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Can Adaptive Management for the Sacramento-San Joaquin Delta be more than Words?

CAN ADAPTIVE MANAGEMENT FOR THE SACRAMENTO-SAN JOAQUIN DELTA BE MORE THAN WORDS?

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"Adaptive management" is an almost unavoidable term in contemporary environmental planning, management, and policy. It is almost impossible to have a major environmental planning or policy effort which does not refer to or require it. Although rhetorical consensus on the desirability of adaptive management seems frequently achieved, implementation experience has been more varied and faces important impediments. This has spawned numerous learned papers and reports on the success, prospects, and pitfalls of adaptive management (Doremus et al. 2011; Stankey et al. 2005; Lee 1999; Walters 1997).

Adaptive management seems to have taken on many practical meanings which differ from the original approach suggested by C.S. Holling (1978). These are summarized in Table 1. Here, the top-most approach seems closest to the original, and perhaps the most difficult to implement, while the latter approaches are perhaps the most common and politically effective, but have dubious environmental management effectiveness. Many authors note the practical, institutional, and political challenges for adaptive management.

Table 1: Schools of Thought in Adaptive Management

Model, manage, and revise	Holling (1978); Walters (1986)
Experimental management	Lee (1993), Grand Canyon
Real-time management	VAMP
Manage and revise reactively (trial and error)	
Manage and promise to fix later	
Just keep saying adaptive management	

To be environmentally effective, adaptive management must learn faster (hopefully much faster) than the ecosystem deteriorates, relative to some management objective. Consider an ecosystem with 100 significant uncertainties, of which somehow only 10 are critical to resolve before the system can be managed to recover; we don't know which of the 100 uncertainties are critical. Given a rate at which uncertainties are resolved, in some sense, how long will it likely take for understanding to advance enough for ecosystem management to become effective? Figure 1 illustrates this for two rates of learning, where 5 random uncertainties are resolved each year (dashed line) and where 2 uncertainties are resolved each year (solid line). Fairly high rates of learning are likely to be needed for adaptive management to be successful, with institutional, financial, and management implications.

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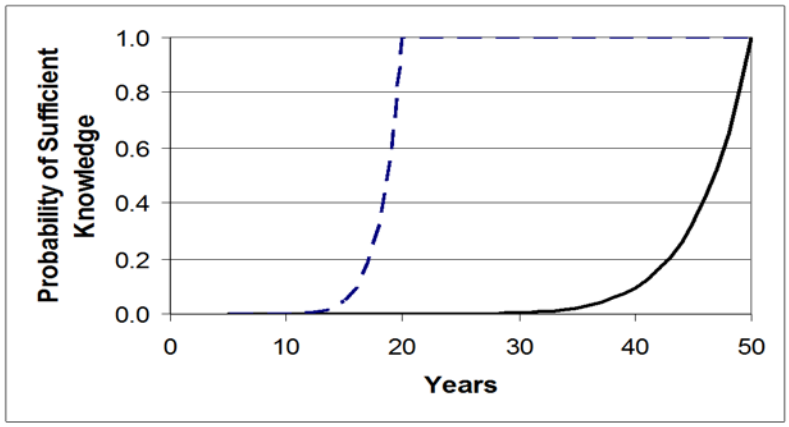

Figure 1 Years required for 10 critical uncertainties to be resolved from 100 significant uncertainties to allow ecosystem management to become effective with learning rates of 5/year (dashed line) and 2/year (solid line)

California's Sacramento-San Joaquin Delta is a diked and drained former tidal marshland of roughly 200,000 ha which also is a major source of urban and agricultural water supply. The Delta's ecosystem includes a growing list of threatened and endangered species under federal and state legislation, as well as a growing number of invasive species and growing controversies over water and land management (Lund et al. 2010). Hundreds of federal, state, and local agencies are involved, as well as numerous non-governmental organizations and private stakeholders. At any time several planning processes are ongoing, some small and focused, and others larger and more comprehensive. All are controversial. Many invoke "adaptive management". The development of an ecologically effective adaptive management program is technically, scientifically, institutionally, and politically difficult under these circumstances. But there seems little alternative.

Some ideas are suggested which seem promising for developing an effective adaptive management program under these challenging conditions. Perfection is unlikely to be an option. The rapid learning needed for adaptive management will challenge both bureaucratic and scientific cultures; mistakes from both perspectives will be made. Mistakes are important for learning.

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