Promoting Private Investment in Wetland Ecosystem Services

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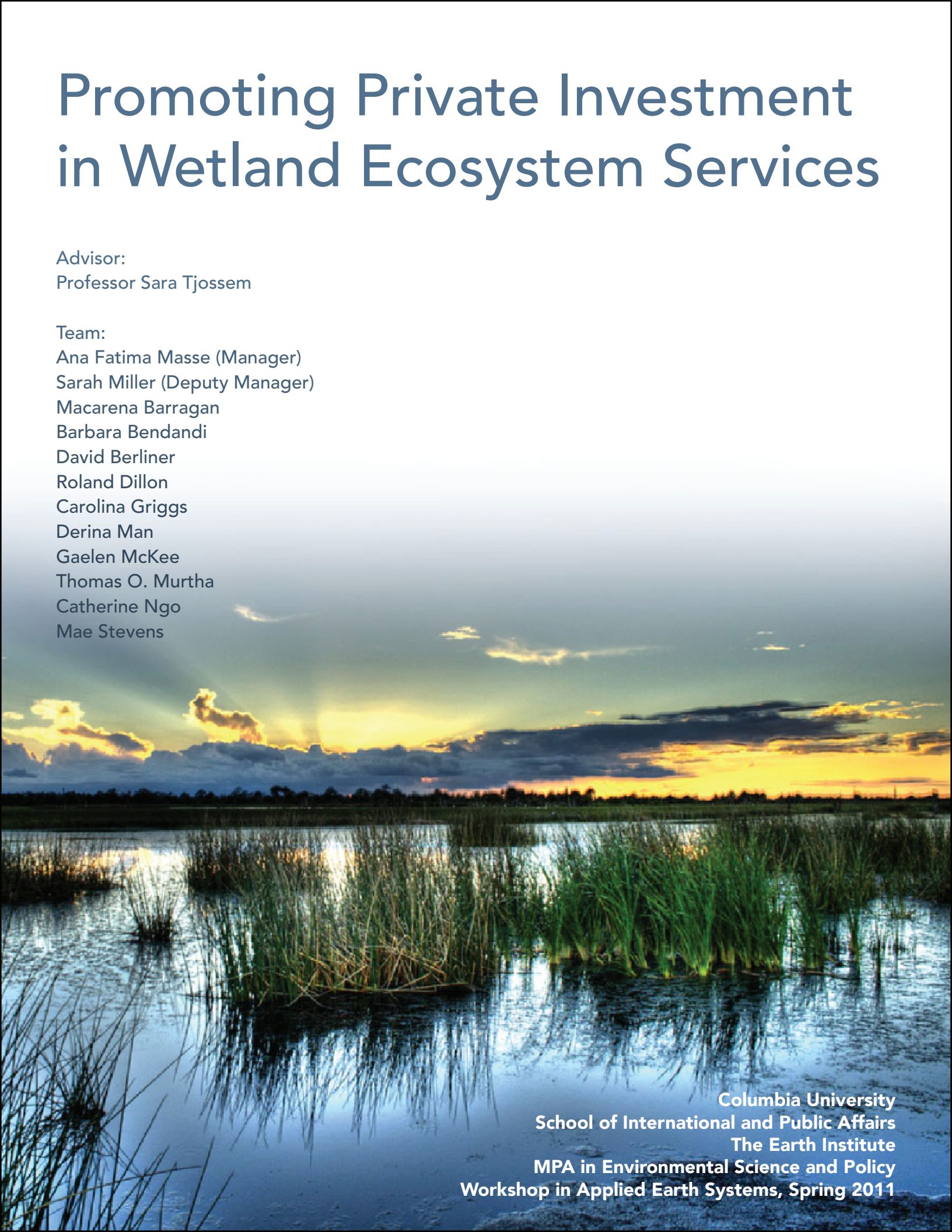

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Preface

This report is the culmination of the Workshop in Applied Earth Systems Management for the Master of Public Administration in Environmental Science and Policy at Columbia University's School of International and Public Affairs. In this course, a team of students work with an organizations on semester-long projects to deliver a high-quality analysis relevant to the client's mission. The Environment Defense Fund (EDF) requested a report identifying innovative ways to engage the private sector in wetland protection.

CONTENTS

ACRONYMS

AB-InBev	Anheuser-Busch InBev
AEC	America's Energy Coast
ARIES	Artificial Intelligence for Ecosystem Services
AWF	America's Wetlands Foundation
BIER	Beverage Industry Environmental Roundtable
BOD	Board of Directors
CCWF	Clear Creek Watershed Foundation
CRS	Community Rating System
CWA	Clean Water Act
EMD	Emergency Management Division
EPA	Environmental Protection Agency
ES	Ecosystem Services
FEMA	Federal Emergency Management Agency
FWS	US Fish and Wildlife Service
GIS	Geographic Information System
HR	House of Representatives
HSPF	Hydrologic Simulation Program-FORTRAN
IDB	Inter-American Development Bank
LA	Louisiana
LLC	Limited Liability Company
LMOGA	Louisiana Mid-Continent Oil and Gas Association
LSU	Louisiana State University
MA	Massachusetts
NFIP	National Flood Insurance Program
NGO	Non-governmental Organization
NRC	National Research Council
NRCC	National Republican Congressional Committee
NY	New York
OCPR	Office of Coastal Protection and Restoration
TCCC	The Coca-Cola Company
TN	Tennessee
TNC	The Nature Conservancy
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGAO	United States Government Accountability Office
WA	Washington
WBCSD	World Business Council for Sustainable Development
WIT	Wetland Investment Trust
WWF	World Wildlife Fund

EXECUTIVE SUMMARY

The Environmental Defense Fund asked a team of 12 graduate students from the School of International and Public Affairs at Columbia University to apply a fresh perspective to the issue of wetland protection in the US. The mission of the assignment was to find innovative and scalable mechanisms to promote private investment in wetland ecosystem services.

Wetlands are areas of land within a watershed that are covered by water at least part of the year. Wetlands provide important services such as water filtration, flood mitigation, recreation and critical habitat for a plethora of species. Despite their valuable benefits, human development activities have historically threatened wetland ecosystems. According to the EPA, over half of the original wetlands in the US have been destroyed and the remaining risk being converted or degraded.

Wetlands are threatened by agricultural and rural development. Over the past 40 years, a compendium of federal, state, and local laws have improved wetland protection. These efforts have an overarching policy goal of 'no-net-loss' of wetlands. This report seeks to move beyond legislation in protecting wetlands. Wetlands provide services that have significant economic value to private stakeholders. Two of the most valuable ones are water filtration and flood mitigation. By identifying key stakeholders that rely on these services, it is possible to find key incentives that would attract private investment in preserving and restoring wetlands.

The first mechanism focuses on the ability of wetlands to provide clean water for the food and beverage industry. These companies typically share a wetland with other stakeholders within a watershed. To pool the resources of multiple stakeholders, we propose developing a Wetland Investment Trust. This is a legal and financial structure that allows different stakeholders to pursue wetland protection projects collectively. By participating, stakeholders can secure the quantity and quality of the wetland services they value like clean water and habitat.

The second mechanism centers on the capacity of wetlands to reduce the impacts of floods. Communities currently purchase flood insurance from the federal government through the National Flood Insurance Program. This program is entering a reform process. It is recommended that wetlands be included as a legitimate flood mitigating strategy within the new regulations. The NFIP can then coordinate private sector investment in wetland restoration projects by guaranteeing a return on investment that will come out of the insurance premiums paid by homeowners. This incentivizes wetland protection thus reducing the risk of flood damages for communities and damage-related expenses to the federal government.

While current regulations have improved wetland protection, there is still a long way to go to in making up for the more than 100M acres that have been lost since colonization. Engaging the private sector through these mechanisms can promote private investment in wetland ecosystem services and help the US restore both the quantity and quality of the nation's wetlands.

WETLANDS

Wetlands are ecosystems inundated by water part or all of the time. Although wetlands have not received equal attention as other ecosystems like rainforests and oceans, this is not an indication of their importance. In reality, wetlands are some of the most productive ecosystems in the world. They provide critical habitat to a plethora of species, including microorganisms, plants and animals and carry out vital services that support the health of the local communities and the larger ecosystems in which they are embedded.

The Value of Wetlands

The services provided by wetlands can be divided into four categories: regulating, provisioning, cultural and supporting (Millennium Ecosystem Assessment 2005).

Table 1: Categorization of wetlands ecosystem services

Service	Example
Provisioning	
Food	Production of fish, game, fruit and grain
Fresh Water	Storage and retention of water
Fiber or Fuel	Production of logs, fuel, peat and fodder
Biochemical	Extraction of medicines and other materials from biota
Genetic Materials	Genes for resistance to plant pathogens
Regulating	
Climate Regulation	Greenhouse gas sink, local and regional temperature
Water Regulation	Groundwater recharge and discharge
Water Purification	Retention, recovery and removal of excess nutrients
Erosion Regulation	Retention of soils and sediments
Natural Hazard Regulation	Flood control and storm protection
Pollination	Habitat for pollinators
Cultural	
Spiritual	Source of inspiration, place of reflection
Recreational	Opportunities for recreation
Aesthetic	Many people find beauty in wetlands
Educational	Opportunities for formal and informal education
Supporting	
Soil Formation	Retention and accumulation of organic matter
Nutrient Cycling	Storage, processing and acquisition of nutrients

Wetlands are connected to larger watersheds, which are areas of land where all water, sediments and dissolved materials drain into a common body of water, like a river, lake or ocean (US EPA 2009). Watersheds vary in size and typically consist of a network of smaller watersheds. For example, the Mississippi River Watershed is made up of thousands of smaller watersheds draining rivers and streams in 31 US states (US EPA n.d.). Within the watershed, wetlands link land and water ecosystems.

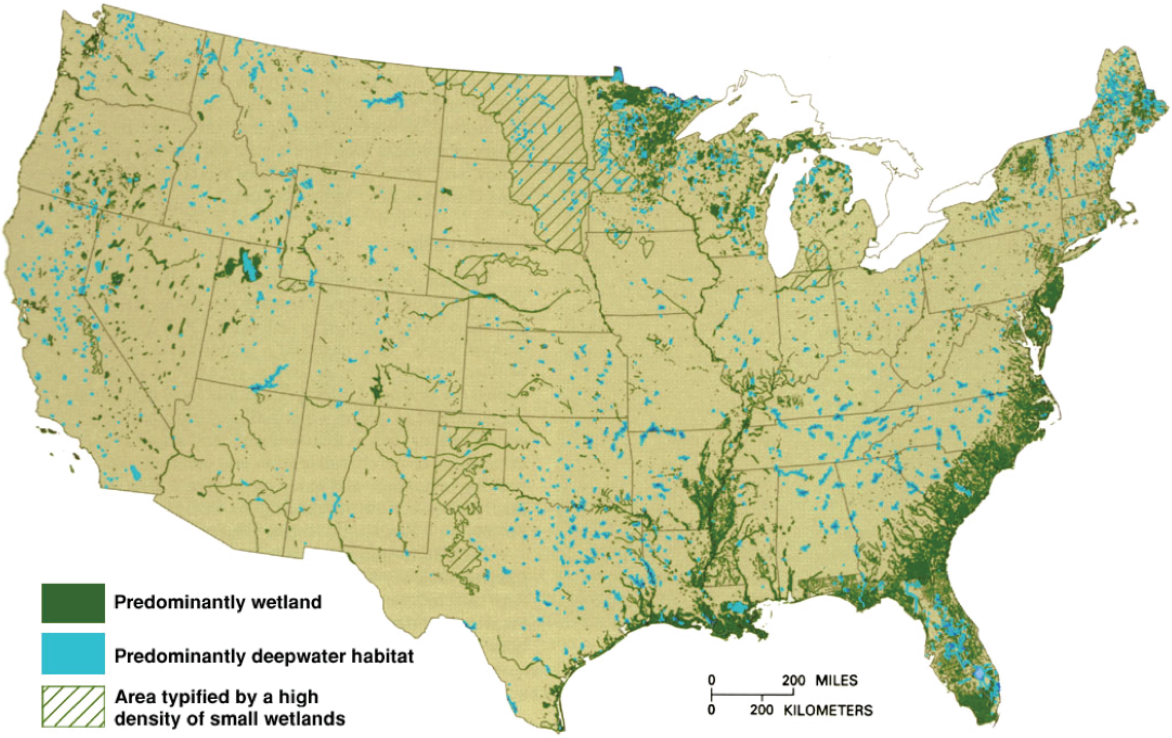


Figure 1: Distribution of wetlands and deepwater habitats (US Geological Survey 2003)

In 2004, wetlands constituted only 5.5% (107.7M acres) of the total land area of the US (Dahl 2006), which is a loss of more than half since the time of colonization (Dahl 1997). Historically, wetlands were perceived as "swampy lands that bred disease, restricted overland travel, impeded the production of food and fiber, and generally were not useful to survival frontier" (Dahl 1997). As such, up until the mid-20th century, wetlands were often drained and converted for agriculture or development. The US government endorsed this approach through legislative incentives and engineering advice for drainage projects (Burwell and Sugden 1964; Dahl 1997).

The high rate of wetland loss continued into the 20th century, as demand for land grew and technological advancements improved the ability to convert wetlands through impermeable concrete structures - known as gray infrastructure - such as levees and drainage diversion projects (Dahl 1997). Starting in the 1950s, public perception of wetlands shifted. As scientists learned more about the important functions that wetlands perform, authorities reversed legislative initiatives that encouraged wetland loss. Wetland protection became an environmental concern and the rate of wetland loss slowed significantly. In fact, by 2004, wetlands were experiencing net annual gains of 32,000 acres per year.*

* The US Fish and Wildlife Service is releasing a new report in the coming months that will provide updated data on wetland acreage in the US.

THREATS

In spite of the reduced rate of loss, wetlands continue to face many threats. The underlying issue is that the ecosystem services provided by wetlands are provided to all, for free, and are difficult to exclude people from using. This creates what is known as a "tragedy of the commons," where a public good is degraded as different stakeholders acting in their self-interest over-exploit the resource.

75% of US wetlands are on private land, which constrains the ability of stakeholders to participate in decision making (US EPA 2011a). Different stakeholders often have very different perspectives on the usefulness of wetlands. For example, farmers may view a wetland as a barrier to agriculture; by converting it to arable land, they can increase productivity and profits. However, to other stakeholders, the wetland may be a resource that provides clean water or lessens the impact of extreme weather events.

Wetland Quantity

Over half of the original wetlands in the US have been destroyed and converted to farmland, altered for development, or filled with industrial and household waste (US EPA 1995). In 1989, a 'no-net-loss' policy for wetlands was introduced which, coupled with other efforts, caused a decline in the rate of wetland loss. The most recent assessment by the US Fish & Wildlife Service indicates that between 1998-2004, the US experienced a net gain in wetland coverage of approximately 32,000 acres.

Wetlands losses were largely due to urban and rural development, with 140M acres, or 61% of losses due to urban and rural development from 1998-2004. Half of this was due to 'deepwater' loss, a transitioning of areas to deep, permanent water bodies such as lakes, rivers and ocean. These losses were offset by the restoration of wetlands elsewhere, either on agricultural lands (>70M acres) or on other lands (349M acres). The final net wetlands gain of 32,000 acres was only made possible due to the creation of ponds in agricultural areas. These gains are nevertheless small in comparison to the total area of wetlands that have been lost since colonization (Dahl 2006).

An added layer of complexity is that the primary threats to wetland quantity varies by type. Estuarine wetlands are located near the ocean and comprise 5% of total US wetlands. These are in danger of being engulfed by open-ocean, due to potential sea level rise (Dahl 2006). The remaining 95% are freshwater wetlands and face destruction from agricultural and rural development. Smaller wetlands are particularly threatened, as 85% of freshwater wetland losses were on wetlands of less than five acres and of these, 52% of the losses occurred on wetlands smaller than one acre (Dahl 2006). With so many wetlands located on private land, one of the largest threats is the destruction of small, privately owned wetland areas.

52%	US wetlands lost since colonization
75%	US wetlands on private land
61%	US wetlands loss due to urban and rural development

Wetland Quality

Degraded wetlands quality directly impacts the ecosystem's ability to provide services such as flood regulation and water filtration. Furthermore, since wetlands are a vital part of the larger watershed, wetland quality will affect the overall health of the watershed.

Many wetlands are threatened by invasive species, biodiversity loss and deteriorating water quality (Millennium Ecosystem Assessment 2005). For example, high concentrations of nitrogen and phosphorous, both primary ingredients in fertilizers, have been collecting in wetlands. In high enough concentrations, these pollutants catalyze algal blooms and can lead to hypoxia, depleting the water of oxygen and creating dead zones. One of the largest dead zones in the US, the mouth of the Mississippi River, is the result of high concentrations of fertilizer runoff in the watershed. Wetland degradation is both a cause and effect of this environmental problem.

The unique conditions in specific locations strongly influence the ecosystem services provided by a wetland. As natural wetlands are lost to development, they are typically offset by restored wetlands under the compensatory mitigation banking framework. There is considerable scientific debate and studies indicate that relocating a wetland through restoration projects has a negative effect on function (Brown and Lant 1999). Even well-restored wetlands are harder to maintain over time than natural wetlands since they are more vulnerable to storm, adjacent land-uses and invasive species (Boyer 2003)

Measurement Challenges

Successful wetland restoration includes quantity and quality goals. However, measuring wetland acreage and functionality is a challenge. There have been great strides made in measuring and accounting for the nation's wetland areas. In the 1970s, the National Wetlands Inventory Program started within the Fish and Wildlife Department to produce maps and data to track wetlands in the US. As this program continues to develop, there are quality issues that must be addressed to ensure that information is accurate. In addition, there is no clear consensus on adequate measures for functions and values of wetlands. For instance, if wetlands are designed correctly they are capable of reducing greenhouse gas emissions by converting reactive nitrogen to a benign form, but there is no index yet capable of measuring and proving this benefit.

REGULATORY FRAMEWORK

Wetlands are subject to municipal, state, federal and international frameworks. Key policies and legislation relevant to management of US wetlands are set out below.

The Clean Water Act (CWA)

Enacted in 1972, the CWA is the chief legislative mechanism for US wetland protection. Section 404 of the CWA prohibits conversion of wetlands for any use without approval from the US Army Corps of Engineers (US EPA 2011b). CWA regulations outline a hierarchy of actions that should be taken if a project may negatively impact wetlands:

- Avoid: negative impacts should be avoided
- Minimize: negative impacts should be minimized as much as possible
- Compensate: compensatory mitigation is required in the case of unavoidable impacts. This model is described further below.

No-net-loss

'No-net-loss' is the overarching American wetlands policy. Developed by the National Wetlands Policy Forum and enacted by President Bush in 1989, it set the short-term goal of maintaining current wetland acreage and a long-term goal of a net gain (Sibbing, 2004). Policy tools that help achieve this goal include:

- Conservation easement programs
- Direct payments
- Education
- Land banks
- Voluntary programs

Subsequent Presidents have all endorsed the 'no-net-loss' policy. The policy was expanded under President Clinton, whose Clean Water Action Plan set a goal of a net gain in US wetlands – 100,000 acres per year by 2005 (Sibbing, 2004).

Compensatory Mitigation

Compensatory mitigation seeks to offset negative impacts through projects in other wetlands, usually within the same watershed, through the following methods:

- Restoration: re-establishing or rehabilitating in order to return it to its natural functions and characteristics
- Establishment: the development of a new wetland where one did not previously exist
- Enhancement: activities within an existing wetland to amplify its functionality
- Preservation: permanent protection of critical wetlands through legal and physical mechanisms (US EPA & US ACE 2008)

In 2008, the compensatory mitigation regime was significantly expanded to apply more rigorous scientific standards and criteria based on recommendations from the National Research Council (US EPA & US ACE 2008).

The Army Corps of Engineers (or designated authority) is responsible for approving the type and amount of mitigation required. The regulations propose a hierarchy of options:

- Wetland Banking: A permit holder can purchase wetland credits from a bank within their watershed to offset their negative impact. Credits are produced through wetland restoration or preservation projects by agreement with the Army Corps.
- In-Lieu Fee: Instead of purchasing a credit, a permit applicant makes a payment to a government or non-profit that will restore, create, or enhance wetlands and watersheds.
- Permit-Responsible: A permitee is directly responsible for a wetland mitigation project, usually within the same watershed.

The wetland banking system takes advantage of economies of scale, potential coordination with other projects and makes use of expert planning and science (US EPA 2011). Wetland banking accounted for 78% of wetland restoration in the US in 2008 (Robertson 2008).

Farmland

Wetlands on farmlands are governed by the Swampbuster provision of the Food Security Act of 1985, which makes farmers ineligible for certain USDA benefits if they negatively impact wetlands (US EPA 2011b). This legislation has played a major role in stemming the degradation of wetlands. The USDA currently oversees the Wetland Reserves Program, a voluntary initiative offering farmers and other landowners technical and financial support to protect and restore wetlands on their property (USDA 2011).

Ramsar Convention

The Convention on Wetlands of International Importance is an international treaty ratified in 1971 that commits signatories to maintain the ecological integrity of their 'Wetlands of International Importance'. The signatories commit to implementing the three pillars of the Convention by designating suitable wetlands for the Ramsar List, working towards the wise use of wetlands through land-use planning, policy and education and cooperating to protect transboundary wetlands and species. The US has been a signatory since 1987 and has listed 29 wetland sites covering over 3.5M hectares.

BEYOND REGULATION

While regulation has improved wetland protection, it does not fully resolve the issue of wetland loss. Federal agencies have limited enforcement resources and the Army Corps of Engineers cannot keep up with the volume of requests. For example, the Army Corps processed permits approving the conversion of 26,000 acres of wetlands in 1995, but gross wetland losses that same year total 150,000 acres (Adler 1999). Delays also often lead applicants to withdraw prior to a decision.

A further weakness of the current framework is that it allows natural wetlands to be destroyed and offset by mitigating actions elsewhere. The benefits offered by wetlands are highly influenced by location so when a wetland is filled for development in a watershed and is offset through the purchase of credits from a mitigation bank, the best-case scenario is that overall wetland acreage and functionality remain the same. However, the original watershed has lost vital benefits and its overall functionality has been reduced.

Any revision to the current regulation would require a degree of political consensus around environmental regulations which is unlikely in the current Congress. Budget cuts are also a priority to address the growing national budget deficit. These factors narrow the window of opportunity for more proactive legislation for wetlands protection. As such, we are seeking solutions that, while complementary to current regulation, move beyond the need for government mandates to maintain these important ecosystems.

Market Opportunities

Investment and involvement by the private sector could potentially overcome the shortcomings of regulation and limited political will. Services like water filtration and flood mitigation are valuable to humans and the larger watershed forms the foundation for private markets. Examples of the value of wetland ecosystem services are:

- New York City avoided infrastructure costs of up to $8B on water treatment plants by purchasing the region around the source waters for $1.5B. The wetlands purify the water at no cost, saving the City anywhere from $1.5 to $6.5B each year (WWF 2004).
- Coastal wetlands in the US provided storm protection services valued at $23.2B per year (WWF 2004).
- The Charles River Basin near Boston, MA offers numerous ecosystem services such as flood mitigation, water supply, pollution reduction and recreation valued at more than $95M per year (WWF 2004).

There is a strong precedent for the use of market systems to address environmental problems. One such example is the carbon market, which has matured over the past decade. The problem is that stakeholders are releasing greenhouse gases without factoring in the environmental cost. By putting a price on the emission of greenhouse gases, countries have been able to value emissions reductions and have created an active market worth billions of dollars per year. In the case of wetlands, market mechanisms have already been used to an extent through the wetland mitigation banking program, which places a cost on wetland destruction and creates the conditions for trading mitigation credits.

Valuing Ecosystems

Our analysis focused on two highly valued wetland ecosystem services: water filtration and flood mitigation. Through two case studies, we explored the possibility of creating innovative and scalable market solutions to protect wetlands.

The water filtration case looked at businesses that rely on clean water as a key input, such as the food and beverage industry. The goal was to identify the common needs, interests and best practices of the many stakeholders interested in the protection of wetlands. Based on this, the case analyzes opportunities and barriers to the creation of a common investment vehicle that could be applied to wetlands almost anywhere in the US.

The flood mitigation case study has two components. The first explored the current flood insurance market and how reforms can create incentives for wetland protection and restoration. The second looked at flood-prone areas – Puget Sound and New Orleans – and analyze opportunities and barriers to creating location specific investment options.

Each case followed a similar approach to collecting and analyzing data. Through interviews with over 40 stakeholders, we gained valuable insights into current perspectives on wetland protection and the most promising mechanisms for collaboration and investment.

In each case, the information obtained from the research and interviews has been distilled into the following broad categories:

- Opportunity Identification: the status quo in the industry related to wetlands and any opportunities for integration of wetland preservation into existing frameworks
- Stakeholder Analysis: groups with a strong interest in maintaining the services and their relationships amongst each other
- Dependencies Analysis: determine stakeholders' dependencies and impacts on ecosystems services
- Incentive Identification: identify barriers to private investment in watershed and wetland restoration and conservation
- Investment Opportunities: specify investment opportunities based on mechanisms to address weak or absent price signals for valuing wetland ecosystem regulating, provisioning, and recreational services

APPENDIX 1 contains a more detailed methodology and APPENDIX 2 provides summaries of key interviews.

FOOD AND BEVERAGE

This case explores the potential for market-based approaches to increase investment in wetland ecosystem services in relation to the food and beverage industry.

Increased collaboration between stakeholders will bring many benefits, including reduced water risk and improved reputation for corporations. There are several persistent barriers that need to be overcome, including low price signals for water, a lack of standard metrics for wetlands and free riders.

We recommend establishing a Watershed Investment Trust that provides an institutional framework for organizing stakeholders to achieve the common goal of increasing the quantity and quality of ecosystem services through funding, implementing and evaluating stewardship practices. This will enable diverse stakeholders to pool their resources and achieve greater environmental and financial returns than they could have separately.

CONTEXT

This case study analyzes potential market mechanisms for water filtration and related services offered by wetlands. Specifically, it examines the value of wetlands and surrounding watersheds to the food and beverage industry as well as other users of these ecosystem services. Set out below are opportunities, challenges and recommendations.

Industry Summary

The food and beverage industry produces, packages, distributes and sells consumable goods, from fresh produce to feedstock to soft drinks and ciders. The industry sells to the individual consumer, wholesale and retail buyers. As an industry, it affects many other sectors up and down the supply chain, including energy, transport, manufacturing, technology and finance.

Estimates made by the USDA suggest that agriculture accounts for over 80% of fresh water consumption in the US, with some regions dedicating over 90% of available surface water to irrigation (Weibe and Gollehon, 2006). The strong relationship between water and raw materials in food processing mean actions of this industry have wide-reaching impacts on watershed management and wetland conservation.

Revenue in the industry is driven by the volume of goods sold and the price premium on branded items. The main costs relate to branding, sales and marketing and the cost of goods sold (including raw materials and packaging). Freshwater is the primary and most important input for the beverage sector and is an integral part of the food and beverage supply chain (Barton 2010). Industry profits are under pressure because, even as production costs rise, customers are not willing to pay more.

This industry is a good partner for watershed protection programs given their scale, high dependency on water availability and quality and the importance of consumer branding to drive sales.

STAKEHOLDERS

Stakeholder interests in wetlands include:

- those who value wetlands for provisioning services (water quality and supply)
- those who value wetlands for recreational services (hunting and fishing)
- those who value wetlands independent of their use value (aesthetic or cultural)

We conducted interviews with stakeholders in all of the above categories to learn how ecosystem services are used, current best practice and opportunities and challenges associated with sustainable water management. Summaries of interviews can be found in APPENDIX 2.

Table 2: Stakeholders Interviewed

Food and Beverage Companies	Anheuser-Busch InBev (AB-InBev) The Coca-Cola Company (TCCC) Pepsi-Co Molson-Coors ConAgra The Campbell's Soup Company
Conservation Organizations	World Resources Institute Ceres The Nature Conservancy (TNC) Manonmet Clear Creek Watershed Foundation National Wildlife Federation Earthjustice World Wildlife Federation UK Union of Concerned Scientists The Freshwater Trust
Representative Organizations	Beverage Industry Environmental Roundtable (BIER) Ducks Unlimited Trout Unlimited
Financial Organizations	Environmental Financial Products GreenVest LLC
Public Sector Organizations	US EPA Inter-American Development Bank Ramsar Convention Secretariat

FINDINGS

Interviewees demonstrated a high level of interest in increasing their effective investment in the protection of watersheds and wetlands. Although for-profit and non-profit interviewees identified different priorities (water availability and habitat protection respectively) both recognized important common issues that must be considered, set out below.

- Water Risk Management: ensuring the long-term quality and quantity of water supply as an essential element of habitat and input into industries
- Branding and Corporate Responsibility: behaving as good corporate citizens in a community and seizing the opportunity for branding differentiation through watershed protection
- Partnerships: developing cooperative relationships between corporations, citizens, governments and non-profit organizations for effective watershed protection
- Decision-making Framework: developing and implementing a framework for collective decision-making and governance of watersheds
- Market Mechanism: identifying market opportunities that leverage the private sector for the protection of wetlands.

Risk Management

Water access is critical to businesses and needs to be managed accordingly. Water supply risk management tends to focus on three areas: water quantity, water quality and sustainability of the supply chain.

Water risk management involves identifying and characterizing risks in terms of severity and likelihood and prioritizing actions to mitigate this risk. Companies need to look beyond their plant when they evaluate water risk into the watershed in which they operate. Risk assessment is conducted through a water risk diagnostic survey. Companies then use the information from such surveys to prioritize water management actions in the watershed. Companies believe that water risk mitigation for plants operating in water stressed areas require greater attention. There is often limited information about risk management choices because public companies are prohibited from disclosing material non-public information about their water related investments under the Sarbanes-Oxley Act of 2002.

When considering water risk, companies consider the issue at the watershed level rather than the wetland level. Although wetlands are integral to watersheds for a number of ecosystem services, protecting wetlands alone is not sufficient for risk mitigation purposes. Based on these industry practices, our analysis focuses on watershed conservation and management in order to address the wetland challenge.

Water risk management raises unique measurement issues that complicate traditional cost benefit analysis. Hydrology varies from region to region and measurement and conservation strategies must occur at a localized level that makes valuation difficult. The expected effects of climate change, including changed precipitation patterns and increased frequency and severity of weather events adds to this uncertainty. To further complicate matters, watersheds by their nature involve a large number of stakeholders with different interests. Thus increasing stakeholder engagement in the conservation of watersheds in the US can complicate matters; this is discussed in detail in the partnership section.

NGOs such as Ducks Unlimited were formed in response to lost waterfowl habitat during the 1930s. Today Ducks Unlimited conserves and protects wetlands to reduce the risk of duck habitat loss on behalf of its membership. Both NGOs and private corporations have a common goal in the watershed: promote healthy ecosystems that provide services that benefit all watershed stakeholders.

The Coca-Cola Company (TCCC)

Coca-Cola is one of the world's most recognized beverage brands, with the largest market share and highest profit margins in the beverage industry. TCCC's watershed and wetland management leads the industry. Examples of best practices include:

- water resource management team at every beverage plant
- vulnerability assessments for all inventory risks to source waters
- source water protection plans with specific responsibilities and funding
- community water partnerships projects which deliver quantitative benefits

TCCC focuses on replenishment, not just consumption

Based on calculations of total use (freshwater inputs minus treated wastewater), plants must take equivalent watershed restoration and conservation activities.

Branding and Corporate Responsibility

Branding is critical to profitability in the food and beverage industry. In recent years, sustainability and the "green consumer" have have become important strategic considerations. Each corporation interviewed was familiar with this trend and had a sustainability program or office of some kind. Research indicates that the top reason why executives were prepared to invest in sustainability was to maintain or improve corporate reputation (McKinsey 2010). Emphasis on reputation has attracted criticism that companies are more concerned about the appearance than the reality of sustainability. However, certain trends are reinforcing responsible corporate behavior, including the increasing attention institutional investors give to external sustainability rankings and the move from philanthropic to strategic spending.

As third party rankings have become more influential, companies have lost the ability to control their sustainability image. Recognition by Newsweek's green rankings, the Dow Jones Index or SAM Group sustainability rankings are very important for maintaining a reputation as a good corporate citizen. Equity investors perceive the rankings as an impartial assessment of the performance of the company and corporations will take action to improve their position. Companies and NGOs recognize the potential branding and reputational opportunities and risks associated with partnerships.

High profile companies such as TCCC and PespsiCo are very cautious of their activities and decisions within local communities, even when they are attempting to do something environmentally beneficial. Large corporations run the risk of being perceived as aggressive or controlling in their stakeholder relations and efforts. For example, TCCC may enter a community to fund wetland conservation; if poorly managed or communicated, other stakeholders may misinterpret their good intention as being domineering. Non-profits may partner with corporations to direct private sector investment toward common goals. If these partnerships are not clearly communicated, incompatible or mismanaged, non-profits run the risk of losing credibility.

Finally, there is a trend where corporations are shifting from philanthropic to strategic spending on social and sustainability projects in the communities where they operate. In the last five years, beverage companies have moved away from providing "no-strings" money to a non-profit group to investing in projects that are closely aligned with corporate strategic goals. Corporate funding is increasingly tied to quantitative performance indicators and assessment of impacts and outcomes. This approach, known as "shared value creation", is increasingly popular with business because it allows them to create economic, social and environmental value while avoiding social harms that create internal costs for firms (Porter 2011).

Evian and the RAMSAR Convention

Occasionally, branding and water source protection are clearly inseparable. Evian, a premium naturally sourced water, has brand value closely related to its source in the French Alps and is highly differentiated from other brands. This dependency on the source for both inputs and marketing creates a powerful incentive for the company to invest in the conservation of the watershed in Évian-les-Bains, France. Evian benefits from the Ramsar Convention, the 1971 global treaty to protect and conserve wetlands, that brings together stakeholders in the community with Evian to protect of wetlands in the watershed. All water users pay for water regulation and provisioning services wetlands provide. Moreover, the community is tightly knit and stakeholders exert social pressure to ensure compliance with watershed rules. Evian is deeply committed to protect the quality of its source waters.

Partnerships

The most critical aspect of watershed management is the development of strong local partnerships. Large multinational companies need to partner with local citizens, organizations and municipal governments to effectively monitor wetlands. Corporate and NGO partnerships offer scientific expertise and relationships with property owners carrying out more day-to-day work, creating mutual benefits for all the stakeholders in the watershed.

Clear Creek Watershed Foundation (CCWF)

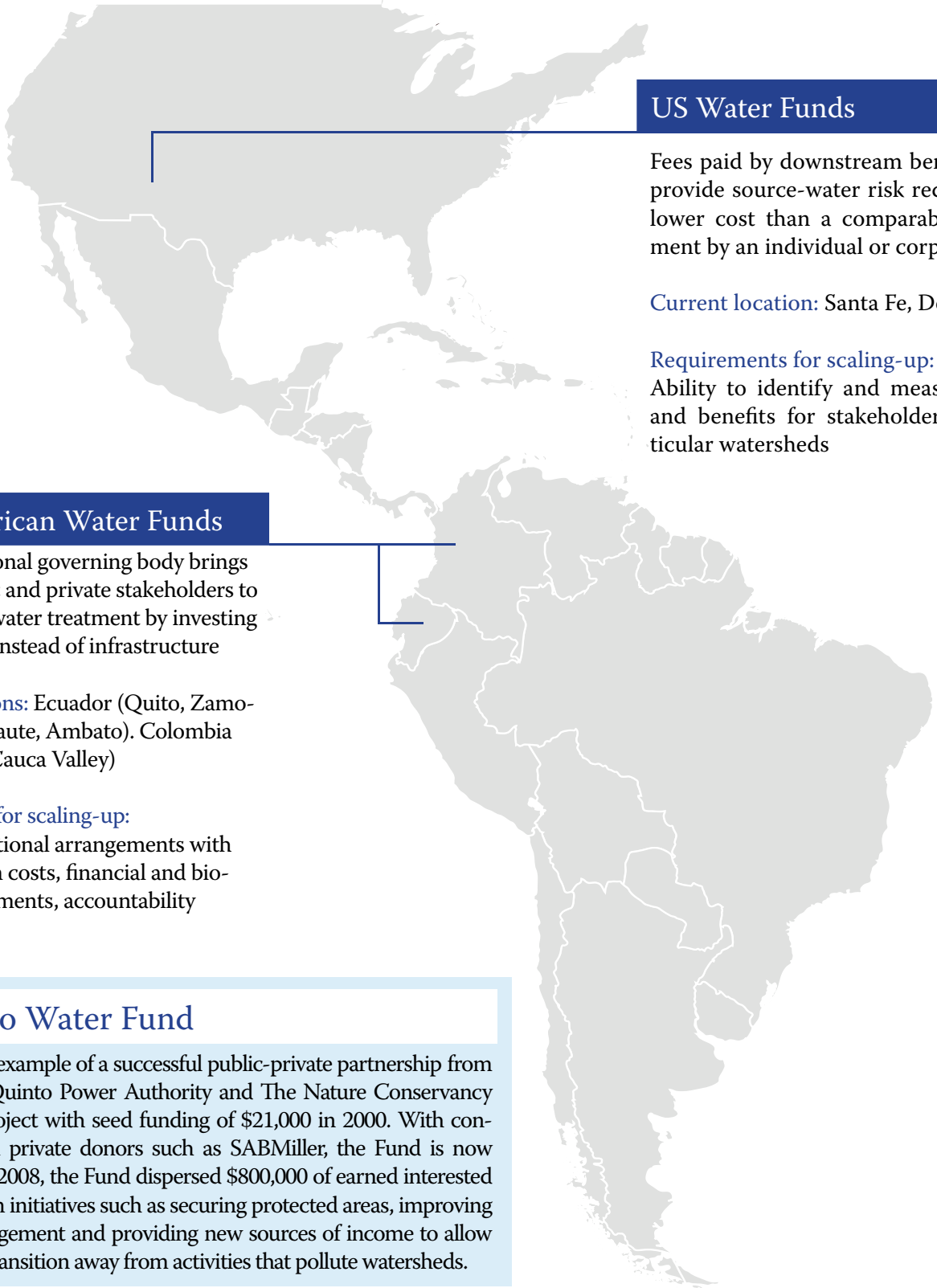
CCWF, a non-profit dedicated to protecting the Clear Creek watershed in Colorado, has been one of the most successful organizations in addressing neglected mining remediation projects in the US. Their success is built on strong engagement of local volunteers and major private partners such as Molson-Coors, Trout Unlimited and the Audubon Society. Difficulties bringing stakeholders together have been reduced through a "culture of cooperation". CCWF has had considerable success with restoration projects as a volunteer-led, 501 c3 organization financed by both government and private grants.

Food processors and beverage companies consistently recognize their water security concerns are outside the walls of their plants because they depend on the watershed. This kind of thinking introduces a new set of risk factors that must be considered in the context of stakeholder relationships in the watershed and their upstream/downstream relationships with each other. Stakeholder engagement is extremely important to food and beverage companies because it involves a trifecta of issues: the license to operate in the community, brand management and water rights. The complexity of dependencies and impacts on the watershed makes stakeholder engagement a challenging and time consuming task.

Water fund creators in Latin America such as TNC and development agencies have formed public-private partnerships designed to restore and conserve watershed ecosystem services (Goldman, et. al., 2010). Investors funds provide an initial endowment sufficient to enable ongoing income from interest on principal invested in fixed income securities. Part of the initial principal is used to create the fund's management infrastructure. In a global context of cyclically low interest rates in many economies, water funds are currently far from self sustaining and most are essentially a financial endowment that will keep the water fund in operation as long as possible. This endowment structure has the advantage of supporting sustained stakeholder engagement in the watershed. A longer-term goal of a fund is to generate sufficient revenue streams to be self-funding. Achieving this is contingent upon the development of an institutional infrastructure that supports the measurement of impacts and benefits of watershed ecosystem services, and the creation of market mechanisms for benefit and impact price discovery.

Stakeholder management by water funds must be adapted to the unique needs of particular watersheds. There are substantive differences in issues a water fund faces in developing or developed economies. For example, a subsistence agriculture population presents completely different stakeholder issues than a developed economy operating in the context of highly mechanized and fertilizer/pesticide intensive agriculture. In both developed and developing economies, water funds are a mechanism for institutional capacity building that can eventually lead to the creation of payments for ecosystem services in the watershed.

Water Fund Comparison



US Water Funds

Fees paid by downstream beneficiaries provide source-water risk reduction at lower cost than a comparable investment by an individual or corporation

Current location: Santa Fe, Denver

Requirements for scaling-up:
Ability to identify and measure costs and benefits for stakeholders in particular watersheds

Latin American Water Funds

Multi-institutional governing body brings together public and private stakeholders to avoid costs of water treatment by investing in ecosystems instead of infrastructure

Current locations: Ecuador (Quito, Zamora, Amaluza, Paute, Ambato). Colombia (Bogota, East Cauca Valley)

Requirements for scaling-up:
Flexible institutional arrangements with low transaction costs, financial and biophysical assessments, accountability

The Quito Water Fund

This fund is an example of a successful public-private partnership from Ecuador. The Quinto Power Authority and The Nature Conservancy initiated the project with seed funding of $21,000 in 2000. With contributions from private donors such as SABMiller, the Fund is now nearly $8M. In 2008, the Fund dispersed $800,000 of earned interested for conservation initiatives such as securing protected areas, improving farmland management and providing new sources of income to allow individuals to transition away from activities that pollute watersheds.

Watershed Management Decision-making

A crucial issue for potential investors is the lack of relevant tools to assess costs, benefits and risks associated with the loss of wetland and watershed ecosystem services. Corporations need to link water consumption and risks to internal financial metrics, rather than purely sustainability or compliance metrics. While there may not be satisfactory methods available to watershed managers for estimating absolute dollar value of watersheds, there are promising frameworks for ranking a set of proposed watershed projects against a known cost of sustainability benefits in a watershed.

Table 3: Decision-making Tools

Multi-Attribute Utility Analysis, Clear Creek Watershed Foundation

Normalizes watershed projects on single scale of sustainability benefit & compares all projects to a known benefit/cost ratio of a reference project in the watershed

Value: Provides a reference point to compare, prioritize, categorize and market projects within the watershed

Streambank Web-based Tool, The Freshwater Trust

Develops watershed specific database to systematize and automate project regulatory compliance, identify project funding sources and organize project monitoring and reporting

Value: Reduces project completion time, generates budgets and RFPs for local contractors.

InVest Software, Natural Capital Project

Integrates ecosystem services into a strategic environmental assessment for a watershed/wetland restoration and conservation program

Value: Identifies systematic baselines for watershed ecosystems status, ecosystem service provision, impacts and mitigation measures.

Market Mechanisms

Interviewees were interested in finding ways to connect with different stakeholders with a common interest in wetland protection. Interviewees did not express interest in the development of a wetland services trading system (following a voluntary carbon market model). Unlike carbon, watershed impacts are highly localized and companies prefer conservation over mitigation. One company noted that creating a wetland in one region to compensate for destruction in another does not adequately remedy impacts on the company's reputation in the community.

BARRIERS

Companies identified several barriers to watershed protection that need to be addressed.

Lack of Price Signal

> The private sector has little incentive to invest in ecosystem services until value is quantified with respect to scientific baselines.

Water is generally recognized by industry executives to be under-priced. This price is not set by the market and does not reflect the scarcity of the resource (Weib and Gollenhon, 2006). The prices paid for water, particularly for irrigation purposes, is set by policy with political goals. In most US watersheds, municipal water utilities charge for water primarily on the basis of delivery infrastructure, reinforcing a bias against paying the true cost of water. The absence of an accurate price signal means that businesses have little incentive to conserve water or invest in watershed restoration.

Several companies acknowledged that the current pricing of water is low relative to replacement alternatives. Food companies noted that the majority of their plants are located in water-abundant regions and water scarcity is not an urgent threat. Current conservation efforts focus on internal water efficiency upgrades and has largely been motivated by concern about reputation rather than for economic reasons. In the long-term, organizations know climate change and population growth will exacerbate water scarcity, which means artificial price ceilings will be revised and they will face prices that more closely reflect water's true cost.

Lack of Agreed Metrics

Many organizations stated that effectively measuring and properly analyzing water risks and impacts is a major barrier to investment. Companies recognize the importance of wetlands but cannot justify investments into ecosystem services without reasonably accurate measurements of benefits. Their incentive to invest is low because of the difficulty of proving causation. This barrier is of particular significance for risk mitigation arguments because corporations require quantitative evidence for making financial decisions.

Several companies indicated that scientific uncertainty is a barrier to investment. Companies lack meaningful baselines on the current status of watersheds or benchmarks for a desired state. The development of such a baseline is perceived as time consuming and expensive. According to the Inter-American Development Bank, difficulties tracking and measuring project progress reduces long-term investment from international companies and donors.

Credits could be generated for carbon, biodiversity and wetland protection. Although appealing in principle, such markets will require significant advances in relation to metrics and evaluation to be feasible. To gain regulatory and public acceptance, project that generate multiple credits (i.e. credit stacking) must address the issues of additionality and double-counting. These issues continue to be a source of controversy in the carbon markets, especially under the UN's Clean Development Mechanism for incentivizing carbon mitigation in developing economies. Producing stacked environmental credits on the basis of one conservation action is not as controversial as the sale or transfer of such credits (Fox, Gardner & Maki 2011). These issues need to be further resolved before the true financial return on wetland restoration can be calculated.

For wetland mitigation banking and watershed project finance, the ability to stack and sell credits from a project can make the critical difference between an attractive or unacceptable return on investment (D. Lashley Pers. Comm. 2011 and J. Whitworth, Pers. Comm. 2011).

Free-riders

Wetland users are interested in protecting and conserving a wetland but none are willing without the participation of the other parties who also draw from the source. In Évian-les-Bains, where Danone has successfully anchored a wetland protection program, there is a strong agricultural association in place and a cultural expectation for cooperation amongst all users. There is strong social pressure to comply with the norms surrounding the wetland. Not allowing free riders has been important for the success of the Évian-les-Bains project.

RECOMMENDATION

Establish a Wetlands Investment Trust to provide a stakeholder driven, incentive-based solution to the ongoing challenges of wetland restoration and conservation.

The Wetland Investment Trust (WIT) can aggregate the power of numerous stakeholders to protect and restore wetlands. Although these stakeholders have different interests, all share the goals of wetland and watershed conservation because of the essential services they provide. Food and beverage companies rely on long-term water supply from watersheds as input for productivity. Recreational users depend on the conservation of wetland habitat to support water fowl and fisheries. Municipal governments and citizens rely on the filtration services of wetlands to reduce sedimentation and nutrient loading for water treatment plants.

Stakeholders share common goals but are individually unable or unwilling to bear the total costs for watershed restoration. Our discussions with companies, representative organizations and NGOS all indicate a need for a structure that enables coordination and pooling of resources. Stakeholders have an incentive to participate because the WIT allows the conservation of watersheds without any single user paying for the entire effort. Branding opportunities, product differentiation and improved perception by communities provide additional incentive to corporations to participate in the WIT. NGOs and municipalities have an interest in participating because the pooled resources provide more capital for them to reach their conservation goals.

The development of a WIT builds a basis for addressing some of the current barriers to conservation. The WIT brings together essential elements for overcoming the barriers to accurately measuring the benefits of watersheds. NGOs and universities in a region provide scientific understanding to develop measurement tools while corporations can provide the funding to support this progress. The combination of these resources enable the development of the most pragmatic and locally acceptable metrics.

The WIT includes a framework for governance and decision making that will help enforce conservation efforts and address free riders. Unlike the status quo, all stakeholders will come together to create standard expectations regarding the use of the watershed. The WIT offers a structure for greater interconnectedness and communication amongst all users. Similar to the situation in Évian-les-Bains, closer cooperation also translates into better community monitoring and awareness of potential free riders. The WIT offers legal and political power for enforcing the expectations laid out by the WIT, thus managing free-rider issues.

WETLAND INVESTMENT TRUST
How does it work?

Private
Food and Beverage
Agriculture

Public
Water Authorities
State Agencies

Community
Environmental &
Recreation Groups

WETLAND INVESTMENT TRUST

- Framework for stakeholder engagement, education & outreach
- Public and private partnership incorporating multiple institutions
- Aggregates capital for green infrastructure investment

Outputs

- Improved water quality and quantity
- Investors' dividends through risk mitigation
- Environmental credit generation
- Improved branding and reputation

BENEFITS

- Establishes scientific baselines
- Pools investment for collective goals
- Prioritizes projects for maximum impact
- Creates a stakeholder coordination framework
- Provides legal shield to manage investor liabilities
- Enables payment for ecosystem services infrastructure
- Lowers individual costs and improves return on investment

IMPLEMENTATION

Governance

The WIT is a legal entity that would collect and manage investor assets to invest in projects that improve water quantity or quality in the watershed. The WIT would be managed by:

- A board of directors (BOD), elected by the WIT investors, that will meet regularly and be responsible for approving capital allocation for watershed projects.
- A permanent staff responsible for evaluating, measuring and monitoring projects and providing community outreach. The staff will be guided by priorities established by the board of directors.

Activities

The WIT's mandate is to identify, undertake and evaluate projects that improve or conserve a watershed's ecosystem services. Activities should reflect the membership's priorities as expressed to the BOD. Projects will be approved based on an evaluation of potential watershed impact, financial cost, environmental benefits created, environmental credits created and cash-on-cash return on investment.

A WIT pilot program should be implemented in a watershed where stakeholders or activities depend on source water availability or other ecosystem services. These stakeholders could include corporations with water intensive operations, water utilities, NGOs, agricultural operations or pre-existing markets for environmental credits.

Potential Pilot Project Sites

- The Crooked River Watershed in Maine
- A smaller tributary basin in the Connecticut River Watershed
- A smaller tributary basin in the Chesapeake Bay
- A city such as Ashland, Oregon dependent upon a national forest watershed

Illustrative Budget

The WIT's source of funding is shareholders' direct investment in the fund. The first-year budget for the WIT would include salaries for three professional staff, office space, administrative support, analytic and project management software development as well as funding for three to five projects in the watershed. Over time, additional funding can be generated with the creation of environmental credits for biodiversity, carbon sequestration, water quality and water quantity. All projects will require annual reporting of environmental benefits obtained and costs incurred. This helps quantify the annual environmental returns for each dollar invested in the fund.

FLOOD INSURANCE

This case explores the potential for market-based approaches that would increase investment in wetlands for their flood mitigation services.

The government run National Flood Insurance Program provides flood insurance to almost 6M homes and businesses, but does not take into consideration the flood mitigating benefits of wetlands. Reform to the program is likely to save money because there is a measurable link between these ecosystem services and their economic value. Private companies self-insure and require something akin to the Watershed Investment Trust to incur direct benefits from the flood mitigation services of wetlands.

We recommend the revision of the Community Rating System and the National Flood Insurance Program guidelines, or the creation of an alternative Community Green Rating System that would allow communities or private investors to invest in wetlands for their flood mitigating services.

CONTEXT

This case focuses on flood mitigation services provided by wetlands, specifically, whether flood insurance markets can use wetlands as a flood risk mitigation strategy. It finds that neither the current government-run flood insurance program nor large private companies consider the flood mitigation benefits of green infrastructure such as wetlands. This report argues that wetland preservation and restoration can be a cost-effective flood mitigation option. Finally, this report explores the potential for private sector investments in wetlands to reduce flood risk.

Three main groups of stakeholders are affected by flooding in the United States: homeowners and businesses insured under the government run national flood insurance program; large corporations with significant infrastructure investments; and public organizations with large infrastructure investments. Preliminary research identified the following two market opportunities as the most promising for attracting private investment:

- The potential for including wetlands' flood mitigation services in the government run flood insurance market, the National Flood Insurance Program.
- The potential for wetlands investment by large private corporations with significant infrastructure in flood-prone areas.

National Flood Insurance Program

Flood insurance in the US is provided by the National Flood Insurance Program (NFIP), a government-run insurance program offered to property owners in flood-prone areas. The Federal Emergency Management Agency (FEMA) administers this program, while private insurance companies sell and service the insurance policies. The NFIP is the main flood insurance market in the US, as only a small proportion of private flood insurers cover flood losses in excess of what is covered by the NFIP (Michel-Kerjan 2010). By exploring the effects of this program on wetlands and opportunities for including wetlands protection in the program, there is a potential to achieve scalable and positive impacts on wetlands in the US.

Congress created NFIP in 1968 after Hurricane Betsy caused $10B (2010-equivalent) worth of flood damages (Michel-Kerjan 2010). Prior to NFIP, a flood insurance market did not exist because private insurers did not and still do not have an interest in bearing the risk of substantial losses from flooding events (Michel-Kerjan 2010). Flood insurance, unlike life, auto, or fire, is not a balanced, predictable risk. Floods impact large communities without warning, forcing insurers to settle thousands of claims for one event. Insurances companies are not structured to handle this volume of claims so the government intervened to provide insurance for property owners in flood prone areas (Parrillo 2011).

FEMA maps out flood risks and designates flood zones across the country. Eligibility for federal funding is determined by participation in NFIP for homes located in high-risk flooding zones.

In order for homeowners, renters and business owners to secure coverage under NFIP, their respective communities must agree to flood mitigation regulations mandated by FEMA, including the creation and enforcement of a floodplain management plan (US GAO 2010). Private insurance companies sell NFIP policies at rates determined by the flood maps (US GAO 2010). Taking out flood insurance policies under the NFIP is not mandatory, however many banks require flood insurance for mortgages or business loans. As of 2010, there were 5.6M policies in force (FEMA 2010). Currently, more than 20,000 communities participate in the NFIP (US GAO 2010). Furthermore, over 90 private insurance companies sell NFIP policies to property owners in these communities (Michel-Kerjan 2010).

FEMA also manages a voluntary Community Rating System, which provides incentives for communities to undertake flood mitigation actions. The activities are grouped into four categories: public information, mapping and regulations, flood damage and reduction and flood preparedness. Activities are worth a certain number of points and after accumulating a certain number of points all policyholders in a community benefit from a premium reduction of 5% - 45% (FEMA 2007). In practice, a large proportion of policyholders only achieve a benefit of 5 to 15 percent reduction as communities are likely undertaking the easiest and cheapest activities to achieve points (Michel-Kerjan 2010). Approximately 3.4M policy holders in 1,148 communities participate in the CRS program (FEMA, 2011).

In the Community Rating System communities located in Special Flood Hazard Areas, where 100 year flood levels have a 1% chance of occurring every year, can undertake 18 types of activities to obtain points which reduces their premium by up to 45%. A full list of these activies can be found in APPENDIX 3. If a community receives 4,500 or more points it is granted a 45% reduction in premiums. From 4,000-4,499, they receive 40%. This point system carries on until the bottom where a community accumulating from 0 to 499 points does not earn any premium reductions.

Reforms to the National Flood Insurance Program

Under the current insurance system, the government bears all the flood risk while the insurance companies assume no risk but collect an administrative fee of about 30% (Michel-Kerjan 2010). The program has accrued a debt of $19B, which it is unlikely to repay, and has catalyzed discussions around reform measures (US GAO 2010). The current program is criticized for charging insurance premiums that undervalue the flood risk.

NFIP is currently under review and there are opportunities to make recommendations. Parties focused on reforms include the Government Accountability Office (GAO) and Smarter Safer Coalition (taxpayer advocates, emergency management organizations, environmental groups, insurance companies and others). A recurring theme is that premiums should rise to reflect the true underlying flood risks (US GAO 2010; SmarterSafer 2011). In April 2011, the Insurance, Housing and Community Opportunity Subcommittee of the House unanimously passed the National Flood Insurance Reform Act (HR 1309 2011). The Act raises insurance premiums to reflect actual costs and encourages private insurance participation in the flood market (Insurance Journal 2011). It also calls for the creation of a technical mapping advisory council to develop new standards for assessing flood risk. The Bill has been referred to the House Committee on Financial Services.

FINDINGS

Our research and interviews with experts raise the following important issues.

- Incentives: NFIP does not provide incentives to preserve or restore wetlands and may be having the opposite effect by encouraging wetland degradation
- Cost effective flood mitigation: Wetlands provide flood mitigation services that should be considered as part of a floodplain management strategy
- Measuring benefits: Current science can calculate the link between a wetland project, the flood benefits provided by the project and the value of the flood benefits

Incentives

NFIP does not provide incentives to preserve wetlands. Ironically, the NFIP may be encouraging development in floodplains and causing wetland degradation (S. Holladay, Pers. Comm. 2011; Pompe and Rinehart 2008). In cases where the cost of flood insurance is less than the underlying flood risk, developers have an incentive to build in ecologically sensitive flood-zones (Pompe and Rinehart 2008). Though some scholars have investigated this relationship, the available data is not at a high enough resolution or scale to conduct proper investigation (S. Holladay, Pers. Comm. 2011). Further research into the link between wetland destruction and NFIP policies issued may find that NFIP's low premiums correlate with urban and rural development, the largest threats to wetlands. Smarter-Safer is urging FEMA to limit flood coverage in high hazard and environmentally sensitive areas.

The NFIP does not provide meaningful incentives for policyholders to restore wetlands for flood mitigation. The Community Rating System (CRS) does not include wetlands projects in its list of actions for communities. Under the CRS, communities can accumulate points under the 'Open Space Preservation' category, whereby communities guarantee that currently vacant floodplain lands, including golf courses and soccer-fields, will not be developed. Although additional credit is given for areas still in, or restored to, their natural state, the point-value of this initiative is minor (FEMA 2010).

Most communities that participate in the CRS receive a 5-20% reduction on household premiums (Michel-Kerjan 2010). While the opportunity for more communities to achieve greater premium reductions exists, there are several barriers. If premiums are already artificially low, communities lack incentives to dedicate time and resources to reductions. Also, we hypothesize that communities are undertaking projects that cost the least and count for the most number of points. Once communities have achieved a certain point level, they lack incentives to continue the process.

The Coastal Barriers Resource Act, 1982 stopped NFIP insuring properties on coastal barriers landforms, which dramatically slowed and nearly stopped development in these fragile ecosystems (Salvesen 2005).

Cost Effective Flood Mitigation

Many flood mitigation cost-benefit assessments evaluate 'gray infrastructure', like levees and dams, but overlook similar benefits provided by 'green infrastructure' like wetlands and other natural ecosystems (Boyd 2011). Although many studies have valued the flood mitigation benefits of wetlands, reports comparing both the costs and flood mitigation benefits from green infrastructure against alternative grey infrastructure projects are elusive. Green and grey infrastructure are not mutually exclusive and often work in tandem to reduce flood damage.

One study by the Army Corps of Engineers provides a cost benefit example of green versus grey infrastructure in the Charles River basin in Massachusetts. In the 1960's, Boston purchased the wetlands along the Charles River for $10 M, one-tenth of the estimated $100M cost for levees and dams that would provide the same benefit (NRCC 2005). Despite the relevance of this study it is outdated and providing a more recent cost benefit comparison would provide needed information.

A more recent study in the upper-Mississippi found that restoring drained wetlands that are currently used for row-crops resulted in a benefit to cost ratio of 1.3 : 1, however it fails to provide a cost comparison with alternative grey infrastructure (Hey et. al. 2004). Cost comparisons would strengthen the argument that, according to the Director at LSU's Center for Natural Resource Economics and Policy, "The benefits of doing certain wetlands projects will be larger than the cost" (R. Caffey Pers. Comm. 2011). This sentiment is recognized and as a result wetlands have also been employed for their flood mitigation benefits along the Napa River, California and the Truckee River, Reno, Nevada (Kousky 2010).

Measuring Benefits of Wetlands

Many studies have attempted to quantify the flood mitigation benefits of wetlands to produce a dollar value per acre per year, three of which are outlined below.

Table 4: Valuation of flood mitigation services

Study	Location	Method	Value (acre/year)
Leschine et al 1997	Washington State	Alternative Cost	$1,187 - $5,430
Ming et al 2006	Momoge Reserve	Alternative Cost	$2,300
Mitsch and Gosselink 1993	Charles River	Damage Avoided	$2,000

The alternative cost method calculated the flood mitigation value for two large wetlands in Washington State (Leschine et al.1997). A Hydrologic Simulation Program-FORTRAN (HSPF) determined the potential increases in water-flow rates if existing wetlands were destroyed. The cost of building reservoirs and other gray infrastructure to offset the increased flooding was used as a proxy for the value of the wetland ecosystem.

The damage-avoided approach was used to calculate the economic benefits from wetlands in the Charles River Basin in Massachusetts (Thibodeau and Ostro 1981; Mitsch and Gosselink 2000). The loss of 1,400 acres of wetlands was estimated to result in flood damage costs in excess of $17M. Thus, the flood mitigation benefits of wetlands were valued at $2,000 acre per year (Mitsch and Gosselink 2000).

Economists have a variety of widely accepted software tools (e.g. the ANUFLOOD software package) to evaluate damage from flooding. These tools could also be used to determine the economic impact of reduction in flood risk (S. Holladay Pers. Comm. 2011).

Current hydrological modeling is quite sophisticated and able to establish the relationship between a proposed wetland project and the potential flood mitigation benefits within a reasonable margin of error (R. Caffey Pers. Comm. 2011; G. Terzi Pers. Comm. 2011). Watershed and floodplain managers are already familiar with these tools and they are common practices when making flood decisions.

Combining the scientific, technical and economic expertise of industry professionals can strengthen the current of the relationship between a wetland project and the value of the potential reduction in flood damage. An expert panel would be able to develop the criteria that define the process for undertaking these calculations. There will be uncertainty in the calculation and valuation estimates. However, this uncertainty is within the range of uncertainly already present in CRS of the NFIP (S. Holladay Pers. Comm. 2011).

Table 5: Examples of mitigation modelling

GIS flood mitigation modelling

The model integrates factors like hydrology, hydrogeography, soil type, topography and land use to assess the long-term sustainability of a wetland restoration project. The second phase of the model prioritizes prospective restoration projects in terms of potential delivery of ecosystem services.

ARIES flood mitigation modelling

ARIES is a software tool under development that can map ecosystem provisioning services, beneficiaries and economic valuations. It can be used to identify areas critical for flood protection and compare various flood mitigation projects (Batker et al. 2010b).

RECOMMENDATION

Revise the NFIP to include ecosystem services and encourage private investment in wetlands.

In order to drive private sector investment in wetland projects, the NFIP must recognize the flood benefits that wetlands and other green infrastructure provide. It is promising that the NFIP Reform Act includes a provision that would direct FEMA to include wetlands and other natural buffers into the flood rate maps that dictate insurance premiums. Wetland benefits could either be included in the current CRS system, or in a new "Community Green-Infrastructure Program"

The first stage of reform is to include wetland ecosystem services in the NFIP program. The second stage of reform is allowing private-sector investment in NFIP risk mitigation. This creates opportunities for private entities to undertake wetland restoration projects, which would cause a decrease in premiums for the host community (since risk decreases), and these savings would constitute the return on investment for private entities.

Table 6: Evaluating the different options

	Pros:	Cons:
Incorporating wetlands into the existing Community Rating System	Administratively simple	Based on the 'points' system which is indirectly linked to dollars
Incorporating wetlands into a new Green Infrastructure Program	Based on cost-benefit and dollars to drive private investment	Administratively more complex

The recommendations to reform NFIP to allow public and private investment in wetland initiatives can likely occur at the regulatory level and may not require Congressional approvals. The National Flood Insurance Program Act 1968 gives FEMA fairly broad discretion in carrying out the program, so inclusion of wetlands likely falls within the power of the agency (S. Holladay Pers. Comm. 2011). Also, the opportunity exists to include wetlands in ongoing discussions to reform the National Flood Insurance Reform Act.

With over 20,000 communities in the NFIP program and over 1,000 in the CRS, the NFIP could be a scalable platform to drive private sector investment in wetlands across the US (US GAO 2010; FEMA 2010).

IMPLEMENTATION

Wetland Assessment

The public and private sector would assess the watershed for potential flood mitigating wetland projects, such as restoration, enhancement and preservation of a large wetland project or a bundle of smaller projects. In particular, the partners are seeking projects where the benefits of the project (calculated using the models and criteria set out by FEMA) are less than the costs. The program will aim to attract private sector expertise, especially firms currently engaged in wetland mitigation banking.

Verification and Review

The community and private partner would submit their project for verification to the Army Corps, since the Corps already verifies wetland projects for Wetland Mitigation Banking. This verification process would ensure the technical accuracy and feasibility of the project and ensure the project is consistent with regional floodplain and watershed planning.

Multi-stakeholder Contract

The different stakeholders, including the community, insurance companies, FEMA and a private sector partner, would sign a contract outlining the responsibilities of each party. The contract would describe who pays for the wetland project (this could be a mix of community or private investment dollars), the expected flood benefits of the project and the repayment schedule and amount to the investors.

Payment and Verification

Once the wetland project is complete, households would continue to make annual flood insurance payments to their local flood insurance provider, though premiums would be reduced. The insurance companies would be responsible for distributing the predetermined amounts to the private company and to FEMA.

A wetland project would require verification to demonstrate that it is meeting the projected flooding benefits. If the flood benefits are not being provided, a clause in the contract decreases the payments to the private company. Another consideration is whether to allow wetland project developers that receive revenue through this NFIP expansion to also sell wetland credits.

The Case of Floodsville

The town of Floodsville, USA (pop. 40,000) is interested in participating in the new Community Green Infrastructure Program. There are 10,000 homes that currently have flood insurance with an average premium of $600 annually, so the aggregate flood payment by the community to the NFIP is $6,000,000.

The town decides to partner with a local engineering company, Wetland Engineering Team (WET). Together, the partners identify a potential wetland restoration project. Hydrological and economic models determine the wetland would provide nine acre-feet of flood mitigation and that flood risk in the town would be reduced from $6,000,000 to $5,500,000 per year. The restoration plan is submitted and approved by the Army Corps of Engineers.

The community, WET, the local insurance companies and FEMA sign a contract that outlines the responsibility of each party. WET will provide the full $1M capital and guarantee that the wetland project will hold nine acre-feet of water as expected. The communities will provide scientific and administrative support and their annual premiums will reduce from $600 to $575 per year. FEMA agrees to pay WET $250,000 per year for a 5 year period. FEMA now receives $5,500,000/year from the residents of Floodsville. The residents of Floodsville continue to write monthly checks to their local insurance broker, who passes on the proper amounts to FEMA and to WET.

Over the next 5 years, WET gets certification that the wetland is healthy and holds three-acre-feet of water, as expected. (If the wetland were to perform suboptimally, a clause in the contract would decreased payments to WET).

By reducing the communities flood risk through wetlands, the town has also created new green-space and recreational opportunities, attracted wildlife, evaded costs it incurs from emergency rescue operations during floods and attracted 500 new households with lower flood premiums.

Year	0	1	2	3	4	5
Premium (house)	$600	$575	$575	$575	$575	$575
Premium (10,000 homes)	$6M	$5.75M	$5.75M	$5.75M	$5.75M	$5.75M
WET (cashflow)	$(1M)	$250K	$250K	$250K	$250K	$250K
WET (net investment)	$(1M)	$(750K)	$(500K)	$(50K)	$0	$250K
Amount payable to NFIP	$6M	$5.5M	$5.5M	$5.5M	$5.5M	$5.5M

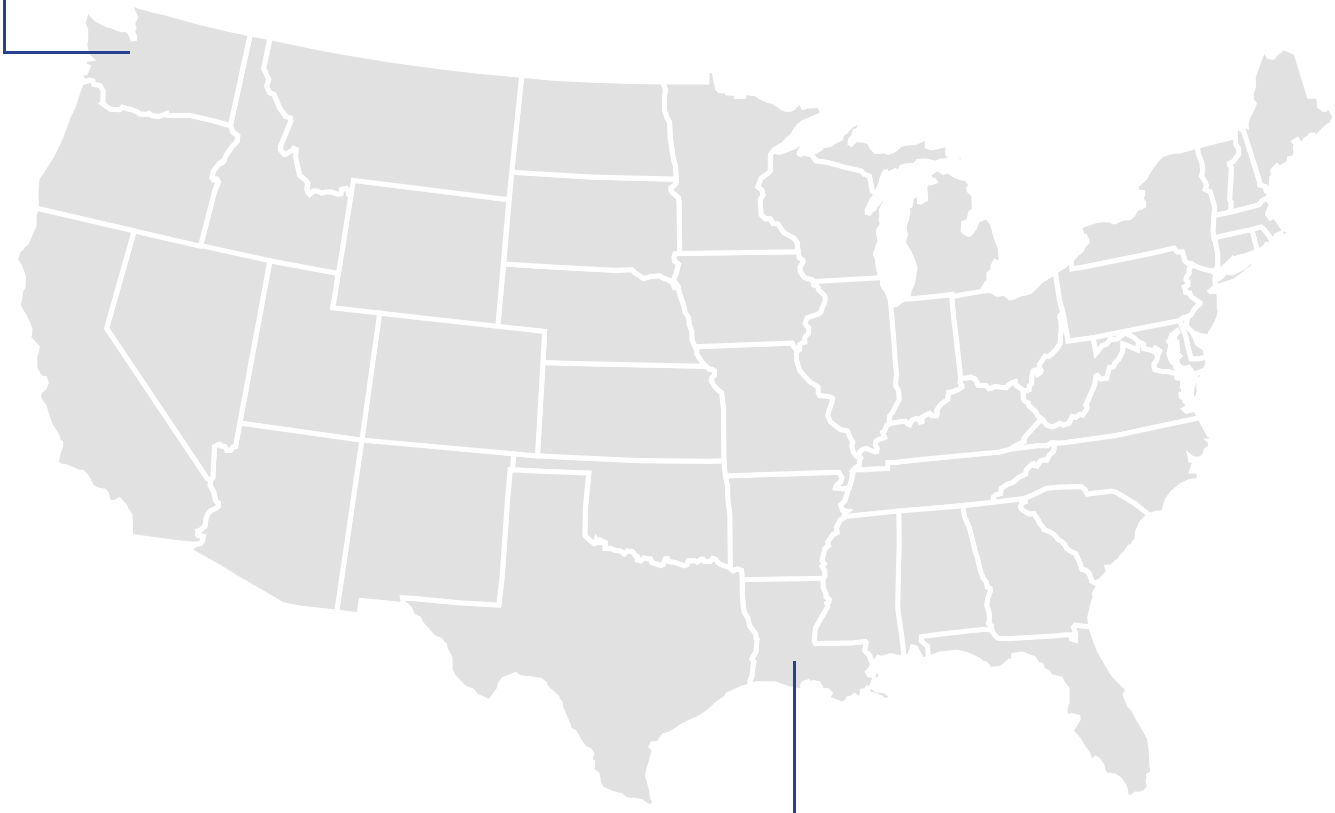
Net Present Value of Investment (5% discount): $78, 446
Return on Investment: 8%

Private Insurance Market

Large private sector businesses and industries face substantial financial risk from flooding, including damages to physical infrastructure, interruptions to businesses and threats to employees' lives. Two flood prone locations – Greater Puget Sound in Washington State and Louisiana State – were selected to conduct an in-depth analysis of market opportunities for wetlands as providers of flood mitigation services for large private services. These two locations were selected based on their vulnerability to floods, the presence of major private corporations and a history of rapid wetland loss. The following sections will provide a background for each location and discuss the feasibility of this potential market.

Washington

The Puget Sound area of Washington frequently experiences costly floods. Home to many large companies located around Seattle, it has lost most of its wetlands to development



Louisiana

The Gulf Coast in Louisiana experiences a high volume of hurricane induced flooding which causes billions of dollars damage. It is host to several large companies and a high proportion of the nations remaining wetlands

Greater Puget Sound in Washington State

Between 1956 and 2003, thirty Presidential Major Disaster Declarations for floods have been issued in Washington (EMD n.d.). Recurrent severe flooding in the low lands of western Washington State has significant economic and social impacts. Significant development in the flood plains along the eastern side of Puget Sound has not only placed more humans in the path of flood waters, it has also degraded the capacity of natural systems to slow and absorb flood waters (Leschine et al. 1997). The Chehalis River Basin in southwestern Washington alone has seen four 100-year floods since 1990 (Boyd, Nelson, & Wagner 2008). The floods in 2009 were arguably some of the worst the region has ever seen, displacing over 30,000 people and shutting down vital transportation routes (CBS News 2009). Being home to many significant industries, with the aerospace industry comprising more than 85,000 employees alone (Department of Commerce n.d.), flooding has significant economic impacts in the region. A 2006 assessment of the potential flood impacts on King County, home to Seattle and located on the eastern side of Puget Sound, showed that a one-day shutdown of the economic activity in the floodplains will result in a loss of $46M (Helvoigt 2007).

Population growth combined with more severe storms resulting from global warming is increasing the amount of flood damage (Leschine et al. 1997). Exacerbating the situation is the destruction and fragmentation of wetlands that aid in flood mitigation. Wetland loss around the urbanized Puget Sound areas has been estimated to range between 70 to 100% (Lane and Taylor 1997). Significant investment in gray infrastructure to reduce flooding, such as the Howard Dam, illustrates the need for flood protection; however, many mitigation projects overlook the potential of green infrastructure to mitigate floods.

Figure 2: Wetland in Puget Sound facing natural degradation by sea level rise and development (USGS)

Louisiana State

Louisiana experiences a high number of hurricanes, storms and flooding, which cause loss of life and costly damage to infrastructure. In the last century, the state has suffered from at least six disastrous flooding events (Roth 2010). Since 2005, several damaging hurricanes smashed into the state, including Hurricane Katrina and Rita. Hurricane Katrina, the mostly costly natural disaster in the nation, caused $200B in damages to the entire Gulf Coast and killed nearly a thousand people in Louisiana alone (Batker et al. 2010a and Brunkard, Namulanda, & Ratard 2008). Less than a month later, Hurricane Rita slammed the region and forced the shutdown of 20 refineries in both Louisiana and Texas, which combined accounted for more than 26% of US refining capacity (Batker et al. 2010a). These major disturbances in Louisiana's crude oil production caused a spike in gasoline and other petroleum product prices throughout the US (Batker et al. 2010a).

Louisiana boasts roughly 40% of the nation's total wetlands (OCPR 2011). However, they are disappearing at an alarming rate. Manmade flood control systems (i.e. levee which disrupts floodplain flows) and the construction of navigational waterways prevent the Mississippi River from naturally reforming wetlands by depositing sediment (NRC 2005). As a result, subsidence – the gradual sinking of coastal land into the ocean – is now one of the major causes of wetland loss (NRC 2005). Other human activities, such as oil and gas extraction, pipeline dredging and the introduction of nonnative fauna have also contributed to wetland loss (NRC 2005).

Wetlands in Louisiana form the first line of defense against the frequent hurricanes and tropical storms the batter the coast. They are critical buffers against the floods from these extreme events for the population centers along the Gulf of Mexico (Tibbets 2006). Furthermore, they safeguard the oil and gas facilities heavily present in the state, large port complexes and the Gulf's valuable fishing industry (Tibbets 2006). Every 2.5 miles of wetlands can reduce hurricane storm surge by one foot and had the original wetlands existed during Katrina, over a thousand lives may have been saved (Batker et al. 2010a). Given its flood mitigation potential but rapid rate of disappearance, the loss of coastal wetlands in Louisiana is one of the most pressing environmental problems facing the country today (US ACE 2008).

Figure 3: Flooding in New Orleans after Hurricane Katrina (Kingston Pierce)

FINDINGS

Interviews were conducted with numerous stakeholders to understand key factors such as the impact of floods on their business, how they insure against flooding, how they mitigate flood risk and whether they consider investments in ecosystem services. Interviews with stakeholders identified several major barriers to investment.

Business Barriers

- Investment time frame: Flood risk mitigation is not incorporated into the business strategies of oil and gas corporations. Most investment decisions are made on a 20-year time scale, which makes it difficult to include low risk/high impact events, such Hurricane Katrina, considered a 100-year event into the cost-benefit analysis. Even under a climate change scenario, when severe disasters like Hurricane Katrina will be considered a 40-year event (Building Resilient 2010), these events are still beyond the typical investment time frame.
- Overall sustainability portfolio: Investment decisions in wetland initiatives are based on philanthropy and included into the corporation's overall sustainability effort. Companies do not undertake conservation or restoration projects to obtain their ecosystem services, much less isolate the flood mitigation potential as a reason to invest. However, some of the corporations interviewed do recognize that there may be a return on investments, although they do not quantify it.
- Jurisdictional and legal issues: Wetlands often cross jurisdictional boundaries, which makes protection especially difficult when entities outside of the market impact the ecosystem in harmful ways.
- Ownership: Lacking direct ownership of land where wetlands may be preserved or restored is an issue. Companies are not entitled to benefit through wetland banking credits nor have full propriety over land use issues if they do not have full ownership.
- Insurance: Most companies self-insure against flood risk.

Scientific Barriers

- Insufficient scientific and economic evidence: Businesses have not thoroughly analyzed the benefits of taking mitigation actions to protect property and infrastructure. They assume it is more economical to accept damage risks and pay for repairs as needed.
- Location: Restoration experts have stressed the importance of site selection as a key determinate in successful wetland restoration. Isolated restoration projects are generally less successful than large-scale contiguous projects. Large projects also provide economies of scale, which lowers restoration costs (A. Davis, Pers. Comm. 2011).

Based on these barriers, we do not think it is feasible to drive private sector investment in flood mitigation services from wetlands.

RECOMMENDATION

Consider how to integrate private sector companies that experience flood risk into the Wetland Investment Trust .

Companies could re-allocate self-insurance funding into flood mitigation projects. The Trust would provide the scientific and technical expertise that make it easy and efficient for private sector companies to invest in green infrastructure for flood mitigation.

The Trust provides a unique opportunity to link stakeholders interested in flood mitigation with stakeholders interest in water quality because the same green infrastructure projects may benefit both parties.

CONCLUSION

Despite regulatory efforts, the quantity and quality of wetlands in the US remain threatened. It is our hope that through innovative thinking and collaboration we have shed new light on solutions to protect wetlands that move beyond regulation. Wetland ecosystem services provide valuable and measurable benefits to communities and private stakeholders. By helping stakeholders realize and internalize their unseen value, we can pave the way to engaging and leveraging private capital in wetland preservation and restoration.

The first case study highlighted the complex and interconnected relationships surrounding wetlands and their myriad services. For many stakeholders, wetlands are viewed as one part of the larger watersheds in which they reside. Within these watersheds, stakeholders have vested interests in wetland protection for different reasons. Cognizant of the links among stakeholders, we have proposed a Wetland Investment Trust – a financial/legal vehicle that pools the strengths of all interested stakeholders to invest in wetland protection. This mechanism finances wetland projects that would have been too expensive for stakeholders to afford on their own. In return, participant stakeholders can confidently secure the future supply of the wetland ecosystem services they rely on.

The second case study identified an opportunity to incorporate wetlands as a flood protection strategy within the NFIP. The current reform period for the program creates an opportunity to include a mechanism to encourage private investment in wetlands. Strategic public-private partnerships can create financial incentives for all the stakeholders involved. Wetland projects that reduce flood risk decrease the money that the government would pay out for claims. This allows the NFIP to guarantee a return on investment to companies who invest in wetlands. At the same time, local communities benefit from a reduction in their premiums and in the risk to property damages from flooding.

Both cases have common challenges that must be overcome in order for these proposals to be realized. First, without accurate price signals, it is difficult to create a legitimate incentive for stakeholders to invest in wetland protection. The challenge is overcoming artificially low prices for water and insurance premiums. Currently, the price of insurance premiums does not accurately reflect the risk and the price of water fails to capture its increasing scarcity. Secondly, stakeholder engagement relies on accurate and quantifiable measurements. Stakeholders will not be motivated to invest unless they can measure the value of their return, whether it is a return of money or ecosystem services. Finally, neither mechanism will work unless there is buy-in from all stakeholders. The free rider problem is a classic issue for public goods like wetland ecosystem services. When some stakeholders are disengaged, this delays action, as other stakeholders are hesitant to bear more of the cost without the ability to exclude free riders from the benefits.

In spite of these challenges, we believe that the common solution of aggregating power among stakeholders has the potential to reverse historical trends of wetland loss and to increase the protection of our wetlands. Evident in each case study, stakeholders are either unwilling or unable to invest in wetland protection on their own. Based on our findings, the best way to engage the private sector in wetland protection is through innovative, multi-stakeholder platforms that pool together the resources and strengths of those involved. The Wetland Investment Trust and NFIP reforms draw upon the strength of multiple stakeholders in order to secure and maximize the supply of wetland ecosystem services.

In the end, the US has made significant strides in the right direction and wetland loss has declined. However, it would be a mistake to become complacent about wetland protection. Regulation is important but will do little to carry us beyond compliance. Wetlands provide us with important and valuable benefits and science has advanced to a degree that allows us to measure and quantify these benefits. There is an opportunity to elicit private investment in wetland protection by helping stakeholders better understand the unseen benefits that wetlands offer. We are optimistic that the analysis and recommendations offered in this report can serve as a launching pad for the Environmental Defense Fund as the organization advances in its mission of finding the ways that work.

APPENDIX 1 Methodology

Wetland ecosystem services vary depending on their physical characteristics and location. With this in mind, this report will explore market opportunities with reference to particular wetlands through case studies. It is hoped the case study analysis will yield principles of common application that can be applied throughout the US.

The methodology for the identification and evaluation of market opportunities for wetland preservation includes five steps:

- Opportunity Identification: the status quo in the industry related to wetlands and any opportunities for integration of wetland preservation into existing frameworks
- Stakeholder Analysis: groups with a strong interest in maintaining the services and their relationship amongst each other
- Dependencies Analysis: determine stakeholders' dependencies and impacts on ecosystems services
- Incentive Identification: identify barriers to private investment in watershed and wetland restoration and conservation
- Investment Opportunities: specify investment opportunities based on mechanisms to address weak or absent price signals for valuing wetland ecosystem regulating, provisioning, and recreational services

Opportunity Identification

The first step is to determine the potential opportunity. Specifically: why is this wetland interesting or important for study? What are the scientific dimensions of the opportunity given the ecosystem services provided? What do we know about ecological dimensions of the ecosystem service? What are the economic, legal, and social dimensions and constraints that define this particular set of ecosystem services? Can we identify common attributes of this particular set of ecosystem services that can be generalized to other locations? What are the economic, legal, and social dimensions of the opportunity?

Stakeholder Analysis

The second step is to develop an comprehensive stakeholder analysis. This kind of analysis is most useful at the beginning of the project to identify and map relationships among key individuals, groups and agents that have both direct and indirect connections to the outcomes associated with the problem. After identifying stakeholders, we examine their relevance and importance for sustainable participation in the ecosystem services from the wetland. Finally, we should rank each stakeholder with respect to the economic, social, and governance factors associated with wetland services.

Dependencies Analysis

The third step is to determine stakeholders' dependencies and impacts on ecosystem services. We use the World Resources Institute's "Dependence and Impact Assessment" tool for ecosystem services (World Resource Institute 2010). The WRI's "Corporate Ecosystem Services Review" (CESR) provides guidelines for this analysis of dependencies and impacts (Hanson et. al. 2008). The process is as follows:

- Select the scope
- Identify priority ecosystem services
- Analyze trends in priority services
- Identify business risks and opportunities
- Develop strategies for organizational change and engagement

For using the CSR to analyze corporations, we focus on operational, regulatory and legal, reputational, market and product, and financial risks (Heal 2000).

Incentive Identification

The fourth step is to identify barriers to private investment in watershed and wetland restoration and conservation. Where barriers were identified, we asked interviewees how incentive structures could help overcome any such barriers as well as mobilize resources for watershed/wetland protection. In many cases, interviewees were unable to identify specific effective incentives. For each case study, we analyzed responses from a cross-section of stakeholders that suggested a variety of best practices, barriers, and incentives for wetland stewardship. Using this mosaic of response data and follow-up interviews, we were able to identify a subset of plausible incentives to increase private investment. Considering these subsets of incentives enabled us to formulate market-based solutions to specific watershed/wetland conservation problems in each case study.

Investment Opportunities

The final step was to specify investment opportunities based on mechanisms to address weak or absent price signals for valuing wetland ecosystem regulating, provisioning, and recreational services. In the case of flood risk mitigation, we created investment opportunities to overcome the deficiencies of the regulatory framework for flood insurance. In the case of water supply risk mitigation, we proposed a watershed investment trust structure to mobilize capital and identify avoided cost opportunities and other investment incentives.

APPENDIX 2 Interview Summaries

America's Wetlands Foundation (AWF)

Sidney Coffee, Senior Advisor

AWF and its subgroup, America's Energy Coast (AEC), brings together the energy sector, environmental organizations, government and other coastal interests in a region spanning four states: Texas, Louisiana, Mississippi and Alabama.

While there is considerable engagement of energy companies to wetlands restoration and preservation through AWF, it is motivated from a philanthropic standpoint. Many of these companies fund AWF to undertake public awareness initiatives and small-scale projects. However, AEC believes that such companies should see the issue of wetlands restoration and preservation as a business related issue. It is in their best interest to protect wetlands because they act as buffers and protection of all the economic activity in the area, which has nationwide implications (Gulf of Mexico provides 50% of the nation's refinery capacity).

AWF highlights the role wetlands play in terms of flood mitigation but declares that funding for restoration will come from the public sector. The federal government has to take a large role in protecting highly valuable economic interests in the Gulf because it has jurisdiction of the Mississippi River; thus, any action that implies modification of status quo would require their approval. Furthermore, the private sector will not voluntarily undertake big scale projects needed to address the issue of wetlands. Finally, in terms of flooding, there is no scientific consensus on how much oil and gas companies as well as levees influence wetland loss.

Army Corps of Engineers

Gail Terzi, Senior Scientist Mitigation Program Manager,

Currently available hydrologic models are sophisticated enough to assess flood mitigation benefits from watershed projects (one of the standard models is the HEC-RAS model). One of the issues that might arise from undertaking wetland projects through the NFIP is how one would deal with 'stacking credits.' Can a project developer generate a flood credit and a wetland mitigation credit?

Washington already has (in limited cases) some flood credits. Should a wetland project be allowed to sell a wetland credit in the bank, on top of a flood credit, or a fish credit? Or perhaps wetland credits become more specific. This one wetland credit has x, y, z attributes to it. These are open questions that are currently being considered.

Beverage Industry Environmental Roundtable (BIER)

Nick Martin, Associate and Rena Stricker, Consultant

BIER is a partnership of leading global beverage companies working together to advance the standing of the beverage industry in the realm of environmental stewardship. Their members include Anheuser-Busch Inbev, Molson-Coors, The Coca Cola Company and Diageo. BIER identified three potential areas of action for companies: water quantity, water quality or sustainability of their supply chain.

BIER stated that beverage companies work mainly on watersheds rather than just on wetlands. To induce action on wetlands, incentives are necessary because there is caution as companies want to make sure that their initiatives don't cause more harm than good when they handle fragile ecosystems. In the last five years, beverage companies have shifted from philanthropic to strategic motivation. Corporations are getting more interested in the project selection and in the project design. One of the most critical points is to make sure that the goals of the stakeholders are aligned (communities, companies, universities) and target specific activities. A barrier to developing a systematic and scalable approach to watershed protection is that ecosystems vary across the country working with local partners is essential for success. Local ownership of projects is a fundamental requirement.

Campbell's Soup

Dave Stangis, Corporate Social Responsibility Officer

Campbell's Soup Company is an American food producer with headquarters in Camden, New Jersey and operates plants globally the vast majority of which are located in the USA. In the USA, Campbell's owns approximately a third of its water supplies (water wells) with the remainder of the water coming from a municipal supply. Monitoring and improving source water security provides an incentive for Campbell's to extend the analysis of water dependencies beyond the plant into watershed catchments in which a plant is located. Presently, Campbell's does not have formal long-term source water protection plans but has agreements with water suppliers. Campbell's is beginning to use the WBCSB water scarcity analysis tool at all plants for determining water risk. Campbell's is working on watershed conservation projects with stakeholders and non-governmental organizations in the region around their largest North American plant in Napoleon, Ohio.

Campbell's has identified that a major barrier to conservation is insufficient information on the impacts and dependencies on watershed quality and quantity. Obtaining the data requires localized action as well as a more sophisticated, long-term investment which has yet to be justified to the company. Once the company has obtained needed information, the challenge will be to know how to use that information in the most effective manner. The company will also need to develop a baseline for measuring impacts. Accuracy issues with water measurement and costs and benefits assignment remain an obstacle for Campbell's identifying specific water issues and ranking their priority.

Clear Creek Watershed Foundation (CCWF)

Edward G. Rapp, President

Clear Creek Watershed Foundation is a volunteer led, 501(3)(c) organization that is financed by both public and private grants. It has been recognized by the EPA as an effective model for watershed restoration and conservation in the arid mountain region of the Western US. Since the 1990s, CCWF has created a culture of cooperation among stakeholders in dealing with restoration projects in watersheds where potentially responsible parties have left the region. CCWF addresses smaller scale projects that are often considered low priority by state and federal authorities. CCWF has effectively engaged with both private and public stakeholders owning primary water rights to help govern and protect watersheds that support recreational activities as well as water provisioning services. Some of these stakeholders include Molson Coors, Trout Unlimited, the Colorado Audubon Society. Molson Coors' significant ownership of water rights in the watershed provides a strong incentive to work with and fund CCWF's restoration and conservation work. CCWF has also recognized a potential opportunity to develop environmental credits and wetland banking activities in the watershed.

CCWF has leveraged the use of technology and the application of value models to identify impacts, outcomes and prioritize restoration projects. With the evolution of watershed sustainability tools and techniques, more precise valuation tools have become available to engage stakeholders and to evaluate and rank projects. This process is necessary for effective decision making but obtaining and updating data is very costly to the organization. CCWF uses avoided costs of water filtration gray infrastructure investment as a reference point for benchmarking projects in the watershed

A stakeholder-based governance system can lead to conflicts among stakeholders over water rights and water usage. CCWF has encountered this issue and identified that this is a continuous barrier to overcome. Another major obstacle for CCWF is the availability of qualified and willing volunteers willing to contribute to watershed conservation. This limiting factor will limit the scale and scope of the projects that CCWF can undertake.

The Coca-Cola Company (TCCC)

Greg Koch, Director of Water Stewardship

TCCC appears to lead the industry in many best practices with the possible exception of the degree to which it is replenishing some of the watersheds from which it draws water. In this regard, PepsiCo, if only in the country of India, may outperform TCCC by having a positive water ratio: water replenished > water used.

TCCC forms a water resource management team at each beverage plant, determines water sources for bottling plants and local communities, and prepares source vulnerability assessment that inventories risks to source waters. Plants in TCCC's network are at different stages of implementing source water protection plans. TCCC's stakeholder engagement process Identifies water stakeholders, facilitates meaningful interactions, and involves them in the source water protection planning process.

TCCC calculates an aggregate water replenishment target as the total amount of water used in the manufacturing beverages minus treated wastewater equals the product volume and the amount to replenish through watershed/wetland restoration and conservation activities.

One focus at TCCC is the creation of a community water partnership project portfolio to identify which activities or projects deliver quantitative benefits to communities and nature and then apply computational technology to calculate the volume of water replenished by these projects. TCCC is developing methodologies to quantify water benefits from Community Water Partnerships. Going forward, TCCC sees a need for corporations and research institutions to develop a better understanding and techniques for measuring embedded water in the supply chain.

ConAgra

Jim Lime- Vice President, Environment, Health & Safety

ConAgra is a major food corporation which produces brands such as Swiss Miss, Chef Boyardee and Healthy Choice. The corporation recognizes that 70% of fresh water is used for agriculture and this has a clear connection with their productivity; however, at this time, water scarcity is not considered a major risk factor. Based on findings from the World Business Counsel for Sustainable Development (WBCSD) Water Tool, 77% of their plants are currently in water abundant regions with low risk for scarcity.

The company representative stated the cost of water as an input is not a sufficient driver for change in behavior as water is very inexpensive in America and large-scale water reduction projects are often not worth the investment. Most projects undertaken by plants affiliated with ConAgra have required low capital investment (less than $10,000) and have resulted in modest returns. When asked about markets, the representative from ConAgra stated they would consider a cap-and-trade program for wetlands but would prefer conservation options instead. The company places a high value on wetlands and supports leaving them where they currently are. The benefits of creating a wetland to offset destruction of another, in most cases, do not exceed the costs.

Being a good corporate citizen is a main motivating factor for ConAgra in relation to environmental change. ConAgra is regularly ranked in Newsweek's green rankings as well as the Dow Jones environmental rankings. These rankings convey to the public and stockholders the performance of the company and ConAgra wishes to not be at the bottom of any of those lists. The company partnered with the Carbon Disclosure Project in order to be proactive about addressing the impacts of their supply chain.

Ducks Unlimited (DU)

Dawn M. Browne, Manager of Conservation Programs

DU has been active in guiding the development of policies that drive and sustain ecosystem credit markets and works to develop project protocols that ensure the environmental integrity of habitat projects and any credits produced.

DU also has extensive experience developing biological and spatial models that identify priority conservation areas that maximize ecosystem services for people and wildlife. DU's role in carbon and water markets is primarily that of a project developer or aggregator. DU has existing relationships with landowners and can act to bring together smaller properties and projects in marketable volumes to buyers, brokers or exchanges.

DU's wetland mitigation program is designed to generate revenue to support conservation goals across North America. DU's wetland mitigation program only provides services to mitigants that have avoided and minimized their impacts to wetlands, and must provide compensatory mitigation for their remaining unavoidable impacts authorized by federal and/or state regulators. DU can assist with compensatory mitigation through mitigation banks, in-lieu fee programs and support for independent restoration programs. DU's strengths are in its large membership base, strong local connections and staff of professional engineers and wetland scientists

Ecosystem Investment Partners (EIP)

Adam Davis, Co-founder

EIP is a private equity firm that generates ecosystem credits on lands they acquire, restore and manage. Wetland banking is a billion dollar industry that continues to grow. Investment in these projects provides competitive economic returns, however this is entirely driven by the Clean Water Act.

With respect to the feasibility and success of restoration projects, Mr. Davis believes that multiple opportunities exist in the US to restore wetlands to a high level of functionality within a short amount of time. However, there are certain factors that are necessary to ensure success. Choosing where to undertake restoration projects is the most critical issue with regards to returning to pre-disturbed levels of functionality. Isolated restoration projects are generally less successful than large-scale contiguous projects. Large projects also provide economies of scale, which lowers restoration costs. To ensure that the right location is selected, EIP works closely with conservation groups and government agencies to identify properties with high ecological potential.

The Freshwater Trust

Joe Whitworth, President

The Fresh Water Trust creates environmental markets so both philanthropic and investment dollars can support restoration projects that create returns for both investors and the environment. A solution to the problem of wetland loss and watershed deterioration is to develop environmental markets that enable the trading of environmental impacts for environmental benefits. A successful example of such a market is wetland mitigation banking where the impact of development is traded for the benefit of wetland restoration or conservation. Creating environmental credits is relatively easy compared to the challenge of finding buyers. In this regard, food and beverage companies operating in a watershed and seeking to offset their water volume use are likely to be natural buyers of wetland restoration credits in the watershed.

Local stakeholders' resources and objectives require greater coordination to be effective at watershed conservation. Stakeholder coordination and organization is especially important for identifying sources of demand (environmental impacts) for the potential supply of environmental credits in the watershed. To successfully develop environmental credit markets, we need scale and liquidity.

GreenVest LLC, Doug Lashley, President and CEO

GreenVest is a major wetland mitigation banking firm operating in the Chesapeake Bay Region. Doug Lashley provided these observations on best practices and barriers for wetland mitigation banking.

Best practices solutions to watershed preservation include watershed partnerships that coordinate stakeholders and provide incentives for stewardship of ecosystem services. Better results are achieved by tailor-fitting watershed protection and restoration activities that recognizes that each acre of ground is different and represents different opportunities for restoration work and for using financial incentives for stewardship. The identification and establishment of zones along stream corridors in a watershed where soils, habitat, water, forests, and wetlands provide multiple values to stakeholders in the watershed. These zones should be restored and or preserved by deed restriction to assure, long term, permanent protection. The implementation of projects that create multiple benefits and allow the watershed manager to leverage a single project into multiple opportunities for creating environmental credits for stewardship practices from the same area.

Barriers to more effective conservation practices include lack of coordination of environmental and economic objectives at both the Federal and State Levels as well as lack of political will among politicians, citizens, industry, and planning officials. These barriers prevent the implementation of many wetland mitigation projects. Unfunded mandates are also a problem as there is not enough public sector money to properly address the host of significant events and activities that negatively impact our most important watershed ecosystems. The alternative to unfunded public mandates is to incentivize the private market. The private sector is best suited to solve this issue with support from the government. Finally, it is important to clarify rules relating to credit stacking (creating multi-credit opportunities for the same environmental area).

Habitat Bank

Victor Woodward, Owner

Restoration science has progressed over the years to become fairly sophisticated, with a high success rate for restoration, if planned and carried out properly. One cannot create a wetland anywhere. One needs to thoughtfully examine historic land uses, hydrology, soil, etc.

Since mitigation bankers bear all the risk for the operation of a wetland project, they undertake the project and keep costs down (if the project doesn't work, the buyer of the credit is not liable; the seller of the credit is). Mr. Woodward currently has wetland restoration projects on the Snoqualmie, Columbia, and East Fork Lewis Rivers, where with some incentive, he could do more to optimize the project for flood storage benefits.

Institute for Policy Integrity

J. Scott Holladay, Fellow, New York University Law School

Expanding the Community Rating System to include wetlands is a neat idea. The uncertainty in the "link" between a watershed project, the flood benefits, and the value of those benefits is within the uncertainty range already present in the Community Rating System (for example how do you know that a flood brochure project is worth x points?). Private sector would be interested in these projects because they can help provide the expertise that link 'green infrastructure' or wetlands and the flood mitigation.

The recommendations for NFIP reform would probably occur at the regulatory level and not require Congressional approval. Many people are currently interested in NFIP reform for fiscal, economic and equity (regional equity, income equity) reasons.

There is a question as to whether NFIP is driving development in flood zones/hotspots, and whether this leads to wetland destruction. The incentives of NFIP are such that theoretically they pass the private risk of a developer to the taxpayer, so we would expect to observe development in floodplains. In practice, some researchers have examined this question to see how much development, above and beyond a certain baseline, is due to NFIP. Researchers have been unable to establish a link, mostly due to FEMA not releasing flood insurance data at a high enough resolution (for privacy reasons). Holladay currently has a Freedom of Information Act request for higher-resolution data.

Inter-American Development Bank (IDB)

Silvia Ortiz Stradtmann, Water and Sanitation Specialist, Fernando Miralles-Wilhelm, Water Expert, and Rebecca Goldman, Water and Ecosystem Services Specialist

The IDB is the largest source of funding for development in Latin America and the Caribbean. They fund a number of water protection initiatives in Bolivia, Mexico and Brazil. The projects are based on a stakeholder engagement platform which involves communities, public sector and international and private sector partners. The degree of involvement varies by location to meet the needs of the communities. Documentation standards have been developed to ensure that initiatives can be reproduced in different contexts.

The IDB has identified value derived from ecosystems services through reduced sedimentation leading to reduced cost of water treatment, increased flow regulation, improved nutrient regulation in vegetated ecosystems and the potential for carbon sequestration and market opportunities. Other benefits of stakeholder participation and investment include educational opportunities.

The greatest challenges that the IDB faces in relation to water initiatives is continued measurement and accountability issues. It is very difficult to demonstrate project benefits to donors and this could jeopardize funding in the long term. The next major barrier to be addressed by the IDB is the development and application of metrics that quantify impacts. Currently, projects are accountable to a board of donors that have all contributed over $1M to the project. This board includes water authorities and agencies who prepare financial and conservation plans to govern projects. Moreover, the IDB has recently started to support Water Funds in Latin America. This model has been initiated by The Nature Conservancy with the Water Fund in Quito (2000), which represents best practice for payments for watershed ecosystem services.

The returns provided by Water Funds can be accounted in terms of conservation returns (water quantity and quality) and avoided cost returns. The traditional philanthropic approach and the water fund approach are not mutually exclusive. Criteria for selecting a water fund location are: proximity to the water source; degree of degradation; proximity to urban centers; threat facing a specific site and related cost-opportunity; transaction costs and size. The biggest challenge for water fund is determined by the fact that payments for ecosystem services are unlikely to be greater than what a developer is willing to pay for land. Among other challenges, Goldman mentioned expectations ("It is difficult to expect water fund returns to happen on the scale needed in a short time period"), the timing of the ecosystems response and the impacts of climate change.

Louisiana State University Agricultural Center

Rex Caffey, Natural Resource Economics Professor

It is possible to do analysis that links and quantifies flood mitigation benefits to a watershed/wetland project. However, the analysis will vary for each region and watershed and will depend on how much data exists for that watershed. To integrate wetland restoration into the NFIP, one would need to do restoration in a strategic way and place. One would probably need an expert review panel per-region to develop criteria, or the Army Corps would need to certify each project. The expertise inherent in the wetland banking community can be used to undertake the wetland projects. Also, there are cases of wetland mitigation projects where the economic benefit exceeds the cost.

Caffey is skeptical of some of the valuation studies that attempt to quantify economic benefits from wetlands, especially those that use the 'benefit transfer' approach. This approach is disingenuous in generalizing the wetland values from one region or one particular wetland to all others. Other valuation methods fall into two main categories: stated preference (ask people their willingness to pay) and revealed preference (value inferred by looking at behaviors, like buying a house or traveling for a vacation). The valuation of flood services is much easier because it can be measured in dollars.

Louisiana Mid-Continent Oil and Gas Association (LMOGA)

Mike Lyons, General Counsel, Specialist in Environmental Law

LMOGA is a trade association that represents all sectors of the oil and gas industry in Louisiana, including exploration and production, pipelines, refineries, and service stations.

The interview focused on two major themes. First, whether oil and gas companies in Louisiana recognize the value of wetland ecosystem services; second, whether these companies are aware of the benefits of wetland for mitigating flood risks and how they insure themselves against floods. The response of the LMOGA representative was that, in fact, some oil and gas companies go beyond wetlands mitigation required by state law because they understand the importance of wetlands in the long-term sustainability of the region. These corporations own land in wetlands and have ongoing mitigation projects on their properties, working hand-in-hand with Louisiana government to fund and help determine the best sites for wetland mitigation.

However, whether or not companies are aware of the specific benefits in terms of flood mitigation remains unclear. Most of these oil and gas companies have little protection against flooding since their location along the coast means their critical infrastructure is always exposed. As completely protecting their operations is nearly impossible, funds are typically set aside to cover potential flood damages.

Major Oil and Gas Company A

Interview was on an anonymous basis

Floods are not taken into account in their operations as most of their critical infrastructure is flood resilient (pipelines are underground), unless in light of a severe event such as Hurricane Katrina. The company self-insures against floods but does buy insurance for business interruptions. Therefore, the specific role of wetlands in terms of flood risk mitigation is not accounted for. However, this business does identify other economic incentives of investing in wetlands.

Through owning the wetlands, making them an asset for the companies, businesses will see a profit and have the motive to invest in wetlands. The generation of revenue will come from creating carbon credits from wetlands: sequestering carbon by rebuilding or regenerating degraded wetlands. It is still a potential business opportunity, but two main barriers impede its implementation today. First, there are no well-established methodologies to quantify carbon sequestration by wetlands compared to forests. As a major landowner, they are keeping a close eye on the science developments. Once there is broad acceptance on the methodology for carbon sequestration in wetlands, they will have an incentive to restore damaged wetlands. Second, the regulation of carbon markets needs to be universally accepted. The interviewee believes that the federal government has to draft legislations to set clear criteria for the creation of such markets.

The energy industry has been long threatened with required carbon offsets but such threat still has not come true. When adopted legislation on carbon markets, this business will see wetlands as a business opportunity for carbon credits.

In terms of wetland mitigation credits, the company has hired a third party to set a mitigation banking on their property. It will sell mitigation credits to other businesses in the same watershed that have to restore wetlands in compliance with the Clean Water Act, section 404. Such mitigation banking will either: 1) sell credits for wetland restoration already undertaken on the property or 2) invite other businesses to secure mitigation credits on their land (the revenue will probably come from a commission for the use of the land).

Finally, the interviewee agrees that wetland preservation and restoration must occur through aggregate power. However, engaging multiple stakeholders in how to address wetland preservation and restoration is extremely challenging because of varying and often conflicting interests. There will inevitably be winners and losers.

Major Oil and Gas Company B

Interview was on an anonymous basis

While this global company carries different catastrophe policies with several different insurers, the deductible is so high that it does not cover most damages inflicted. Thus, this company self-insures against most flood damages. Although this corporation has not analyzed the details of taking mitigation actions to protect property and infrastructure, it states that it is economical to accept damage risks as a cost of doing business and pay for repairs as needed.

Furthermore, most investment decisions are made on a 20-year time scale, which makes it difficult to incorporate low risk/high impact events into the cost-benefit analysis (big storms like Hurricane Katrina are considered 100 year storms). The motivation to invest in wetland preservation is largely community philanthropy (and marketing), and not the direct commercial benefits of ecosystem services.

Major Private Company in Washington State

Interview was on an anonymous basis

Since wetlands and watersheds transcend county lines, one of the major barriers to coordinate multiple stakeholders' participation on a wetland restoration project relates to the difficulties in dealing with various jurisdictions. Having a comprehensive watershed management plan that details expectations, projections, and stakeholder involvement is key.

From the corporation's perspective, they support donating to restoration efforts, but do so mainly for philanthropic motivations and not because they view these projects as providing future economic returns. Furthermore, they prefer to donate with no strings attached, so providing a platform to facilitate this would be an asset. With respect to flood insurance, this company's policy is complex, but they largely self-insure against flooding.

Manomet Center for Conservation Sciences

John S. Gunn, Senior Program Leader and Advisor

The World Resources Institute (WRI) and the American Forest Foundation (AFF), along with key partners, have developed the Northern Forest Watershed Incentives project to provide economic incentives and technical assistance for family woodland owners to restore, enhance, and protect aquatic resources in two critical watersheds in the Northern Forest region—the Crooked River in Maine and the upper Connecticut River in New Hampshire and Vermont. Currently, only 4.7 percent of the Crooked River watershed and 23 percent of the Connecticut River watershed is permanently protected under conservation easements. The three-year project is funded through a $500,000 Conservation Innovation Grant from the Natural Resources Conservation Service and $500,000 of match funding from project partners. Key partners on the project include Hubbard Brook Research Foundation, Manomet Center for Conservation Sciences, Western Foothills Land Trust, and White River Partnership.

A key payment for ecosystem services demand driver in the Crooked River Watershed is the fact that City of Portland has a water filtration avoidance waiver. This provides a vested stakeholder interest in watershed protection. Because of the high cost of negotiating and acquiring conservation easements on the scale needed for maintenance of the water quality, the Northern Forest project works with stakeholders to use market incentives to achieve similar conservation outcomes at a lower cost. The partnership alliance is targeting projects that identify landowners that can participate in payment for ecosystem services programs. One of the partnership's projects in the watershed involves afforestation of riparian zones that is financed by the sale of carbon credits. As the initial "water fund" structure develops over time, the partnership may possibly fold into a more extensive coalition of stakeholders in the watershed in order to create a permanent stewardship organization.

Molson-Coors

Michael Glade, Director, Water Resources & Real Estate

To promote watershed conservation goals, Molson Coors has currently partnered with the CEO Water Mandate, Carbon Disclosure Projects Water Disclosure, Beverage Industry Environmental Roundtable, Quantis and many other smaller local organizations such as the Clear Creek Watershed Foundation (CCWF). Mr. Glade states that one area that is typically neglected when groups try to focus on water is that water is a "local issue." With respect to conservation goals, the cumulative efforts of many typically trump the strong efforts of a few. That is, the more stakeholders that are engaged, holding each other accountable and also supporting each other's efforts, the more successful source water protection will be. Using the CCWF as an example of effective best practices, they have established clear common goals in the watershed that lead to shared rewards. In Mr. Glade's opinion, the CCWF balances the ecological, social and economic perspectives of the collective stakeholders and is an example of best practices in watershed protection and integrated water resource management.

The largest barrier to watershed conservation is that incentives of recognition and rewards (usually of a financial nature) do not necessarily drive the right behaviors (just as with employees) when it comes to conservation/restoration efforts. He finds that a combination of an active watershed forum, with clear targets and challenges that engages the impacted stakeholders is most effective. However, in watersheds around the globe where per capita income is very low (e.g., subsistence farmers etc.), land owners can be influenced in strategic portions of a water shed to stop use, change use or even donate property through financial incentives.

The Nature Conservancy

Laura McCarthy, Senior Policy Advisor for Fire and Forest Restoration and Mark P. Smith, Director, Eastern U.S. Freshwater Program

The Santa Fe Water Fund has a unique plan that seeks to fund forest restoration activities using the Payment for Ecosystem Services model as an insurance policy against future threats, particularly of catastrophic fire, to the municipal water supply. The main challenge is to provide a framework and funding mechanism for long term maintenance. The advantages of this initiative for the City of Santa Fe are: awareness and education about watershed health and protection; collaboration between water consumers and forest managers; and long term funding for the watershed maintenance costs.

A recent survey conducted in the City of Santa Fe found that an overwhelming majority of voters indicate that they would support a nominal fee to help fund the protection of the water supply from the threat of a catastrophic forest fire. The survey revealed that they were willing to pay a fee for ecosystem services as an additional charge on their monthly water bill.

The Nature Conservancy understands that sustainable funding is a critical component to conservation generally and for freshwater resources in particular. Our work in South America in developing water funds shows the power of such models to catalyze actions to develop and administer new funding sources for the benefit of people and nature. We are interested in exploring new models for developing such funding sources, including market based models and are interested to learn more about the work that has been done to explore what models may be appropriate for North America and to discuss with others how such models can be piloted as a model for other communities and areas.

PepsiCo

Liese Dallbauman, Director, Water Stewardship

Pepsi, in 2011, is just beginning to focus on activities in the water catchment by assessing local impact so water risk mitigation strategies make sense in terms of cost benefit analysis. This is stage three of a four stage water conservation approach called ReCon for "resource conservation" being conducted worldwide at PepsiCo food and beverage plants. ReCon involves water and energy conservation.

The four stages of Pepsi's water conservation process are:

- Identify and quantify in-plant water use
- Understand and optimize major in-house water uses
- Catchment focus to assess local impact so water mitigation strategies make sense
- Comprehensive focus of conservation efforts on watersheds where direct and indirect water use has the greatest impact

In India, Pepsi has achieved a positive water balance, i.e. the quantity of water used to manufacture beverage products is less than or equal to water conserved, recharged and replenished to nature.

Pepsi is now focusing on opportunities to achieve positive water impacts. This is different from the notion of a positive water balance because impact takes into account that water is fundamentally local and the quantity of water used isn't the only thing that is important. A positive water impact involves making more or better water available to the environment and the communities where Pepsi and its suppliers operate.

Ramsar

Claudia Fenerol, Senior Partnership Coordinator, and Virginie Pirens, Project Management Officer for the partnership with the Danone-Evian Group

In 1997, the Danone-Evian group became a signatory to the Ramsar Convention and formed the Evian-Ramsar fund. Danone-Evian partnered with a number of institutional groups, including the French Ministry of Foreign Affairs, the French Fund for the Global Environment, the French Ministry of Land Planning and Environment the Société des Eaux Minérales d'Evian, the town of Evian and the Conservatoire de l'espace littoral et des rivages lacustres, to protect the wetlands they depended on. The fund had a budget of $1M Euros between 1998 and 2000 and an additional $300,000 Euros for 2001-2002. In 2008, Danone-Evian and Ramsar began to focus on the protection of wetlands for carbon sequestration and biodiversity, with a particular focus on mangroves. Danone has been working to develop a method to measure carbon emissions. In the Danone-Evian example, stakeholder engagement was important to the longevity of the project. All users of the watershed pay fees into the fund to protect the wetland. Unlike the situation in America, there are strong farmer associations in France with political power that can bring together farmers for united purposes. The community that uses the wetland is small and very interconnected; this closeness allows for community monitoring of uses and abuses. Free riders are not a major issue in this project as peer pressure and collective monitoring are very effective enforcement mechanisms.

Washington State Department of Ecology

Lauren Driscoll, Project Leader, Wetland Mitigation Bank Rule Development

The Washington State Department of Ecology (Ecology) is involved with all major restoration projects undertaken in Washington. Ecology works as a conduit to channel federal and state grants to various restoration projects throughout the state. Grant money is leveraged to get more funding mainly from land-trusts and non-profits. Ecology monitors private restoration companies during the project and then evaluates the wetland upon completion.

Determining the success of projects in Washington is difficult because many projects are young, but most are progressing nicely. There are financial contingency plans in place to mitigate project risk. Some barriers to success of a restoration project include financing (these projects are extremely expensive, especially when excavation and material transport is necessary), the agricultural community (they are resistant to the erosion of the agricultural land base), and the lack of technical expertise (best available practices are still being developed).

West Bank Hurricane Damage Risk Reduction System

Melanie Goodman, Senior Program Manager

The key points of the interview focused on the role wetlands can play as buffer systems to flood mitigation risks. Goodman first noted that both green and gray infrastructure (levees) should be seen as reduction systems to flood damages, rather than as flood control systems. In this sense, she pointed out that one has to be careful when speaking about the role that coastal ecosystems can play in terms of flood risk reduction (quantifying storm surge reduction per acre of wetlands). Marshes and barrier islands only enhance the levees to protect people from hurricane storms, but they alone cannot protect people as the coastal plain is flat. Thus, it is wise to be cautious about not taking findings from studies out of context; studies of flood risks are site and storm specific.

Jurisdictional issues are also barriers to wetland initiatives as downstream communities cannot control the activities of upstream communities. However, there are ongoing talks between coastal and inland states to coordinate issues which holistically affect the Mississippi River.

APPENDIX 3 Community Rating System

Activity	Max Possible Points	Avg Points Earned	Max Points EarneD	Communities Credited	Avg earned / Max Poss. Points
Public Information Activities					
Elevation Certificates	162	69	142	100%	**43%**
Map Information Service	140	138	140	95%	**99%**
Outreach Projects	380	90	290	86%	**24%**
Hazard Disclosure	81	19	81	61%	**23%**
Flood Protection Information	102	24	66	87%	**24%**
Flood Protection Assistance	71	53	71	48%	**75%**
Mapping & Regulatory Activities					
Additional Flood Data	1,346	86	521	29%	**6%**
Open Space Preservation	900	191	734	83%	**21%**
Higher Regulatory Standards	2,700	166	1,041	85%	**6%**
Flood Data Maintenance	239	79	218	68%	**33%**
Stormwater Management	670	98	490	74%	**15%**
Flood Damage Reduction Activities					
Floodplain Management Planning	359	115	270	20%	**32%**
Acquisition and Relocation	3,200	213	2,084	13%	**7%**
Flood Protection	2,800	93	813	6%	**3%**
Drainage System Maintenance	330	232	330	69%	**70%**
Flood Preparedness Activities					
Flood Warning Program	255	93	200	30%	**36%**
Levee Safety	900	198	198	1%	**22%**
Dam Safety	175	166	87	82%	**38%**
TOTAL	**14,810**	**2,023**	**7,776**		

Table 7: Community Rating System Activity Table (CRS Coordinator Manual 2007)

The maximum possible points are based on the 2006 CRS Coordinator's Manual.
The average points earned are based on communities' scores as of May 1, 2005, and do not include growth adjustments or the new credits provided in the 2006 CRS Coordinator's Manual.
The maximum points earned are the highest scores attained by a community as of May 1, 2005 and do not include growth adjustments. In some cases many communities have attained the maximum points listed.
The percentage of communities credited is as of May 1, 2005.

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