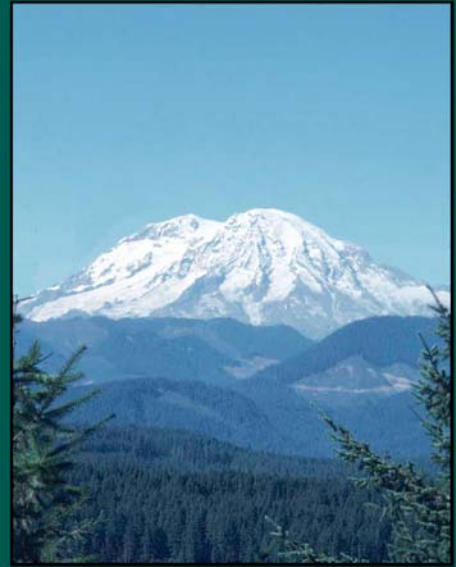# BUYING, SELLING, AND TRADING BIODIVERSITY IN WASHINGTON: A BAZAAR FOR BIODIVERSITY

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Defenders of Wildlife
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DEFENDERS OF WILDLIFE

Defenders of Wildlife is a national nonprofit membership organization dedicated to the protection of all native animals and plants in their natural communities.

Buying, Selling, and Trading Biodiversity in Washington:

A Bazaar for Biodiversity

DEFENDERS OF WILDLIFE
West Linn, Oregon • Washington D.C.

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PREFACE — *by Sara Vickerman*

The State of Washington is one of the few in the nation with an official policy acknowledging the importance of biodiversity conservation. The governor appointed a Washington Biodiversity Council in 2004 to develop a long term conservation strategy for the state. The council hadn't gotten far with its deliberations before it began to focus on the need to address biodiversity conservation on private lands.

Defenders of Wildlife has long recognized that although public land supports many important habitats and species, many more depend entirely or partly on private land. And while land acquisition, regulations and government incentive programs are important tools, new approaches are needed in order to accomplish the enormous task of conserving the nation's biodiversity before it is lost to development and other threats.

In preparation for a major conference on landowner incentives, sponsored by the Washington Biodiversity Council in January of 2007, Defenders offered to write a background paper outlining some policy options. We were fortunate to have Bartholomew (Mac) Martin as a summer "resident" completing the requirements for his Masters Degree in natural

resource policy at Portland State University. Together, we decided that some of the most novel and promising approaches to conservation are emerging as part of a new generation of market-based tools like conservation banking. Though challenging to implement, these tools have the potential to re-direct existing mitigation programs toward more integrated and ecologically significant projects while providing new and profitable opportunities for private landowners to sell "ecosystem services" to developers.

This report provides extensive background information on these market-based strategies and methodically outlines the opportunities and challenges they present. After sifting through many policy options to facilitate the implementation of market-based conservation strategies, Mac recommends the creation of special districts for biodiversity markets, using ecoregional boundaries.

Time will tell whether this approach or other some other institutional arrangement will best expedite biodiversity conservation in Washington or elsewhere. Regardless of the outcome, we believe the information in this report will be useful to policy makers and others who want to tap new revenue sources for conservation and engage private landowners in a positive way.

I. EXECUTIVE SUMMARY

The future health of Washington State's natural resources, and specifically its native biodiversity, depends on the coordinated management of public and private resources. This presents the state with a difficult question: How can the public need to preserve and restore vital natural resources occur while still respecting the historically-established property rights of private citizens? One of the many possible answers to this question involves an emergent class of public policy that transfers principles common in commerce to the arena of natural resource conservation. This modern approach, often described as market-based public policy, frequently allows for conservation goals to be met in a less intrusive, more effective, and more efficient manner than traditional prescriptive approaches. The use of market-based policies to preserve a region's biodiversity, like mitigation banking and payments for ecosystem services, lacks successful precedent. Nonetheless, it still holds promise as a way to preserve and restore Washington's biodiversity in a manner that meets public goals and respects private rights. Specifically, market-based policy may be of particular use in filling gaps left by the current regulatory framework and in organizing isolated public efforts into a more comprehensive and congruent whole.

Biodiversity includes three major components: living organisms, their relationships with each other, and their relationships with the land, air, and water around them. It therefore includes most of what we commonly call *nature* and attempts to capture all of the naturally occurring differentiation and variability present in a given area. A robust level of biodiversity provides humanity with opportunities for economic gain, security against future disasters, and genetic knowledge. It also plays a key role in the provision of ecosystem services that help sustain and fulfill human life. Washington has been successful in preserving many portions of its native biodiversity. Yet, studies indicate that the state has not conceptually integrated biodiversity in to its broad plans for conservation, nor adequately assigned responsibility for its preservation. As a result, there seems to be a lack of coordination in the government's response to biodiversity loss, and significant gaps in its protection. One way to encapsulate these failings into a single concept is to label current conservation efforts as non-strategic or lacking in the identification of long-term goals and the means necessary to achieve them.

Market-based policies generally consist of three characteristics. First, they define a natural asset, service, or output. Second, they seek to measure that which they have defined. And third, they arrange for quantities of what is being measured to be paid for, or invested in, through market forces. Market-based policies therefore create opportunities for the owners of natural resources to profit by preserving them in, or restoring them to, their natural condition. Through careful institutional design, market-based policies can

efficiently and effectively fulfill specific conservation goals involving biodiversity through private sector participation. They lend themselves readily to strategic implementation by focusing private conservation efforts geographically and topically around set goals.

Mitigation banking and payments for ecosystem services are two popular types of market-based policy used for conservation. Both assume that a defined natural landscape shares fundamental similarities that allows for a destructive or detrimental action taken in one place to be compensated for by a reconstructive or beneficial action taken in another. Mitigation banks serve as a means through which destructive actions are permanently attached to reconstructive ones in a targeted area. They generally emerge as a response to mandatory environmental-mitigation requirements imposed on developers. Ecosystem services are, roughly, the processes through which the natural world and its species sustain and fulfill human life. Payments for ecosystem services generally emerge as a response to scarcity, or a lack of needed natural processes or conditions that serve beneficial purposes. For biodiversity, using mitigation banks and ecosystem payment arrangements is difficult because of the need to conserve many different natural aspects or elements (not just a single one). However, there are ways to mange the design and implementation of these tools to overcome this difficulty.

Special districts allow individual issues, within a defined area, to be governed by limited governments that are generally free from the influence of others that share their boundaries.

The advantages of creating special districts to handle biodiversity in Washington are many, but they all may be captured in the argument that a government agency with a singular task has a strong incentive to execute it well. Dedicated special districts therefore avoid the multiple and competing mandates that face regular agencies by allowing them to focus their efforts with minimal internal conflict. The key to using market-based policies to conserve biodiversity is to synchronize markets with the spatial limitations of special districts that have been designed around distinct areas of biodiversity. In other words, new geographic designations that encircle similar types of biodiversity could help unify conservation efforts by becoming the basis for special districting. These "ecoregions" could simultaneously be the jurisdiction of a government, the service area for mitigation banks, and the service area for the provision of ecosystem services. Such an institution, dedicated to conserving all native biodiversity, would be comprehensive by definition and allow for strategic decision-making at all levels of government.

An arrangement like this is not without its challenges, foremost of which is determining how to integrate and reconcile ecoregional special districts with the matrix of government institutions and policies already in place. However, strong leadership that understands the value of Washington's biodiversity, combined with innovative funding techniques and a willingness to change, may be able to overcome this challenge and deliver a durable public response to the pressing need for biodiversity conservation in Washington.

II. INTRODUCTION

Those interested in the management of Washington State's natural resources frequently note that around forty percent of the state's land is publicly owned. Federal, state, local, and special governments manage these lands using a complex and interwoven system of rules and laws. This vast body of regulation, instituted over the last century, has secured varying degrees of protection for the living and nonliving elements of these public resources. However, it has become increasingly clear that the future health of Washington's natural resources depends on the coordinated management of them on private, as well as public, property. This presents the state with a difficult question: How can the public need to preserve and restore vital natural resources occur while still respecting the historically-established property rights of private citizens? One of the many possible answers to this question involves an emergent, market-based, class of public policy. This kind of policy transfers principles common in commerce to the arena of natural resource conservation. Ideally, it allows for conservation goals to be met in a less intrusive, more effective, and more efficient manner than traditional prescriptive approaches. These newer policies, or market-based policies, have been used successfully to achieve valuable conservation objectives in a number of different fields. They have not, however, been used specifically to preserve the natural characteristics of any region in their entirety. In other words, the use of comprehensive market-based policies to preserve a region's biodiversity lacks successful precedent. The reasons for this are plentiful, as these policy options include significant design limitations and create difficult implementation challenges. They also rely on the fundamental assumption that the public interest can be served through the collective efforts of individuals seeking their own private interests — an attractive but unproven supposition. Despite these hurdles, and the recognition that market-based policies will never be used to the exclusion of other approaches, they can contribute to the preservation and restoration of Washington State's biodiversity in a manner that meets public goals and respects private rights. Furthermore, they may be of particular use in filling gaps left by the current framework of traditional public policy and easing the transition to more prescriptive approaches if necessary.

Orcinus orca. **Orca or killer whale, the state animal of Washington. Photograph courtesy of the National Oceanic and Atmospheric Administration.**

III. WHAT IS BIODIVERSITY?

A great deal of debate surrounds the most appropriate way to define biodiversity. Most agree that biodiversity includes three major components: living organisms, their relationships with each other, and their relationships with the land, air, and water around them. It therefore includes most of what we commonly call nature and attempts to capture all of the naturally occurring differentiation and variability present in a given area. Most also agree that conservation efforts related to biodiversity should focus on native species. This common belief stems from the fact that exotic species frequently pose a grave threat to the health of native species, their ability to productively interact with each other, and their ability to productively interact with the natural world around them. This preference for endemic biodiversity also reflects a basic value judgment that local species are of higher importance to local conservation efforts than non-local species. For the purposes of this paper, the emphasis is on native biodiversity. The three part definition provided above is a broad one. Other more detailed definitions of biodiversity serve practical purposes in technical and scientific fields, yet these comprehensive descriptions are unlikely to aid this investigation as they include controversial concepts that defy integration into public policy.

WHAT VALUE DOES BIODIVERSITY HAVE?

Ideally, the amount of biodiversity present in an area could serve as an objective and isolated measure of its biotic and abiotic richness. The combined measurements of species diversity, genetic variability, species prevalence, and a number of other separate metrics might provide a rudimentary valuation of any given area's biodiversity. Yet, the eventual value of an area (or resource) depends on a multitude of subjective and contextual factors that may have little to do with the number of species residing within it. In other words, when creating public policy, *what it is* generally matters less than *what we want to use it for*. Some may argue that biodiversity possesses intrinsic value independent from human concerns. They may be right. But to consider it in the context of public policy, and market-based policy in particular, biodiversity must be viewed from a distinct perspective that includes subjective human preferences and larger, context-specific, factors. For instance, two acres of land, identical in terms of all the measurements listed above, may be of wildly different value to society if one is in a rural area and the other is in an urban one. This value difference could result from the urban acre providing convenient recreational and flood protection services that the rural acre does not. Therefore, to place a concern for biodiversity in the broader sphere of public policy, it must be assigned value in a way that incorporates

subjective and contextual issues related to human needs and human goals.

Economists, biologists, and public policy experts have all attempted to establish the value of biodiversity in terms appropriate for their given professions. Arguments continue on whether anyone has accomplished this goal in a complete and useful manner. As this paper is concerned with the efficacy of market-based policies in meeting biodiversity goals, the favored method of expressing biodiversity's worth will be an economic one. One economist categorizes biodiversity in a way that leads to a well-rounded and representative valuation through including subjective and contextual factors. By breaking down the economic functions of biodiversity into the four parts of ecosystem productivity, insurance, knowledge, and ecosystem services, economist Geoffrey Heal describes how the components of biodiversity provide for humanity. The first, second, and third entries on his list capture how healthy levels of biodiversity ensure the continued "productivity and robustness of natural plant communities" (Heal 6), the provision of "variability that could be critical in responding to the environmental changes wrought by humans" (Heal 8), and how we "can learn, from natural organisms, to make chemicals that have important and valuable properties" (Heal 8). These three components demonstrate that biodiversity provides opportunities for economic gain, security against future disasters, and greater genetic knowledge. The final entry on this list of economic functions argues that biodiversity plays a key role in the provision of ecosystem services or "the wide range of conditions and process

through which natural ecosystems, and the species that are part of them, help sustain and fulfill human life" (Daily and Ellison 12). All of these categories relate biodiversity to human endeavors and, therefore, allow it to be considered in the context necessary for establishing public policy. It is important to note that the value attributed to biodiversity, like most things, is dynamic and must therefore be continually reassessed to reflect changing conditions and beliefs. It is also important to note that the first three economic functions listed above are mostly public goods. Economists use this term to describe goods that are available to all regardless of who paid for it. The last function listed, ecosystem services, is also a public good (most of the time) but has the best chance to become a private one through changes in public policy.

Bald eagle. Skagit River, Mt. Baker-Snoqualmie National Forest. Photograph by Don Virgovic.

IV. WASHINGTON AND BIODIVERSITY

Hundreds of laws and rules, created and promulgated at the federal, state, and local levels, serve to protect parts of Washington's native biodiversity. Many argue that this complicated web of piecemeal regulation fails to preserve biodiversity in its entirety-pointing toward deteriorating natural resources across the state as evidence. Large federal programs, like the Clean Water Act or the Endangered Species Act, have positively affected the amount and variety of species and natural resources under their protection. State administered programs, like Washington's Comprehensive Wildlife Conservation Strategy, are also bound to have a positive affect on biodiversity conservation. Even some localized zoning decisions appear to be making valuable preservation and restoration contributions. While a comprehensive considera-tion of all of these programs together exceeds the scope of this investigation, some reoccurring themes are worth mentioning as they illustrate how market-based policies might be used successfully to conserve biodiversity within this regulatory web.

The Washington Biodiversity Council received a report in June 2006 that provides an institutional assessment of the state's current approaches to conserving biodiversity. The report, called *Institutional Assessment: Preliminary Findings*, breaks these approaches down into six categories of which two, "Stewardship and Restoration" and "Regulation," are particularly germane to the creation and implementation of

market-based policies. Under "Stewardship and Restoration," the report provides two lists, one describes what is working and one describes what is not. Among the former, the report suggests that budding public efforts at the state and local levels have increased the recognition of, not only what biodiversity is, but why it is important. It also mentions that efforts to define, categorize, and prioritize areas of concern related specifically to biodiversity are making important progress. In the "What Isn't Working" category, the report lists five major shortcomings related to stewardship and restoration efforts. These include the absence of an "overarching state policy on biodiversity conservation," the fact that "biodiversity as a concept has not been incorporated into the culture or plans of most conservation institutions," and that "there is no standing organization or entity" with the explicit purpose of conserving biodiver-sity in Washington (La Tourrette 3). Correcting these deficiencies requires broad institutional changes that exceed the scope and influence of market-based policy. However, the assessment lists two more examples of things that are not working that such policies may help to rectify.

The final two shortcomings outlined in the report under "Stewardship and Restoration" efforts both involve a systemic lack of coordination among those institutions charged with preserving biodiversity. The institutional assessment asserts that the "Conservation efforts of various public and private conservation institutions are not well coordinated at any

geographic or institutional level" (La Tourrette 4). Second, the report also states that "major unresolved gaps in biodiversity conservation efforts" persist between these efforts. One way to encapsulate these failings into a single concept is to label current conservation efforts as non-strategic, or lacking in the identification of long-term goals and the means necessary to achieve them. Without clear goals, a corresponding allocation of resources to meet them, and a way to measure the progress made by using them, it is impossible to use a truly strategic process.

The second major approach to conserving biodiversity in Washington, as presented in Institutional Assessment: Preliminary Findings, is labeled "Regulation." Like the last approach discussed, the report first mentions many of the positive things that the existing institutional framework has accomplished in this arena. Specifically, it notes how current and past regulations have successfully preserved many individual components of biodiversity (La Tourrette 7), or slices of the larger whole of bio-diversity. An example of this is the state's multiple-agency approach to saving anadromous fish. On the other side of the analysis, in the things that aren't working category, the report presents a number of general regulatory problems that fall under the broad categories of the inconsistent application and enforcement, the generation of policy in isolation, and the reactive nature of existing regulations (La Tourrette 8-9). Market-based policies have the potential to address the last two of these, as future paragraphs will explain, but the first one is simply a matter of political will that requires public understanding and pressure, not new policy designs.

Developing and implementing market-based policies will not necessarily increase the level of coordination between public institutions — unless institutional reform occurs. Likewise, developing and implementing market-based policies will not directly fix the regulatory shortcomings presented above. However, as these policies require the creation of specific goals to be used, these goals might in turn be used to direct the efforts of other programs in a coordinated fashion while also filling the gaps left by their limited scopes-thereby acting as a catalyst for broader institutional and regulatory change.

McCroskey State Park straddles the Washington-Idaho state line. Photograph by George Bedirian

V. WHAT IS MARKET-BASED PUBLIC POLICY?

The history of natural resource management in the United States, and public conservation efforts in specific, includes a wide range of public policy approaches. By briefly considering this history, and how we arrived at our current state of affairs, the origins of market-based policies and why they have become an attractive alternative becomes clearer. Initial public policy efforts behind natural resource conservation and management date back over a hundred years. The originally favored method for the preservation of them involved public ownership. Through either a declaration of intent regarding land already owned by the government, or the purchase of it, the public sector came to own and manage a vast amount of land and resources. As these natural resources became increasingly rare, more expensive to buy and manage, and were pressured by the competing demands of growing populations, the government

Blue bird, Colville National Forest, Washington. Photographer unknown. Courtesy of USDA Forest Service photo archive.

embraced a more regulatory approach to managing natural resources. Many citizens found this new approach intrusive, and as this body of regulation grew, so did their resistance to it. Less controversial approaches then emerged, partially as a reaction to the public's unhappiness, which promoted the voluntary participation of private natural resource owners in achieving conservation goals. Under this advancement of policy, public resources, like technical assistance, were offered to willing private participants to reach desired public ends. Incentives-based policies common in the agricultural industry, like the Conservation Reserve Program, are representative of this approach. Incentive programs pay for certain actions to be taken on private lands that, in turn, produce public benefits. The market-based policy approach represents the latest step in conservation policy's evolution. Generally speaking, market-based policies flip the logic of incentives around by rewarding the outcomes of certain actions taken on private lands (not the actions themselves).

Governments now use all of these policy approaches, with varying degrees of success, to achieve national, state, and local conservation goals. The relationships between these distinct approaches can be complementary, neutral, or conflicting. An investigation into how they all interact exceeds the scope of this paper, but what is important to remember is that any new market-based policy must operate harmoniously within the older public policy matrix. Developing

market-based policy outside this matrix could lead to complications that negatively affect their ability to execute the public will. After all, the end goal of these newer policies is not to replace ones that already work well, but to support them by focusing efforts on performance instead of compliance.

The federal government began achieving general conservation goals with market-based policies decades ago. The policies have become increasingly refined over the last twenty years to the point at which they now play an essential role in a variety of natural resource management programs. Nearly everyone is familiar with some kind of market-based policy, like cap and trade air quality programs or carbon trading markets. As mentioned before, their use to expressly conserve biodiversity is limited, but examples of how they work towards other conservation goals may provide valuable insight into how such an application might work. These policies include a wide-ranging assortment of tools that makes categorizing them difficult. Even with this being the case, most of them do share three key characteristics. First, they all generally seek to define a natural asset, service, or output. Second, they all seek to measure that which they have defined. And third, they all arrange for quantities of what is being measured to be paid for, or invested in, through market forces (The Katoomba Group). Market-based policies therefore create opportunities for the owners of natural resources to profit by preserving them in, or restoring them to, their natural condition.

It is tempting to define these outcomes as commodities (like a bushel of wheat), as they can often be traded like one. However, these outcomes are sufficiently more complex and diverse than the simple commodities we are accustomed to. This makes the label of *commodity* somewhat misleading — and counterproductive in many instances. With this in mind, these policies do use other elements and concepts that are readily transferable from traditional markets.

Market-based policies rely on buyers, sellers, and a market through which transactions can take place. They also rely on a motive. In traditional markets this motive is profit. For most of the markets created through public policy the motive may still be profit (if the seller is a private entity). Yet, unlike a free market, this ability to profit is created directly through the external application of government regulation. So, in some ways, these policies are no different than traditional regulatory approaches. In each case the government allows, prohibits, or demands action. What makes market-based policy different is in the "how." More traditional policy uses the force of law to ensure compliance and achieve its goals. Market-based policy takes a different approach. It allows market forces, like supply and demand, to determine the most economical way for compliance to be achieved. This flexibility is manifested in a number of ways. For instance, the decision to participate in a market created by these policies often remains optional for the owners of natural resources, whereas traditional regulation rarely allows for such flexibility.

VI. PROPERTY RIGHTS AND BIODIVERSITY

At the heart of all market-based public policy directed at the conservation of natural resources is a paradigm shift over what constitutes private property. The debate about this shift is a long one, and usually requires the introduction of impressive-sounding jargon and opaque references to influential economists. For our purposes, the conversation will be a short one, even at the risk of being incomplete. Private property, or a property right, generally includes three components: Excludability, divisibility, and transferability. Therefore, if you have a property-right you can keep other people from using it, divide or manipulate it as you see fit, and transfer or exchange it as you see fit. It is a protected claim, right, or ability to use or consume a good. This may be done directly or "indirectly through exchange" (Wilkinson and Thompson 6). Returning to the three elements of market-based policy discussed in the last section, the establishment of property rights comes into play immediately when a market-based policy seeks to define a natural asset, service, or output. This definition must include not only what it is we are targeting for trade or investment, but who owns what we are targeting as well. Markets exist to exchange property rights, and if no one can claim a property right, it cannot be traded.

In relation to the two market-based policy models of mitigation banking and payments for ecosystem services, property rights are being established for things that have historically been public goods, such as air, water, or biodiversity. Goods of this sort are naturally missing some or all of the characteristics necessary to make them private goods. In a sense, market-based policies help to turn public property into private property. It would be wrong, however, to conclude that the property rights attached to natural resources are the same as those attached to conventional commodities, like wheat or timber. Instead, these rights are more nuanced. They reflect a balance between public and private interests that, quite frankly, is not completely clear. Exactly how all three components of a private property relate to, what historically have been, public natural resources, is still up for debate. Though, it is important to recognize they will most always account for a high level of public interest in their use. So, while this transformation is real, it should also be noted that property rights under these policies are generally weaker than more traditional ones and subject to approval by forces outside the control of their owners. These distinctions will become clearer in the following sections as mitigation banking and payments for ecosystem services are discussed in detail.

VII. BANKING AS A MODEL FOR CONSERVATION

Conventional banks play a number of different roles. They provide security for private assets, resources for private investment, and services with a comfortable rate of return for their use. Simply speaking, they make money with money. Banks designed to preserve natural resources do similar things. They provide security for public assets, resources facilitating private investment, and themselves with a comfortable rate of return for their services. Simply speaking, these "green" banks make money by achieving public conservation goals. Returning to the three shared characteristics of all market-based policies already mentioned, these banks define a natural asset (like a species), seek to measure that which they have defined (like a breeding pair), and then arrange for quantities of it to be paid for or invested in through market forces (using credits). As a model for conservation, compensatory mitigation banking is used primary to preserve two types of natural assets in the United States: endangered species and wetlands. In both instances, only a slice of an area's biodiversity is being preserved. Expanding the application of this model to encompass the whole of biodiversity may be possible, but many of the problems programs have already encountered might be amplified though such an effort.

Both types of working "green" banks include the central assumption that a defined natural landscape shares fundamental similarities that should allow for a destructive action taken in one place to be compensated for by a reconstructive action taken in another (hence the label of "compensatory mitigation bank" often used to describe them). The bank then serves as the means through which destructive actions are permanently attached to reconstructive ones through the purchase of credits that represent the resource in play. Mitigation banks require the usual trinity of buyers, sellers, and a market for them to succeed. The buyers in this scenario consist of those undertaking a destructive action, including private and public developers. The sellers include those who have undertaken some form of restorative action on a natural resource and have had that action approved by a public body. The market then connects buyers and sellers within a predetermined service area, establishes some sort of equivalency between the actions of the two, and then transfers the liability of the first party to the second in exchange for payment. In the end, the buyer fulfills his or her

Viola trinervata. **Badger Mountain, Wenatchee National Forest. Photograph by Terry Lillybridge.**

obligation to protect a natural resource by paying someone else to do it for them. These transactions are much more complex in the real world, but the basic process of exchange remains the same.

Those most familiar with species or wetlands banking often assert that these types of banks, and the markets of exchange they help create, differ from traditional banks and markets so much that the word "bank" is simply a metaphor used to explain what is really happening. They argue this because the government's role in mitigation banking is much greater than in traditional banking. The reason is that, as mentioned near the beginning of this paper, mitigation banks ultimately seek to deliver a public, not a private good. This therefore necessitates the government to help answer three fundamental questions that conventional banks answer for themselves:

- How much of the good should be produced?
- Who should pay for the production of the good?
- Who should carry out the production of the good? (Heal 11)

In mitigation banking the government decides how much of a resource should be protected as development occurs. At the very least, they seek to prevent any further depletion a particular natural resource, where the total amount of it neither decreases nor increases. At the very most, this model could easily operate in a way that has a net a restorative affect on a given natural resource.

Secondly, the government also determines who should pay for the production of natural resources through the creation of regulatory requirements. Banks depend on demand-side

drivers to operate. In less rarified terms, this means that the government must first create a societal need to buy what banks have, because people are unlikely to pay for it otherwise (with some public and private conservation organizations being notable exceptions). The government accomplishes this by creating regulations that provide the opportunity for private landowners to participate in banking if certain actions are taken on their land. Opening an account at a traditional bank is voluntary. Opening an "account" at a conservation bank is generally not, as other options exist (like on-site mitigation, in-kind habitat work, or in lieu of payments). Finally, the government also determines who can produce the public good — or become conservation bankers. Banks require approval by governing bodies before entering the market, they must offer some sort of guarantee that they will continue to operate well into the future, and they must meet strict operating criteria that reflect public preferences. Overall, banks really are more of a device to ensure the efficient delivery of the public good than a representation of what the public good should be.

THE MECHANICS OF BANKS

Defining what a mitigation bank should target, or how it realizes the first shared characteristic of all market-based policies, requires the government to answer two questions. These questions are: "What should be preserved" and "Where should it be preserved?" Taken together, these questions define that which is to be measured and then traded (or invested in). The "what" question is answered by the actual natural asset selected for conservation (whether it is wetlands, a single species, or a specific

ecosystem). The "where" question is somewhat dependent on the "what" question. Geography and climate create obvious limitations. Beyond these, banks generally seek to achieve equivalent exchanges, and therefore confine themselves to service areas that keep destructive and constructive actions in relatively close proximity. The "where" question is therefore answered using watersheds, bioregions, ecosystems, or some other geographically determined boundary. When considering the outcomes that mitigation banking seeks to generate, it is useful to remember that exact equivalency between parcels is not necessary. The idea is not to compensate for the destruction of one tree through the protection or planting of another. Rather, the end goal of mitigation should be the preservation or enhancement of natural resources in a way that provides substantial ecological benefit. It may be better to think of this type of policy as one that allows exchanges of functional equivalency.

Measuring what is being targeted, the second shared characteristic of market-based policy, can be very contentious and difficult. Accurate measurement is essential for equivalency to occur and to determine whether the overall impact of the development and associated mitigation represents a loss, swap, or gain of ecological values. If you want to measure a natural resource simply through its quantity, you may facilitate its exchange, but you risk not capturing the true importance of the resource. Using more qualitative metrics may allow for the importance of the resource to be captured more completely, but then the ease with which they can be exchanged disappears, requiring more public value judgments to be inserted in the process that, in turn, leads to a decreased reliance on

the market. The most contentious element of the mitigation-banking model involves the credits it produces. Credits are abstractions that measure the specific natural resources being made and destroyed. Banks create them and developers buy them. They can exist because everyone involved in this banking model relies on the assumption that natural resources, to some extent, are interchangeable. Therefore, a credit representing a resource in one place may be used to compensate the destruction of another credit in another place. The government grants them to successful banks to sell. It also assigns them to land being developed. Superficially, this does not appear to be a difficult concept. The difficulty arises when we delve into what exactly these credits represent and whether the assumption they depend on is true and not just practical.

Credits involve two types of value. First, when used effectively, credits capture the importance of the natural resource they represent. More specifically, they represent the subjective and contextual values of the natural resource. It is through the assignment of credits that an urban acre of forest may acquire more credits than a rural one because of its location and the human demands placed upon it. This value includes recognition of the functions of the resource and why those functions are important to humans. Second, credits also represent value in terms of dollars. This allows for their exchange, creating a consistent currency that makes it possible for the destructive and restorative actions to be paired with economic efficiency (the third and final shared-characteristic of market-based polices). The first determination on value is open to a great deal of subjectivity and leads to doubts over the purpose of banks and their true ability to conserve

natural resources. How these problems will be resolved is not immediately clear, though current efforts (discussed later in this work) are being made to help banks become more effective at meeting their goals. Ultimately, the exact value, in both senses, may be less important than the consistent evaluation and attribution of value within a service area.

MITIGATION BANKING AND SPECIES

The Endangered Species Act requires compensatory mitigation by developers when their actions result in an unavoidable impact to the species listed under it. The developer may choose from a number of options when fulfilling his or her mitigation obligations. One of them is to use a conservation bank if one is available. Such a bank guarantees that an equivalent amount of habitat, species, or a combination of both will be preserved for the developer in exchange for payment. The developer essentially transfers his or her liability related to the endangered species to the bank and the bank assumes this liability in exchange for payment. Returning to the three shared components of market-based instruments mentioned above (definition, quantification, and privatization) these types of banks first define a species, habitat, or combination of both. They then measure it through the assignment of credits. Then lastly, they allow for these credits to be sold and bought.

The structure of this type of bank breaks down into four pieces: the bank site, the bank instrument, the regulatory agent, and the service area (U.S. EPA). The first piece, the bank site, refers to the actual natural resource that has been established, restored, enhanced, or preserved. The bank instrument is "the formal agreement

between the bank owners and regulators establishing liability, performance standards, management and monitoring requirements, and the terms of bank credit approval" (U.S. EPA). The third component, the regulatory agent, refers to what is formally called a Mitigation Bank Review Team. This team conducts the regulatory review of banks, approves or rejects them, and then oversees their operation. The final component, the service area, refers to "the geographic area in which permitted impacts can be compensated for at a given bank" (U.S. EPA).

MITIGATION BANKING AND WETLANDS

Wetlands banking could have started in the 1970's when the U.S. Government established a no-net loss wetlands policy with mitigation requirements for developers. However, these requirements were not strongly enforced at the outset and the mitigation responsibilities required by them were often ignored or poorly executed (few had the long-term management plans necessary to provide lasting benefits). A rule clarification in 1995 spurred a more consistent and strategic approach to mitigation along with the development of banks. Wetland banks allow developers to compensate for the destruction of wetlands in one place by buying credits that represent an ecologically equivalent area of wetlands elsewhere. Returning once again to the defining characteristics of market-based policies, wetland banks define an area of land, objectify it through the assignment of credits, and then allow for it to be bought and sold.

Wetlands banks include the same four pieces that conservation banks have: the bank site, the bank instrument, the regulatory agent, and the service area (although they may have different

names). These pieces also accomplish the same goal of attributing rights and responsibilities.

WHAT ARE THE MAIN STRENGTHS OF BANKS?

The use of banks has many advantages over more prescriptive public policy approaches. Most of these advantages fall under the two categories of economic benefits and environmental benefits.

The environmental benefits of mitigation banks include:

- The possibility of large, ecologically significant, conservation areas that increase the probability that species, natural resources, or natural processes will thrive;

- The possibility of protecting resources into perpetuity;

- The opportunity to avoid the temporal loss of resources as destructive actions are exchanged for pre-existing reconstructive ones;

- The high management standards demanded from regulators to create and maintain banks;

- The potential for banks to have a restorative affect, if managed with that objective in mind.

The economic benefits of banks include:

- The severance and consolidation of liability for preserving and enhancing natural resources in some programs;

- The time and effort saved by pre-established banks to achieve compliance;

- The reduction of risk for developers;

- The ability to transform a liability (like endangered species) into a financial asset;

- The management of land for multiple uses (grazing, recreation, and perhaps ecosystem services) and hence multiple revenue streams.

Banks may also promote strategic behavior through market mechanisms. For instance, some have suggested that a bank with a statewide service area could trade less critical wetland credits for more critical species credits. Or to put it bluntly, banks could trade apples for oranges. Doing this would demand that the banking system "balance the benefits of conserving the highest priority habitats (regardless of location and type impacted) with the benefits of replacing impacted habitat with the same habitat and in close proximity" (Hummon and Cochran 34).

Overall, banking offers the government an opportunity to require a type of change that reduces the expenses associated with it to the absolute minimum. However, doing this requires no small amount of expertise and carries with it a number of weaknesses.

WHAT ARE THE MAIN WEAKNESSES OF BANKS?

While there is some overlap between the categories, the weaknesses of banks as a policy model for the conservation of natural resources can be broken down into the categories of design limitations and implementation challenges.

Design Limitations

One major design limitation of compensatory mitigation banks is that, while some sort of compliance is mandatory, participation in mitigation banking is optional. Because developers often have other options to banking to achieve compliance, a bank's strategic effectiveness is limited unless they are consistently viewed as the most attractive option for developers to use. For instance, research indicates that, "commercial wetlands banks provide only a relatively small fraction, perhaps 10-20% of all wetland credits" (Woodward 66).

This is attributed in part to the fact that: "Only after regulators have determined that the on-site credit production is impractical or environmentally undesirable can credits from a third-party credit provider be used as wetland credits. Then, commercial banks must compete with [in-lieu of financing] and cash donations programs that don't have the same regulatory barriers and upfront investment costs" (Woodward 66).

If the banking option is not prioritized as the most favorable one, and considered favorably by those who would use it, then banks will be a minor contributor to the management of natural resources. The design of this policy tool must then be continually evaluated to reflect changing market conditions. This being said, the U.S. Army Corps of Engineers and the Environmental Protection Agency recently proposed a rule change for wetland mitigation banking that, among other things, addresses the limitation above (the public comment period for the proposal ended June 30, 2006). It does this mainly through embracing a watershed approach when reviewing mitigation options, thereby taking into consideration the broader landscape when determining which mitigation option is best in any given situation (U.S. EPA). This departs dramatically from existing rules that follow a more hierarchal set of options regardless of their potential efficacy. The final rule change will be published sometime in 2007.

A second design limitation often attributed to banks is their resource-intensive nature. The large amounts of expertise and money required to establish, manage, regulate, and promote banks makes them unattractive to the public and private sectors alike. The relative novelty of banking also means that expertise about their structure and operation is limited. And, when so much of their design requires an in-depth understanding and consideration of local phenomena, much of the expertise that exists is only transferable in a generalized way. The legal expertise alone required to finalize banking agreements is significant and grows quickly if the approval process drags on.

A final design problem with banking as a model involves the necessity to balance competing definitions of success. The results of banking "can be measured in two contexts: biological, defined as success in maintaining or restoring endangered species on bank lands, and economic, defined as success in selling credits (at a profitable price) to developers" (Wilcove and Lee 643). The danger is that only one of these measures will be emphasized in our evolving regulatory framework. Emphasizing the biological context, at the expense of the economic context, will lead to fewer and fewer participants in the market and limit its impact as a policy tool. Doing the opposite, and emphasizing the economic context, will promote participation in the market but not

guarantee the outcomes mitigation banks intend to produce. The monetary value can therefore compete against the ecological value.

Implementation Challenges

Regulations often lack transparency and consistent application. All those being regulated voice this complaint at some point. For banking, transparency may be lacking due to the inexperience of regulators and agencies in creating the banks. It may also be due to the ambiguity created by the multiple and conflicting mandates agencies operate under. Meanwhile, the inconsistent application of rules may result from both technical and political issues. Agencies may lack the means to process bank applications or they may be directed to prioritize other activities by the elected officials that oversee them.

Frustrations with redundant paperwork, unclear procedural steps, and inadequate staffing are all well documented when it comes to mitigation banking. Some time may be necessary to build the institutional knowledge necessary to use mitigation banking effectively, even after a political consensus emerges that it is a good approach to take.

A second implementation challenge highlights what can be described as market apathy. A buyer (or developer) may not care about the quality of the resource being used to achieve mitigation. He or she just wants their liability eradicated. A seller (or banker) may not care about investing anything more than the absolute minimum necessary to generate the credits they want. Therefore, the only party truly interesting in preserving the resource to the highest standard possible is the regulating body, and their track record of doing this is not stellar. Furthermore,

when credits are traded, natural resource bankers seek to maximize the recognized ecological value of their land. Those required to mitigate seek to minimize the recognized ecological value of their land. If both of these parties successfully meet their objectives, then "when the mitigation seeker is matched to a credit seller there is likely to be a net loss of ecological value" (Fox and Nino-Murcia 1005). What both of these points suggest is that the banking model does not fully align the private interests of it participants with the public interest and that the only party really interested in the quality of the banks is the government (Salzman and Ruhl 18).

Finally, timing is one of the most common implementation complaints about banking. One study about conservation banks found that the "process to establish an agreement took an average of 2.18 years" (Salzman and Ruhl 1002). During that window of time landowners have to mange the land and pay property taxes on it, creating a significant liability for them without an immediate source of income. This then leads to the more general implementation challenge of risk. What happens if the bank fails due to environmental conditions, financing issues, volatile or non-existent markets, or unforeseen costs? As a newer approach to conservation, banks have not had the opportunity to prove their durability over the long term. And, more so than other prescriptive regulations that offer the government a high degree of management control, mitigation banking divides this control creating a significantly higher level of complexity and greater chance for problems to arise. This, and all the other shortcomings can be addressed, to some extent, by better design and increased expertise.

VIII. PAYMENTS FOR ECOSYSTEM SERVICES AS A MODEL

Ecosystem services can be defined as "the conditions and processes through which ecosystems, and the species that make them up, sustain, and fulfill human life" (Whitten et al. 3). The idea being that the natural world provides, not only raw materials that are useful to humans, but vital processes as well. The development of markets through which these processes or services may be bought and sold represents another market-based policy approach to conservation. Many ecosystem services depend on vibrant and stable levels of biodiversity. In fact, "there are cases in which the full diversity of organisms in an ecosystem is required for that system to function and to provide services to human societies" (Heal, "Biodiversity as Commodity"). This vital nexus between human need and the conservation of an area's full spectrum of biodiversity has created a great deal of enthusiasm for developing public policy that includes payments for ecosystem services as an essential piece. Such enthusiasm is not misplaced, however it must be tempered with the recognition that, in application, the payments for the ecosystem services model poses at least one major challenge that may relegate it to the periphery of future conservation efforts.

Some argue that "Markets work well at providing rewards — and markets for ecosystem services may prove to be one way of rewarding and encouraging land managers to protect and produce ecosystem services" (Whitten et al. 2). This statement is truer for some ecosystem services than others. Ecosystem services fall under four categories: the production of goods, regeneration processes, stabilization processes, and life-fulfilling functions (Daily, "Developing a Scientific Basis" 64). The first category describes those services we are most familiar with, such as food, fuel, and fiber production. The second category includes slightly less obvious services like decomposition and water filtration. The third category continues this trend towards obscurity with services like climate stabilization and the regulation of the hydrological cycle. Lastly, the fourth category includes things we don't often associate with the concept of service, like natural beauty or spiritual inspiration. We already have elaborate markets in place to deal with the first category of ecosystem services (the production of goods). Most of what this paper will address falls under the last three categories for which a large body of academic papers has been written and for which a small number of working examples exist.

As already noted, evidence suggests that the future health of the environment in the state of Washington will depend on increased coordination between all natural resource owners and managers (both public and private). Traditional methods of ensuring coordination, through direct public ownership, regulation, public assistance, or incentives, may not be adequate. Landowner resistance to the first two, and the participatory challenges of the second two, limits all of their effectiveness. As some

familiar with the problem have stated, "Mechanisms are needed by which owners are rewarded for their role as stewards in providing biodiversity and ecosystem services" (Jenkins, Scherr, Inbar 36). Payments for ecosystem services meet the three characteristics used to group market-based policies in a straightforward way. First, they define a natural service or function (like water storage). Second, they measure that service or function (like acre-feet of water). And third, they arrange for quantities of what is being measured to be paid for or invested in (like payment for every acre-foot delivered per year). The government plays a less intrusive role in the market for ecosystem services when compared to the role it plays in mitigation banking. When it comes to the fundamental questions of how much of the good should be produced, who should pay for the production of the good, and who should carry out the production of the good (Heal 153), this model lets the government decide on the first one and the market decide on the last two.

A garden-variety scenario for an ecosystem service payment would be a local water utility paying a farmer to improve the quality of water draining off his or her land so that the utility didn't need to invest in expensive water improvement infrastructure (Please see "Clean Water Services" box on page 22). Here, the ultimate goal of water quality is met through the use of a natural process for less money than the creation of new infrastructure. If the behavior of the private landowner also provides secondary benefits, as efforts to improve one component of water quality often improves others as well, then the public benefits without cost. For instance, paying for ground vegetation that

reduces sedimentation in a river might also provide habitat for endangered species or reduce water temperature through shading.

The importance of an ecosystem service is defined by human need. This need may depend on a number of things, but generally originates from scarcity. Scarcity may be naturally occurring, like a water shortage faced by a growing city. Or, it may be created though regulation, like the requirement to reduce water temperature due to the application of federal regulation. In either case, more of a good is needed than is currently available. The price of the service is controlled by a number of complex contextual factors. What may be the most important thing to recognize is that the absolute price of the service is usually less important than how the price relates to the price of other options. If a city has the option to pay twenty million to cool water through built infrastructure, and another option to pay a farmer twenty thousand to accomplish the same cooling through various natural mechanisms, then the price may be right even if another city in an adjacent town is paying two thousand for the same service. Ultimately, price does relate to scarcity for ecosystem services, like many other commodities, but because these services are not transferable outside of limited areas, price will not be entirely consistent.

In a very real sense, the payment for ecosystem services model is not fundamentally different to the government than the contracting-out it does for other types of services (like garbage removal). In both circumstances, the public sector is relying on the private sector to provide a public service in exchange for compensation. When it comes to payments for

LESSONS FROM THE FIELD: Clean Water Services

Clean Water Services, an independent special service district located in Northwestern Oregon, provides an accessible example of how payments for ecosystem services can effectively and efficiently meet regulatory requirements related to environmental protection — and deliver a host of other vital ecological benefits in the process.

Clean Water Services provides a variety of services to about 500,000 customers in the Tualatin River Watershed. These services run from wastewater and storm water management, to flood management and habitat protection. With around 93% of the watershed that Clean Water Services serves in private ownership, its options are limited when it comes to mitigating the ecological impact of its activities. This reality, combined with progressive thinking by the district, led the Oregon Department of Environmental Quality to issue an integrated, municipal watershed-based permit in 2004. This unprecedented permit includes, among other things, permission for the district to implement a water quality trading program within its service territory. Generally speaking, this trading program allows Clean Water Services to meet its regulatory obligations related to water quality by paying others, who produced relevant ecosystem services, to mitigate the district's impacts on the watershed.

Clean Water Services currently uses the program to reduce water temperature, or thermal loading, in the watershed. The district's effluent contributes to the warming of river water. Federal and state regulations demand that this water stay cool (for aquatic species). As a result, the district is required to counter the warming affects of its activities. By paying private landowners to reduce their contributions to thermal loading by planting shady vegetation that cools the water or conservation easements that maintain healthy stream corridors, Clean Water Services offsets some of its own thermal loading. And, as these private landowners "produce" cooling with less expense through natural means than the district can through unnatural ones, the district realizes a significant savings in costs. Importantly, this reliance on natural capital also produces a number of other valuable ecosystem services for the basin. The plantings and easements provide additional services that built capital cannot, like erosion prevention, carbon sequestration, runoff filtering, and habitat expansion.

By taking advantage of the lower costs enjoyed by the private landowners to cool water, Clean Water Services is demonstrating that market-based policy offers a tenable alternative to more prescriptive policy approaches that is both economically efficient and ecologically effective. While the program currently focuses on temperature, it appears suitable for expansion into to other aspects of water quality as well — making it a working archetype relevant to the rest of the nation.

ecosystem services, the relationship between the public and private sector is really a contractual one in which local governments pay private landowners to deliver specific outcomes, with the added benefit of also achieving conservation goals. Such an arrangement can provide for a great deal of flexibility for both parties. The government only pays for what it wants, when and where it wants it. Meanwhile, private landowners receive a new property right if they choose to participate and their participation is totally optional. This model does, however, expose the government to serious risks, as services will only be provided as long as the contract is valid. This places a premium on planning for the future. Planning then depends on the formulation of goals, which makes this payment model no different then mitigation banking in that they are both useless in achieving conservation goals unless attached to a strategic plan.

WHAT ARE THE MAIN STRENGTHS OF PAYMENTS AS POLICY?

Using payments for ecosystem services as a public policy model to achieve conservation goals includes many advantages and disadvantages. They are presented below in the same way that those of the mitigation-banking model are, by listing the environmental and economic benefits, and then the design and implementation weaknesses.

Environmental Benefits
- Payments as policy allow for needed environmental outcomes to be delivered strategically by paying more for that which is needed most in a given location; and

- The delivery of one service often has the affect of delivering others.

Economic Benefits
- Payments as policy allow for the definition of new property rights in a way that meets the public good;

- They can provide the public with considerable cost-savings related to new infrastructure development; and

- Private landowners can be paid directly for achieving public conservation goals, thereby reducing the chance that private resources will be developed.

WHAT ARE THE MAIN WEAKNESSES OF PAYMENTS AS POLICY?

It should come as no surprise that the number of design limitations and implementation challenges is significantly lower for the ecosystem-payments model than for the mitigation-banking model. This difference is attributable to the amount of government interference required for each of these options. Banks require a lot while payments require relatively little. This lack of public control allows for market forces to fill the resulting vacuum — which can be a good or a bad thing depending on the state of the market.

Design Limitations
Participation in an ecosystem payment program is entirely voluntary for private landowners. This could be the most important design limitation of them all. There is simply no regulatory driver forcing compliance like in

mitigation banking. This makes the government entirely dependent on market forces and market logic to ensure participation. If the conditions are favorable, and the payments are attractive relative to other options, then participation will increase. If conditions are not favorable then participation will plummet. What this limitation suggests is that this model is not durable over time unless development pressures are managed with it in mind. This then returns us to an earlier assertion that market-based policy must be created while considering the existing matrix of public policy. A recent example drawn from the East Coast illustrates this point clearly. Dozens of programs and policies currently operate in the Chesapeake Bay to clean its polluted waters. One program involved water-utilities paying farmers to produce higher quality water run-off from their properties. However, after the program was instituted, a levy was passed in Maryland to support the creation of water-treatment facilities around the bay. This created a new revenue source for utilities to build infrastructure, and therefore, undermined their incentive to pay for the services farmers were providing (Jenkins, Scherr, and Inbar 39).

A somewhat related design limitation for this model is that payment for an ecosystem service is hard to justify without comparison to an alternative. For instance, it is easy to rationalize payments to farmers, loggers, or other private landowners if these payments are significantly less, or even equal to, the cost of a major public-works project. But what happens when no comparison can be made? For instance, one major argument for preserving biodiversity is that by doing so we "foster genetic diversity, maintaining a 'library' of genes with values yet to be discovered for future medical and industrial

products" (Daily and Ellison 6). There really isn't any alternative with which to compare this ecosystem service, making the valuation of it next to impossible. We don't yet have the ability to make this public-good characteristic of biodiversity a private-good one.

Another smaller but potentially serious design limitation is that the service only becomes possible when it becomes scarce. When this point is reached it may already be too expensive to secure commitments from landowners, or too late to deliver the conservation benefits needed. As those familiar with the problem explain, payments "are only a practical option where ecosystem services generate sufficient values to encourage trade and where transaction costs can be sufficiently minimized to facilitate market exchange" (Whitten and Salzman 14). If developing a property with housing is more lucrative for a landowner than receiving payments for ecosystem services, then they can't be expected to take payments.

One final limitation that broaches the next category of implementation challenges becomes apparent when considering what should be paid for and how this payment should be administered. Few argue that the owners of natural resources should be paid for obeying the existing regulations that apply to them. That would be akin to paying a person not to litter. Instead, there should be a baseline of compliance. At a certain point, however, management actions taken by the owners of natural resources might go beyond this baseline. Payments for ecosystem services must make a determination on when this threshold is crossed. Furthermore, if the threshold is crossed, payments need to accurately reflect how far beyond it landowners have gone and

reward them accordingly. Doing this rewards desired outcomes and encourages the production of more of them. But determining this threshold is fraught with difficulty because it is not always obvious when an owner is exceeding regulatory requirements, nor is it easy to measure or otherwise determine the extent to which they are doing so. Certain incentive programs administered by the federal government have incorporated the idea of tiered compensation for landowners into their operation to address this very problem, with some success (See box on page 26).

Once what is going to be paid for is established, thought must be given to delivering the payment. One-time payments offer resource-owners a lump sum in exchange for a long-term guarantee of service (like conservation easements). Such an arrangement provides temporal stability. But it also requires a relatively large amount of investment up-front and is difficult to modify if conditions and needs change. Multiple or annual payments for services do not provide the same level of stability. But multiple payments do cost less upfront and offer administrators the ability to adapt to changing conditions with greater ease, as they are not locked into long-term or permanent contracts. A program for buying ecosystem services must consider what its priorities are, and will be, before selecting an option for delivering payment. This process is laden with difficulty as the criteria for making such a determination depends on funding sources that may be outside of their control.

Implementation Challenges

The major implementation challenge for ecosystem payments is in making them strategic. Governments can pay more to get what they want where and when they want it, but at what point does it become too expensive? Also, there is no guarantee that landowners will participate regardless of price. Extending the logic of the market, and the profit motive of private land-owners, it becomes apparent that they will only provide needed services until other more lucrative options emerge, so the government must be careful in assessing other policies to ensure that the payments model remains competitive.

A second implementation challenge involves contract management. If payments of this sort are similar to other situations in which the government looks to the private sector to supply public benefits, then no small amount of expertise will be required to manage them. This will require administrative structures and budgetary allotments that may be significant. Third parties, like land trusts, may oversee some of these programs efficiently and effectively. Yet, their presence complicates administration and requires complex contractual arrangements related to public goals.

A final implementation challenge, which really applies to all conservation and restoration efforts, involves our limited knowledge about the environment. While huge strides have been made towards understanding the complex natural systems public policy often seeks to conserve, our knowledge remains incomplete. The direct and indirect relationships between actions and outcomes are not as predictable as most interested in conservation would like. This uncertainty creates disagreement over best practices and

creates the additional risk that, even if design and implementation are close to perfect for any given policy, it may still not produce the outcomes we desire.

GLOBAL PROBLEMS AND LOCAL MARKETS

One macro-level problem that must be addressed in this conversation is the effect of large-scale environmental changes on private landowners who are participating in market-based policies. The likelihood that climate change, non-point pollution, and other human-induced global environmental factors will impact the outcomes produced by private landowners participating in these policies is increasing. This leads us to a couple of questions: Should these landowners be responsible for the impact these factors have on the services they are providing? Are they simply part of the cost of

LESSONS FROM THE FIELD: The Conservation Security Program

The Conservation Security Program emerged as a significant force for natural resource conservation after the passage of the 2002 Farm Bill. The agency that administers the program, the Natural Resources Conservation Service, declares that it "supports the ongoing stewardship of private agricultural lands by providing payments for maintaining and enhancing natural resources" (Natural Resources and Conservation Service). While not really a market-based program, the Conservation Security Program does provide an interesting model for such programs because it structures payments to private landowners in a way that encourages the strategic conservation of private resources, with local input and minimal governmental interference, by using profit as a motive.

As a federal incentive program that promotes conservation practices on private lands, the Conservation Security Program does not differ in concept from other, more established, federal programs. They all offer public money or technical assistance in exchange for management actions taken on private resources. In practice though, the Conservation Security Program does differ from these other programs because it is not a cost-share program, does not buy property rights, and does not retire working lands from production like they often do. Instead, the Conservation Security Program seeks additional conservation benefits from "operations that already have addressed environmental problems, while keeping the land in production" (Natural Resources and Conservation Service). It therefore doesn't limit production levels so much as reward more environmentally friendly ways of maintaining them. The Conservation Security Program, as mentioned before, does not meet the definition of a market-based policy. It does not define natural assets, services, or outputs, and as a result, does not seek to measure them or arrange for them to be paid for through market forces. Yet it does use the motive of markets — personal profit — to achieve conservation goals. It accomplishes this through matching private interest to public interest through a novel payment structure.

doing business, or should they be given relief from the liabilities created by these factors? A mitigation banker seeking to preserve wetlands in Puget Sound may eventually face the combined impacts of water pollution from in-land sources, temperature increases from global warming, and perhaps even acid rain from the rapid industrial-ization of China. In short, these factors could make the maintenance of a wetlands bank extremely expensive over the long-term and

may facilitate its collapse. Without some sort of protection, few from the private sector will be inclined to take the risks inherent in developing banks or providing services, or those that do may proceed under the pretense that failure is likely. In either case, the banking and payments models will not provide for the long-term preservation of biodiversity in Washington.

(Continued)

   The Conservation Security Program pays private landowners based on the extent of their conservation efforts related to soil and water. It uses three levels, or tiers, to reward increasingly intense (Tier 1), expansive (Tier 2), and coordinated (Tier 3) activities. More money is given to landowners that make, not only greater efforts on their own land, but also greater efforts to coordinate their actions with those executed on the lands around them. These goals are established partially by local governments to aid in their acceptance and durability.

   A similar tiered structure could be developed for the preservation and enhancement of biodiversity. The first tier might offer nominal payments to resource owners that apply good habitat management practices (beyond those established by regulation) on their property without regard to geographic priorities or context. The second tier might offer higher payments to resource owners who implement such management practices and also make them consistent with a statewide, or eco-regional, habitat conservation plan. The third tier could offer the largest payments to resource owners who implement such management practices, make them consistent with a statewide plan, and also specifically address threatened habitat or species at an ecologically significant scale — mainly by virtue of the project size or its proximity to other similar projects. Such a program would help direct federal resources to local areas where the greatest public benefit could be achieved. And, like the Conservation Security Program, simultaneously make this public benefit an attractive management option for private landowners.

   The Conservation Security Program attaches private goals to public goals in a manner that prioritizes natural resources of strategic concern. Successful market-based programs will most likely need to do the same thing. The Conservation Security Program does not represent a market-based public policy. It stands to reason that similar encouragement could be given to the delivery of defined natural assets, services, or outputs that are measured and organized for delivery through market forces. If such a program is directed toward biodiversity conservation, then measuring these services accurately, in a way that captures all of their importance, becomes a challenge of central importance.

IX. CONNECTING MARKETS AND BIODIVERSITY

When market-based policies are considered as a tool for preserving biodiversity, one issue rises above all others as the formidable barrier to their creation and implementation. It returns us to the assumption, presented early on in the discussion about mitigation banking, that a defined natural landscape shares fundamental similarities that should allow for a destructive action taken in one place to be compensated for by a reconstructive action taken in another. Unfortunately, an acre is simply not like another acre when it comes to biodiversity. Different acres may have similar species, similar natural attributes, and a similar set of relationships between them all. Yet, in function, these acres can remain quite different. If we are to use market-based public policies to save biodiversity, these functional differences must be accounted for. In other words, the importance of these differences must be reflected in the

Bull trout in Mill Creek, Snohomish County, Washington. Photograph by David Crabtree.

market. If importance cannot be reflected in the indicators available to us, and in the services we pay for or the credits we exchange, then we must find an alternative that makes sense while providing protection for as many of the benefits of biodiversity as possible.

Another way to consider the barrier mentioned above is to assert that we currently lack the ability to capture all of biodiversity's importance in a property right. It has been noted that, "biodiversity services are the most demanding to protect because of the need to conserve many different elements essential for diverse, interdependent species to survive" (Landell-Mills and Porras 20). Furthermore, "If we intend to market [all of] biodiversity, it is essential that we are clear on what we are selling" (Landell-Mills and Porras 20). Mitigation banks require a government agency to approve what, and how much of what, they are preserving. A payment for an ecosystem service is tied directly to the amount of the service being used. If you can't define a property right for biodiversity, you can't possibly use either of these mechanisms to support or conserve it efficiently. In addition, if you can't define a property right comprehensively, there is little assurance that it will be comprehensively conserved.

This problem can be resolved a couple of different ways. First, we may accept that we can't preserve biodiversity in its entirety and, by using our limited scientific understanding, preserve

what we can with the hope that future efforts will allow for a more holistic approach. Or second, we can establish a commonly accepted suite of indicators that represents biodiversity. Economists have long recognized that the gross national product (GNP) is not a comprehensive indicator of economic health. Along similar lines, no single indicator or measure might be able to represent an ecosystem's biodiversity. However, a combination of indicators aggregated into a single measure could allow for a significant portion of biodiversity to be measured. And, as long as the application of these indicators remains consistent, they should allow for trades to be made with confidence.

Current thinking suggests that the "stacking" of payments or credits on single piece of land or resource may allow for such indicators to be used in the way described above. For instance, a bank that sells wetland credits may also receive payment from a municipality for the flood control services that the wetlands offer. Or a farmer may receive separate payments for water purification and cooling achieved through planting trees and ground cover on his or her land. Stacking services allows private lands to be managed for conservation purposes in a way that is most competitive. It also diversifies the income landowners receive, making them less susceptible to the volatility of single good markets. In terms of biodiversity, this idea of stacking is attractive because it gets the public closer to preserving an area's entire spectrum of biodiversity. Another issue closely entwined with the stacking of

services is the use of proxies. Some of those close to this issue conclude that, "Unless a unit of biodiversity can be defined, then we must resort to the use of proxies…" (Landell-Mills and Porras 20). One proxy is unlikely to capture all the importance of biodiversity, but if multiple proxies are stacked upon the landscape, then great gains may be made to capturing all of its ecological importance. The use of stacking and proxies for preserving biodiversity is no panacea. Proxies themselves are problematic because the market is designed to focus on the proxies, and if they become detached from the real goal of biodiversity, then there will be no institutional incentive to reattach as long as the proxies are thriving. Also, proxies are still unlikely to cover all the ecological importance of biodiversity, even if we stack them to the sky. When it comes down to it, "Defining what qualifies as a biodiversity offset or credit is subjective, but is likely to take into account diversity, abundance, uniqueness, and relative rarity" (Heal 30).

It may be impossible to do this completely, and to the satisfaction of all stakeholders, but a reasonable representation may be created through combining multiple proxies that produce multiple opportunities for private landowners to receive payment. Even if stacking payments and the use of proxies lead to an ultimately incomplete approach to conserving biodiversity, they may still be the best tools currently available and, through careful management, their risks might be minimized.

X. A POSSIBLE INSTITUTIONAL SOLUTION

The already mentioned institutional assessment delivered to the Washington Biodiversity Council contends that the capacity of Washington's public sector to define, categorize, and prioritize areas of concern related to biodiversity is increasing. But this capacity to understand biodiversity must be matched with governing institutions for it to be of any use, and some institutions are better suited for administering market-based policies than others. To use market-based policy to conserve biodiversity, there first needs to be a legislated understanding of biodiversity. Second, there must be an institutional realization of that understanding. And third, there must be a way to strategically weave this realization into both the existing regulatory framework and the market. The very existence of the Washington Biodiversity Council demonstrates recognition of biodiversity's importance and offers the state a starting point for creating a legislative under-standing. Special districting, a prevalent form of government, creates a convenient way to build on this, and achieve all three of the steps above — allowing for the administration of market-based policies for biodiversity across the landscape, in a holistic way.

SPECIAL DISTRICTS FOR BIODIVERSITY

The preservation of Washington's entire range of biodiversity is unlikely to occur through the current, piecemeal public policy approach. Existing conservation programs, even though there are scores of them, deliver insufficient results. They are neither comprehensive enough, nor coordinated enough, to ensure the level and breadth of protection necessary. Part of the reason for this is that there are no clear goals for the preservation of biodiversity. The other part of the reason is that no institution of government aligns itself completely with the protection of biodiversity *in its entirety*. Both of these factors need to change in order for better protections to emerge.

Goals

The establishment of goals related to the conservation of biodiversity will depend first on the expertise of natural resource managers and other stakeholders, and second on confirmation by the public. It is therefore far outside the scope of this paper to dictate what these goals

Snow Creek Wall in Icicle Canyon, Okanogan National Forest, Washington. Photograph courtesy of the USDA Forest Service photo archive.

should be. Thinking broadly, they could include a mission to slow down the rate of loss, prevent any further loss, or to take a restorative approach to conserving different types of biodiversity. Whatever the case, these public statements of value must be coupled with indicators that measure the progress made towards them. As discussed earlier, a comprehensive indicator for biodiversity may not yet be possible. But if a governmental apparatus is in place, along with goals for what this government is working towards, then at least some sort of evaluation can occur (even if its validity isn't guaranteed) as long as the indicator, or suite of indicators, is used consistently. If different types of biodiversity are to have different conservation goals applied to them, and if the progress made towards these goals is to be measured using different indicators, then it is reasonable to expect a highly complicated regulatory environment to emerge. While some regulatory complexity is inevitable when dealing with such a multifarious issue, it may still yet be possible to organize a relatively simple institutional response.

New Institutions

Biodiversity is generally tied to geography. Where you are dictates, in many ways, what kind of biodiversity surrounds you. It is location specific. This isn't to say, however, that elements of biodiversity aren't affected by external factors. As discussed before, international pollution may profoundly affect the health of biodiversity in Washington. This also isn't to say that elements of biodiversity depend wholly on a single place. Wildlife does have a tendency to move around after all. Rather, this statement provides a tenable starting point in space for building an institution

to govern it. Special districts, like biodiversity, are also tied to geography. These districts allow individual issues, within a defined area, to be governed by limited governments that are generally free from the influence of others that share their boundaries. Special districts can exist within one type of conventional jurisdiction, or cross over many of them. They allow for a government to be built around an issue or service in a way that accounts for the actual spatial characteristics of the issue or service. The advantages of creating special districts to handle biodiversity in Washington are many, but they all may be captured in the argument that a regular state agency "that has multiple tasks can be expected to perform one or more of them poorly" (Schick 46), while "an agency with a singular task has an incentive to perform its sole responsibility well" (Schick 46). Dedicated special districts, therefore, avoid the multiple and competing mandates that face regular agencies by allowing them to focus their efforts with minimal internal conflict.

Special districts, by their very nature, operate outside of the traditional, vertically integrated, government structure that has developed in all states. This frees them from a lot of the burdensome administrative and fiscal rules by which this older type of government structure must abide. The end result is that special districts offer greater flexibility when addressing public concerns, greater independence from political and bureaucratic influence, and a greater opportunity for continuity in policy related to a specific issue or service (Schick 14).

Special districts include one additional characteristic that makes them an attractive option for executing the public's will. They

generally are very responsive, for four reasons, to local concerns. First of all, they are often situated in the districts they represent, creating physical proximity. Second, they are often staffed by people from the district they represent, imbuing them with a local regard for place. Third, the flexibility these districts posses usually allows them to account for local conditions and needs better than more rigid traditional forms of government which are embedded in a hierarchy. Finally, special districts are often funded by local taxes making their continued survival dependent on satisfying local concerns. Local independence brings with it a variety of hazards, including the difficulty of coordinating actions between independent entities and of keeping them directed towards the statewide goals they are ultimately accountable for. Local and state objectives will undoubtedly come into conflict when addressing biodiversity. For instance, rural communities may favor more utilitarian biodiversity values than urban communities by placing less emphasis on those elements of biodiversity that have limited value as traditional commodities. Special

Black-capped chickadee (*Parus atricapillus*) enjoying a snack. Range: Northern United States and Canada.

districting does not solve such value conflicts. However, it does provide a dedicated venue in which such conflicts can be mitigated, which is more than is currently available in many places.

Challenges

Of course, special districts present their own set of challenges relating specifically to accountability, coherence, and integration. The accountability challenge emerges precisely because these districts operate outside of traditional government and its series of checks and balances. To keep these districts accountable, many governments have turned towards perform-ance-based evaluations. This refocuses oversight on outputs and outcomes instead of inputs and procedure. The coherence challenge emerges for the same reason as the accountability challenge and can be overcome, in part, through the same application of performance-based evaluations and measurement. As long as there are clear goals, and a way to measure the progress made towards them, special districts have the potential to deliver public services without the bureaucratic conflict and confusion endemic to agencies struggling to fulfill multiple mandates, with dwindling resources, and little guidance on how they should be balanced.

The integration challenge is particularly tough. Productively weaving special districts into both the existing regulatory framework and the market will be difficult. Older agencies, and the larger government structures they represent, are not eager to relinquish authority or funding to new ones. Nor are they designed to coordinate seamlessly with other agencies that don't share their mandates, history, or culture. Solving these "turf" issues requires strong leadership and, at the

least, minor structural revisions to existing government entities.

Structure

The actual structure and administrative mechanics of special districts are varied and complex, creating a number of different design options for biodiversity conservation. This paper will not examine all of these options and their associated characteristics, but special attention will be given to how such a district could be financed. Most special districts receive funding from a variety of sources, even though one source often brings in a most of the revenue. These sources may include property taxes, service fees, intergovernmental grants, and general-fund money from the state. Research conducted in the late 1990's suggests that most special districts that span multiple local municipalities rely on property taxation as a major component of funding (Foster 167). This "regionalized and

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LESSONS FROM THE FIELD: Funding Local, Regional and State Goals

As a structure for executing and protecting the public interest, special districts have been used in many geographic and policy areas with varying degrees of success. The Pacific Northwest offers one example of what, by most accounts, is a special district that provides a particularly useful model for the funding of ecoregional governments. In Oregon, the Portland area metropolitan service district, or Metro, is a "directly elected regional government that serves more than 1.3 million residents in Clackamas, Multnomah and Washington counties, and the 25 cities" in the Portland metropolitan area. Metro provides a wide-variety of services including green-space creation, the promotion of environmental quality, and comprehensive urban-growth planning. While not dedicated to biodiversity, and not built around an area unified by ecological attributes, Metro still pulls together disparate jurisdictions in order to address collective priorities related to biodiversity — and it accomplishes this while remaining sensitive to the needs of its local components. This commitment to conservation, inter-jurisdictional coordination, and fulfilling local need is clearly presented in how Metro funds its green space initiatives.

Metro passed a measure during the November 2006 state elections that will raise $227 million for the purchase of additional natural areas within its jurisdiction. Three programs will distribute the money raised by the measure. First, the bulk of it will go to an acquisition program set on purchasing and improving twenty-seven Regional Target Areas. These areas have been determined by Metro to be of great ecological significance and include critical fish and wildlife habitat, vital natural corridors, and other natural assets of regional importance. Second, if the measure is approved, the Local Legacy Program will distribute a smaller share of the funds, on a per capita basis, to local governments within Metro's jurisdiction. Under this program, Metro approves and funds local conservation priorities generated by municipalities using Metro guidelines. Third, and finally, the Nature in Neighborhoods Capital Grant Program will direct a small share of the money raised by the measure towards community-identified projects like parks, trails, and gardens. This program demands that two locally generated dollars be matched to every Metro dollar

collectivized" (Foster 105) approach has the advantage of spreading service costs over the entire population of the district, which may make the most sense when considering the dispersed and hard to quantify benefits that biodiversity supplies. Whether such a revenue source make political sense is debatable — especially with a spirited anti-tax movement in Washington. Alternatively, a special district for biodiversity may chose to privatize their costs by relying on

fees, rents, or other individualized charges. Such an approach "enhances fiscal equity, encourages the conservation of resources… and eliminates cross- subsidization of services delivery, all of which increases efficiency" (Foster 107). The challenge with this approach is in finding the appropriate individual activities to affix such charges. Whatever method is used, it is important to recognize that the more dependent a special district is on general fund support, the less

(Continued from page 33)

available. Overall, this funding structure allows Metro to meet its region-wide goals using common revenues, while simultaneously creating some autonomy for local areas to meet their own goals by using a mix of common and local resources.

The best opportunities for preserving the full spectrum of biodiversity in Washington often exist in areas where there is little wealth available to do so. How then do these poorer areas, with the most strategic opportunities, get the funding and encouragement they need to engage in conservation activities? Furthermore, how can this funding be administered in a politically acceptable way? Metro's three-part model for funding green spaces provides one answer to these questions. The model described above first pools financial resources and then allows for their redistribution based on regional goals. Such an approach, implemented at the state level for biodiversity, could clearly allow poorer ecoregions to receive funding generated in wealthier ecoregions.

Second, the Metro model also directs regional resources to locally established conservation goals that fit into a regional framework. When applied to ecoregions, a similar approach could allow for local communities to select conservation activities that make the most sense to them, without disrupting the overall strategy. It therefore integrates a local regard for place into the larger framework for statewide biodiversity conservation.

The third part of the Metro model rewards local areas with regional funding for smaller-scale local projects. Such an approach, when applied to biodiversity, might generate interest, understanding, and local buy-in for biodiversity conservation — especially in places without statewide priorities. Ultimately, a model like Metro's could direct revenues generated collectively by all ecoregions to rural areas with natural assets of statewide importance. Yet, it could also reward urban areas with smaller scale projects that still make a contribution to biodiversity conservation. Such an approach offers an effective, and perhaps more politically acceptable, way to coordinate conservation activities across the state through a funding mechanism that reflects large-scale priorities and respects small-scale needs.

independent it is going to be. So, if independence is prioritized, then independent sources of revenue need to be as well (Please see "Funding Local, Regional and State Goals" box). It is also worth mentioning that a special district with the capacity to generate income for dispersal to other government agencies — in order to accomplish shared goals — will most likely surmount some of the integration challenges mentioned above. The opportunity to secure more revenue does tend to weaken an agency's institutional barriers to collaboration.

MARKETS AND NEW INSTITUTIONS

Markets, unlike biodiversity and special districts, are not generally tied to location. Certainly exceptions to this statement occur, but for the most part, the domains of markets are dictated by economic restraints. The key to using market-based policies to conserve biodiversity is to synchronize markets with the spatial limitations of special governments designed around distinct areas of biodiversity. New geographic designations that encircle similar types of biodiversity could help unify conservation efforts by becoming the basis for special districting. This same designation could also be used to define the boundaries of market-based policies created to preserve it. For instance, these "ecoregions" could simultaneously be the jurisdiction of a government, a service area for mitigation banks, and a service area for the provision of ecosystem services related to biodiversity. Such an institution, dedicated to the complete conservation of biodiversity, would be comprehensive by definition. It could also provide coordination in two ways: first through addressing the public policies of the traditional

institutional framework, and second through addressing those of a new market-based one.

It would be easy to say that a new regard for biodiversity must be incorporated into older government programs. However, with multiple and conflicting mandates, and a dearth of funding, such a statement fails to account for the constrained operating environment they face. When it comes to established programs and policies, special districts for biodiversity could simply act as an evaluation tool. They could assess the effectiveness of the existing policy matrix and expose any gaps or shortcomings. This would not require a shift in authority. Such an arrangement would allow for isolated and statewide appraisals to occur and establish benchmarks for future actions After conducting evaluations, the special district could then make suggestions as to how these gaps can be filled, or fill them directly. Among the tools available to them would be market-based policies.

Market-based policy is unlikely to take the place of traditional types of policy. What it can do is efficiently direct government resources and private resources to achieve conservation

Humpback whale breaching. Photograph by Cornelia Oedekoven. Photo courtesy of the National Oceanic and Atmospheric Administration web site.

goals that complement this traditional body of regulation. For instance, if existing regulation was providing insufficient protection to biodiversity on undeveloped lands, then a district could promote a banking model of public policy that makes such lands within their jurisdiction more profitable to conserve. They could also dictate, through the assignment of credits, the land that will provide the greatest monetary compensation, if preserved. This would require the formulation of regulations to serve as drivers of need. While such efforts are bound to meet resistance from landowners, they will be justified through established goals and implemented at the local level, allowing for local people to have some say about the tools that are used to achieve these goals.

An earlier assertion in this paper suggested that market-based public policy might best be used to fill gaps and work around the margins of traditional public policy. Mitigation banks are particularly well suited for filling gaps, and payments for ecosystem services are particularly well suited for marginally increasing protections. Through special districting for biodiversity, any given district could assess the effects of development on the biodiversity within their jurisdiction and demand compensatory mitigation for all additional development, thereby filling the

gap. If ecosystem degradation was widespread enough and incremental gains were necessary over the whole district, then a payment system might be established to achieve these gains. In either case, the district would be reliant on existing regulation to form a baseline of protection for biodiversity, and then make use of additional market-based policies to meet reasonable goals set beyond this baseline.

Overall, special districts for biodiversity use bonds created through the natural environment as a starting point for creating government — whether they are called ecoregions or something else. In such a model, special districts could aid in making the preservation of biodiversity more strategic by focusing public preservation efforts where they are needed, using local input and a flexible set of policy alternatives. Special districts do have their drawbacks as "they tend to be creatures of expedience" and "are established because it seems the sensible thing to do in a particular case, not to fulfill some grand design" (Foster 40). However, if they consider the existing policy environment within which they are to operate and recognize their own complimentary contribution, they will fill some greater design, perhaps even a grand one.

XI. CONCLUSIONS

The direct ownership of natural resources by the government, as a sole conservation strategy, has become prohibitively expensive as land prices increase and financial resources decrease. In addition, the creation and implementation of new regulations to govern privately-owned natural resources meets with more hostility every year. By themselves, the isolated islands of public natural resources in Washington cannot preserve biodiversity over the long run. Market-based public policy is one way to promote the participation of private landowners in public conservation efforts. Such an approach is often perceived as less intrusive than more traditional alternatives. Mitigation and conservation banking, and payments for ecosystem services, conveniently represent two broad groups of market-based policies: voluntary and involuntary.

Mertensia longiflora. **Badger Mountain, Wenatchee National Forest. Photograph by Terry Lillybridge.**

To encourage participation in a banking model, a bank must be the most attractive compliance option for landowners. To encourage participation in a "green payment" model, payments must be the most attractive economic option (more so than traditional agricultural, forest product, or development options that sometimes compete and sometimes compliment them). The first requires a narrower consideration of options by the landowners, most of which are under the direct control of the government. The second requires a broad consideration of all the options available, most of which lie outside the direct control of government. As a result, banks are easier to make strategic than payments for ecosystem services as they allow for more public control. However, the implementation of special districts could allow for all types of market-based policy to be used strategically for biodiversity conservation. They have the potential to provide the coordination and coherence necessary to align old and new policies around a single service, like biodiversity conservation, while being considerate of local concerns and broad state-established goals.

Appling the concepts of market-based policy comprehensively to biodiversity lacks national precedent. Attempting to establish such a precedent poses serious challenges. Foremost among them is proving that enough similarity exists between two places so that the destruction or degradation of one can be compensated by the rehabilitation of another (and that this

compensation occurs in a way that preserves ecologically significant attributes). There are benefits and drawbacks to each type of market-based policy, many of which depend on the extent to which the public sector manages them. Some may argue that market-based policies are simply a temporary measure before the institution of more prescriptive regulation, like using the stacking of payments as way to preserve private resources until they become important enough to become public resources.

In the meantime, a new form of government that reflects local concerns related to biodiversity, with its boundaries determined by natural limits not political overlays, may be appropriate. Using special districts as an evaluation tool of the old, and an implementation tool of the new, may allow market forces to be harnessed to meet conservation goals. Yet, one should not lose track of the fact that market-based policies must be tailored carefully to ensure that desired public outcomes are tied directly to the desired outcomes of private companies. The nebulous nature of what biodiversity is, and how it is best represented, makes an alignment of personal benefit with public benefit difficult, and therefore limits the extent to which market-based policy may be used.

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