Adversarial Science: Conflict Resolution and Scientific Review in British Columbia's Central Coast

1997; Krimsky 2003). Scientists do not speak with a unified voice, and it is often unclear what science-based means (Mills and Clark 2001) or whose science should drive policy when they yield conflicting recommendations (Allen 2005). When scien-

not less, uncertainty, a greater understanding of the depth of our ignorance (Bocking 2005), and greater caution in predicting the effects of policy alternatives.

Uncertainty can sometimes be reduced by more science—indeed, more science is usually necessary, since the ''science' needed to resolve legal conflicts is seldom ready to hand when the action begins'' (Jasanoff 2001, 29). It is often generated at the scale needed for management while planning goes on, but better knowledge

and their knowledge were included in the policy process without abandoning the goals of independent scientific review.

Scientists' collective political response to the degradation of ecosystems and

interest-based model incorporating dependent scientists and technicians, and emerged as a boundary organization regulating the science–policy divide. This boundary organization aided in conflict resolution in the short term, and in the long term created a boundary object that facilitates the collaborative production of science and social capital.

Environmental Planning for the Central Coast

Adversarial science has exacerbated the ''war in the woods'' (Hayter 2003) in Pacific North America, and played a central role in the dispute over British Columbia's central coast, also called the Great Bear Rainforest. Wars in the woods reflect ''a perceived democratic deficit'' (Jackson and Curry 2004, 30) due to the lack of public involvement in resource management as societies have shifted from a commodity-oriented regime toward more participatory management. In this shift, science was a catalyst for conflict: Scientific critiques of forest management decisions played central roles in litigation, market campaigns, blockades, and other protests launched by environmental and aboriginal organizations (Satterfield 2002). Science documented the region's old-growth forests, species diversity, and megafauna, and verified the negative impacts of landscape alteration. Science also underwrites silvicultural strategies to regenerate forests, maintain habitat, and mimic natural disturbance regimes. Governments defend their resource policies as science-based management, and accept that science will be essential to developing operational guidelines that will protect the values desired by stakeholders.

The central coast contains the world's largest mostly intact temperate rainforest ecosystem (Jeo et al. 1999). Forests cover roughly half the land area, with half of those forests older than 141 years. Moore's (1991) influential early survey identified 20 intact and 25 slightly modified watersheds, and these old-growth valleys became central to the conflict due to their conflicting habitat and timber values. At least 20 First Nations are resident in or claim territory in the central coast, including the Heiltsuk, Kitasoo, Nuxalk, and Oweekeeno, and more than half the population is aboriginal. The workforce is employed principally by the public sector (45%), fisheries (19%), and forestry (9%), but virtually all timber is processed outside the region (CCLRMP 2004).

British Columbia's provincial government initiated planning for the central

agreed that the ENGOs would suspend the market campaigns, while the companies deferred logging in 30 watersheds considered critical for conservation. The bilateral agreement restarted the multisector negotiations that would result in an interim land use map, the establishment of a coast information team (CIT), and commitments to apply ecosystem-based management in the coastal forest matrix (Table 1).

The incoming Liberal government endorsed the agreements and committed to a second phase to finalize land uses, develop the CIT, and define ecosystem-based management (CCLRMP 2004). Phase II (2001–2003) differed in several respects

Methods

assimilating the dueling priorities, models, and databases, and combining the principles of independent scientific review with the knowledge of dependent scientists. The CIT combined elements of a collaborative multiparty team approach to formulate management options and to recommend strategies (e.g., FEMAT 1993), and an interagency technical team providing scientific analysis to assist decision makers (Hadley 2004). The CIT was envisioned as a team independent from and subordinate to the negotiators, presenting information, options, and recommendations, but its recommendations were not binding on the negotiators. The CIT incorporated scientists and technicians working for environmental groups and the forest industry as well as government and academia. The CIT contracted with separate scientific teams to prepare an ecosystem spatial analysis and a socioeconomic analysis, and to develop a framework for ecosystem-based management in areas where logging would be permitted.

A multisector management committee directed the CIT, reflecting accountability

transparency, compared to the scientific claims deployed in Phase I, although some thought that the reviewers themselves were partial. If Phase I was prolonged by adversarial science, Phase II waited for the postadversarial science to arrive. Negotiators attempted to wait for the CIT's analysis before reaching decisions (Interview 5), but in the end they were forced to decide by the CCLRMP deadline.

Conflict Resolution and Boundary Objects

> Once you accept that science is not objective and then try to set up an environment where assumptions are made explicit, then you can move forward with developing better science. If your pretext is that science is an ivory tower, you are setting yourself up for problems. (Interview 7)

While several writers have focused on the successes and failures of the CIT in developing better science or integrating multiple knowledge domains (Allen 2005; Hadley 2004), less has been said regarding the CIT's role as a conflict resolution strategy. We argue that the CIT has achieved limited but important success in conflict resolution

> that it was not generated for without appropriately qualifying it. (Interview 3)

A further goal of the CIT was the development of a single, shared, and authoritative data set to avoid dueling GIS presentations derived from conflicting databases (Interview 1). The CIT began with the government's database, which it extended,

databases, and they challenged each other's data as well as interpretations. Phase II established a shared-source database in which all parties' technical specialists agreed to the coordinate system.

As a boundary object, GIS facilitates the coexistence of conflicting interests, putting their integration to the test only when conflicting values are overlain. Overlays of the ecosystem mapping and the timber harvesting land base enabled the negotiators evaluate candidate protected areas for the volume, species composition, and accessibility of its timber, as well as its old-growth habitat, rare ecosystem types, and landscape connectivity. Without a common database of ecosystem types and timber volumes, it would have been much more difficult to split the difference, as bargainers sometimes must do to reach agreement.

The GIS layers also persuaded the negotiators that the government could implement the complicated bargain struck over ecosystem-based management in the forest matrix. The agreement established different retention thresholds for ecosystem types of varying scarcity—30% reservation for common ecosystems and 70% for rare ecosystems (Price et al. 2009). This agreement would have been impossible without GIS, which enabled negotiators to compare each forest stand for its timber value, constituent ecosystems, and landscape connectivity within the region, relative to alternative candidates for protection. In effect, the GIS provided a currency—watersheds of varying economic and ecological value and proportions of protection—that allowed ENGOs and industry to bargain.

The attainment of a common data set heeds conflict resolution advocates who seek to improve communication, scientists who argue that better data are needed

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