Facilitating markets and mitigation: A systematic review of early-action incentives in the U.S.

Christopher S. Galik[a,*], Lydia P. Olander[b]

[a] Department of Public Administration, School of Public and International Affairs, Box 8102, North Carolina State University, Raleigh, NC 27695, USA
[b] Nicholas Institute for Environmental Policy Solutions, Box 90335, Duke University, Durham, NC, 27708, USA

ABSTRACT

Early action refers to activities undertaken prior to a regulatory program or generation of services prior to mitigation of impacts elsewhere. In U.S. environmental markets, early action could reduce lags in environmental performance, improve outcomes, and encourage innovation in mitigation approaches. Multiple tools have emerged for encouraging early action in environmental markets. Several tools have also been deployed in markets, providing valuable insight into their function. This paper presents a systematic review of early action tools and describes their use in wetland and stream mitigation, species and habitat banking, greenhouse gas mitigation, and water quality trading. It finds that incentives necessary to motivate sellers differ from those motivating buyers. The tool or approach best suited to encourage early action also varies as conditions change. Anecdotal evidence suggests the potential for benefits to accrue from early action, but additional data are needed to inform the use of specific tools.

1. Introduction: early action and environmental markets

Environmental markets are innovative policy tools designed to provide incentives for the management of ecosystems and the services they provide (USDA, 2017). In recent years, they have emerged as a prominent conservation strategy in a variety of contexts, ranging from greenhouse gas (GHG) sequestration, to water quality regulation, to wetlands and stream mitigation, to species and habitat conservation. In the abstract, environmental markets are relatively simple tools, in which some environmental good is created (e.g., a unit of species habitat preserved, a unit of carbon stored), commodified via an established methodology, and sold or traded to some other entity requiring mitigation to proceed with an otherwise-lawful activity. In practice, environmental markets can be substantially more complicated. The manner in which the unit of trade is determined is complicated and contentious. The spatial distribution of some services is critical to some markets (e.g., species, wetlands) but less relevant to others (e.g., GHG mitigation). Of particular relevance to the analysis below, there are also potential time lags to address, or differences between when a service is generated and when that environmental good is used to mitigate for an impact elsewhere. In this paper, we discuss a variety of tools to help encourage development of environmental markets and to speed delivery of associated mitigation.

1.1. What is early action?

Early action can mean different things, depending on the particular context in which it is used. In some situations, early action refers to activities undertaken prior to implementation of a particular regulatory program, for example, prior to set compliance periods under greenhouse gas (GHG) reduction regimes (IISD, 2002; DiMascio, 2007; Kelly and Bianco, 2009) or prior to implementation of total maximum daily load (TMDL) requirements to improve water quality (Willamette Partnership, 2015). In other situations, early action refers simply to the generation of a particular ecosystem or environmental outcome through protection, restoration, or both prior to the need to mitigate an impact elsewhere (e.g., Hahn and Noll, 1990; Woodward, 2003; USFWS, 2011; The White House, 2015).

Many markets contain both types of early action, and the distinction often blurs in practice. This paper focuses on the policies and incentives used to facilitate early action. It describes the policy tools to encourage early action, and it reviews those that have been used in four markets: wetland and stream mitigation, species and habitat conservation, GHG reduction and carbon sequestration, and water quality trading. It concludes with a brief review of the lessons provided by this implementation experience and recommendations for future research.

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* Corresponding author.
E-mail addresses: csgalik@ncsu.edu (C.S. Galik), lydia.olander@duke.edu (L.P. Olander).

1.2. Purposes of early action: claims of benefits and concerns

Early action has the potential to achieve two distinct benefits. The first is market function, helping to generate sufficient credit supply to provide a viable, low-cost option to buyers and to help new markets gain momentum. The second potential benefit is facilitation of advance mitigation. As markets emerge and mature, early action can increase environmental and other benefits by producing benefits before impacts occur, resulting in accumulated early benefits (e.g., more carbon stored earlier) or reduced lags in outcomes (e.g., wetland functions partially restored before others are impacted). Owing to the complicated, site-specific nature of environmental markets and the inherent complexities of mitigation efforts themselves, questions remain as to whether such benefits are achieved in practice.

As argued by Landry et al. (2005, 20), "one of the major impediments to the success of trading programs is the lack of supply of and demand for mitigation offsets, or 'thin' markets." A thin market is "a market with few buying or selling offers" and one "characterized by low trading volume, high volatility and high bid-ask spreads" (Rostek and Weretka, 2008). Thin markets may lead to higher transaction costs and price volatility (Adjemian et al., 2016; Heberling and Nietch, 2015). Thin markets can also reduce transparency and make it difficult for small parties and outside entities to know the true prices being paid, thus complicating their efforts to fairly participate in or adequately support market activity (Adjemian et al., 2016).

External market support can help to reduce investor risk and thus encourage participation (Moura Costa, 2010). By fostering a more favorable trading environment and seeding emerging markets, early action policies and incentives may also provide important learning opportunities for market participants, lower search and other transaction costs, and help to improve long-term business decision making while reducing economic risks (IISD, 2002; Pan and Van Regemorter, 2004; Streck et al., 2010). If properly designed, early action policies and incentives theoretically could reduce the long-term costs of program compliance (Parry and Toman, 2000; Choi, 2005). If not designed properly, however, early action programs could give rise to activities that undercut market and environmental objectives (Kelly and Bianco, 2009; Streck et al., 2010).

Early action policies and incentives can also speed the delivery of environmental services to market, contributing to early achievement of environmental objectives. Depending on the mechanism used to facilitate early action, early contributions could be retained for longer periods of time before being used to mitigate impacts elsewhere, resulting in further environmental uplift. Advance mitigation may also reduce permitting time, further reducing costs (Institute for Water Resources, 2015). Alternatively, poorly designed early action programs could undercut market or environmental objectives if they foster low-quality activities or fail to provide long-term assurances that a particular service will continue to be provided (e.g., Streck et al., 2010). Environmental objectives could also be undercut if early action policies and incentives serve only to award early adopters for activities that would have been provided regardless of the presence of a market (i.e., credits that are "non-additional").

2. Materials and methods

This analysis undertakes a systematic review of the literature on early action in U.S. environmental markets. The review sought to assess the early action tools that have been used in U.S. markets, and what effect these tools have had on advance mitigation and market function objectives. Relevant literature providing insight into the theory and practice of early action mechanisms was first gathered using targeted searches of literature databases, including AGRICOLA, CAB Abstracts, Environment Complete, and GreenFILE. As in previous works (e.g., Galik, 2015), Google Scholar was also used to avoid possible limitations imposed by search provider emphasis and to ensure inclusion of studies

which may only exist in the gray literature.

A list of possible early action tools was first compiled by reviewing the literature returned from searches for "early action" + "environmental market". The tools identified in the returned literature were then explored using searches for "[tool]", "[tool]" + "early action", and "[tool]" + "environmental market", where "[tool]" is the particular mechanism being explored. No publication year filters were applied to search results. No geographical filters were applied for results describing the theory underlying the operation of early action tools. Implementation examples were limited to U.S. market experience, and were gathered from both the content of literature returned in tool-specific searches and through searches of particular markets referenced in returned studies. In all cases, references in returned studies were also examined, with references relevant to either tool theory and implementation experience included in the analysis. Once particular markets were identified in the literature as making use of a particular tool, supporting information on the markets themselves (e.g., program websites, third-party program assessments, implementing regulations) was reviewed to assess details on tool usage and effect.

An overview of studies included in this assessment can be in found in Table 1. A brief overview of the mechanics and expected effects of early action tools are then presented below in a narrative fashion. This is followed by a review of implementation experience in the four environmental markets most often associated with early action: wetland and stream mitigation, species and habitat conservation, greenhouse gas mitigation, and water quality trading. The review concludes with a short summary of lessons from both the theoretical and applied literature and recommendations for future work.

2.1. Tools to facilitate early action

Multiple policy tools and incentives can be used to encourage or reduce barriers to early action (IISD, 2002). Specifically reviewed are buyer banking, seller banking, purchase guarantees, advance sales, early action credits, grandfathering, phased-in or ratcheting baselines, and general financial, regulatory, and administrative incentives. Apart from having important functional differences, the tools vary in the market actors they affect (e.g., seller versus buyer) and the timing of effect (initial or short term versus long term or continuous). These differences translate into a variety of possible advantages, drawbacks, and distributional effects that, collectively, can influence the decision of when and where to deploy each tool for maximum benefit.

2.1.1. Buyer banking

Buyer banking is the authorization for a buyer of an environmental credit to hold that credit for use against future compliance obligations or for resale at a later date (e.g., Whitesell and Davis, 2008). Buyer banking facilitates early action on a continuing or long-term basis by providing an incentive for buyers to invest ahead of anticipated needs, thus increasing planning flexibility and decreasing price and supply risk (Valderrama et al., 2013; Olander, 2016).

2.1.2. Seller banking

Seller banking is the authorization for a producer or seller of an environmental credit to offer that credit for sale at some date following generation of the credit. The most straightforward example is the establishment of physical banks, which produce tangible benefits for a particular resource (e.g., wetlands, species). If deployed correctly, seller banking can help seed the available stock of credits and act as a price-hedging tool to maximize profitability over the long run.

2.1.3. Purchase guarantees

Purchase guarantees are formal contractual relationships that detail the fixed price that is to be paid by a buyer for some quantity supplied by a producer (Lowder et al., 2011). Purchase guarantees involve a reallocation and sharing of market risk (Olander, 2016; Lowder et al.,