

# Large-Scale Ecosystem Restoration and the Federal Policy Process

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A significant movement in environmental policy has emerged over the last 20 years that seeks to target federal resources toward the restoration of large-scale ecosystems. Starting with the 1983 Chesapeake Bay Agreement, the movement now includes more than a half-dozen restorations-in-progress, spanning community, state, and even national boundaries. These large-scale restoration efforts have evolved in response to the awareness that the physical, biological, and chemical integrity of such ecosystems are closely intertwined. The ubiquitous, persistent nature of some pollutants, the spread of increasingly mobile populations and economies, and an intensification of human activities such as land development and agriculture are causing conventional media-specific programs to lag far behind regional needs. As a result, an emerging theory holds that restoration will be achieved most effectively if activities can be targeted to the specific needs of specific places.

Resources required to support these large-scale restorations are measured in dozens of organizations, hundreds of people, and billions of dollars, and the time-scale is generational. As subregions rally scarce resources to launch or step up large-scale initiatives, questions of whether a given initiative will result in real programs and if so, whether the programs will in fact deliver results become urgent. Because of conflicting interests, ecological complexity, and high costs, restoration actions are necessarily deferred pend-

ing lengthy and charged negotiations among stakeholders. Yet even after agreements are reached and monies allocated, actual progress—or lack of progress—takes decades to assess. These facts underscore the critical importance of understanding what leads to successful restoration activities and what does not, and how to support more immediate actions that will advance restoration in our nation’s ecosystems across the board.

## The Ecosystem Approach to Restoration

The ecosystem approach to restoration is place-based, holistic, and multidisciplinary, and broadly considers environmental factors, including land, surface water, underground aquifers, vegetation, species, and their linkages. This contrasts with a narrower approach used, for example, to restore the habitat of a single endangered species or regulate discharges to a single environmental medium such as air, independent of other media, such as water.

Some conservation biologists have raised concerns about the shift from species-specific or habitat-based approaches to conservation planning to ecosystem-based approaches. Increases in the spatial scale of the restoration effort are almost inevitably accompanied by increases in its complexity, variability, and uncertainty. As discussed in greater detail below, this points to the importance of adaptive management to all large-scale ecosystem restoration efforts.

Particularly with large-scale initiatives, human impacts caused by infrastructure, industrial activity, and intensive land uses—ranging from suburban development to agriculture—all form inseparable dimensions of the ecosystems approach to restoration. Practically speaking, these human dimensions almost always constrain the restoration goals of initiatives and also play a critical role in the choice of strategies for achieving them. They also point to the strong need for interdisciplinary collaboration among biophysical and social science experts, as well as extensive stakeholder involvement, in all phases and facets of the ecosystem restoration initiative.

## Comprehensive Planning and the Limits of Ecosystem Restoration

Often the first noticeable indications of an impaired ecosystem are species-level symptoms such the decline of oysters in the Chesapeake Bay or salmon in the Columbia River, but the holistic ecosystem approach to restoration focuses on the system-wide stressors and interactions that are responsible for those declines. Overharvesting, hydrological or habitat alteration, excess nutrients, disease, competing non-native species, and toxic materials all might be implicated in these declines. Often it is necessary to address this entire complex of issues to arrest and reverse the ecosystem’s degradation.

Restoration’s purpose is to return the ecosystem to some prior, more functional state. From a scientific, ecological

standpoint, one can posit a historical condition of the ecosystem before the disturbance, but reestablishing the ecosystem's pre-disturbance condition is rarely, if ever, the goal of restoration activities. Competing uses, high costs, and limited technical and scientific capabilities all impose practical limits to ecosystem restoration goals.

In the case of the Florida Everglades, due to "substantial and irreversible reductions in the spatial extent of the wetlands system" and a significant lack of data, the restoration goal is to "create a 'new' Everglades, one which will be different from previous systems, and one which will be substantially healthier than the current system." However, even in the Everglades, the trajectory is toward determining and working toward a historic condition. Without an agreed-upon end state it is not possible to measure progress and determine what changes in the ecosystem constitute success or failure.

### ***The Challenges of Large-Scale Ecosystem Restoration***

The unprecedented size and complexity of large-scale restorations present challenges that smaller restoration efforts do not face. Each of the seven initiatives in the Northeast-Midwest Institute's study—including the region's Great Lakes, Chesapeake Bay, and Upper Mississippi River—involve a myriad of interconnected and inter-related habitats, species, vegetation types, rivers and tributaries, climatic zones, and underlying geomorphology. The target of restoration is not just one coastal wetland or one harbor loaded with contaminated sediments. In the Great Lakes, for example, it will be necessary to clean up contaminated sediments in dozens of harbors and restore hundreds of thousands of acres of coastal wetlands in order to begin to address the long list of serious and debilitating ecosystem impairments.

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often are immense. The sources of stress can be located hundreds of miles away from the ecosystem they impair, and there is often no easy way to isolate causal pathways. Furthermore, impairments to large-scale ecosystems rarely stem from single stressors, but are usually the result of cumulative impacts of individual stressors over long distances and periods of time. Examples would be:

- Excess nutrients escaping from individual farm fields and municipal wastewater treatment plants in Pennsylvania, New York, Maryland, and Virginia until they concentrate to levels that harm the aquatic life of the Chesapeake Bay.
- The acre-by-acre filling-in of wetlands over decades resulting in an 80 percent loss of the wetlands in the estuaries of the San Francisco delta.
- One hundred years of building hydroelectric dams and levees along the Columbia River, resulting in a more than 90-percent decline in wild populations of salmon and 50-percent loss of salmon and steelhead habitat.

Complexity and scale issues present both scientific and institutional challenges. Restoration planning efforts must bring together people with disparate, competing, and even clashing interests. Since ecological rather than political boundaries determine the scope of restoration plans, innovative cross-jurisdictional arrangements often are necessary to target restoration activities appropriately and adequately safeguard public and private rights and interests. In the case of the Great Lakes, even the U.S. national boundary must be crossed to involve Canadian leaders as equals if restoration efforts are to succeed.

A further challenge is that large-scale ecosystem restoration must proceed in the midst of considerable scientific uncertainty. This requires implementing agencies to adopt adaptive management frameworks that often are at odds with standard institutional and budget protocols. The scientific challenges associated with large-scale ecosystem restoration have provided the benefit of advancing methods of monitoring and modeling biological, chemical, and physical changes. For example, scientists working to restore the Chesapeake Bay have become world experts in modeling as they pushed their own boundaries of knowledge to craft new ways to track and understand aquatic ecosystem responses.

The final challenge of large-scale ecosystem restoration is financial. In seeking to tackle hugely complex environmental problems, these initiatives tend to be hugely expensive. As one person interviewed for the study said, large-scale ecosystem restoration is "a game of billions." In a world of limited budgets, this points to the immense but all important task of rallying public support and political will around very long-term and geographically expansive initiatives.

## Obtaining Political Support: Understanding the Federal Policy Process

One critical component of large-scale restoration is the federal policy process for obtaining program authorization and funding. It may be necessary for restoration advocates to adapt their original proposal, slightly or in some wholesale way, to assure their proposal comes out the other end of the legislative process to enactment. Restoration advocates should make changes with their eyes open to the potential consequences in terms of how the restoration will actually play out. While many changes will be justified, improve the proposal, and assure actual passage, others will not be justified or undermine the original proposal too dramatically. In the latter instance, delaying action to a new Congress, or pushing ahead with something that seems unlikely but meritorious, may be in order.

### *Obstacle 1: Your Region is One of Many*

While consensus for restoration generally develops in a region, the federal government plays the major role in advancing restoration efforts in all the nation's ecosystems. Yet convincing Washington policymakers of the merits of specific restoration efforts is an onerous task. To be successful, restoration supporters need to get the attention of the appropriate agencies and Congressional committees. For this to happen, it is essential to identify a "friend" in Washington—either in the administration or Congress—who has influence and can keep the plan moving forward. Coupling two or more individuals with complementary influence is the best strategy, particularly bipartisan, cross-committee, or cross-chamber couplings.

Many supporters of restoration efforts have delayed approaching Washington for federal authority

and funding, resulting in uncertainty about issues such as which federal agency should provide leadership and the extent to which other agencies are involved. Some regions have been working independently to determine how to attract funds and implement restoration actions. Because of Washington's high level of responsibility for both restoration implementation and funding, it is important to include federal policy makers in restoration proposal developments at an early stage.

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### *Obstacle 2: Agency Leads Must be Identified*

Barring a presidential decision to launch a regional restoration effort, Congress must act for a regional restoration strategy to be implemented with the assistance of a federal agency—such as the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, or U.S. Fish and Wildlife Service. It is important for restoration advocates to come to Washington prepared to address a) which agency should be the lead based on its existing activities; b) whether that agency fundamentally supports the restoration initiative and

the advocates' preferred approaches to implementing it; and c) whether new legislative authority would be needed for that agency to undertake the effort. Joint leadership arrangements can be constructed through direct division of labor or through teamwork using terms like "concurrence," "coordination," and "consultation." In general, the more complex the leadership arrangement, the more difficult the enactment process on Capitol Hill as more committees become involved. Implementation also will be more cumbersome with complex leadership arrangements. Still, it is rare that a single agency has all the skills (including available resources) necessary to deliver an ecosystem restoration successfully. In the end, restoration advocates must determine the best balance between complexity and agency skills for their initiative, and must be able to justify that mix to their champions on Capitol Hill.

### *Obstacle 3: Showing Support*

Initially, policymakers on Capitol Hill commonly seek to determine the degree of support for a restoration proposal among the affected federal agencies. It is extremely important not to take agencies by surprise with proposed congressional directives since their knee-jerk reaction will be to oppose it. Instead, restoration advocates should cultivate support within the agency so when the congressional champion "pops the question," the answer will be affirmative.

Congressional policymakers also assess a restoration effort's nonfederal support. This evaluation includes determining how local constituents feel about the proposal, whether there is state support, and who else will contribute funding and resources for the effort. Policymakers generally will not act if there is substantial local opposition to a restoration effort. Accordingly, cultivating documented support in advance of approaching congressional champions is advisable.

**Obstacle 4: The Funding Crunch**

It is important to think ahead to the likelihood that funding will be needed to support a new initiative. A legislative authorization without funding means nothing on the ground. The design of the legislative authorization influences the likelihood of funding. For example, congressional appropriators are not fond of bearing the brunt of costs, so they will not act without the commitment of states and/or other responsible parties to some form of cost sharing. In addition, members of Congress will not write blank checks; they do not provide large amounts of money for projects unless they know where the money is going, how much is needed annually, and for how long the funding will be needed. Finally, policymakers perform their oversight role, determining how progress will be measured and what factors will indicate the achievement of restoration goals. The legislative authorization should include measurable and achievable goals so that continued funding can be justified.

**Obstacle 5: Picking a Train that's Running**

This problem is perhaps best solved by congressional champions rather than restoration advocates from the region, but it could entail alterations to the ideal legislative authorization which should be carefully reviewed by the regional advocates. If the restoration effort requires new federal authority, a number of criteria are used to determine how to best win passage by both the Senate and House. Often a stand-alone piece of legislation, while the least encumbered by underlying precedent, is the most difficult to enact because it requires its own set of hearings and mark-up sessions in an already overly busy congressional calendar. Attaching the initiative to a larger legislative vehicle, if a suitable one is already pending—such as the Water Resources Development

Act which authorizes Army Corps of Engineers work, or the Clean Water Act, which authorizes Environmental Protection Agency work—can assure committee action. Still, in so doing, the proposal may have to be adapted to fit the underlying bill.

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The congressional champions also will seek to draft the legislation so that it is destined to pass through a committee of jurisdiction that is friendly to the proposal, and will avoid committees that are not friendly to passage. This bit of engineering also can entail changes to the original restoration vision of advocates. Finally, Capitol Hill champions will seek to include specific provisions to make the legislation attractive to committee and chamber leadership, which also could alter the original proposal.

**Obstacle 5: Circling Wagons and Firing In**

A trend toward restoration efforts independently vying for the attention of Washington is seductive to advocates of specific proposals, but ultimately a losing game. In effect, the regions are competing against each other, and it is easier to kill a proposal on Capitol Hill

than gain its enactment. Historically, each region has worked on its own because each has its own set of drivers. For example, some efforts are the result of past federal activity that was found to be harmful, such as the navigation and dredging operations in the Upper Mississippi River and Coastal Louisiana. Some efforts, as in the Great Lakes, result from the failure of poorly coordinated programs to make headway. Other initiatives are driven by litigation over water rights (e.g., in the South Florida Everglades) or the protection of endangered species (e.g., in the Columbia River). No matter what the drivers are, the result is a handful of federal agencies taking the lead on regional restoration work and multiple restoration frameworks.

In practical terms, this lack of synchronization has resulted in inefficiencies as multiple agencies are gearing up to undertake similar objectives. In addition, region-by-region opportunism has meant that regions that benefit from senior representation on the relevant authorizing and appropriating committee fare better than those that do not, regardless of merit or urgency of their respective needs. Moreover, it has led to internecine struggles for the same federal resources, and such one-on-one engagement of Washington in some cases has produced changes in program missions during the Congressional appropriation process—to the detriment of other environmental programs. The most important downside of this approach is outlined under the next obstacle.

**Obstacle 6: Watch Me Pull a Rabbit Out of My Hat**

Because attention is currently focused on new regional restoration efforts, there is not adequate attention on line programs that are languishing or being actively eroded. While the prospect of receiving billions of restoration dollars is very attractive, funding and improvement of current federal envi-

ronmental safeguards is the foundation of ecosystem restoration success. Building on a failing foundation does not work.

First, there is a basic funding problem. The overall funding for environmental and conservation-based programs has not grown significantly in recent years. As a result, increases in regional restoration funding could result in corresponding decreases in the national baseline environmental and conservation programs that provide the backbone of ecosystem protection and restoration. Examples of these “line” programs include the state revolving loan fund that helps communities improve sewer systems; initiatives that minimize point and nonpoint source pollution; efforts that reduce atmospheric deposition of pollutants; cost-share assistance to farmers for agricultural conservation; and programs that prevent the introduction of invasive species.

Second, there has been little focus on how to strengthen and improve these national programs to make them more supportive of restoration initiatives or more effective generally. Some key improvements would include enhancing a program’s operational efficiency, delivering funds to restoration opportunities, and evaluating potential changes in programs and regulations against restoration objectives. Because several of these line programs are reauthorized by Congress every five years and agencies are able to amend regulations, there are frequent opportunities to support and improve these national programs.

Third, in the absence of active support, those who would like to erode or eliminate these national programs, especially the regulatory ones, are succeeding. In some cases, restoration advocates are afraid to confront these efforts to erode environmental regulation because they involve the very congressional members who are pur-

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porting to be champions of a particular initiative. Yet, without these regulatory protections, the cost of restoration soars even higher than it already is, and what Congress delivers to regional restoration initiatives is more red ink rather than the black ink that they seek.

Solely focusing on improving national programs will not address all the endemic concerns of specific regional restoration programs. The best strategy would be to form a collective effort to advance and improve national line programs while at the same time advancing regional initiatives. This approach could be achieved by encouraging inter-regional dialogue about common problems and needs. There is also a need for greater transparency so that everyone understands the impact of regional requests on line programs, as well as a better ecosystem valuation of baseline contributions of existing programs to regional restoration accounts. For instance, restoration advocates across the country need to understand the dollar value for restoration of Clean Air Act regulations, stormwater management, coastal zone and non-point source pollution management; as well as the potential dollar value that changes in the Environmental Quality Incentives Program within the Department of Agriculture could contribute to their efforts. Improvements in line programs not only further the value of restoration in all regions, but also result in hard cash for ecosystem restora-

tion. Another benefit of line programs is that they receive administration support in the budget process and generally obtain more consistent funding levels from year to year than regional initiatives do.

It is essential to realize that ecosystem restoration is achievable and need not come at the expense of other regions. Restoration advocates from across the country must work together to improve and sufficiently fund the national environmental and conservation programs that provide the minimal level of protection and restoration. At the same time, we must systematically support regional restoration efforts in order to tackle problems not addressed under the national line programs.

## Conclusion

Large-scale ecosystem restoration opens new and challenging frontiers in environmental policy. Reversing long-term degradation across large landscapes is a daunting task. To move forward, the concept of ecosystem restoration must progress from regional projects to a national priority, from an expensive option to an economic and ecological imperative. From our study of seven large-scale ecosystem restorations around the country, we reached three overarching conclusions:

### *Make Large-scale Ecosystem Restoration a National Priority*

Currently there are more than a half dozen large-scale ecosystem restorations in process, including the Upper Mississippi River, Chesapeake Bay, and Great Lakes in the Northeast-Midwest region. These efforts have evolved based on the belief that restoration can best be achieved by regions acting separately to compete for federal funds. Yet because of severely limited federal resources, we believe this premise is no longer true. We argue

for a new coordinated, collective effort to place large-scale ecosystem restoration at the top of national priorities. We envision a two-part approach of 1) advancing and improving national line programs—such as the revolving loans under the Clean Water Act—while 2) jointly advancing regional priorities. We propose active and on-going documentation of the ecosystem and economic benefits of existing and proposed federal line programs, and then combining forces to promote those programs and secure adequate federal appropriations. While the prospect of receiving billions of restoration dollars is seductive, funding and improvement of current federal environmental safeguards is the foundation of ecosystem restoration success. Building on a failing foundation does not work. In combination with this valuation of line programs, we propose jointly supporting funding of top restoration priorities for each region.

#### ***Transform Complex Human Systems***

We believe restoration can be a vehicle to transform and improve complex human systems, including those focused on energy, transportation, and

economics. Concentrating solely on restoration's upfront costs overlooks real benefits stemming from the new technologies and business efficiencies associated with large-scale ecosystem efforts. To realize these benefits, we need to let go of old ways of thinking in order to develop win-win strategies for ecosystem health. Restoration planning should aim to transform the future of the region's human systems that interact with ecosystem health. For example, the Northeast and Midwest regions' transportation system, electricity production and delivery processes, and land-use planning mechanisms all need modernizing to make them compatible with long-term ecosystem restoration and protection objectives. The region's savvy industrialists will see this restoration effort as an opportunity to move aging infrastructure into the 21st Century.

#### ***Keep Our Eyes on the Prize***

It is difficult to keep the vision of a healthy, restored ecosystem in mind as we struggle with day-to-day realities. Ecosystem restorations entail complexities, uncertainties, and huge costs, but tackle these problems we must for

human economic and social life cannot thrive if the existing trajectory persists. The challenge is to stay the course long enough to ensure a solid future for our grandchildren and their grandchildren. Needed are an inspiring vision, political will, cross-regional cooperation, and continual reevaluation and realignment. By working and learning together, large-scale ecosystem restoration initiatives hold promise as forerunners to a higher quality of life throughout our nation.

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*The authors are part of the Northeast-Midwest Institute's ecosystem team. This article includes excerpts from Large-Scale Ecosystem Restoration: Lessons for Existing and Emerging Initiatives, published by the Northeast-Midwest Institute in April 2005. That report reviews the restoration efforts of the Chesapeake Bay, Coastal Louisiana, Columbia River, Everglades, Great Lakes, and Upper Mississippi River for lessons learned. The full report, with extensive case history appendices, is available free of charge at [www.nemw.org/restoration.htm](http://www.nemw.org/restoration.htm) under "Project Reports."*