developed detailed case studies focused on high tech realms of knowledge production and future generation, such as biotechnology, agricultural biotechnology, and information technology (Borup et al., 2006; Brown, 2003; Brown and Michael, 2003; Milne, 2012; Van Lente, 2000). In these cases, expectations are raised by a champion, often the "entrepreneurial technoscientist" (Brown and Michael, 2003, p. 13), who switches back and forth between research and promotion. Other key actors include competitors, investors, policy makers, and potential end users. To succeed in materially shaping the future, champions must overcome resistance to shake-up these actors' existing networks and reconfigure them to support their own ideas, a process of translation and enrollment reminiscent of Latour. Analytically, the actors do not hold equal weight. While sociology of expectations case studies sometimes include a paragraph about the increasing importance of public advocacy groups in shaping visions of the future (e.g. Brown, 2003, p. 7; Borup et al., 2006, p. 295), the bulk of the attention goes to the technoscience community, and to a lesser extent to investors.

A last notable feature of the sociology of expectations literature involves the relationship between timing and uncertainty. As Borup et al. note, visions of the future tend to be most powerful and most contested as new fields develop, when uncertainty is highest:

> [I]n the most early stage of technoscientific constructions and innovations ... roles will be ambiguous, lacking form or agreement; regulatory aspects like those of standards and quality control are unlikely to have been developed; market players will experience acute levels of uncertainty in judging appropriate levels of investment; it will probably be the case that numerous competing innovation futures are also being promoted; contestation and conflict may be very high, etc. (2006, p. 289)

This description of undeveloped regulatory standards, deep uncertainty, and competing visions of the future maps clearly onto the state of stream restoration in the late 1970s and early 1980s. And indeed, much of the sociology of expectations' analytical framework is quite useful in explaining the take-off of holistic stream restoration in the US. Thus, in keeping with several other papers in this section, I demonstrate here that this framework has utility outside the technocentric realms in which it has thus far been deployed. In addition to expanding its range of cases, I argue here that the sociology of expectations literature should give more weight to people outside the research and investment communities. As I demonstrate below, honorable mentions of lay people, public agency staff, and regulators are not sufficient given their central role in generating particular expectations and promoting their success. Finally, I argue that the sociology of expectations literature, like much STS, gives insufficient attention to the larger political–economic context within which new visions of the future are proposed, contested, and (rarely) fulfilled.

## 3. The doability of stream restoration

In the US, organized attempts to enhance fluvial systems (streams, creeks, rivers, etc.) date back to at least the late 1800s.