Ecosystem Restoration Business Line Budgeting:

A Systems Approach

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Critical Think Piece (CTP)

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Introduction

Much effort is underway within and outside of the Corps of Engineers to quantify the benefits of our ecosystems and, therefore, capture the value of restoring those systems that have been degraded by man's activities. One goal of these efforts is to ensure the wisest Federal investment to achieve the Corps' mission of restoring degraded ecosystem structure, function, and dynamic processes to a less degraded, more natural condition. This is, in part, an effort to prioritize the budgeting process for the projects that fall in the Ecosystem Restoration Business Line, as well as an effort to more clearly define the science and true benefits of ecosystem restoration.

Background

Under the current budgetary guidance for the Ecosystem Restoration Business Line, opportunities to be emphasized for restoration are associated with wetlands, riparian and other floodplain zones, and aquatic systems which are appropriate for Corps involvement. Factors for consideration when examining wetlands, riparian corridors, and aquatic systems are continually being developed. The fiscal year (FY) 2009 Budget Engineering Circular (EC 11-2-187) includes new, improved criteria which address both specific and general aspects of individual ecosystem projects. These criteria are: Habitat Scarcity, Connectivity, Special Status Species, Hydrologic Character, Geomorphic Condition, Self Sustaining, and Plan Recognition.

When a District assembles the initial budget submissions, Project Managers/Planners familiar with the projects score each project on these ranking criteria. This results in a local

district prioritization for ecosystem restoration projects, most likely between similar or comparable habitats.

These District rankings are then grouped at the Major Subordinate Command (MSC) level and ranked and prioritized accordingly. This results in an MSC prioritization for ecosystem restoration projects. Since all MSC's cover regions with fundamentally different habitats, it is probable that, at the MSC level, projects from very dissimilar ecological areas are being compared.

Ultimately, the budget is assembled at Headquarters (HQ), where there are unavoidable comparisons of projects representing dissimilar habitats. While district expertise is utilized on a case-by-case basis, it is invariably a strict comparison of MSC rankings, without a view of targeting habitats or ecosystems from a broader systems perspective. These HQ rankings are then submitted to the Office of Management and Budget (OMB), which reviews and ultimately establishes the President's budget sent to Congress. Once an appropriation is passed by Congress, the rankings as established by the President's budget are followed for prioritization of funding for ecosystem restoration projects that are not otherwise individually named and funded by Congress.

The criteria outlined in the Budget EC are appropriate for comparing projects located in similar geographic locations. Given the current budgeting process, however, many of the criteria are less appropriate for comparison on a nationwide scale. For example, judgments made between projects on items of scale, species, geomorphology or plan recognition have less direct relation to a unified approach for addressing the nation's needs. Habitats from various parts of the country might have a very different need on a national scale, but might earn equivalent scores on those particular criteria. For example, a tidal wetland in the Chesapeake Bay is dissimilar to

wetlands in Southern Florida, the Mississippi Valley, and the Columbia River Basin, but the politics involved in each of these areas is a strong driver for the scores for budgeting priorities.

The current system is functional, but not optimal. Criteria in the existing budget process do not lend themselves to a systems approach. The reason for this is that the currently utilized budgeting criteria do not easily allow for comparisons outside of ecologically similar areas and, therefore, cannot be considered a systems approach when the project environments being scored are so different. Another reason the current approach is not optimal is that budgetary rankings on ecosystem restoration projects submitted to OMB are made by the Corps with little input from other agencies with the exception of the plan recognition criteria, while projects that the Corps implements may have great impacts on other agencies and their mission areas. This paper proposes a more optimized approach for budgetary decisions that better reflects the nature of ecosystems and applies a collaborative structure to prioritization of ecosystem restoration projects.

Habitat

A habitat is any environment in which biologic organisms normally live and biologic processes occur. Habitat, for the purpose of this paper, is defined by its biodiversity, physical structure, and ecosystem functions. Biodiversity is defined as the number and variety of organisms found within a specified geographic region. Physical structure is the hydrology and geology of a given habitat. Ecosystem functions are defined as the physical, chemical, and biological processes or attributes that contribute to the self-maintenance of the ecosystem. Habitat is the critical component to analysis of projects, and it is at the habitat level that comparisons between projects are more aptly made.

Existing Data

Many governmental agencies and non-governmental organizations (NGO's) have been conducting extensive research and have collected significant data on the many unique habitats throughout the United States. Due to restricted mission areas and budgeting constraints, most of these data sets are fragmented, inconsistent, and incomplete. For example, the U.S. Fish and Wildlife Service (USFWS) has extensive research and data on waterfowl and terrestrial animals but lacks detailed information on marine habitats since this is not within its area of responsibility. In contrast, the National Marine Fisheries Service (NMFS) has conducted extensive research and collected data on the habitat needs for marine fisheries and mammals. No single repository could be identified during the development of this paper where all Federal agencies, non-Federal agencies, and NGO's with habitat mission areas or interests had compiled and interpreted data that seamlessly covered the United States.

Since flora and fauna do not have political boundaries, their habitats overlap. For example, the blue heron, whose habitat USFWS has purview over and an interest in, may eat young salmon, whose habitat is researched by NMFS. Therefore, better coordination of information and data nationally would provide better understanding of habitats and habitat needs.

Ecological Divisions

One possible framework that could be used to encompass all of the habitat information would be a National Ecosystem Restoration policy focused on Ecological Divisions. This approach is outlined in great detail in a report funded by The Nature Conservancy titled "Ecological Systems of the United States, A Working Classification of the U.S. Terrestrial

Systems" (NatureServe, 2003). Ecological Divisions represent a more regional size and distribution of habitats that include many different types of comparable or similar habitats. This approach intrinsically views habitat from a systems perspective.

Ecological Divisions are defined by many physical and biological features which may include, but are not limited to, biodiversity, ecosystem functions, and physical structure including landforms, landscape juxtaposition, and vegetation structure. Figure 1 is a representation of Ecological Divisions as delineated by the NatureServe report for the North American continent.

Implementation Plan

Given the large amount of existing data and the broad spectrum of interests in habitat restoration, the prioritization of the ecosystem restoration budget submitted to OMB is not a decision that should be made by the Corps of Engineers alone. The Corps of Engineers is recognized as one of the premier organizations for inter-agency collaboration. Due to the large amount of fragmented information currently available, there is a need to bring the various agencies and subject matter experts on habitats together to synthesize the information into a framework for habitat prioritization. This framework could then be used by all Federal agencies for implementation of their respective missions.

The Corps of Engineers should take the lead on developing an Inter-Agency Prioritization Committee (IPC) which would be a multi-agency, national-level committee tasked with the responsibility of establishing funding goals for individual Ecological Divisions. The IPC would be represented by Federal and state agencies, NGOs, and academia which operate within the Ecosystem Restoration area; have specific technical expertise to assist in the decision-making

process; and have an interest in an efficient and effective national approach to ecosystem restoration and protection.

Agencies that could participate on the IPC include: USFWS, NMFS, U.S. Forest Service, U.S. Geological Survey, U.S. Environmental Protection Agency, Natural Resources Conservation Service; NGOs such as The Nature Conservancy, The Audobon Society, The Chesapeake Bay Foundation, and Ducks Unlimited; state resource agencies; and academia, with non-Federal participants serving in an advisory role. Since the IPC would help establish a Federal prioritization strategy for habitat restoration and preservation budgeting, the OMB and the Assistant Secretary of the Army for Civil Works are also suggested members.

There are certain tools available to assist the IPC in their mission of assessing habitat health and establishing priorities on a national scale. Models such as the Multi-Scale Assessment of Watershed Integrity (MAWI), developed by the Environmental Laboratory of the Engineer Research and Development Center, and the Ecosystem Management Decision Support (EMDS) System, developed by the U.S. Forest Service, could be useful and appropriate tools to assess aspects of the Ecological Divisions. Such aspects could include a percentage of the Ecological Divisions with altered hydraulic conveyances, percentage of Ecological Divisions with restricted access of waters to floodplains, or percentages of hardened or impervious land cover. In addition, these models can assist in calculating the integrity of Ecological Divisions and be viewable on a platform such as ArcGIS, thereby making visualization of data and discussions by the IPC and policy makers more productive when assessing the rankings and prioritizations for budgeting.

When using data integration tools, specific criteria will help in the process of prioritization. Criteria such as percentage of habitat lost with respect to the percentage of

recoverable habitat available in an Ecological Division could be an appropriate method to discern which Ecological Divisions might have a higher priority for funding. Other factors may be determined by the IPC as more useful or appropriate for screening, based on collaboration amongst the IPC and its advisors. First, clear metrics should be established by the IPC to better establish the focus of analysis during data integration.

Once the IPC has established decision metrics, integrated available data, and established funding priorities and levels-of-effort for individual Ecological Divisions, the next step would be to determine the means of funding individual projects. Under the proposed scenario, the budget process for ecosystem restoration projects would change significantly. Instead of a ranking process by District, then MSC, and then HQ, funding would be allocated to each of the Ecological Divisions based on the prioritization established by the IPC. Projects within the same Ecological Divisions would then compete for the funding allocated to the respective Ecological Divisions. Metrics that could be used could include the existing FY09 Corps Budget Criteria for ecosystem restoration, habitat units, indexes of biotic integrity, or any other agreed-upon metric that can be compared within the same Ecological Division.

Benefits of Implementation

Evaluation criteria used within an Ecological Division would likely meet less resistance by stakeholders and special interest-groups, given that similar habitats would be competing against each other with the same metrics. As stated above, at the Ecological Division level, the current Corps budgeting criteria could effectively be used to better scrutinize similar habitat for prioritization as well.

With the Ecological Division concept comes the added benefit of increased cooperation between MSCs. Many projects could exist that would cross MSC boundaries while remaining in one Ecological Division, requiring MSCs and Districts to have better coordination regionally and a systems focus. This greater level of coordination will ultimately benefit the Corps with respect to information sharing, lessons learned, and an organization-level perspective.

A final beneficial outcome of the Ecological Division concept and the implementation of the IPC is the opportunity to assist the Washington-level decision-makers, such as the HQ's components of Executive Branch departments and the OMB, with a scientific, targeted, and efficient prioritization for funding of ecosystem-related projects. The process could be used to unify Federal Government agencies in their perspectives on best use of dollars for habitat restoration or protection initiatives.

Recommendations

There are three recommendations to implement as outlined in this paper. First, it is recommended that the Corps of Engineers take a leadership role in focusing the Federal budgeting perspective at the Ecological Division level by establishing an Inter-Agency Prioritization Committee (IPC) to set funding priorities at that level. In this light, the members of the Civil Works Planning Community of Practice, such as the Planning Associates, could provide leadership and momentum for this change. Second, it is recommended that the Corps of Engineers, in consideration of the recommendations of the IPC, budget at the Ecological Division level for ecosystem restoration projects. Third, it is recommended that the Corps of Engineers compare ecosystem restoration projects at the Ecological Division level, using consistent metrics within the Ecological Division.

Conclusions

In conclusion, a systems approach to ecosystem restoration should focus on Ecological Divisions. A properly planned and collaborative effort to prioritize habitat restoration strategies from a national level will help move the Corps of Engineers to a more efficient, holistic planning and implementation process for ecosystem restoration. The Ecological Division concept will provide a more unified Federal approach for focusing ecosystem restoration funding across organizations, and allow for better acceptance of selection metrics used between similar projects in a common Ecological Division.
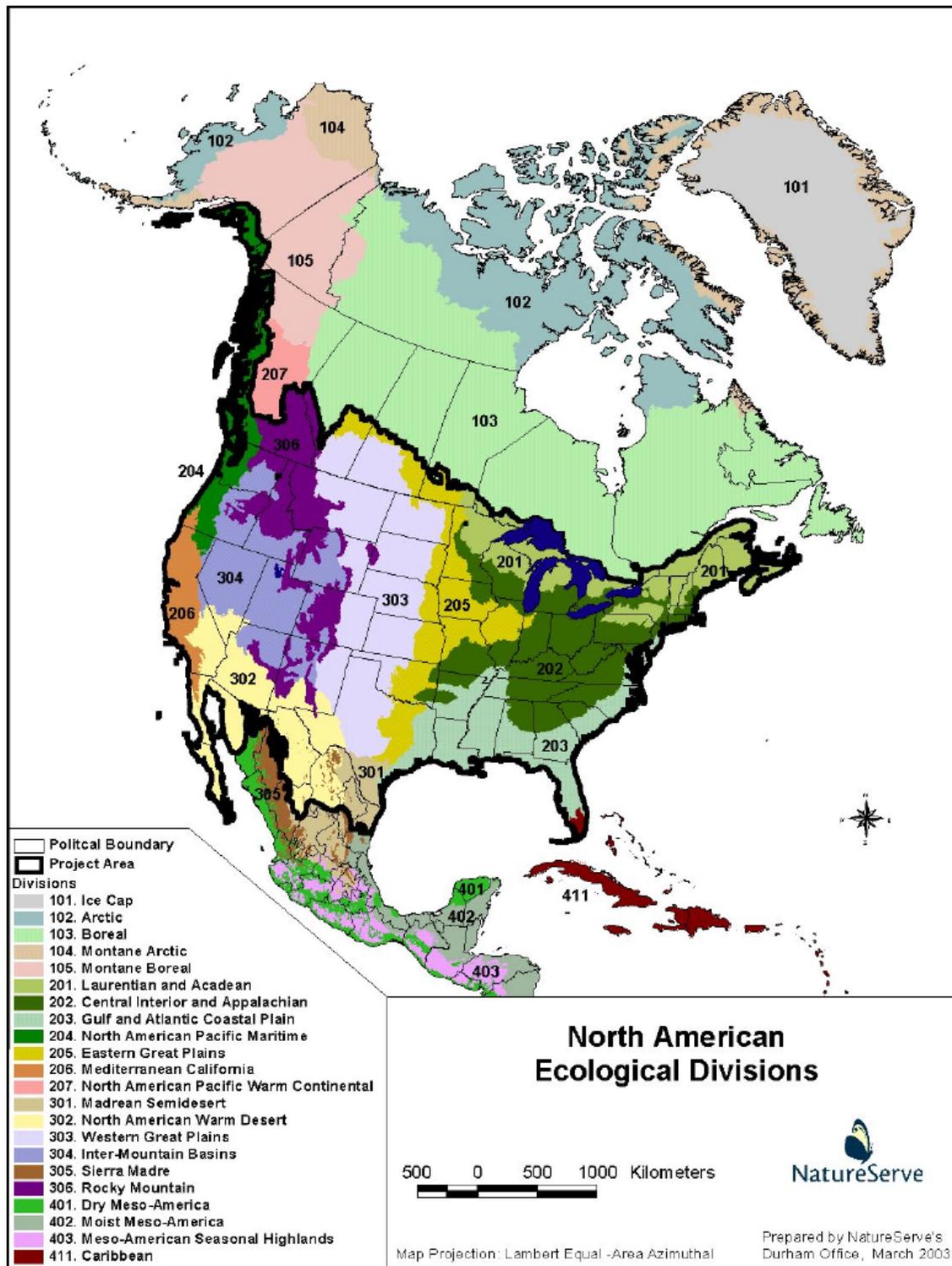
Figure 1 – Ecological Divisions of North America

The legend for the map reads:

Politcal Boundary
Project Area

Divisions
- 101. Ice Cap
- 102. Arctic
- 103. Boreal
- 104. Montane Arctic
- 105. Montane Boreal
- 201. Laurentian and Acadean
- 202. Central Interior and Appalachian
- 203. Gulf and Atlantic Coastal Plain
- 204. North American Pacific Maritime
- 205. Eastern Great Plains
- 206. Mediterranean California
- 207. North American Pacific Warm Continental
- 301. Madrean Semidesert
- 302. North American Warm Desert
- 303. Western Great Plains
- 304. Inter-Mountain Basins
- 305. Sierra Madre
- 306. Rocky Mountain
- 401. Dry Meso-America
- 402. Moist Meso-America
- 403. Meso-American Seasonal Highlands
- 411. Caribbean

North American Ecological Divisions

NatureServe

500   0   500   1000 Kilometers

Map Projection: Lambert Equal-Area Azimuthal

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