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Saving money when safeguarding species and habitats: Conventional vs. advance land acquisition for transportation mitigation

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ABSTRACT

Advance mitigation has attracted attention for its potential to improve ecological outcomes of and to reduce transportation agency expenditures for compensatory environmental mitigation. When developing or improving infrastructure in ways that impact habitats and species, transportation agencies are required to avoid, minimize, and mitigate natural resource impacts through compensatory mitigation. Whereas agencies traditionally plan and implement compensatory mitigation project-by-project, late in project development, advance mitigation addresses the impacts of one or many transportation projects before or during project planning. This new practice may reduce infrastructure development costs, yet evidence of its associated cost savings has been piecemeal and often anecdotal. We explore the early acquisition of land for compensatory mitigation as one advance mitigation strategy that may reduce costs. With case-based analysis of California's Beach Lake Mitigation Bank, we provide *post hoc* empirical estimates of savings realized from advance purchase. Additionally, hypothetical scenarios illustrate how the timing of mitigation land purchases can impact cost. Overall, we provide new evidence that advance mitigation, specifically early acquisition of land for compensatory mitigation, could promise agency cost savings, particularly when land is purchased during a market trough instead of at market peak. Still, inevitable project planning and land market uncertainties necessitate cautious optimism.

1. Introduction

1.1. Advance mitigation in transportation projects

When building or improving infrastructure in ways that could infringe on sensitive natural habitats and species, transportation agencies are required to avoid or minimize any anticipated natural resource impacts. When such impacts are unavoidable, agencies must offset them through compensatory mitigation. Traditionally, transportation agencies plan and implement compensatory environmental mitigation on a project-by-project basis and late in project development. Federal and state transportation funding structures and business practices often reinforce the just-in-time, single-project approach (Sciara, Bjorkman, Lederman, Thorne, et al., 2015). In contrast, agencies practicing advance mitigation would act considerably earlier to estimate impacts from many transportation projects, assess likely compensatory mitigation requirements, and undertake activities to satisfy those requirements.

Advance mitigation has attracted attention for its potential project delivery benefits, including reductions in project delay (TransTech Management, 2003) and in direct mitigation costs and associated transaction costs. Further, the practice promises to improve mitigation quality, by enabling project sponsors to align mitigation activities with the landscape-level preservation goals and priorities of regional or statewide conservation stakeholders (Cambridge Systematics, 2011; Crist, Venner, Kagan, Howie, & Gaines, 2013; Lederman & Wachs, 2014; Sciara, Bjorkman, Lederman, Schlotterbeck, et al., 2015).

One way advance mitigation is expected to reduce costs is by allowing the purchase of mitigation land to occur earlier than would otherwise be the case. When a transportation agency must conserve or restore natural lands or species habitats to mitigate a project's specific impacts, it may need to purchase lands in fee title or to buy conservation easements. By making these purchases well

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in advance of need and across multiple projects, agencies may save money by avoiding or reducing costs from land price escalation and purchase under duress (Greer & Som, 2010). In contrast, most state transportation departments follow the conventional approach; they assess mitigation obligations one project at a time, acquire mitigation land as-needed, and acquire any needed land later in project development and sometimes only shortly before project construction.

To encourage comprehensive and early mitigation planning, the U.S. Congress has highlighted advance mitigation as a beneficial approach, and individual states have also shown growing interest. The 2012 transportation authorization law, Moving Ahead for Progress in the 21st Century, called MAP-21 (U.S. House of Representatives 2012) shows how multi-year programmatic mitigation plans may be developed within larger statewide or regional transportation planning processes and makes funds eligible for expenditure on environmental mitigation activities. At the same time, several states, including Florida, Oregon, Michigan, and North Carolina have established advance mitigation programs for some portions of their transportation investments. California has begun a pilot advance mitigation program to address impacts associated with state highway maintenance (Caltrans, 2015, p. 6).

Reports suggest advance mitigation can improve ecological outcomes, yet its adoption may depend in part on the potential for cost savings to transportation agencies facing increasingly strained budgets. Expenditures for mitigation and associated land acquisition can contribute notably to project cost. Survey data profiling 29 projects from selected state transportation departments reveals that typical per-project environmental mitigation costs range from 2 to 12 percent and average 7.5 percent of total project cost, excluding right-of-way costs. More specifically, for transportation projects requiring an environmental impact statement, right-of-way costs – which would include the acquisition of mitigation land as well as land for project construction – can increase total non-right-of-way project cost by 18.3 percent on average (Macek, 2006, p. 13).[2] Consequently, mitigation practices offering small project-level savings may deliver larger savings when carried across whole programs. Consider that California proposes to invest $53.4 billion in transportation and high speed rail from 2014 to 2019 (California Department of Finance, 2014), making roughly $4 billion (7.5 percent) needed for compensatory mitigation of transportation projects.

That early acquisition of mitigation land can reduce the cost of transportation projects is a frequently touted but sparsely documented benefit of advance mitigation. Addressing this gap in the evidence, this paper examines the cost savings that may accrue when mitigation parcels are purchased earlier than on the conventional timeline. We examine one of the California Department of Transportation's (Caltrans') own experiences with advance mitigation – the Beach Lake Mitigation Bank – and estimate the financial savings it yielded the agency. We also develop hypothetical advance mitigation scenarios to explore how the timing both of mitigation purchase and use or need affects cost. Using historical land price indices, we compare the cost of large-parcel purchases made in advance to the cost of counterfactual, smaller-parcel purchases made as-needed. To test the robustness of our results, we apply multiple inflation indices to bring these comparison values from nominal to 2013 dollars when calculating potential savings or loss associated with advance mitigation.

[2] These findings are from a small sample of projects with representative mitigation needs, as reported by five state transportation departments. They are discussed here as rough estimates of the scope of mitigation costs and right-of-way costs relative to an overall program or for a hypothetical average project, not as statistically accurate predictors of cost.

1.2. Advance mitigation's financial benefits: state of the evidence

Available assessments indicate that advance mitigation may reduce the cost of environmental mitigation in a variety of ways. Earlier, more comprehensive mitigation enables agencies to avoid certain costs, such as price escalation; to achieve economies of scale, for example by purchasing a single land parcel to mitigate multiple projects; and to reduce procedural costs and delays, for example by moderating staff hours needed to fulfill mitigation requirements or reducing project delivery times.

Still, most evidence suggesting these benefits has been piecemeal and anecdotal. Existing efforts to quantify advance mitigation's cost and time savings are summarized in Table 1. Studies use different measures to assess advance mitigation's performance, making it difficult to compare results or consider them in context. Overall savings estimated from advance mitigation programs range from $73 million in Oregon to $26.1 million in Florida (Oregon DOT, 2008; Florida DOT, 2012), while Michigan DOT saved $70,000 per acre of mitigation land purchased (Environmental Law Institute et al., 2010). Washington State sponsored mitigation banks reduced wetland mitigation costs by 30- to 80-percent (Greer & Som, 2010), and internal Caltrans analysis suggests the Beach Lake Mitigation Bank saved the agency over $12 million ($ 2009) in land costs. Further, standard methods and data sources for quantifying reported benefits are scarce (Sciara, Stryjewski, Bjorkman, Thorne, & Schlotterbeck, 2015; Appendix A). Reported cost and times savings are often rough, sparsely documented calculations made within agencies, drawn from expert opinion, or narrow in scope given limited available data.

1.3. Challenges in estimating mitigation's costs and benefits

Existing evaluations seldom rigorously compare the costs of conventional mitigation to those of advance mitigation, yet such analysis faces fundamental challenges. First, the transportation planning field has an incomplete understanding of the mitigation costs for transportation projects, whether using conventional or advance mitigation. Project costing systems of most state DOTs do not adequately reflect the costs of addressing environmental concerns, including costs for restoration activities and for ongoing maintenance, monitoring, and management of mitigation sites. Data on environmental mitigation costs and timelines are often incomplete, missing, or not tracked in a way amenable to analysis. This circumstance has “limited efforts to assess policy impacts and the efficient allocation of resources, given that all benefits and costs of investments cannot be clearly identified” (Macek, 2006, p. 4).

Second, the absence of a counterfactual case to assess what would have occurred without such a program complicates the evaluation of advance mitigation. One might resolve this issue by comparing average mitigation costs, where documented, across pre- and post-advance mitigation implementation, yet this approach has limits. The advance mitigation program would have to have been longstanding before any such comparison could yield statistically robust, not simply coincidental, results. The San Diego Association of Government's *TransNet* advance mitigation program could be a candidate for before-and-after study, but as of late 2014, only seven projects were completed under this effort, too few to reach generalizable conclusions about program savings. Where before-after comparisons are possible, confounding factors – such as land market fluctuations, regulatory changes, and other events impacting project costs and timelines – could influence results.