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A FOREST TRENDS INITIATIVE

# Charting New Waters

## State of Watershed Payments 2012



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**Ecosystem Marketplace**, an initiative of the non-profit organization Forest Trends, is a leading source of information on environmental markets and payments for ecosystem services. Our publicly available information sources include annual reports, quantitative market tracking, weekly articles, daily news and news briefs designed for different payments for ecosystem services stakeholders. We believe that by providing solid and trustworthy information on prices, regulation, science and other market-relevant issues, we can help payments for ecosystem services and incentives for reducing pollution become a fundamental part of our economic and environmental systems, helping make the priceless valuable.

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Watershed Connect, a project of Forest Trends and Ecosystem Marketplace, is an online platform connecting practitioners, policy-makers, and other stakeholders involved in investing in our natural water infrastructure. The online platform serves as a centralized space to learn about the latest news and analyses, join relevant social media discussions, share your project or organization's work, access key resources and tools, and research ongoing efforts on investments in watershed services (IWS) and water quality trading.

Find out more at  
[www.watershedconnect.org](http://www.watershedconnect.org)

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## State of Watershed Payments 2012

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and Heidi Huber-Stearns

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# Executive Summary



**Table 1: Summary Details, Global**

Number of active programs:	205
Number of programs in development:	76
Value of transactions in 2011:	\$8.17 billion
Value of transactions 1973-2011:	\$66 billion
Hectares managed for watershed services in 2011:	117 million hectares
Hectares managed for watershed services 1973-2011:	195 million hectares

*Source: Ecosystem Marketplace.*

## Overview

This report is the second installment in the “State of Watershed Payments” series, an effort to globally track the size, scope, and direction of investments in watershed services (IWS) as well as the ecological infrastructure from which they flow. Throughout this report we use the term ‘investments in watershed services’ to cover the broad diversity of incentive- or market-based mechanisms being used to protect the natural infrastructure of watersheds – including payments for ecosystem services (PES), payments for watershed services (PWS), water quality trading markets, and reciprocal or in-kind agreements. Data comes from surveys, interviews, and desk research on over 200 programs worldwide in more than 30 countries.

## Report Objectives

Building on the 2010 *State of Watershed Payments* report, the primary objective of the current report is to provide an accurate snapshot of the scale, size, shape, and direction of investments in watershed services worldwide.

A second objective of this report is to provide detailed design and project analysis that informs smart decision-making among policy-makers, local communities, conservation organizations, private businesses, and other natural resource managers. The IWS field is growing rapidly; transparency and access to reliable information is critical to ensure that practices and policies are beneficial for both society and nature.

Gathering project-level information at a global scale on mechanism design, transaction values, and project outcomes is no small undertaking. Information on projects and programs is often scarce, fragmented, and rapidly changing. This report represents our most comprehensive inventory of programs yet, but it is not the complete picture. In all cases, we have done our best to err on the side of conservatism in our estimates and analyses.

In this report, we offer an overview of our findings at global and regional scales. More detailed project-level data is available in our online global project inventory at [www.watershedconnect.org/projects](http://www.watershedconnect.org/projects).

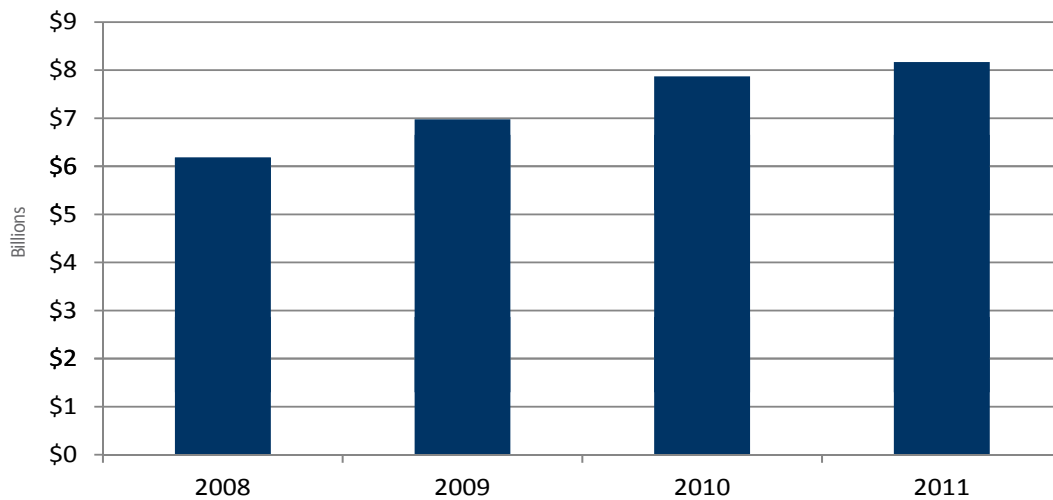
## Key Findings: By the Numbers

In 2011, we tracked 205 active programs around the world. More than half of the programs are in two countries: China (61) and the United States (67). In all, watershed investment programs are active in 29 countries.

Transactions totaled \$8.17 billion in 2011. Globally, investments in watershed services have steadily increased since tracking began in 2008.<sup>1</sup> On a regional level, the picture is a bit different. 2011 was a slower year for IWS in North and Latin America. But preliminary evidence suggests that markets saw a bounce in 2012.

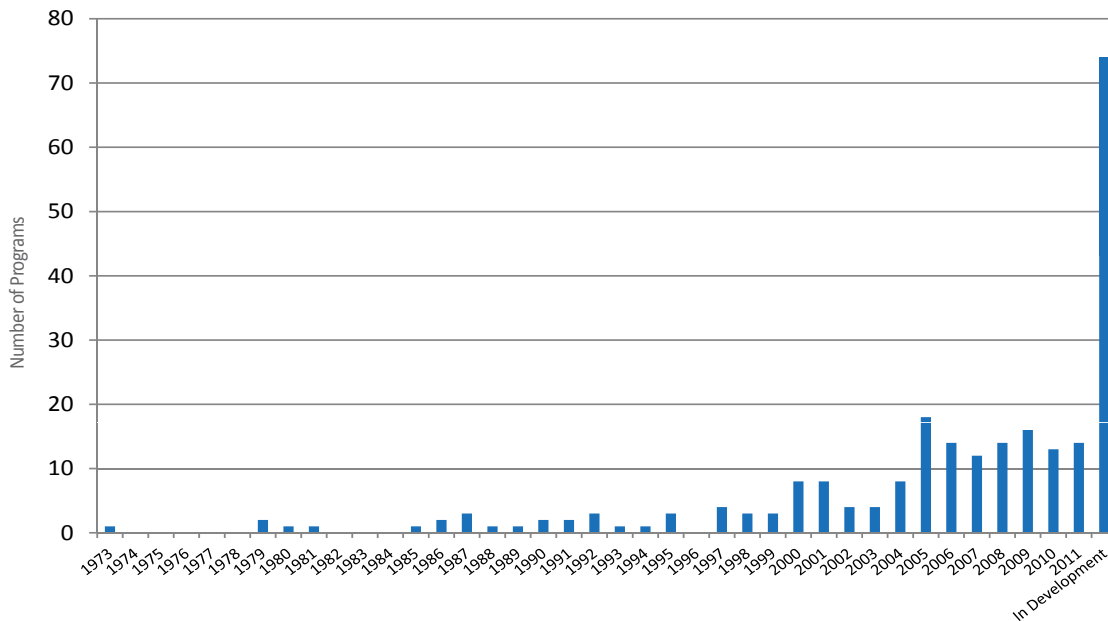
China represents the lion’s share of reported payments as the country’s leadership has increased funding for “eco-compensation” mechanisms and placed eco-compensation in a key role in the most recent national Five-Year Plan and in a proposed new zoning system. In the aggregate, Chinese economic muscle has more than offset falling investments in ecological infrastructure in North and Latin America, traditionally global leaders in funding watershed protection.

**Figure 1: Global Annual Transactions, 2008-2011**



Source: Ecosystem Marketplace.

**Figure 2: New Watershed Investment Programs by Year, Globally**



Source: Ecosystem Marketplace.

1 In contrast to our 2010 report, we have tightened our scope here to exclude bundled government agri-environmental schemes that pay for environmental stewardship but do not focus primarily on watershed services. Programs like these certainly can support watershed functions but are not driven by them. Where our 2008 baseline data is discussed in this report, we have revised it to reflect these changes.

In terms of environmental outcomes, these payments have translated into efforts to rehabilitate and protect nearly 117 million hectares – a total land area nearly the size of South Africa.

Of course, not all programs measure success in terms of land. Programs also returned nearly 138,000 megaliters of water to rivers and aquifers around the world in 2011 and more than 4.6 million megaliters to date – that’s the equivalent of enough water to nearly fill Lake Michigan. Thanks to watershed investment programs, 3.4 million pounds of nitrogen and 97,000 pounds of phosphorus were kept out of global waterways in 2011, where they would have led to algal blooms and oxygen-starved “dead zones.”

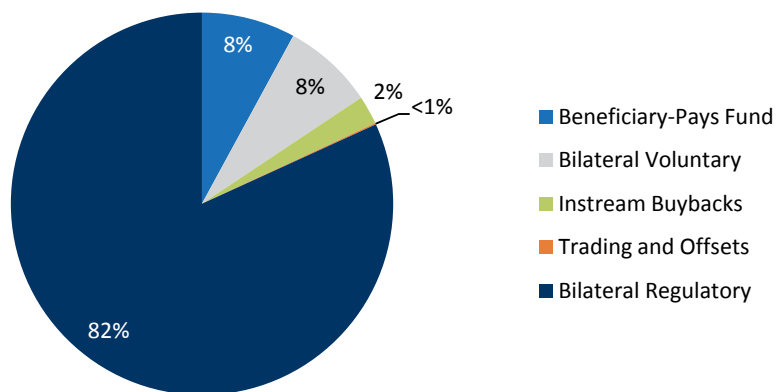
Nor do all watershed investments take the form of cash payments. We also see watershed service providers being compensated in the form of technical training, agricultural inputs, or even tenure security. Our survey respondents, where possible, have estimated the value of in-kind payments to be included in our aggregate transaction figures.

## China Takes the Wheel, Water Funds Take Off, and Nutrient Trading Takes It Easy

Watershed investments had their share of highs and lows in 2011. In some regions, a still-sluggish economy seems to have dampened activity, while in others, natural infrastructure’s cost-effectiveness made it all the more attractive. A sampling of key report trends to take away:

- China has cemented its position as a global leader in using compensation for ecological restoration and protection.** The country’s political leadership has given “eco-compensation” a key role in China’s latest Five-Year Plan and a proposed national land zoning system. Water insecurity poses probably the single biggest risk to the country’s continued economic growth today, and the government has clearly decided that its ecological investments will pay off.<sup>2</sup>
- Water funds, which draw on a mix of funding streams to capitalize a fund, generally managed in trust, to invest in conservation and restoration projects, are the fastest-growing model today in Latin America.** We’ve tracked eight new funds since our 2008 baseline and at least another seven are set to launch in 2012 and beyond. A new \$27-million dollar partnership between The Nature Conservancy, the FEMSA Foundation, the Inter-American Development Bank, and the Global Environment Facility aims to have 32 funds capitalized across Latin America by 2015. These funds offer sustainable financing, long-term stakeholder engagement, and flexibility to select projects at a landscape scale.
- 2011 was a slow year in North America as far as water quality trading,** with \$7.7 million in trades tracked down from a 2008 high of \$10.6 million. A slow economy is probably partly to blame, although we also see some signs that counter-intuitively suggest this means that markets are working. Survey respondents reported that increased engagement with nonpoint-source credit sellers like farmers translated into lower credit prices (and thus lower overall market values). Meanwhile, a number of point sources noted that they’d come in under their regulatory caps so haven’t needed to trade at all in 2011, suggesting that trading in recent years had allowed them to buy time while making environmentally-friendly technological upgrades.

**Figure 3: Transactions by Watershed Investment Program Type, Annually**



Source: Ecosystem Marketplace.

2 World Bank, 2007.

- **We tracked growing interest in stacking and bundling payments for multiple ecosystem services** – not just in the US, but also in Indonesia, Vietnam, Tanzania, Kenya, and Colombia. ‘Bundling’ refers to a payment that recognizes multiple ecosystem services delivered by an intervention, while “stacked” payments not only recognize multiple services but offer distinct revenue streams for each. Biodiversity is the most commonly “bundled” service, though the degree of rigor in measuring and protecting it appears to vary quite a bit. Financing for stacking and bundling remains mostly “internal” – we aren’t yet seeing many signs of linkages to new buyers in the carbon or biodiversity markets.
- **It’s not just developing countries who rely on natural water infrastructure to keep water sources clean and safe.** Green infrastructure as a substitute for or complement to traditional engineered approaches is gaining currency in the developed world – from using forests as green infiltration galleries in Germany, to using mussel beds to filter nitrate pollution instead of a treatment plant in Sweden, to New York City planning to restore wetlands to its waterfront to deal with storm events.
- **For the first time, we’ve tracked environmental water markets in Australia and the United States.** Governments and conservation groups are taking advantage of traditional water rights markets – which have historically been used by irrigators and municipalities to trade water rights for consumptive use – to buy and retire water rights to ensure sufficient water is left in rivers (known as “instream buybacks”). It’s an innovative use of existing markets to achieve environmental goals that channeled more than \$171 million in 2011 to restoring critical river systems.

## A Field Guide to Watershed Investments

The term ‘investments in watershed services’ covers a spectrum of instruments in practice. All are premised on the idea that our ecological infrastructure has tremendous value: we rely on it to filter our drinking water, absorb floods, keep soil on the land from eroding and clogging waterways, and recharge aquifers. Healthy watersheds can often do all of these things more cost-effectively than built infrastructure and with co-benefits like providing wildlife habitat and sequestering carbon.

In more than 200 towns, cities, and regions around the world, leaders and communities have opted to invest in our natural infrastructure and reward the people who protect it. The approach is a powerful new source of financing for conservation, a cost-effective way to ensure clean drinking water and supplies for other uses, and can be tailored to improve livelihoods in poor and rural communities who often manage water resources at their source.

In this report, we track a variety of mechanisms for investment and a range of terminology being used to describe them – from “payments for ecosystem services” to “reciprocal agreements for water” to “eco-compensation.” But all have some common elements (see Table 2). Where they vary lies in how these elements are operationalized. Project design can vary according to a region’s regulatory and institutional frameworks, local politics, economic realities, and regional environmental problems.

In our tracking, we see many of these design elements tending to “cluster” together. For example, a “polluter pays” program might usually be linked to some regulatory driver and transacts payments in cash. Cluster analysis on our inventory of global programs gives us several overarching program types that repeatedly appear around the world. We use these broad groupings in analysis in this report, as we feel they best reflect the “on-the-ground” realities of investments in watershed services, as opposed to a theory-driven typology. Still, it should be noted that these are general types; in practice we see a range of sub-types and hybrids.<sup>3</sup>

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<sup>3</sup> For further discussion, please see Forest Trends’ forthcoming white paper which can be accessed at <<http://forest-trends.org/dir/iw-stypes/>>.



**Table 2: Key Elements of Project Design**

Design Element	For example...
<b>Hydrological Service Goals: What problem is this mechanism trying to solve?</b>	- Groundwater infiltration, filtering of pollutants, or trapping of sediments
<b>Scale: At what geographic level do investments occur?</b>	- Local or watershed-scale - Regional, spanning multiple watersheds or jurisdictions, or encompassing a major basin - National, active in multiple areas or across an entire country
<b>Participants and other Stakeholders: Who are the key actors?</b>	- Providers: Private or communal landholders, forest managers, factories or treatment plants discharging into a water body - Beneficiaries: Water users downstream, hydropower operators concerned about sedimentation of their reservoir, beverage companies depending on clean water supplies - Other stakeholders: Community organizations, regulators, policy-makers, conservation professionals, ecosystem market service providers (such as aggregators or trading platform hosts)
<b>Buyer: Who pays?</b>	- Beneficiaries - Polluters - Public good payers (such as a government or NGO)
<b>Intervention: What does the buyer pay for?</b>	- Agricultural best management practices - Afforestation/reforestation or improved forest management - Technology upgrades to limit polluted discharge - Water rights transactions
<b>Driver: Why does the buyer pay?</b>	- Voluntary arrangement - Discharge permit requirements - Environmental tax or fee on water use
<b>Exchange Arrangement: How do they pay the hydrological service provider?</b>	- Bilateral contracts - Water fund - Marketplace mechanism
<b>Compensation: What form does the payment take?</b>	- Cash - In-kind: Agro-inputs, technical training, or tenure security
<b>Co-Benefits: Does the program have multiple objectives, beyond hydrological services?</b>	- Socio-economic goals: Poverty alleviation, indigenous representation/management of resources, or gender equity - Environmental co-benefits: Habitat for imperiled species, carbon sequestration, or landscape beauty

Source: Ecosystem Marketplace.

### Core Program Types

When people talk about payments for watershed services, they are generally referring to either a bilateral agreement or a beneficiary-pays fund. These two are the most commonly observed program types around the world, though in practice we see a good deal of variation on these broad models. Beyond differences in implementation, we also see evidence of hybrids and even one type morphing into another over time. In addition to bilateral agreements and beneficiary-pays funds, we track two other general types: trading & offsets and instream buybacks. In this report, we attempt to highlight trends and outcomes specific to different program types wherever useful for the models described below.

## Key Programs Tracked in this Report

### BILATERAL AGREEMENTS

The largest group of programs tracked is bilateral agreements, which are characterized by the use of direct deals between payer and provider. Multiple payers and providers may participate in the program, but contracts always take a bilateral form, as opposed to using other exchange arrangements like a marketplace or water fund mechanism. Government agri-environmental payments often fall into this category. Bilateral arrangements may be either voluntary on the part of the payer or driven by some form of regulation. These types of arrangements are observed at a range of scales, from a local deal up to a national-level payment program.

### BENEFICIARY-PAYS FUND

Here, individuals or organizations who benefit from watershed restoration or preservation contribute to a centralized fund, often matched by public co-investment. The contributors to the fund do not necessarily determine how money is invested in the watershed; generally some trustee, council, or technical committee selects interventions. An endowment fund is a common feature, with only interest being used for restoration or conservation projects while the principal is left untouched. We also often see a mix of participation drivers on the payer/beneficiary side: some beneficiaries (usually domestic water users) may be required to contribute to the fund through mandatory fees, while others participate voluntarily. Watershed service providers always participate voluntarily. These schemes predominantly take place at the local level though there are also instances of regional and national programs that fall into this type. These programs are most often seen in Latin America.

### TRADING & OFFSETS

These are the cases where we observe a fairly high degree of commoditization of watershed services, often paired with some kind of marketplace exchange arrangement. Water quality trading programs in North America and Oceania fall into this group as do some quantity-driven mechanisms like groundwater mitigation banking programs and instream flow restoration certificates in the United States. The “polluter pays” principle is often an underlying force: there is usually a linked regulatory driver for participation, particularly on the side of the buyer.

### INSTREAM BUYBACKS

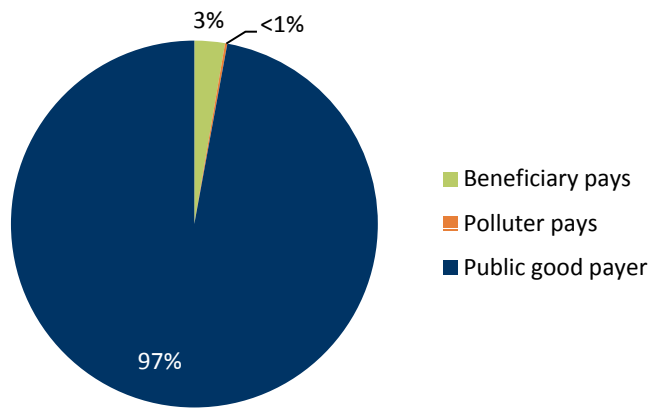
Instream buybacks are the purchase of water rights for the purpose of leaving that water instream (rather than diverting it for irrigation, drinking, or some other consumptive use) to restore natural flow regimes. These transactions usually have a strong biodiversity co-benefit component, with the goal of protecting or enhancing aquatic and riparian habitats. The buyer is generally a government or non-profit organization which may not necessarily benefit from the intervention; in this respect the presence of a “public good payer” is a defining characteristic of instream buybacks. We observe these types of programs only in areas with defined property rights for water extraction and existing markets for water rights – thus to date, instream buybacks have only taken place in Australia and the United States.

## Who’s Buying? Who’s Selling?

We find three main types of funders: beneficiaries of watershed protection (like a downstream city), polluters compensating for their impacts (like a factory offsetting its polluted effluent) and ‘public good payers’ that may not be directly benefitted by or responsible for watershed cleanup, but fund it nonetheless on behalf of general welfare (usually a government or NGO).

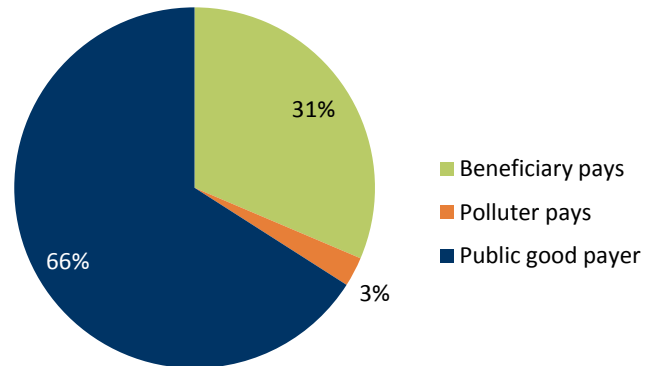
Considered by payer type – beneficiary, polluter, or a public good payer – payments were overwhelmingly initiated by public good payers like governments and NGOs. However, China again skews these numbers with massive spending by government eco-compensation programs (see Figures 4a and 4b). When China is set aside, beneficiary-pays programs account for an estimated \$162 million out of \$517 million in global transactions, or nearly a third of payments. Polluter-pays programs, leaving aside China, comprise about three percent of transactions.

**Figure 4a: Watershed Investments by Payer Type, Globally**



Source: Ecosystem Marketplace.

**Figure 4b: Watershed Investments by Payer Type, Globally, Excluding China**



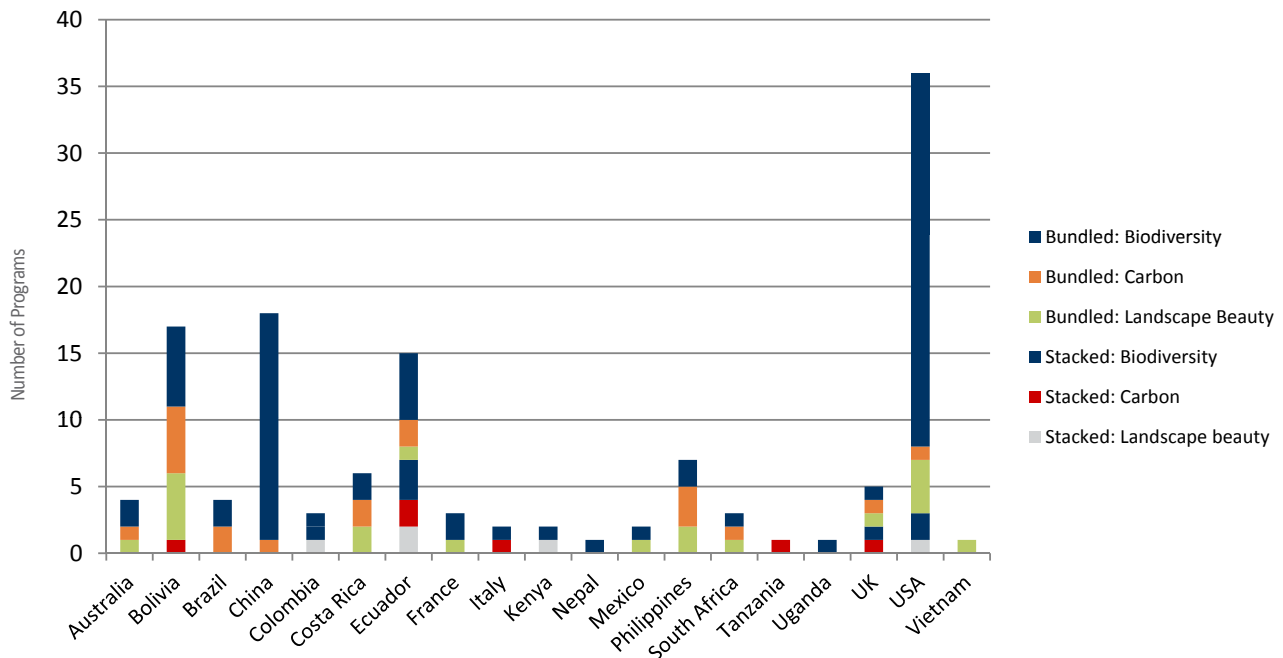
Source: Ecosystem Marketplace.

## Co-Benefits

### Environmental Co-Benefits

Sixty-six programs – nearly a third of those tracked – reported that they engage in some form of stacking or bundling (see Figure 5). Conservation of habitats that support biodiversity was the most common ecosystem service targeted. Most often this meant protection or rehabilitation of ecologically valuable habitats, although a large number of bundled biodiversity payments were instream buybacks in the US and Australia, where restoring natural flow regimes was expected to support aquatic and riparian habitats. These programs are often driven by concerns about endangered and threatened species.

**Figure 5: Stacking and Bundling with Watershed Investments, Globally**



Source: Ecosystem Marketplace.

Although we did not ask programs to provide detailed information on how bundled environmental co-benefits are measured, protected, or monitored, we suspect that there is considerable variation across programs, ranging from assuming habitat protection will deliver biodiversity benefits to very detailed tracking and management strategies.

Thirteen programs reported that stacking payments for co-benefits was taking place. These tended to be Latin American water funds or programs supported by a single buyer. In all cases but one, payments came from ‘inside’ the program – that is, through existing funding streams and established buyers.

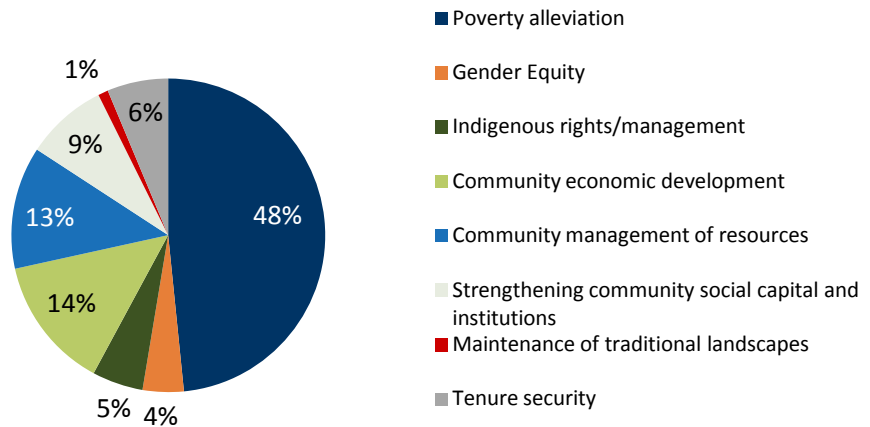
### Socio-Economic Co-Benefits

We tracked 54 programs that report explicit social objectives, exhibiting a variety of social goals (see Figure 6). Nearly half of these are in China, where eco-compensation can be considered in part a rural welfare support program to more evenly distribute benefits of economic growth to poorer regions of the country.

Investments in watershed services programs also appear to be pursued as a strategy for community development; program requirements like strong social capital, functioning institutions, and tenure security also support larger goals of socio-economic development.

Though some programs offer compelling evidence that social goals are being met with demonstrated improvements for incomes, equity, and food security, we also found that worryingly little socio-economic monitoring appears to be taking place.

**Figure 6: Socio-Economic Objectives Reported by Watershed Investment Program Globally**



Source: Ecosystem Marketplace.

## Outlook

We’ve seen watershed investment programs nearly double in number and geographic spread over the past four years. These four years have also seen government cutbacks, austerity measures, down-sized corporate environmental departments, and unprecedented economic and political uncertainty, including the largest global recession in recent memory.

Such continued growth in management systems for a natural resource in the midst of a major global economic downturn should be raising eyebrows. Leaders and communities around the world are recognizing water security as a serious problem and taking creative steps to address it.

This report attempts to capture activity that has taken place over the course of a year, 2011, that is already in our past. But in our research, we’ve also come across new developments, ongoing trends, and future projections. In this section, we summarize the most important of these.

### The Good News

- **With 76 new programs in development, interest in IWS clearly continues to spread.** Countries like Gabon, Ghana, Kyrgyzstan, Malawi, Bulgaria, and Romania are in line to implement their first IWS mechanism in 2012 and the coming years.
- **China’s already-massive investments in watershed services are expected to grow even more,** as eco-compensation settles into its new role as a key element of environmental policy in the most recent Five-Year plan and new land-zoning framework, a new national ‘eco-compensation’ ordinance, and ramped-up government funding for pilots.
- **Latin American transactions overall are expected to see a jump in 2012.** Between new water funds coming online and increased funding for national programs like Mexico’s **PSAH** and Ecuador’s **Socio Páramo**, relatively modest activity in Latin America appears to have turned the corner in 2012 based on our initial tracking.
- **Water quality markets in the United States are expected to see a 2012 bounce** as well, with an uptick in overall economic activity and a surge of regulatory drivers behind new growth. New water quality standards in the Chesapeake Bay watershed made themselves felt in 2012. The first interstate water quality trading program under a single set of rules also expects to begin trading soon in the **Ohio River Basin**. We’re also tracking the emergence of a new player in water quality trading: private nutrient banks,

which are repurposing the wetland banking model for nutrient credits. In Virginia, banks look to have quadrupled in number in 2012 and have been behind a big piece of trading activity in the state.

- **Transboundary programs are slowly emerging.** We tracked a developing program in the **Danube Basin**, as well as a new effort to restore instream flows in the **Colorado River**, which flows from the United States into Mexico, with a coalition of American and Mexican NGOs working together to secure instream flow rights.
- **Increased experimentation with stacking and bundling of multiple ecosystem services is everywhere.** We've heard about streambank credits in the US state of Georgia, programs linking with carbon in Indonesia, bundled payments for landscape beauty by tourism operators in Vietnam, and more. While in 2011 payments still tended to come from "inside" existing programs – that is, from the same buyers that also paid for watershed services, rather than new sources of financing – in 2012 and beyond we expect to see increased cross-investment between ecosystem markets. We've heard about pollinator credits stacking with water quality, wetland banks pursuing both carbon and nutrient accreditation, water funds linking to international carbon markets, and more.
- **Climate risk adaptation and mitigation are increasingly cited as a driver of watershed investment.** Protecting water supplies from climate change effects like natural disasters, glacier melt, and food insecurity were much more frequently reported as program drivers than in our last survey, though it's not always clear how these concerns are translating into management. Better information about how IWS can increase resilience to climate effects and natural disasters and the cost-effectiveness of doing so will likely strengthen the usefulness of IWS mechanisms as a tool for communities in long-term planning. IWS as a risk mitigation strategy is already being taken up in locales from New York City and Denver to Peru and the Philippines.

## The Bad News

- **We have seen little movement from the private sector to tackle their water-related risk.** Fifty-three programs tracked use some private sector funding, but these are nearly always regulation-driven and public or NGO-initiated. IWS remains largely powered by the public sector and public good investors. This trend is echoed in a recent Deloitte report (CDP Global Water Report) showing that over half the Global 500 companies report having experienced water-related challenges, yet are failing to take action to improve water stewardship. The exception to this are a few progressive and clearly exposed businesses, namely certain beverage companies including the members of the Water Futures Partnership, Coca-Cola, natural mineral water companies, and a number of breweries around the world.
- **In many regions and particularly Africa and Latin America, new or developing programs identified in 2008 no longer existed by 2011.** This seems to be directly linked to initial grant monies running out and programs struggling to stay operative thereafter. Of course, sometimes an IWS mechanism may simply not be appropriate to a given locale or water resource problem. But it's an unwelcome trend nonetheless, and underscores how long-term financing and local ownership are essential.
- **Survey responses suggest that socio-economic monitoring is relatively rare.** Only sixteen cases of monitoring these impacts were reported. In contrast, 126 programs confirmed that environmental monitoring takes place.

## The Bottom Line

We hope you'll come away from this report convinced of two things: firstly, that the widespread adoption of ecological investment mechanisms is a key part of any strategy for ensuring secure and sustainable water systems – and secondly, that accurate tracking of these finance mechanisms and making information about them freely available to decision makers around the world is crucial to timely and widespread adoption. The latter conviction drives this report and the rest of our work at Ecosystem Marketplace.

The global landscape in 2011 looks very different from what we found in 2008 in our first report. Water insecurity has sharpened the need for scaling up investment in our ecological infrastructure, while patchy global economic growth has underlined the need to do so cost-effectively.

This report tracks a rich and diverse portfolio of programs around the world that have found creative ways to finance safe drinking water and instream supplies. Models for watershed investment have both multiplied and matured since our last report, and show great promise in 2012 and beyond.

# Mapping Watershed Payment Programs



Summary of Watershed Payment Programs (2011)

Total Active Programs	205
Total Programs in Development	76
Value of Transactions	US\$8.17 billion
Hectares Managed for Watershed Services	117 million ha







# Table of Contents



<b>Executive Summary</b>	i
<b>Mapping Watershed Payment Programs</b>	x
<b>Foreword</b>	1
<b>Methodology</b>	3
Approach and Scope	3
Data Sources	3
<b>Global Findings</b>	5
General Status Update	5
Transactions by the Numbers	6
<b>Africa</b>	15
General Status Update	15
Transaction Activity	15
Outlook	18
<b>Asia</b>	21
General Status Update	21
Transaction Activity	23
Outlook	30
<b>Europe</b>	33
General Status Update	33
Transaction Activity	35
Outlook	39
<b>Latin America</b>	41
General Status Update	41
Transaction Activity	43
Outlook	47
<b>North America</b>	49
General Status Update	49
Transaction Activity - Bilateral and Fund Arrangements	51
Outlook - Bilateral and Fund Arrangements	55
Transaction Activity - Water Quality Trading	56
Outlook - Water Quality Trading	60
Transaction Activity - Environmental Water Markets: Instream Buybacks and Water Quantity Offsets	62
Outlook - Environmental Water Markets: Instream Buybacks and Water Quantity Offsets	66

<b>Oceania</b>	69
General Status Update	69
Transaction Activity - Water Quality Trading	71
Transaction Activity - Instream Buybacks	72
Other Activity	72
Outlook	73
<b>The Global Outlook</b>	75
Charting New Waters in 2012 and Beyond	75
The Bottom Line	76
<b>Bibliography</b>	77

## List of Tables

Table 1: Summary Details, Global	i
Table 2: Key Elements of Project Design	v
Table 3: Summary Details, Global	5
Table 4: Dollars per Hectare Average by Program Type, 2011	8
Table 5: Socio-Economic Co-Benefits Objectives Reported, by Country	13
Table 6: Summary Details, Africa	15
Table 7: Active Programs, Africa	17
Table 8: Summary Details, Asia	21
Table 9: Summary Details, Europe	33
Table 10: Tracking Activity in Europe, 2008-2011	36
Table 11: Summary Details, Latin America	41
Table 12: Water Funds, Latin America	45
Table 13: Summary Details, North America	49
Table 14: Active Source Water Protection Programs, North America	52
Table 15: A Sample of Watershed Investment Programs in North America: Where Are They Now?	54
Table 16: Active Water Quality Trading Programs, North America	58
Table 17: Tracking Water Quality Trading 2008-2011, North America	59
Table 18: State Instream Acquisition/Leasing Programs Active in 2011, United States	64
Table 19: Summary Details, Oceania	67
Table 20: Tracking Activity in Oceania, 2008-2011	68
Table 21: Active and Developing Programs, Oceania	70

## List of Boxes

Box 1: Environmental Co-Benefits: “Stacking” and “Bundling”	11
Box 2: Eco-Compensation in Action, China	24
Box 3: The Water Framework Directive in Europe	35
Box 4: Federal Funding for Drinking Water Protection, United States	52
Box 5: Water Quality Trading in the United States: The Regulatory Framework	57
Box 6: The Murray-Darling Basin, Australia	68

## List of Figures

Figure 1: Global Annual Transactions, 2008-2011	ii
Figure 2: New Watershed Investment Programs by Year, Globally	ii
Figure 3: Transactions by Watershed Investment Program Type, Annually	iii
Figure 4a: Watershed Investments by Payer Type, Globally	vii
Figure 4b: Watershed Investments by Payer Type, Globally, Excluding China	vii
Figure 5: Stacking and Bundling with Watershed Investments, Globally	vii
Figure 6: Socio-Economic Objectives Reported by Watershed Investment Program Globally	viii
Figure 7: Sample IWS Project	1
Figure 8: Survey Response Rates	3
Figure 9: Global Annual Transactions, 2008-2011	5
Figure 10: New Programs by Year, Globally	6
Figure 11a: Watershed Investments by Region, 2011	6
Figure 11b: Watershed Investments by Region, Historically	6
Figure 12a: Global Demand for Investments in Watershed Services by Sector	7
Figure 12b: Global Supply of Investments in Watershed Services by Sector	7
Figure 13a: Payer Driver, Watershed Investment Programs, Globally	7
Figure 13b: Provider Driver, Watershed Investment Programs, Globally	7
Figure 14: Average Amount of Dollars per Hectare Transacted in 2011, by Country	8
Figure 15a: Watershed Investments by Payer Type, Globally	8
Figure 15b: Watershed Investments by Payer Type, Globally, Excluding China	8
Figure 16: Transactions by Watershed Investment Program Type, Globally	9
Figure 17: Active Investment in Watershed Services Programs by Type	9
Figure 18: Management Interventions Used by Watershed Investment Programs, by Region	10
Figure 19: Stacking and Bundling with Watershed Investments, Globally	12
Figure 20: Socio-Economic Objectives Reported by Watershed Investment Programs Globally	12
Figure 21: Active IWS Programs by Transactions and Hectares Protected, 2008-2011, Africa	17
Figure 22: Growth in Investments in Watershed Services in China	23
Figure 23: New Watershed Investment Programs by Area of Focus, China	24
Figure 24: Composition of Estimated Annual Eco-Compensation Funds, China	25
Figure 25: Total Area Protected by IWS Program Composition, China	26
Figure 26: Demand for IWS by Buyer Type, Southeast Asia	29
Figure 27: Active IWS Programs by Seller Type, Europe	37
Figure 28: Active IWS Programs by Buyer Type, Europe	37
Figure 29: Annual Watershed Investments by Year and Country 2001-2011, Latin America	43
Figure 30: Average IWS Program Payment Ranges in 2011 (Cash and In-kind), Latin America	46
Figure 31: New IWS Programs by Year and Type, North America	51
Figure 32: Annual IWS Transactions by Year and Program Type 2009-2011, North America	51
Figure 33: Watershed Investors by Sector - Bilateral and Fund Arrangements, North America	53
Figure 34: Annual Transactions 2001-2011, Water Quality Trading, North America	57
Figure 35: Buyers by Sector, Water Quality Trading in North America	59
Figure 36: Sellers by Sector, Water Quality Trading in North America	59
Figure 37: Management Interventions Used to Generate Water Quality Credits, North America	60
Figure 38: New Instream Buybacks and Groundwater Offset Programs by Year and Type, North America	66

## List of Maps

Map 1: Global IWS Transactions by Country	x
Map 2: Active and Developing Programs, Africa	16
Map 3: Active Programs, Asia	22
Map 4: Active and Developing Programs, Europe	34
Map 5: Active Programs, Latin America	42
Map 6: Active Programs by State, United States	50
Map 7: Historical Transactions by State, United States	50
Map 8: 2011 Average Credit Prices by State, United States	61
Map 9: Instream Buybacks in 2011 by State, United States	63

# Foreword



Water, like its flow through the physical landscape, touches almost every sector of society and aspect of human life. Businesses are materially affected by water risks and dependencies; governments are charged with building systems to ensure clean and continuous supplies of water; human settlements are vulnerable to flooding and climate instability; and our food systems that sustain the well-being of a global population of over seven billion are strikingly vulnerable to changes in the water cycle. This immediate and inextricable connection between people and water means that vulnerability in water systems are at the top of the most pressing environmental challenges facing society this century.

Throughout the development of human civilization, people have been acutely aware of the value of watersheds. Almost all major cities, from Babylon to Beijing to New York City, were built around access to clean water – along rivers, lakes, and estuaries. Even as our modern civilization becomes more and more detached from the natural world, our fundamental need for clean water remains. This immediate and inextricable connection between people and water means that vulnerability in water systems are among the most pressing economic and environmental challenges facing society this century.

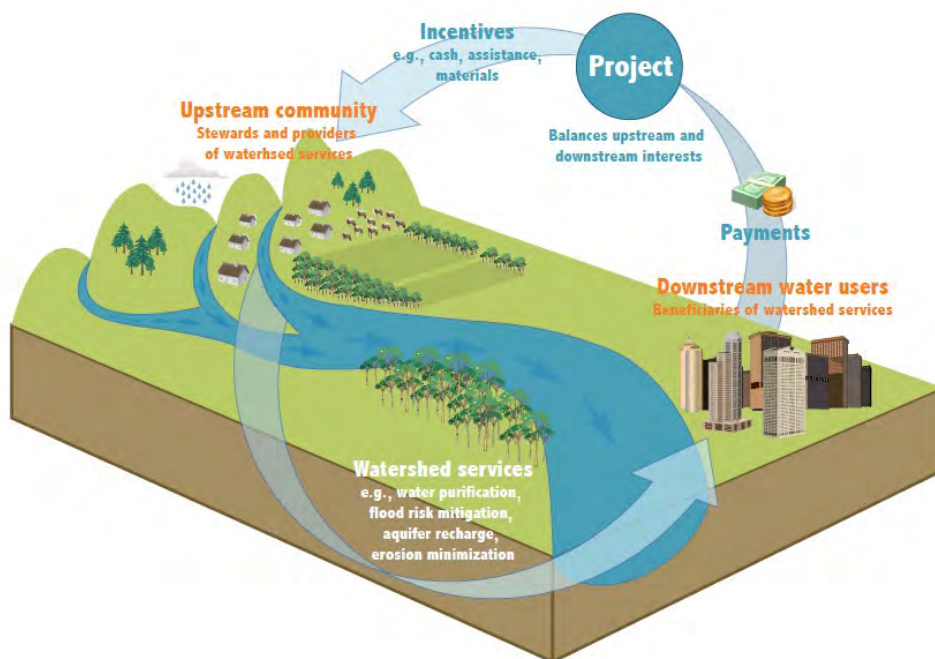
Societies often respond to water problems by investing in “grey” infrastructure like storage reservoirs, water transfers from one river basin to another, piped drainage, and water treatment systems. Such infrastructure is not the only piece of the equation. In nearly all cases, our drinking water also flows through a watershed. Protecting the health of this watershed can not only improve water flowing through the tap but also across the landscape. Maintaining ecological systems to support water quality or supplies is far more cost effective in some cases than grey solutions. Still, watershed protection inevitably requires us to pay for or invest in something that we have for centuries thought was free.

In this report, we track new and innovative watershed management tools emerging across the globe – from local communities, individual businesses, and regional and national governments. These approaches, which are effective, affordable, and sustainable, work to enhance the landscapes and ecological processes that naturally maintain and regulate water flows, instead of trying to re-create them with bricks and mortar engineering. Known as **investments in watershed services (IWS)**, these approaches address the natural landscape and the overlying social and economic fabric – which often directly controls the health of the natural environment.

Projects are as varied as the communities and countries in which they take place and go by different names: payments for watershed services, reciprocal agreements for water, water funds, eco-compensation, benefit-sharing arrangements, source water protection, green infrastructure investments, and so on.

This report focuses on such investments in watershed services (IWS). These investments are one tool to deal with the water crisis and to

Figure 7: Sample IWS Project



Source: Forest Trends

manage water quality and supplies. While IWS is not the only solution, it has the potential to be a central component of watershed solutions in many parts of the world, with myriad co-benefits for local communities, biodiversity, and climate adaptation.

The following analysis presents a landscape filled with tremendous variety and creativity. It is our hope that by capturing in this report the range of available mechanisms for investment, future project developers may find useful models for their own work.

As diagrammed in Figure 7, the essence of watershed investment or payments is to provide incentives to landholders and other actors impacting the landscape, to manage water resources in a way that sustains clean and reliable water supplies for beneficiaries. This is usually an upstream provider-downstream beneficiary relationship – although, as you’ll see in later chapters, not always.

In 2010, Forest Trends’ Ecosystem Marketplace released the first *State of Watershed Payments* report. This is the second report in which we’ve catalogued data on payments, impacts, and stakeholders for over 200 active programs. Months of online research, interviews, questionnaires, emails, and phone calls have resulted in the following snapshot of these investments globally.

Increasing transparency and access to information around investments in conservation is the core mission of Forest Trends’ Ecosystem Marketplace. If you find this report useful, we encourage you to utilize our (free) ongoing coverage on investments in watershed services at [www.ecosystemmarketplace.com](http://www.ecosystemmarketplace.com) and detailed project inventory on [www.watershedconnect.org](http://www.watershedconnect.org).

Michael B. Jenkins,  
President and CEO, Forest Trends

Katherine Hamilton,  
Director, Ecosystem Marketplace



# Methodology



## Approach and Scope

This report aims to track global transactions paying for or otherwise incentivizing the restoration, enhancement, or protection of watershed services.

As we noted in our “State of Watershed Payments 2010” report, this is not always a case of “apples to apples” in comparing projects, as we see a tremendous variety of models on the ground for financing watershed rehabilitation and conservation. As far as scope, we have endeavored to include mechanisms where a clear buyer and seller (generally, representing the “beneficiary” and “provider” of watershed services, respectively) exist, where some form of remuneration for providing those services takes place, and where the primary motivation is clearly water. In contrast to the last report, we do not include bundled agri-environmental payment schemes in our tracking. These mechanisms, which include for example agricultural subsidies for sustainable farming practices, can and do support watershed health, but have not been included here.

Our findings are based primarily on data collected through a survey of program administrators. Respondents were asked to provide information about program design and annual aggregate transactions. We define an ‘active’ program as one which has seen transactions taking place in 2009, 2010, or 2011. Units transacted and payment values are reported according to the year in which payments actually exchanged hands, rather than the year in which a contract was signed, as payment timing can vary considerably - either taking place up-front, at regular intervals on an ongoing basis or over some period specified in the contract, or conditional upon some outcome.

We believe that market participants, observers, and stakeholders will benefit from improved transparency and access to information about these types of programs. We have attempted to follow up with respondents where necessary to clarify or confirm survey responses. But as is our practice at Ecosystem Marketplace, we do not attempt to “screen” projects for perceived quality of outcomes or project design.

We also do not attempt to extrapolate data on overall global market size. Gathering project-level information at a global scale on mechanism design, transaction values, and project outcomes is no small undertaking. Information on projects and programs is often scarce, fragmented, and rapidly changing. This report represents our most comprehensive inventory of programs yet, but it is by no means the complete picture. In all cases, we have done our best to err on the side of conservatism in our estimates and analyses, and report only the best available data.

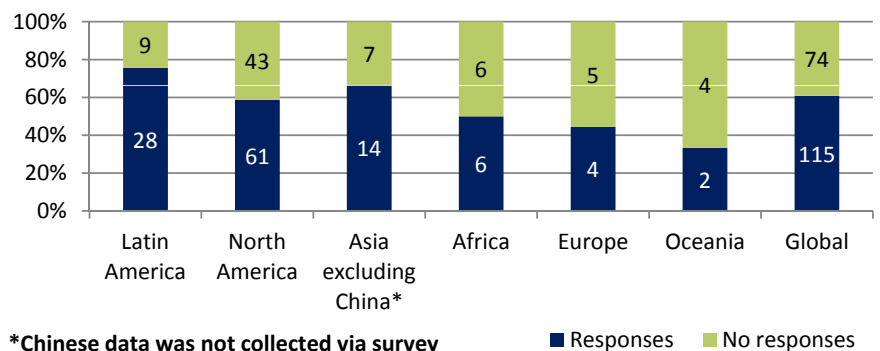
In all cases, exchange rates are in 2012 US dollars. For Chinese Yuan, we have used a rate of 6.23 Yuan to the dollar.

## Data Sources

Our primary sources of data are responses to a survey disseminated to known projects and through Forest Trends’ networks. Overall, 61% of program administrators responded to our survey.

Survey data was complemented by direct contact with more than fifty practitioners, project developers, and market observers, either through phone interview or email. We have also relied extensively on published and unpublished research and analy-

Figure 8: Survey Response Rates



Source: Ecosystem Marketplace.

sis (which is cited throughout the report), reports, articles, and general and targeted internet searches. In China, we relied entirely on desk research and direct contact with program developers and did not use a survey.

Colleagues expert in each of the geographic regions we cover have been kind enough to review our regional chapters to ensure that we've captured key trends and initiatives.



# Global Findings



Table 3: Summary Details, Global	
Number of active programs:	205
Number of programs in development:	76
Value of transactions in 2011:	\$8.17 billion
Value of transactions 1973-2011:	\$66 billion
Hectares managed for watershed services in 2011:	117 million hectares
Hectares managed for watershed services 1973-2011:	195 million hectares

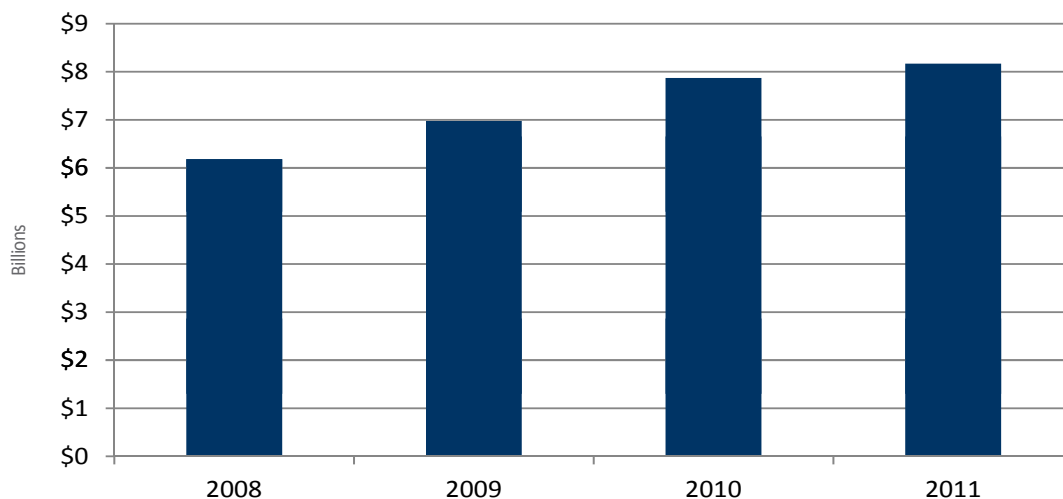
Source: Ecosystem Marketplace.

## General Status Update

Overall, we tracked 205 programs around the world. More than half are in China (61) and the United States (67). In all, watershed investment programs are taking place in 29 countries, though a staggering 91% of payments in 2011 took place in China (see Map 1).

Despite the exclusion of bundled government agri-environmental schemes (which were tracked in our last report, and which are estimated at at least \$3.8 billion in 2011), 2011 saw more than \$8 billion in transactions around the world.<sup>4</sup> These figures are conservative; data was available for just over half of active programs' transactions for the year. Actual payments are likely higher.

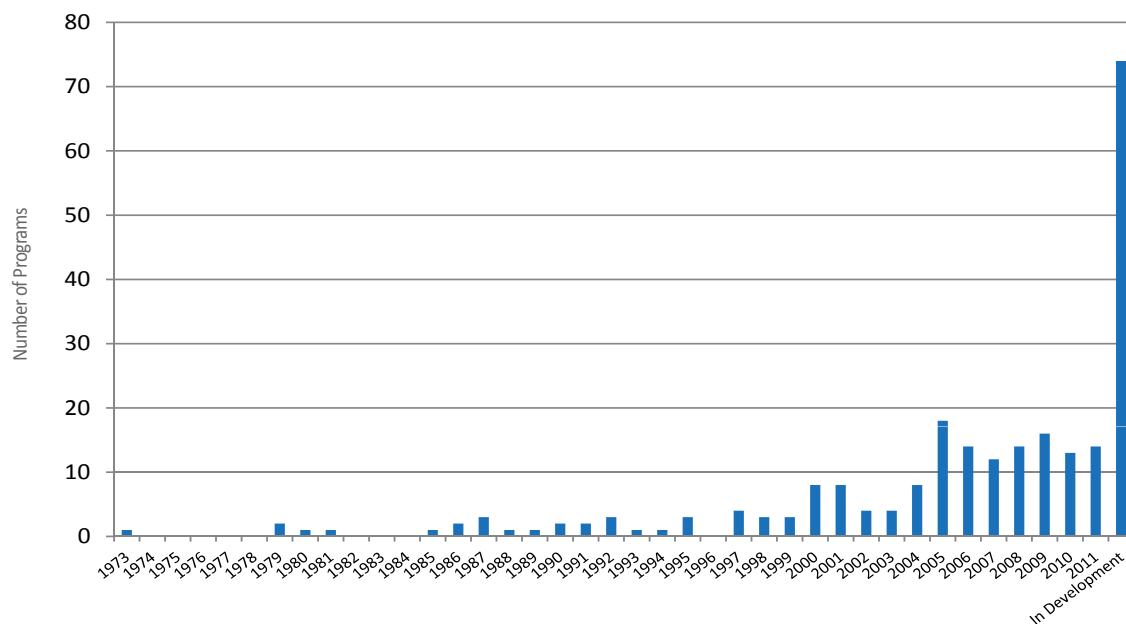
Figure 9: Global Annual Transactions, 2008-2011



Source: Ecosystem Marketplace.

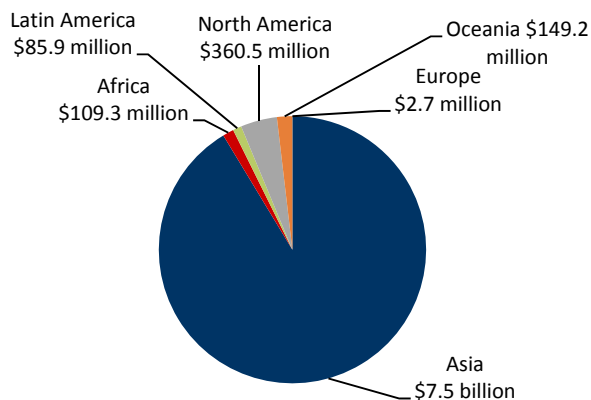
<sup>4</sup> In this report, where we make comparisons with our 2008 baseline, we have adjusted those numbers to reflect this tightened scope.

**Figure 10: New Programs by Year, Globally**



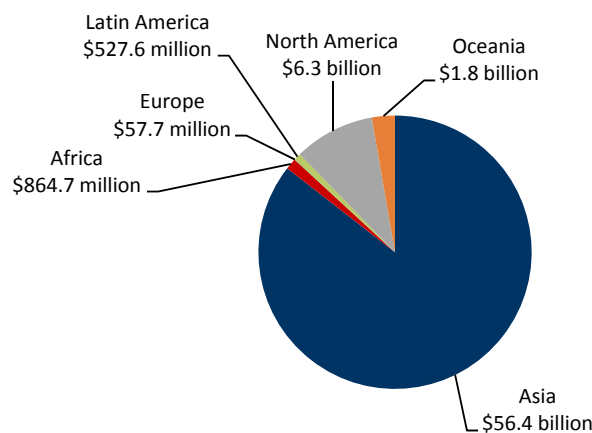
Source: Ecosystem Marketplace.

**Figure 11a: Watershed Investments by Region, 2011**



Source: Ecosystem Marketplace.

**Figure 11b: Watershed Investments by Region, Historically**



Source: Ecosystem Marketplace.

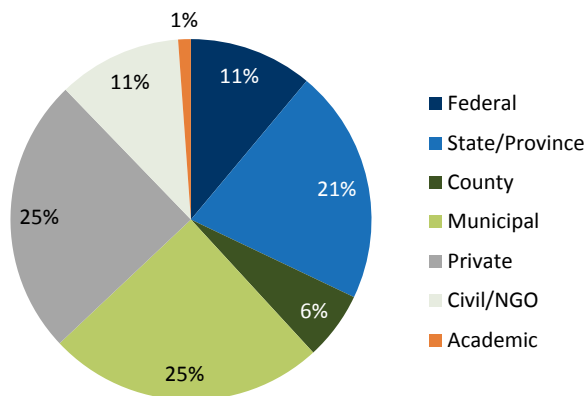
## Transactions by the Numbers

Looking at demand, we see a range of “buyers” of watershed services across sectors, while private landholders – often agricultural producers and forestland holders – continue to be the most prominent “sellers.” However, interventions to enhance or maintain hydrological functions on public land make up more than 25% of transactions. Privately-generated watershed services are not uncommon; this category is mostly made up of point-source facilities in the United States (i.e., facilities that discharge to water bodies through a single conveyance) who have discharged less than their permit allows and thus been able to sell water quality credits. This group also holds some innovative programs, such as a mussel bed farmer in Sweden that is paid for nitrate filtration services by a municipality in lieu of constructing a wastewater treatment plant,<sup>5</sup> and a private nutrient bank in Virginia that restores degraded lands to generate nutrient credits.

5 See page 38.

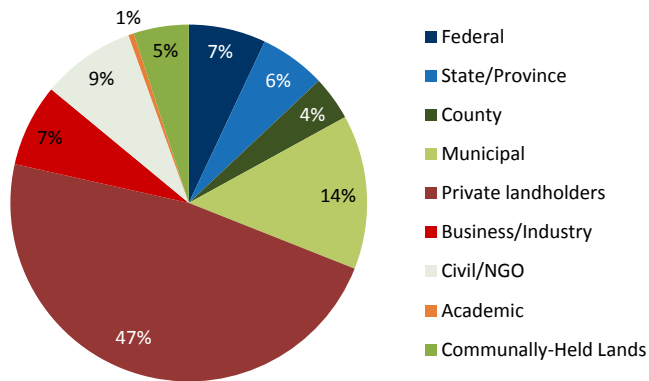
On both the payer and provider side, participation is still largely voluntary. However, the share of participants driven by policy frameworks is growing, suggesting that compensation for watershed services is gaining popularity as a carrot to accompany regulatory sticks.

**Figure 12a: Global Demand for Investments in Watershed Services by Sector**



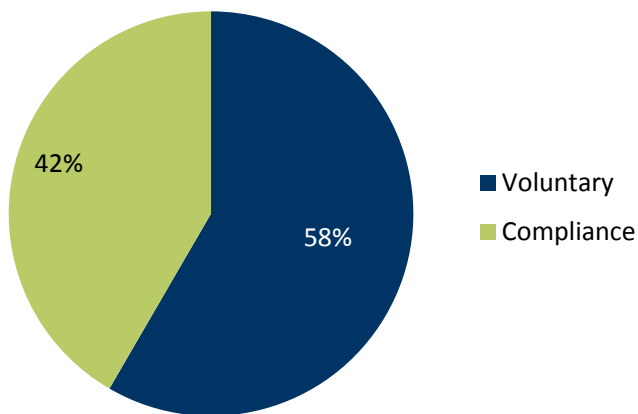
Source: Ecosystem Marketplace.

**Figure 12b: Global Supply of Investments in Watershed Services by Sector**



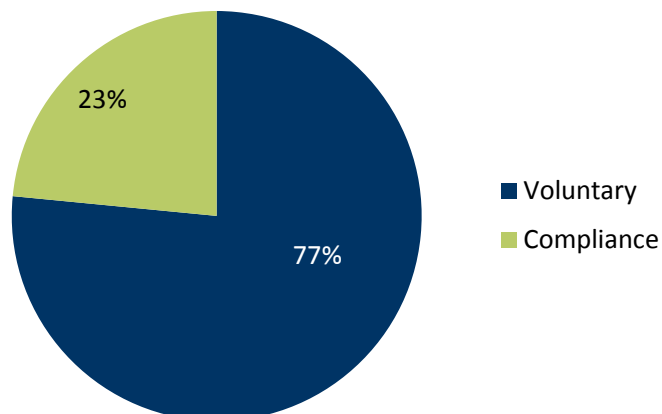
Source: Ecosystem Marketplace.

**Figure 13a: Payer Driver, Watershed Investment Programs, Globally**



Source: Ecosystem Marketplace.

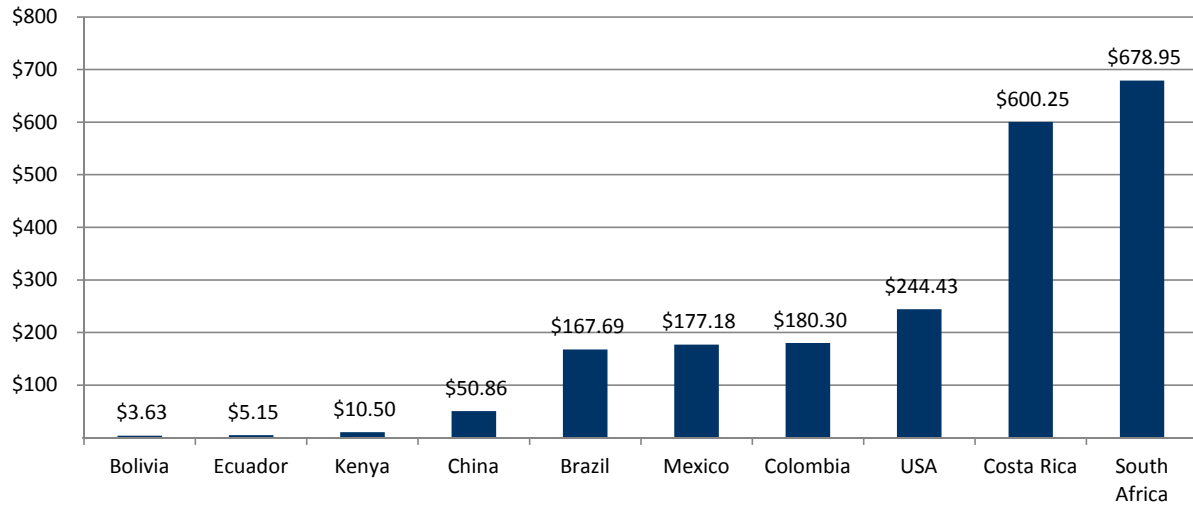
**Figure 13b: Provider Driver, Watershed Investment Programs, Globally**



Source: Ecosystem Marketplace.

Average payments per hectare ranged considerably, as evidenced by Figure 14. Payment levels can be affected by local resources, opportunity costs, the value (perceived or otherwise) and costs of the intervention itself, transaction costs, and also project stage. For example, Working for Water, the largest program in South Africa, reported hectares newly rehabilitated from invasive plant species in 2011. Intensive restoration will likely cost much more on a per-hectare basis than annual maintenance payments thereafter, or ongoing payments for soil and water conservation measures undertaken by agricultural producers.

**Figure 14: Average Amount of Dollars per Hectare Transacted in 2011, by Country**



Source: Ecosystem Marketplace.

## Payer Type

Considered by payer type – beneficiary, polluter, or a public good payer – payments were overwhelmingly initiated by public good payers like governments and NGOs. However, China again skews these numbers with massive spending by government eco-compensation programs (see Figure 11). When China is set aside, beneficiary-pays programs account for an estimated \$162 million out of \$517 million in global transactions, or nearly a third of payments. Polluter-pays programs, leaving aside China, comprise about three percent of transactions.

**Table 4: Dollars per Hectare Average by Program Type, 2011**

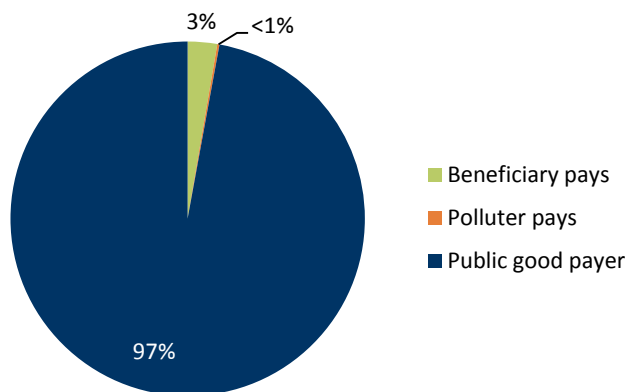
<b>Beneficiary-Pays Fund</b>	\$115.54 per hectare
<b>Bilateral Voluntary</b>	\$10.50 per hectare
<b>Bilateral Regulatory</b>	\$56.81 per hectare

Note: The Trading & Offsets and Environmental Water Markets categories are not included here as they do not generally measure protection in hectares.

## Program Type

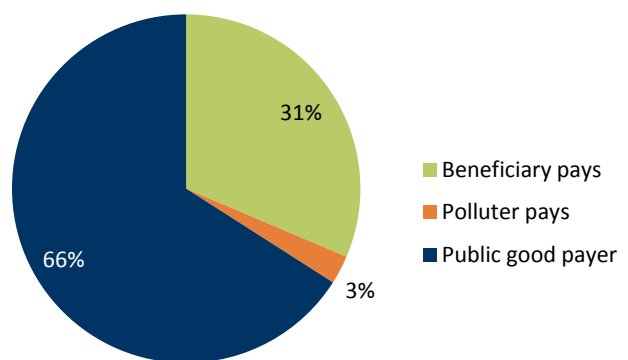
The role of policy in driving compensation mechanisms is also evident when examining transactions by program type, as depicted in Figure 16.<sup>6</sup> Bilateral, regulation-driven contracts were the dominant model as far as payments generated. Again, we see the influence of Chinese eco-compensation on global figures.

**Figure 15a: Watershed Investments by Payer Type, Globally**



Source: Ecosystem Marketplace.

**Figure 15b: Watershed Investments by Payer Type, Globally, Excluding China**

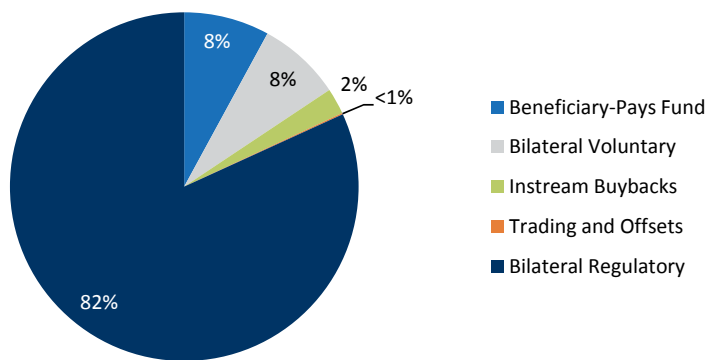


Source: Ecosystem Marketplace.

<sup>6</sup> For discussion of program types identified in this report, please see the Executive Summary.

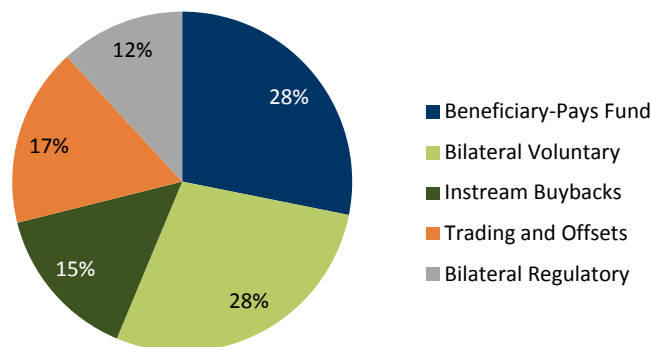
It is interesting to contrast this with the share of active programs of each type; bilateral regulation-driven programs account for twelve percent of all programs but 82% of transactions. This indicates that not only may payments be higher when a regulatory stick or policy framework is involved, but also that these programs tend to be larger in scale. Beneficiary-pays funds, for example, comprise 28% of all programs but tend to be smaller in scale, with funds created and managed at a catchment level.

**Figure 16: Transactions by Watershed Investment Program Type, Globally**



Source: Ecosystem Marketplace.

**Figure 17: Active Investment in Watershed Services Programs by Type**



Source: Ecosystem Marketplace.

## Management Interventions

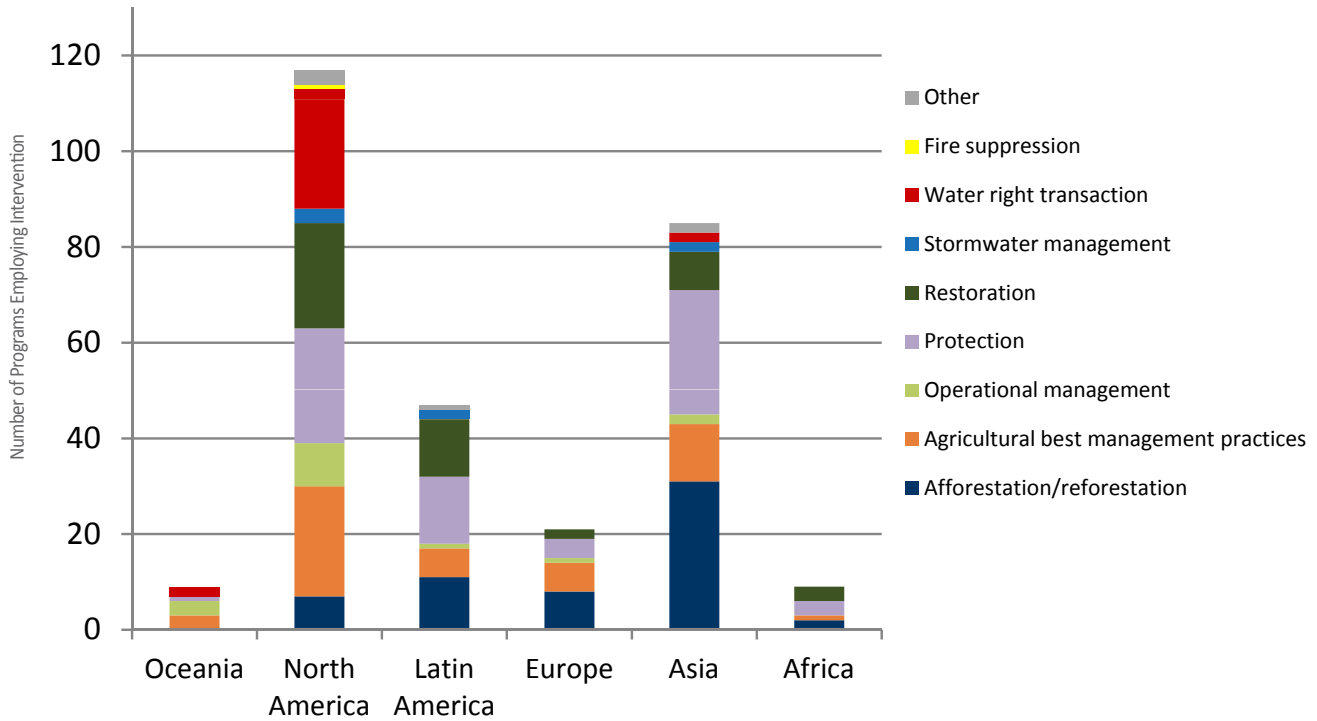
The way that watershed services are enhanced or maintained varies considerably (see Figure 18). Most of the programs tracked used more than one strategy to get results. Protection of ecologically valuable land was the most common intervention reported, followed by afforestation/reforestation and agricultural best management practices. Rehabilitation of degraded land paired with long-term protection payments was a frequent strategy.

Afforestation, reforestation, and forest protection was a common intervention across the board, though programs reported undertaking it for different reasons. In Europe, interest in reforestation and protecting standing forests was linked to forests’ aquifer recharge capabilities; Latin American programs also indicated strong interest in aquifer recharge and in instream flow regulation. In Southeast Asia, on the other hand, reforestation was most often cited as a strategy to control erosion and landslides. Several programs in that region also are exploring the potential for linking carbon and water payments to stem widespread deforestation. Meanwhile, a handful of North American programs also are pursuing forest management in order to mitigate wildfire hazards, since catastrophic fire events can send tremendous quantities of sediment and pollutants downstream, costing utilities millions and threatening already-scarce water supplies in the Western US.

Engaging agricultural producers in sustainable management practices was the third-most frequently reported intervention. Nutrient management, soil and water conservation, and ecologically-friendly siting of agricultural lands were pursued as cost-effective strategies for reducing downstream treatment costs and managing flows and groundwater levels. Agricultural interventions were also often linked in Africa, Latin America, and Asia with improving livelihoods and ensuring long-term food security. Payments for agricultural best management practices generally come coupled with technical training and agro-inputs; in Latin America non-cash rewards were frequently the preferred form of compensation.

North America, China, and Oceania were more likely than others to use incentives for operational management strategies – such as technological upgrades to wastewater treatment facilities. Water rights transactions only took place in countries where legal frameworks allowed for them: the United States, Australia, and China.

**Figure 18: Management Interventions Used by Watershed Investment Programs, by Region**



Source: Ecosystem Marketplace.

## Co-Benefits

Sixty-six programs – nearly a third of those tracked– reported some form of stacking and bundling (see Figure 19 and Box 1). Conservation of habitats that support biodiversity was the most common ecosystem service targeted. Most often this meant protection or rehabilitation of ecologically valuable habitats, although a large number of bundled biodiversity payments were instream buybacks in the US and Australia, where restoring natural flow regimes was expected to support aquatic and riparian habitats. These programs are often driven by concerns about endangered and threatened species. Ecuador was an outsized player; its programs reported multiple instances of bundling and stacking.

Although we did not ask programs to provide detailed information on how bundled environmental co-benefits are measured, protected, or monitored, we suspect that there is considerable variation across programs, ranging from assuming habitat protection will deliver biodiversity benefits to very detailed tracking and management strategies.

Thirteen programs reported that stacking payments for co-benefits was taking place. These tended to be Latin American water funds or programs supported by a single buyer.

### Box 1: Environmental Co-Benefits: “Stacking” and “Bundling”

While the majority of market-based and incentive programs for watershed protection remain focused on a single water-related service, there is growing interest in programs that protect or restore multiple ecosystem services in addition to the targeted or primary service of interest. These programs either ‘stack’ or ‘bundle’ multiple individual services or credit types to realize potentially greater environmental and market efficiency benefits than single service programs can deliver. Despite the potential benefits, both stacking and bundling present challenges in terms of program design and implementation that need to be addressed – there is currently a lack of clarity around:

- What is meant by stacking and bundling,
- How programs are actually implementing stacking or bundling,
- How legal or regulatory contexts affect the potential for stacking or bundling,
- How stacking and bundling will affect program elements such as transaction costs, additionality, and social co-benefits or impacts, and
- The pros and cons of stacking and bundling in a particular program context.

Lack of a consistent terminology has made it difficult to evaluate stacking and bundling in practice, with bundling sometimes referring to financial bundling of payments and other times to the ecological bundling of services (the sense used here). Stacking in particular has been a confusing topic with a proliferation of terms, including horizontal stacking, vertical stacking, temporal stacking, layering, and piggybacking. Standard definitions are emerging however, which will make it much easier to critically evaluate both stacking and bundling approaches (see sidebar).

#### Why bundle or stack?

The growing interest in bundling and stacking reflects increasing recognition of the potential benefits – both in terms of market or program efficiencies and in environmental benefits – including:

- Greater incentives for conservation from price premiums for bundling or multiple revenue streams from stacking;
- More effective conservation through valuing the suite of services a land or seascape typically produces, and less likelihood for negative trade-offs such as maximizing carbon sequestration at the expense of water or biodiversity;
- More resilient markets or IWS programs with stacking if access to multiple revenue streams buffers sellers against collapse of individual markets or revenue sources; and
- Better management of social impacts (both positive and negative) as inclusion of multiple ecosystem services necessitates a broader consideration of multiple beneficiaries.

#### Research needed to realize the potential of stacking and bundling:

- Critical evaluation of the ecological benefits of stacking or bundling compared to single service programs.
- Case studies documenting how stacking and/or bundling are being implemented in IWS programs.
- Evaluation of additionality and the potential for double counting with credit stacking – implications for regulatory and voluntary programs.
- Critical assessment of the demand for bundled or stacked credits in both voluntary and regulatory programs.
- Effects of stacking or bundling on transaction costs and recommendations for minimizing these costs.

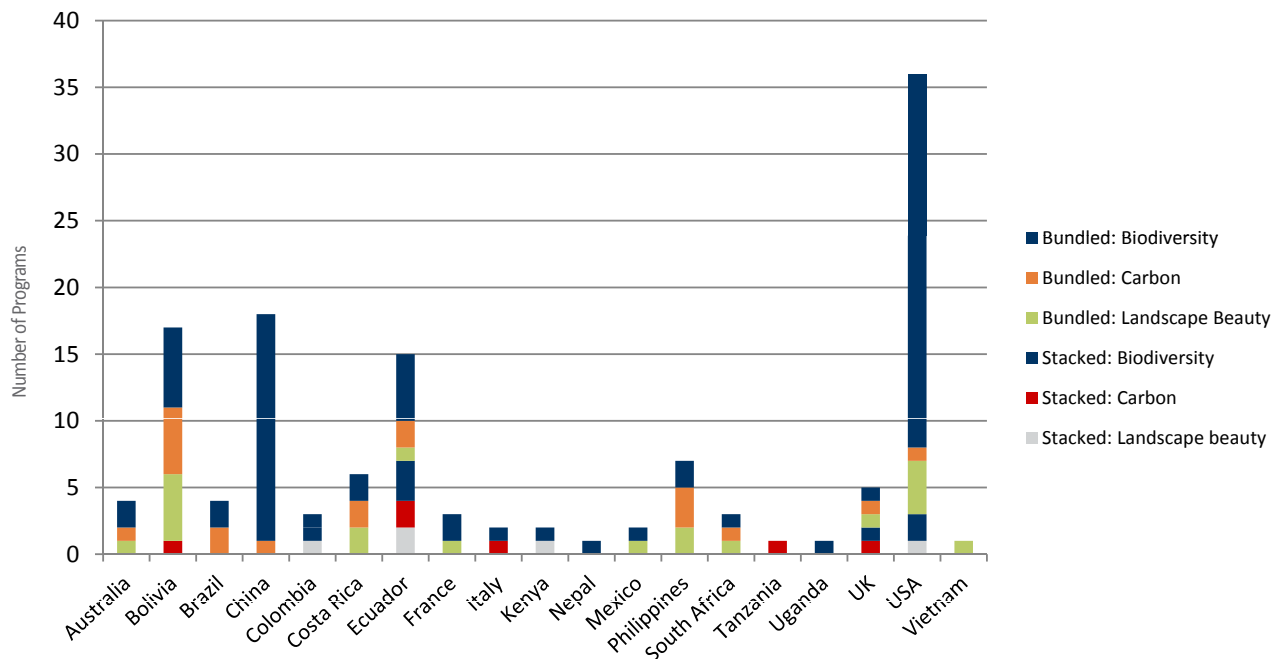
**Bundling:** A suite of ecosystem services provided by an area of land/sea is sold as a single package (i.e., in the form of one credit type) to a single buyer. One payment occurs for a set of multiple services that cannot be disaggregated (Wunder & Wertz-Kanounnikoff, 2009; LaRocco & Deal, 2011; Deal, Cochran, & LaRocco, 2012).

In the U.S., wetland mitigation banking and wetland credits illustrate bundling of multiple ecosystem services – wetland credits are typically based on the area of wetland but a single wetland credit includes the aggregated set of services typical of wetlands – including water purification, flood hazard mitigation, carbon sequestration, landscape beauty, and recreation – the set is sold or traded as a single credit type.

**Stacking:** A set of ecosystem services generated on a single land/sea area are disaggregated and sold individually as different credit types to multiple buyers (Olander & Cooley, 2012). Some authors have distinguished “horizontal” stacking, where the area of land is subdivided and a different credit type is sold from each subdivision, from ‘vertical’ stacking where the different credit types are all sold from the same area of land, but following (Fox, Gardner, & Maki, 2011) the emerging consensus definition for stacking is vertical stacking. ‘Temporal’ stacking is a special case of vertical stacking where the different services come from the same land/sea area but may be sold at different times.

The Ohio River Basin water quality trading program being developed by EPRI will include stacking of N, P, and, GHG emissions reduction credits - pilot transactions will implement and test protocols under development to allow for transparent and accountable credit stacking.

**Figure 19: Stacking and Bundling with Watershed Investments, Globally**

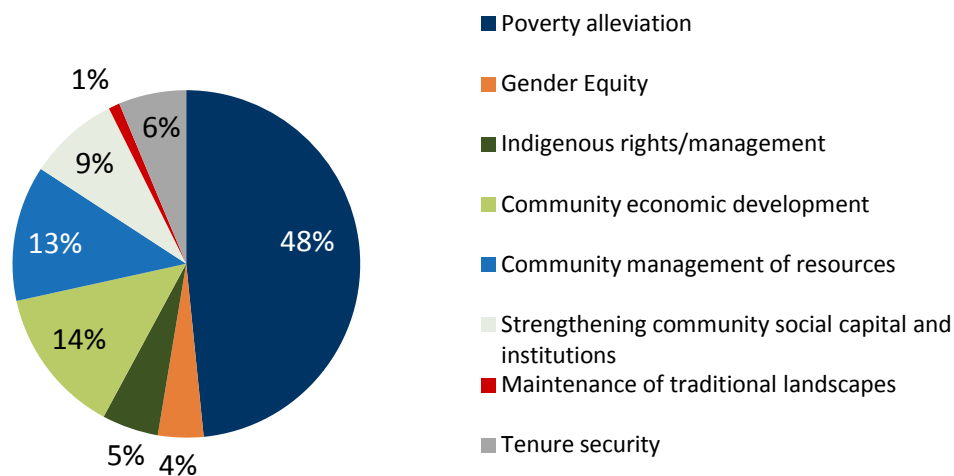


Source: Ecosystem Marketplace.

In all cases but one, payments came from “inside” the program – that is, through existing funding streams and established buyers, rather than a new set of buyers. We found one exception – the Carroll County source water protection program in Georgia in the United States has sold streambank credits on land it has acquired for watershed protection, an intriguing model for revenue generation. Six developing programs in Latin America and Asia also reported that they’re exploring carbon payments, potentially through international carbon markets. The Conservation Marketplace of Minnesota has also developed pollinator credits with financing from General Mills which could potentially in the future be stacked with water quality credits from agricultural best management practices, though at present the two are generated on different lands.

Fifty-three programs include explicit social objectives, exhibiting a variety of social goals (see Figure 20). Half of these are in China, where eco-compensation can be considered in part a rural welfare support program to more evenly distribute benefits of economic growth to poorer regions of the country.

**Figure 20: Socio-Economic Objectives Reported by Watershed Investment Programs Globally**



Source: Ecosystem Marketplace.



Investments in watershed services programs also appear to be pursued as a strategy for community development; program requirements like strong social capital, functioning institutions, and tenure security also support larger goals of socio-economic development. We see evidence that these social goals are being met. A compensation mechanism in Lake Naivasha, Kenya, for example, has found in its socio-economic monitoring that program participants have seen livelihood, food security, and gender equity benefits in just a few years of operation.<sup>7</sup> However, only sixteen programs reported that they are currently carrying out socio-economic monitoring. In other cases, monitoring of these impacts may be taking place but could not be confirmed.

**Table 5: Socio-Economic Co-Benefits Objectives Reported, by Country**

	Australia	Bolivia	China	Colombia	Ecuador	France	India	Indonesia	Kenya	Mexico	Pakistan	Philippines	South Africa	Tanzania	USA
Poverty alleviation		✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	
Gender equity		✓								✓			✓		
Indigenous management	✓														
Local economic development			✓			✓				✓		✓			✓
Community management of resources								✓			✓				
Strengthening community social capital & institutions					✓							✓			
Maintenance of traditional landscapes						✓									
Tenure security								✓							

Source: Ecosystem Marketplace.

<sup>7</sup> See page 17 for more information.





**Table 6: Summary Details, Africa**

Number of active programs:	6
Number of programs in development:	10
Value of transactions in 2011:	\$109.3 million
Value of transactions 1995-2011:	\$864.7 million
Hectares managed for watershed services in 2011:	162,115 hectares
Hectares managed for watershed services 1995-2011:	2.3 million hectares

*Source: Ecosystem Marketplace.*

## General Status Update

Africa is perhaps the continent most vulnerable to climate change-driven freshwater risk. It is also – though rapidly urbanizing – still largely composed of disbursed low-income agrarian economies. For both of these reasons, low-cost, pro-poor, land-based interventions to ensure water security are an obvious fit. We’ve observed considerable interest in eastern and southern African countries in investments in watershed services. Africa often makes for a fascinating study in project design; active and proposed projects take a range of forms.

Africa also makes for a useful lesson in the difficulty of getting projects off the ground. Despite interest, projects often struggle to secure upfront capital for design and implementation, and long-term funding for operation. This is partly due to trouble finding buyers, but we often frequently see institutional and regulatory frameworks standing in the way of compensation for watershed services. Four of the ten active programs identified in 2010 are no longer in operation, while three of five developing projects in 2010 appear to have been abandoned.

That said, the region also offers some strong evidence for IWS’ effectiveness and ability to deliver multiple objectives – including socio-economic benefits and a bundle of environmental services. All but one of the active programs tracked reports social goals like poverty alleviation and gender equity at the core of program design, and the evidence that they’re succeeding is starting to come in.

## Transaction Activity

Altogether, the six active programs tracked delivered at least \$109.3 million in payments in 2011, protecting nearly 161,000 hectares. Limiting sediment loads to water bodies and protecting extractive supplies were common program goals; in South Africa the removal of invasive plants is the focus of efforts, while in Uganda, a brewery pays for wetlands protection as a pollution filtration strategy.

By far the largest program is South Africa’s **Working for Water (WfW)**, a public works program that hires the long-term unemployed to remove invasive plant species. Alien invasive plants are a major contributor to de-watered streams and sedimentation problems in the country. Removing a large eucalyptus tree, which can draw 40,000 gallons of water a year through its roots, essentially puts all of that water back into the river system. In the Thukela catchment, for example, good management practice will deliver annually an estimated additional 12.8 million cubic meters of flows in the dry season and reduce sediment yields by 1.2 million cubic meters. Studies estimate that the program has saved South Africa more than \$50 billion in avoided costs from invasive plant impacts (de Lange & van Wilgen, 2010).

WfW employs nearly 30,000 people at present. Funds come from the government’s poverty relief fund as well as water use fees for households and foundation support. WfW spent \$109 million in 2011 on watershed restoration efforts treating over 160,000 hectares. Working for Water has also joined forces with WWF on an initiative that works with companies to become “water use neutral”. The

Map 2: Active and Developing Programs, Africa



Source: Ecosystem Marketplace.

**Table 7: Active Programs, Africa**

	Country	Payer type	Driver	Payment	Co-Benefits
Lake Naivasha Watershed Management Project	Kenya	Beneficiary pays	Voluntary	Cash, In-kind	Stacked: Biodiversity, Landscape beauty
Working for Water	South Africa	Public good payer	Voluntary	Cash, In-kind	Bundled: Biodiversity, Carbon sequestration, Landscape beauty
Cape Town City Council	South Africa	Beneficiary pays	Voluntary	Cash	Bundled: Biodiversity
Water Balance Programme*	South Africa	Polluter pays	Voluntary	Cash	Bundled: Biodiversity
Uluguru Mountains	Tanzania	Beneficiary pays	Voluntary	Cash, In-kind	Stacked: Carbon sequestration
Uganda Breweries/National Wetland Programme	Uganda	Polluter pays	Voluntary	Cash	Bundled: Biodiversity

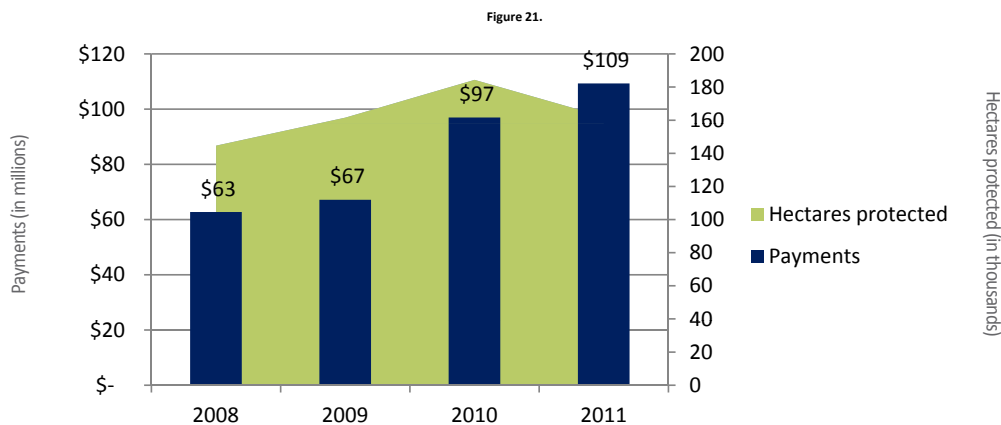
\* Note: This program contracts with Working for Water to carry out catchment management activities.

**Water Balance Programme** helps participating firms improve their water use efficiency and then offset the remainder through catchment restoration via WfW contracts. South African Breweries piloted the methodology; more recently, insurance company Sanlam, chip manufacturer Sonae Novobord, and retailer Woolworths have also gotten involved.

A similar invasive plants species-removal program is underway in Cape Town, where the Cape Town City Council has partnered with a local conservation group, Cape Nature, and public and private landowners to clear invasive aquatic plants to improve supplies and water quality for the city.

In Kenya’s **Lake Naivasha** basin, the WWF-CARE consortium’s Equitable Payments for Watershed Services (EPWS) program has supported a compensation mechanism linking upstream farmers with downstream users. A receding shoreline, expensive clogging of irrigation systems due to sediment, and declining biodiversity and landscape beauty are all cited as motivating factors for buyers, whom at present include the Lake Naivasha Water Resource Users Association (LANAWRUA), representing large-scale horticulture farms, ranchers, and hoteliers near the lake. Farmers in the upper catchment, represented by local Water Resource Users Associations (WRUAs) receive annual vouchers worth \$17 each that can be redeemed for agro-inputs, in exchange for implementing agricultural best management practices and protecting riparian areas.

**Figure 21: Active IWS Programs by Transactions and Hectares Protected, 2008-2011, Africa**



Source: Ecosystem Marketplace.

Participating farmers report that they have used their vouchers to buy high-value crop seeds, which result in harvest revenues 30 times the value of the original voucher payment. Recent program evaluation also confirms that the mechanism has led to improved food security and livelihoods among participants – and that these benefits appear to be shared equitably gender-wise. \$12,070 was disbursed in payments in 2011, with 1,150 hectares enrolled to date.

The Equitable Payments for Watershed Services program has also supported a pilot program in Tanzania, where the Dar es Salaam municipal water supplier DAWASCO has begun to compensate villages in the **Uluguru Mountains** for changing land-use practices, including implementing agroforestry and limiting erosion, as well as riparian rehabilitation. Two hundred households in the upper catchment participate, with payments channeled through village councils. Coca-Cola and SAB (a brewery) have also signed MOUs as of 2011.

Payments are designed to cover both hydrological benefits and carbon sequestration, and are outcome based – households receive \$0.20 per year per surviving seedling planted. Farmers receive free seedlings and training in planting and maintenance. An evaluation one year into the program found that many farmers would be willing to continue managing and protecting trees even if payments were to cease; they felt that the training, seedlings, and expected income from forest products were sufficient incentive (PRESA, 2011).

Finally, we identified a program in Uganda, wherein **Uganda Breweries Limited** in Kampala makes voluntary payments to the National Wetlands Program in order to ensure the protection of nearby wetlands, which are valued for their ability to filter water pollution from brewery operations. Limited information is available about this effort.

## Outlook

Activity in Africa has grown steadily since our tracking began, underpinned in large part by the success of South Africa's **Working for Water**, which has become something of a banner program for pro-poor IWS. WfW expects budgets to continue to grow in the coming years for its activities, and has launched sister programs including Working for Forests, Working for Wetlands, and Working on Fire following a similar model of using rehabilitation as an engine for employment. WfW's work in recent years with private-sector 'buyers' is also an intriguing development as far as suggesting a public-private model for water resources management in the country.

We identified an array of projects in development, including in Malawi, Kenya, Tanzania, Gabon, and Ghana. Quite a few of these are supported by the Pro-poor Rewards for Environmental Services in Africa (PRESA) initiative, part of the World Agroforestry Center (ICRAF). With four watershed payments projects at varying stages of progress in Kenya and Guinea, the program has generated a large body of research findings and program design lessons.

In late 2011, a payment mechanism was piloted in Kenya along the **Kapingazi River** which will compensate local households for tree planting. The mechanism is unique in that participating farmers signed one of two contracts: one set payments based on the implementation of practices such as watering seedlings, which were monitored regularly, while the second contract type had lower monitoring and payments based entirely conditional on seedling survival rates at the end of the six month contract. Farmers were engaged through a reverse auction mechanism wherein they submitted bids indicating their preferred level of compensation; the lowest bids were chosen for contracts. The pilot study is expected to generate important lessons for project design as to designing conditionality into a project (Andeltová & Nzyoka, 2012).

Another developing program in Kenya, **Green Water Credits**, aims to engage agricultural producers at a basin scale in soil and water conservation practices, and compensate them for their efforts. Demonstrations of the methodology took place in Kenya and Morocco, and in 2011 program developers reached an agreement, with funding from international groups and Kenyan utilities, to pilot the model in Kenya.

Program developers have also recently signed an MOU with the Changjiang (Yangtze River) Water Resources Protection Institute of China, to co-implement the Green Water Credits concept – a development we'll be watching closely in the future. China has indicated tremendous interest in watershed investment to date; cross-fertilization efforts like these can help both parties move up the program design learning curve more quickly, with lessons learned in Kenya getting a shot in the arm in the form of Chinese resources for implementation.

The Green Water Credits concept is also taking root in **Malawi's** Shire River Basin, which provides a full 98 percent of the country's power generation capacity; heavy siltation in the basin has led to staggering costs for the Electric Supply Company of Malawi ("Es-

com”). The SIP-Private Public Sector Partnership on Capacity Building for Sustainable Land Management in the Shire River Basin, a GEF/UNDP funded program, aims to pilot a Green Water Credits mechanism in the Shire River basin districts of Blantyre, Balaka, Neno and Mwanza, with plans to ultimately develop a Shire River Basin Development Authority and basin-wide SLM incentive program.

We’ve observed that several developing projects identified in a 2008 inventory remain in the developing stage. These ‘slow starts’ can be attributed to a number of factors, though a few common ones are emerging. One difficulty – securing demand – is well-known to PES project developers worldwide. In Africa, the problem is exacerbated by resource constraints. A PRESA project in Kenya in the **Nyando and Yala River Basins** that feed Lake Victoria, for example, found only smallholder farmers both upstream and downstream and concluded that it would be necessary to seek a public payment option since a beneficiary-pays model appeared unworkable.

Sometimes the difficulty lies not in the absence of a buyer, but in institutional constraints. Legal hurdles are a commonly-cited barrier in some countries. Another PRESA project aiming to protect the Sasumua Reservoir, a water supply source for Kenya’s capital city Nairobi, had an interested buyer in the Nairobi Water Company (NWC). But NWC is prohibited from raising tariffs to fund such a mechanism, nor could it easily redirect existing fees it already paid into the state corporation Water Services Trust Fund (WSTF) via the national Water Resources Management Authority (WRMA), since such a use of funds was outside the WSTF mandate. Project developers have been able to negotiate a pilot through the WRMA and are currently pursuing reforms to Kenyan policy and legal frameworks (Mwangi, Gathenya, Namirembe, & Mwangi, 2012).

2012 also saw work kick off on a pre-feasibility assessment of IWS mechanisms in **Ghana’s** Pra and Kakum River basins serving the Sekondi-Takoradi Metropolitan Area and the city of Cape Coast. The study found high potential in both areas, which suffer from sedimentation and toxic chemical contamination. Plans for large investments in “grey” treatment infrastructure in the area also underscore the need for complementary “green” infrastructure investments to ensure clean, dependable supplies.

A stakeholder working group has been convened by Forest Trends and its local partner, the Nature Conservation Research Centre to develop a “business case” and full feasibility assessment. The group is currently working to engage the Ghana Water Company and national Water Resources Commission to support a demonstration project in one or both of the watersheds.

Significant policy support for investment in watershed resources can also be found across Africa. In Gabon, policymakers are developing a comprehensive legal framework for environmental protection and are supporting, through the Ministry of Environment, a pilot compensation mechanism in the **Mbé** Watershed which aims to be operational by 2013. Encouragingly, a hydroelectric plant has already expressed interest in funding watershed protection around its reservoir. Gabon’s government is also exploring possibilities of integrating payment mechanisms into future hydropower development, such as the Grand Poubara dam in the northeastern part of the country.

In Tanzania, 2011 saw the “**Valuing the Arc**” project beginning to draw to a close. A collaboration between WWF and the Tanzanian government, Valuing the Arc aimed to quantify ecosystem service values across the Eastern Arc Mountains, whose cloud forests provide much of Dar es Salaam’s drinking water and are the source of flows generating half of the country’s electricity. Project outcomes will be used to support payment mechanism proposals; for example, the Equitable Payments for Watershed Services program plans to use their data.

A similar valuation exercise was carried out in Kenya and completed in 2012 following an initial valuation of the country’s Mau Forest Complex. The Kenyan Forest Service and the United Nations Environment Programme (UNEP) have collaborated on valuing the ecosystem services generated by the country’s montane forests and quantifying the true costs of deforestation (Government of Kenya & United Nations Environment Programme, 2012).

In **Zambia**, the Water Futures Partnership, a consortium including SABMiller, WWF, and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), has begun work on a mechanism to protect the Itawa springs, which provide water for the city of Ndola, where SABMiller subsidiary **Zambian Breweries PLC** operates a brewery. The project comes as part of a broader expansion of the Partnership – to be renamed the Water Futures Initiative – including new members like Coca-Cola and greater global reach.







**Table 8: Summary Details, Asia**

Number of active programs:	83
Number of programs in development:	36
Value of transactions in 2011:	\$7.46 billion
Value of transactions 1979-2011:	\$56.43 billion
Hectares managed for watershed services in 2011:	115.96 million hectares
Hectares managed for watershed services 1979-2011:	188.5 million hectares

*Source: Ecosystem Marketplace.*

## General Status Update

When it comes to investments in watershed services, Asia is perhaps the world’s epicenter today. China is responsible for most of the transaction activity in the region by several orders of magnitude, but other Asian countries are also home to long-running compensation mechanisms, innovative mechanisms, and strong national policy support.

High economic growth rates and population densities characterize the region. These contribute to rapid and intensive land conversion and pressure on water resources, which in turn are behind ecological degradation, water scarcity, and pollution problems. Climate risk is also making itself known in many areas, whether in the form of drought in China, receding glaciers in the Himalaya, or storm-induced landslides in the Philippines.

A range of program types and scales can be found in Asia – from China’s massive government-driven “Eco-Compensation” efforts, to local NGO-backed initiatives in Indonesia, to private-sector financing in the Philippines.

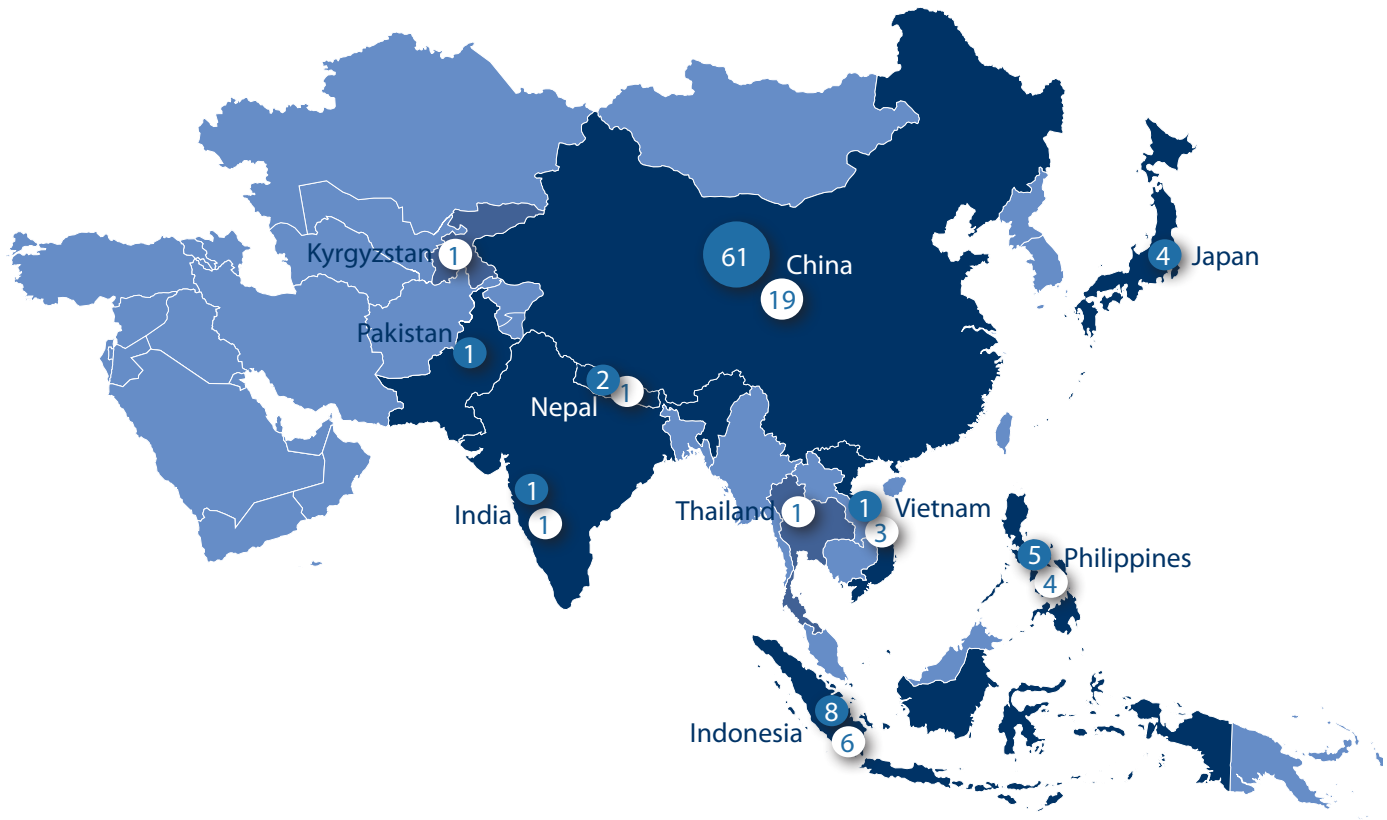
In Southeast Asia, there is a long history of local-scale NGO-driven payment mechanisms. Many of these are part of the World Agroforestry Center (ICRAF)’s RUPES (“Rewards for, Use of and shared investment in Pro-poor Environmental Services”) program and WWF-Care’s Equitable Payments for Watershed Services initiative. But we may be seeing a slight turning of the tide: RUPES and WWF in 2011 were both winding down their engagement, having laid groundwork for programs to continue functioning under community leadership.

At the same time, we may be witnessing the rise of national watershed investment programs and policies. Vietnam’s national **Forest Protection and Development Fund** moved out of the pilot phase in 2011 after rapid scale-up of the model in two provinces from 2008 to 2010. Now, other countries in Southeast Asia including Cambodia, Thailand, and Laos are expressing interest in the model, which, unlike prior national payment programs, sources its funding directly from beneficiaries like hydropower operators.

China is responsible for 99.98% of payment values in 2011 in Asia – showing growth from our last report even despite a stricter standard for program inclusion. In this report, we have not included bundled agri-environmental programs where government payments target a bundle of environmental goods and not watershed services primarily.

Chinese policy backing eco-compensation is stronger as well. Due to the extreme stress of several decades of breakneck extractive economic growth, water is now likely the single most pressing resource bottleneck to China’s ongoing economic growth over the next ten to fifteen years. China has among the lowest annual per capita freshwater resources for a major country, and a recent government report found that drinking water for one in seven Chinese does not meet national pollution standards, while 300 million rural Chinese lack access to safe drinking water (World Bank, 2007). The World Bank very conservatively estimates that the country’s water crisis is already costing the country 2.3 percent of its gross domestic product, of which 1.3 percent is attributable to water scarcity and the remainder from the direct impacts of water pollution (World Bank, 2007; Asian Development Bank, 2012).

Map 3: Active Programs, Asia



Source: Ecosystem Marketplace.

In face of these challenges, and given that China’s “economic miracle” has provided the government with the financial wherewithal to invest in its environment, national and regional governments across the country have been experimenting with a range of new regulatory and financial instruments to improve watershed management outcomes under the broad heading of “eco-compensation”. Eco-compensation appears to us a distinctly Chinese form of IWS, characterized by a voluntary public good ‘payer’, ongoing practice-based payments, and bilateral deals – all at a very large scale and often making participation for landholders (who may be working on communally-held State lands) mandatory.

These programs represent a potentially important new direction in China’s evolving water resource management framework. The concept has also constituted an important rallying point and platform for debate and negotiation among key stakeholders in water management as to how fundamental and much-needed institutional reforms to the water sector, like clarifying access rights and enforcing regulations, can be approached.

Outside of public support, we also tracked the emergence of programs initiated or supported by international NGOs – a most interesting development for a country that has long looked internally for IWS support. These include partnerships with existing eco-compensation frameworks as in the **Miyun Watershed demonstration project**, as well as examples of cross-fertilization of models, like **proposed nutrient trading in Anhui province** and a Conservation International-backed **water fund in Sichuan province**.

## Transaction Activity

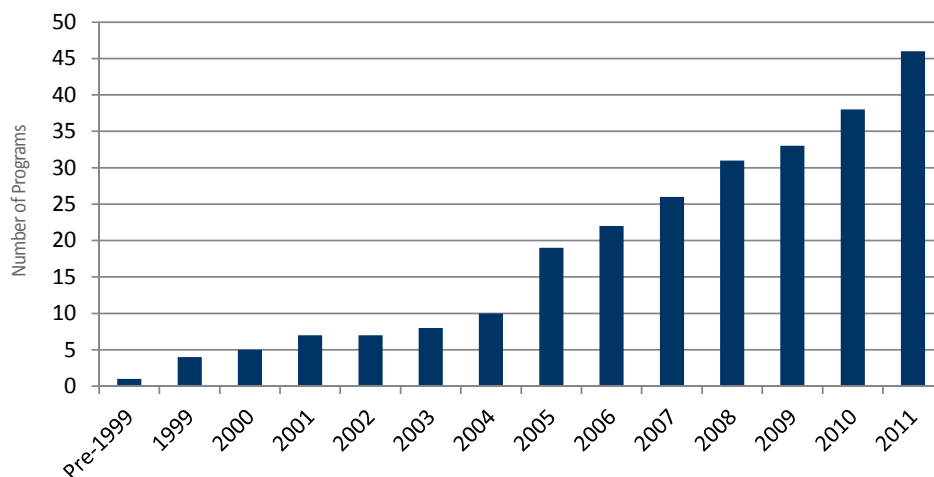
### China

While it remains challenging to obtain detailed information on many local and provincial programs, and even some national programs, a clear picture has emerged of strong growth in both investments and the number and diversity of programs targeting watershed services in China.

Such growth is despite a stricter standard for inclusion compared to the 2010 *State of Watershed Payments* report. In this report, only those programs that explicitly target watershed services as key benefits (as compared to a potential, but somewhat indirect, co-benefit) are included in the analysis. As a result, the current results exclude a few large-scale national forestry and agricultural programs that were included in previous reports.

Even with such restrictions we conservatively estimate that total transactions for IWS programs in 2011 exceeded \$7.46 billion, while total transactions to date are at least \$56.42 billion, if not significantly more. More striking is the trend in total number of programs, as provincial and sub-provincial governments are increasingly launching their own watershed eco-compensation programs to address water management challenges, in response to encouragement by the central government. Starting from only a few (albeit very large-scale) programs before 1999, the number of programs has exploded in recent years, jumping from around 5 in 2000 to 61 by 2011, with this a conservative estimate due to much information remaining unavailable.

**Figure 22: Growth in Investments in Watershed Services in China**



Source: Ecosystem Marketplace.

### The Eco-Compensation Model

One of the most apparent trends we’ve tracked is the growth in programs directly concerned with watershed “eco-compensation.” There is no official definition of an eco-compensation program, but generally speaking, current watershed management programs fall into two main types (though these often overlap): (i) Cross-Boundary Watershed Management initiatives, and (ii) Water Source Protection initiatives. Cross-Boundary Watershed Management initiatives focus on mechanisms and approaches to better coordinate and incentivize watershed management across jurisdictional boundaries, while Water Source Protection initiatives directly target and compensate for better management in the upper watersheds of reservoirs and river systems that are important sources of drinking water. In practice, these twin goals of compensation and cooperation are pursued through a variety of arrangements (see Box 2).

Eco-compensation programs often also have a redistributive element, entailing the transfer of funds from urban and rich to rural and poor regions, or requiring that polluters compensate those experiencing environmental degradation from the polluting activity.

Programs in the first group are often generally concerned with how best to develop cross-jurisdictional management frameworks that map out responsibilities, rights, and targets, and include a range of different financial transfer mechanisms. These include programs like the **Min River Watershed Water Resource Protection Eco-compensation Program**, wherein downstream Fuzhou City annually provides roughly \$800 million (CNY 5 million) each to upstream Sanming and Nanping cities, which also provide matching funds of \$800 million each for pollution control, source water protection, and township waste disposal in the basin. The Fujian government has also set up a special fund (under the Water Environmental Protection of the Min River Special Fund Administrative Measures) whereby the Fujian Provincial EPB and Development and Reform Commission provide \$2.4 million (CNY 15 million) per year each, to be used mainly in the implementation of projects listed in the Min River Basin Water Environmental Protection Plan.

Programs in the second group (though these often also have cross-jurisdictional elements), generally involve some form of direct compensation from downstream beneficiaries (water users and local governments) to upstream ecosystem services providers (local governments, communities, and households), with compensation being linked to direct interventions (e.g., land-use changes

or restrictions, investment in waste management facilities, restructuring of husbandry and agricultural activities, etc.) (Zhang & Bennett, 2010). Such watershed programs have grown greatly in recent years, from around three in 2004 to more than 30 by 2012.

One example of a program in which the polluter must compensate those who are negatively impacted by pollution is in Zhuhai City. Communities located within the drinking water source protection zone for **Zhuhai City** have lagged behind their neighbors in social and economic development, with residents long not easily able to enjoy the benefits of economic reforms, industrialization, and the results of modernization, so that per capita rural incomes were around \$130 below the township average. In 2009, the city earmarked \$106 million and approved the Zhuhai City Drinking Water Source Protection Area Support and Incentive Instrument for a 5-year pilot period. This program will provide health insurance for 108,000 rural residents in the drinking water source areas as non-cash compensation for foregone livelihood benefits.

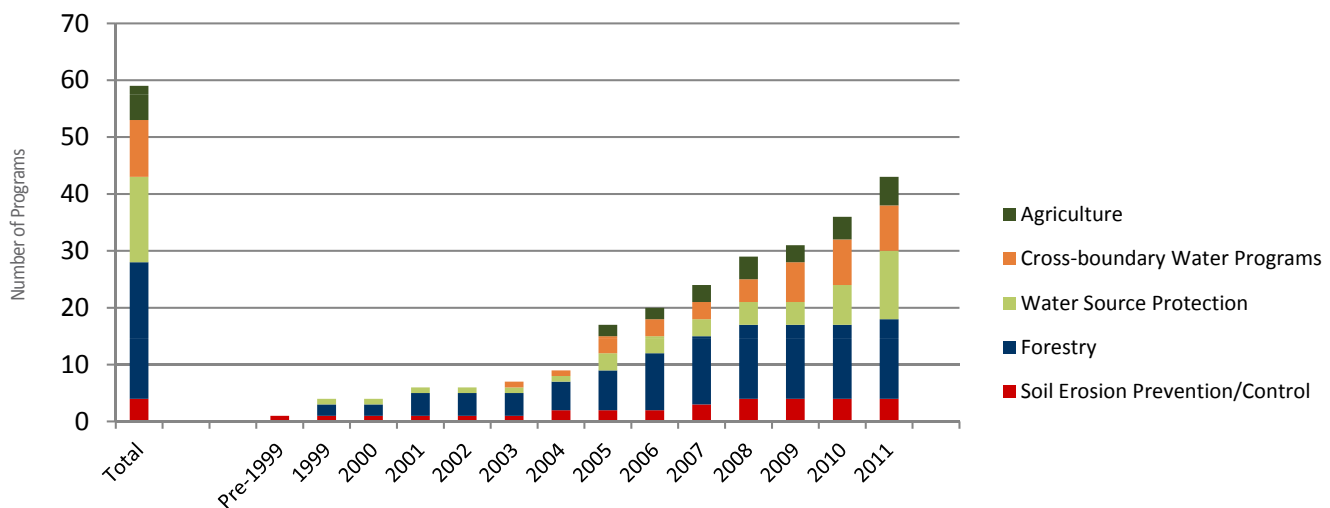
Parallel to these developments there have been an increasing number of provincial **Forest Ecosystem Compensation Fund (FECF)** programs, which are related to the national program of the same name. These programs provide subsidies to communities, households, and forestry units for the management and protection of designated “ecological public benefit forests”. These “ecological public benefit forests” have imposed harvesting and use restrictions and are most often categorized as such due to the watershed ecosystem services they provide (e.g., “headwaters forests”, “riparian forests”, “mangrove forests”).

### Box 2: Eco-Compensation in Action, China

The term “Eco-Compensation” in China actually captures a variety of frameworks for compensation and cooperation between government bodies and households, communities, and other arms of government. These include:

- Direct payments from the government to individual and community suppliers of watershed ecosystem services to ensure and improve ecosystem service provision;
- Compensation to households, communities, or regional governments for regulatory takings associated with environmental policy (e.g., the creation of protected areas or restricted development zones for conservation, and the associated introduction of land use stipulations or quasi-mandatory relocation to remove stress on fragile ecosystems);
- The creation of transparent, horizontal frameworks of cooperation and financial transfers between regional or administrative levels of government to ensure and improve watershed ecosystem services delivery;
- The adjustment or introduction of fees, levies, taxes, tax reductions, or subsidies on resource uses to increase funding and/or incentives for conservation, environmental management, and/or restoration;
- Increased upper- to lower-level government financial transfers to better fund environmental management; and
- Compensation to regions, especially China’s less-developed west (which is the headwaters for both the Yangtze and Yellow Rivers), for past and current extractive and environmentally damaging development mode.

Figure 23: New Watershed Investment Programs by Area of Focus, China



\* Discrepancies between yearly and comprehensive totals is due to lack of information on program starting years, specifically for provincial Forest Ecosystem Compensation Funds.

Source: Ecosystem Marketplace.

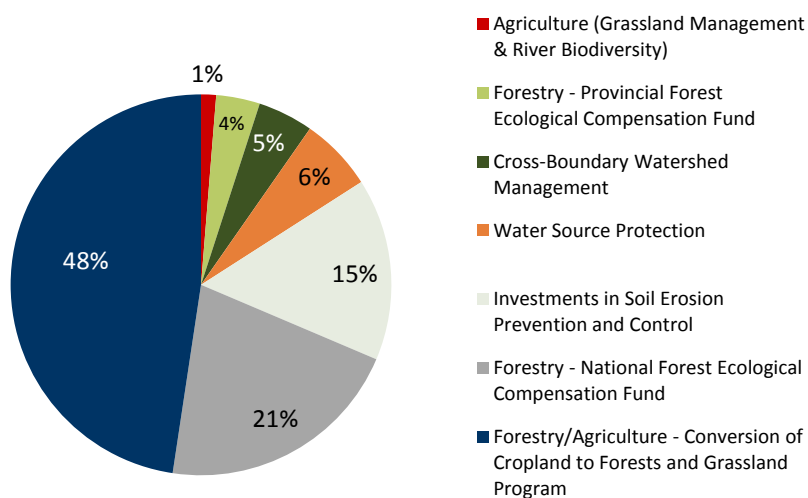
Often, watershed programs and provincial and national FECF funds are interrelated; in program documents for watershed protection one often sees line items for funding for local public benefit forests.

Finally, two additional broad categories of programs are (i) soil erosion prevention/control programs, which have been a long-term investment item for the government, and (ii) the more recent appearance of agricultural programs for grassland management and restoration (again, in strong part due to water source services provided) and for freshwater aquatic biodiversity. One example is in the “Three Rivers Source Area” of Qinghai Province (the source of the Yangtze, Yellow and Mekong Rivers). As part of a large-scale conservation effort, the **Master Program for the Three-Rivers Source National Ecological Protection Comprehensive Experimental Zone** offers production subsidies and financial assistance for rural herdsmen to shift livelihoods to protect water supplies.

In terms of funding and land area affected, the **Conversion of Cropland to Forests and Grassland (CCFG)** program remains the dominant IWS program in China, comprising fully 47% of total funding in 2011. This is followed by the national **FECF** and **soil erosion prevention/control funding**, making up 21 percent and 15 percent of totals, respectively. However, when it comes to scale, the provincial FECF programs take up the majority of area (31 percent), followed by the national FECF and then agricultural programs.

This is in part due to the fact that area-based subsidies for the FECF programs are still quite small. While the national FECF program just recently (in 2010) increased the subsidy rate to \$24/hectare (CNY 150), and provincial programs generally add to this somewhat, it pales in comparison to subsidies under the CCFG program, which have been upwards of \$300/hectare (CNY 1,875). That said, both national and provincial programs involve a long-term subsidy payment system, and are operating under the principal of continually increasing subsidy rates to more accurately reflect the opportunity costs of restricted harvesting and access to designated forest areas.

**Figure 24: Composition of Estimated Annual Eco-Compensation Funds, China**



Source: Ecosystem Marketplace.

### “The National Government Makes the Policy, the Local Government Makes the Counter-Policy”

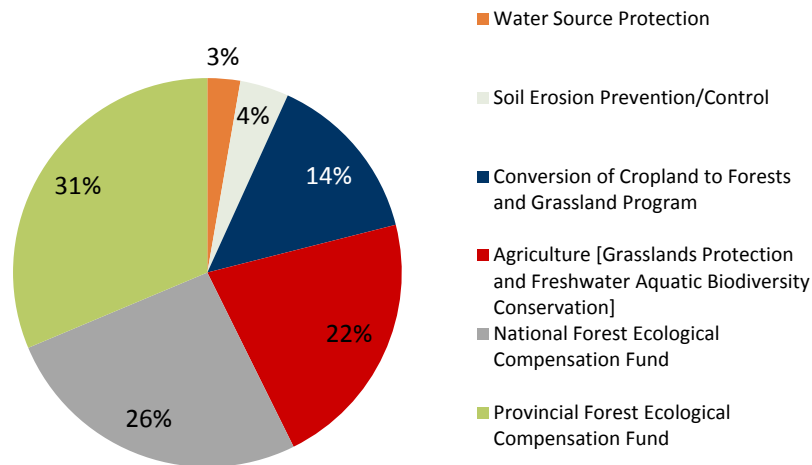
IWS is dominated by the public sector in China. The central and provincial governments are by far the largest, and often the only buyers of watershed ecosystem services in the country.

At the same time, how and from whom services are purchases often varies significantly across locales, even within the same national or provincial programs. Informational asymmetries and shortfalls in national government manpower and capacity provide regional and local governments significant leeway in how upper-level programs are interpreted and implemented on the ground. A common refrain is “the national government makes the policy; the local government makes the counter-policy”.

Further complicating this dynamic is the opaque delineation between public and private sectors in China; for example, it is not uncommon for local government forestry offices and departments to serve in an intermediary role and to operate in some instances somewhat like private sector entities. These local agencies can often provide technical support and consultation regarding – and be subcontracted to implement and manage – the afforestation components of other agencies’ programs. Such work can also be spun off to quasi-private research institutes or technical companies that operate more explicitly on a “for-profit” basis. Soil erosion prevention and control programs and agro-environmental programs also use similar approaches for on-the-ground implementation and management.

In short, current programs contain the seeds of what could eventually become a decentralized, complex and value-driven landscape of investments in and payments for watershed ecosystem services. Investments in watershed services are often siloed within larger national and regional programs; in reality these larger programs hide what is likely a significant degree of de facto diversity in program design and implementation on the ground.

**Figure 25: Total Area Protected by IWS Program Composition, China**



Source: Ecosystem Marketplace.

### Non-Governmental Actors

Beyond public eco-compensation programs, we find evidence of several local-scale initiatives driven by international NGOs. In Sichuan Province, Conservation International and the San Shui Conservation Center have supported the **Pingwu Biodiversity and Water Conservation Fund**, which raises funds from downstream water users in Pingwu City to pay upstream landholders to de-intensify livestock production and agri-chemical use. The fund also supports alternative livelihood activities including beekeeping, and developing solar energy production as an alternative to forest products combustion.

### Engaging Rural Households

The Ministry of Water Resource’s soil erosion prevention and control work, which include a long-term program category called “small watershed integrated management” that is not unlike the Conversion of Cropland to Forests and Grassland program, has the longest history of rural engagement in implementing land-use interventions for watershed services and conservation. These programs, followed more recently by the growing range of initiatives implemented by other line agencies, have traditionally followed three modes of engagement of rural households:

- **Labor Investment** – These types of programs pay rural households to conduct land-use interventions (afforestation, planting grasses, terracing land etc) on village, collective land or state-owned land.
- **Land Investment** – These types of programs compensate rural households for allowing interventions on household land (i.e., land to which the household has use rights over a reasonably long time horizon), with the labor contracted to outside workers, sometimes from the same village;
- **Labor and Land Investment** – These programs pay rural households for both the provision of household land, and their labor input in conducting interventions on this land.

Numerous case studies of the **Conversion of Cropland to Forests and Grassland (CCFG)** program, which is a huge national program implemented throughout China, indicate that all three of these modes have been adopted to implement the program in different locales. It is also interesting to note that many rural programs targeting land-use interventions in China also involve the engagement of indigenous peoples. This is because many of these programs are implemented in mountain areas at the headwaters of key rivers, where soil erosion, deforestation, biodiversity and poverty alleviation are all key concerns, and where ethnic minority groups are more common, especially in China’s western regions. (Apart from the dominant Han ethnic group, China has 55 officially-recognized ethnic minorities.)

## Japan

We tracked four programs in Japan – all newly-identified since 2010. Limited transaction information is available about these (Japan Ministry of Environment, 2010). Three involve a city protecting its source water supplies.

**Fukuoka City** has no water supply within its boundaries, relying instead on desalinization and dams some distance from the city. To protect the latter, an add-on fee on water users was channeled into a dedicated fund, which is matched by an allocation from the city's general account – altogether amounting to a bit over \$0.01 per cubic meter of water used. The water source conservation fund pays for forest management, reforestation, and land acquisition in catchments around the dams supplying the city, as well as supporting small municipal governments' watershed management efforts in areas upstream of the city. Investments are estimated at about \$1.2 million annually, with at least 505 hectares restored and protected to date. Fukuoka City's fund was modeled on **Toyota City**, about which little information could be gathered for this report. Toyota City uses a similar funding mechanism, directing a water user fee toward watershed conservation.

An interesting model of cooperation can be found in the **Anjo City-Neba Village** agreement. Neba Village, facing falling wood prices and degradation of water resources from logging-related erosion, decided in the early 1990s to suspend future logging activities. To do so, it purchased the local forestry office's logging rights, but found that it lacked the necessary funds to rehabilitate cleared lands. Anjo City, recognizing the importance of protecting and restoring forest lands in the upper Yahagigawa River watershed, agreed to purchase the logging rights from Neba. The negotiated payment covered stumpage costs and rent, with Anjo City agreeing not to fell stumpage until 2022 and to share profits from lumber obtainment through management thinning.

Finally, a privately-funded IWS mechanism in **Kumamoto City** aims to recharge groundwater through a novel mechanism. Agricultural policies discouraging rice production coupled with urbanization and paving over of permeable surfaces had the unintended effect of decreasing groundwater infiltration. In the early 2000s, concerns sharpened with a proposed Sony semiconductor manufacturing facility in the city that would have significant groundwater pumping requirements. A local NGO, Kumamoto Environmental Network, proposed an innovative solution: the semiconductor manufacturer agreed to offset its groundwater withdrawals by paying agricultural producers in the area to flood fields no longer under rice production, in order to increase infiltration to the aquifer. Producers are compensated for their management costs at an initial rate of 11,000 yen per hectare, which increases depending on the length of off-season flooding. The semiconductor company also purchases sustainably grown rice from partner producers to sell in its cafeteria as a further indirect offset. As of 2009, the quantity of water offset was significantly higher than water used by the company. The success of the program has led to participation by other local businesses and the Kumamoto City government's water conservation program activities.

## South Asia

South Asia is home to several long-running payment mechanisms. Compensation for watershed services in this region is often linked to water infrastructure development like dams, and has a strong socio-economic development component. In the four active programs we identified, all place an emphasis on benefit-sharing from watershed development.

In India's **Sukhomajri Watershed**, marginal community members had not received benefits from soil conservation structures built to reduce sedimentation and store rainwater for irrigation. To reach these groups, a compensation mechanism was initiated. In exchange for limiting land conversion and animal grazing in sensitive areas, participants receive non-cash supports including rainwater collection dams and access to other grazing areas.

In Pakistan, the government-operated **Mangla and Tarbela dams** benefit from soil and water conservation practices by upstream communities that reduce sedimentation. These communities receive in-kind payments and technical support for these activities through the regional "Poverty Reduction through Participatory Watershed Development" program.

A hydropower plant located in Nepal's **Kulekhani Watershed** provides seventeen percent of the country's electricity, but is negatively impacted by sedimentation from upstream land-use change. The Kulekhani Watershed Conservation and Development Forum, supported by RUPES, developed a payment mechanism whereby under the Hydropower Royalty Distribution and Use Directive (2062) the hydropower operator allocates 50 percent of central government royalties from hydropower toward compensation for villages for impacts from hydropower and promote sustainable agricultural practices upstream. An estimated \$134,000 has been disbursed by the Fund to date.

Land-use change in the region around Nepal's **Rupa Lake**, driven by forest clearing for agriculture and settlements, is a major contributor to heavy siltation and nutrient pollution in the lake. To promote land management practices to rehabilitate the watershed, the Rupa Lake Restoration and Fishery Cooperative ("the Cooperative") has arranged to share benefits with upstream land managers for conservation activities that benefit the lake's fisheries. The Cooperative makes annual direct and in-kind payments, at a value of about \$45 annually, to Community Forestry User Groups (CFUGs), and to Community Development Groups through the Rupa Lake Watershed Conservation Fund. Seventeen CFUGs participate and receive annual payments. The Cooperative also financially supports schools and annual scholarships in the upper catchment to increase environmental education.

## Southeast Asia

We tracked significant IWS activity in Southeast Asia, finding eight active programs in Indonesia and five in the Philippines, and another nine in development between the two countries. These programs delivered at least \$55,000 in 2011 and \$4.9 million to date, with 111,655 hectares confirmed under management.

The region also is home to Vietnam's national **Forest Protection and Development Fund**, which in early 2011 was launched at a national scale. The program began in 2008 with a government decree, Decision 380 on the "Pilot Policy for Payment for Forest Ecosystem Services." Two pilots in Lam Dong and Son La provinces were developed with support from the German Development Cooperation (GTZ) and NGO Winrock International. Under the new policy, four categories of watershed services buyers were delineated and required to compensate local communities for watershed benefits, including water and electric utilities and tourism operators. The Decree identifies a bundle of forest ecosystem services; buyers must pay specifically for those that their operations rely on – so a hydropower plant pays specifically for erosion control, for example.

The pilots in **Lam Dong** and **Son La** provinces were both rapidly scaled up, delivering an estimated \$4.46 million in payments in their first two years. Based on this success, a national decree (Decree No. 99/2010/ND-CP) went into effect in 2011. The Lam Dong province pilot paid farmers about \$500 per year to rehabilitate and protect forestlands that the government has assigned or leased (forests are not owned privately in the country). An estimated 104,000 hectares were conserved in the pilot phase, with households on average managing about 20 hectares.

Payments are differentiated by watershed service – flow regulation is valued at about \$16/hectare, soil protection at \$15/hectare, and landscape scenic values at \$0.50/hectare. Payments can be either through direct contract or paid indirectly through provincial funds. Some funds are also allocated for overhead and for community projects like funding fire fighting.

All of the tracked programs but two (the Vietnamese program and the Philippines' **National Power Corporation's** watershed management efforts) are local in scale, and the majority have their roots in efforts by NGOs like RUPES and WWF. These catchment-scale efforts united by common intermediaries benefit from shared learning and tool development. Southeast Asia is also characterized by a strong emphasis on delivering livelihood and local institutional benefits from compensation mechanisms. All programs save one reported poverty alleviation objectives, as well as community management of resources, tenure security for participants, and strengthening of social capital.

The **Sumberjaya Community Forestry Program**, for example, works with local communities in the Way Besai watershed to enroll in Indonesia's Community Forestry Program wherein conditional tenure is granted in exchange for adopting sustainable agricultural practices and committing to protecting standing forest. The watershed is a source of water for hydroelectric generation and the Tulang Bawang River, a major water source in Lampung Province.

Another initiative in the same watershed, the **Sumberjaya River Care Project**, is a pilot project demonstrating how agricultural best management practices can limit sedimentation in the Way Besai hydroelectric company's reservoir. The company provides \$1000 in upfront capital for implementation upon signing of a one-year contract, and between \$ 250 - 2000 at the end of contract depending on level of sediment reduction achieved.

We also identified active agreements between water companies in **Rinjani, Magelang**, and the **Cidanau catchment** to upstream communities. In the first two programs, a portion of water user fees are channeled toward conservation efforts. In Cidanau's case, PT KTI, the company which manages water distribution from the Cidanau River, makes regular payments – about \$20,000 in 2011 – to farmer groups through the multi-stakeholder Forum Komunikaski DAS Cidanau.

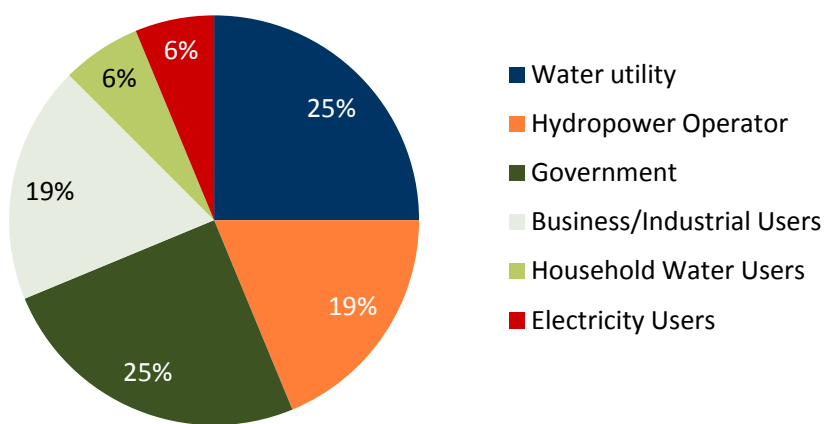
In the **Brantas Watershed**, a quasi-compensation mechanism is at work. Representatives for several upstream villages cooperate with downstream water users on an ad-hoc basis on rehabilitation projects including planting seedlings, protecting spring areas, and



restoring riparian and other critical zones; no formal compensation mechanism appears to exist. Downstream buyers include the Community Water Buyers Association (HIPPAM), public river basin operator Perum Jasa Tirta I, and the Java-Bali Power Company (USAID Indonesia, 2009).

We also tracked an intriguing fund model centered in the **Gunung Gede Pangrango National Park (TNGGP)**, the site of three major watersheds supplying water to the urban centers of Jakarta, Bogor, Sukabumi, Cianjur, and the Puncak tourist region. The park is also a designated UNESCO Biosphere Reserve. Businesses and industry surrounding the park have contracted with non-profit stakeholder group FORPELA to pay for forest conservation activities in the park and its buffer zone contributing to TNGGP’s ongoing provision of ecosystem services. Buyers – who come from the private, public, civil, and academic sectors – pay a “joining fee” and make monthly membership payments (about US\$50/month) to FORPELA, and sometime also provide in-kind support. Funding also comes from government and academic institutions. Suppliers are represented by six model Village Conservation Pilots. Transactions, based on projected revenues from fees in the FORPELA TNGGP Statutes, amounted to roughly \$19,400 in 2011 (USAID Indonesia, 2009).

**Figure 26: Demand for IWS by Buyer Type, Southeast Asia**



Source: Ecosystem Marketplace.

Finally, the hydropower-beneficiary and farmer-provider dynamic has been turned on its head in **Singkarak Lake** in West Sumatra Province, where declining water quality was assumed to be caused by upstream logging and agriculture. A RUPES-led study based on water-balance models, local ecological knowledge and soliciting community input indicated that inflows in the Lake have also been affected by the local hydropower plant. RUPES helped to facilitate an arrangement between the hydropower company and local communities to direct some portion of company revenues upstream to compensate for impacts and improve livelihoods.

In the Philippines, two payment programs are supported by private-sector companies. In **Ilagan**, WWF and Coca-Cola are partnering on an initiative to conserve critical watersheds in the Northern Sierra Madre Natural Park, paying upland communities to rehabilitate denuded areas and implement agroforestry practices. Isuzu Corporation is also contributing funds for reforestation work. After an initial project phase from 2008-2010, the program been extended through 2015. Payments appear to be in-kind in the form of seedlings for reforestation and estimated to be worth \$12,000 in 2011. Opportunities for marketing carbon credits are also being explored.

Meanwhile, in **Mt. Kanla-on National Park**, the Kanla-on Spring Water company has arranged voluntarily to provide support for farmers living within the park to support water quality. Payments are in-kind, including tree saplings for planting and technical training on agroforestry, as well as support for community development projects.

Other programs are underpinned by policy drivers. The Philippines’ **National Power Corporation** is authorized under the Electric Power Industry Reform Act of 2001 to levy a PhP 0.0025 kW/hr charge on its electricity consumers for watershed management. This “social responsibility” fee supports reforestation and watershed management projects, as well as livelihood improvements like electrification. Communities in turn help provide labor for maintaining water infrastructure (Porrás & Neves, 2006). Nearly 2000 hectares have come under sustainable management under this arrangement.

The **Baticulan** watershed is a source of water for the city of San Carlos. To limit soil erosion and flooding, the city passed an ordinance in 2004 requiring that a fee of PhP 0.75 (roughly \$0.02) is collected for every cubic meter of water used by water consumers. This levy funds the “Watershed Development and Environmental Protection Fund”, which supports watershed restoration projects. Since many landowners upstream live in the city, they are both providers and beneficiaries; tenants on the upper catchment land are paid for labor in reforestation projects.

In 2009, the Local Government of **Lantapan** enacted Municipal Ordinance No 114, which outlines an incentive mechanism for small-holders to adopt sustainable land use. The government has allocated funds for building the capacity of the Agriculture Extension and Municipal Planning office, linking with ES buyers, and investing in in-kind incentives for soil and water conservation activities including input subsidies for crop production, subsidies for crop insurance, and micro-financing support.

## Outlook

### Outlook - China

Eco-Compensation in China on the whole has been in line with, and supported by, an overall shift in the central government’s approach towards a more environmentally sustainable growth model and proactive conservation and environmental management regime.

To provide additional regulatory and legal support to the diversity of local eco-compensation initiatives taking place, the National Development and Reform Commission has been tasked with drafting a national Eco-compensation Ordinance. Eco-compensation will also ostensibly play a key role in the country’s new ecological function-based land-zoning system, which allocates development rights or restrictions to regions based on their determined ecological functions. In terms of land area and population, watershed ecosystem services make up at least 39% and 59% of zoned area, respectively (Zhang & Bennett, 2011). However, much work still needs to be done to operationalize the concept, and to find approaches which are both financial sustainable, politically and socially stable, and environmentally effective. The ongoing experimentation at national and regional levels in eco-compensation is thus playing an important role in the ongoing evolution of China’s water management regime.

The range of actors supporting IWS is also slowly expanding beyond government bodies. International NGOs in the last few years have proposed an array of programs across the country.

Forest Trends is working with partners and local stakeholders to improve the efficiency, equity, and performance of afforestation, forest management and rural land use investments in the **Miyun Watershed** in Hebei Province under the existing Beijing-Hebei cooperation framework. **WWF-CARE’s Equitable Payments for Watershed Services** program is supporting a payment mechanism in Sichuan province, as is Conservation International through its **Yujiashan Nature Reserve PES Pilot**. ICRAF China meanwhile is backing a **Tibet Grasslands PES Scheme** and has proposed a **Songhuaba** IWS program to the Kunming City and Yunnan Provincial government. The Asian Development Bank and WWF-Beijing are part of a public-private partnership developing a compensation mechanism in the **Chishui River Basin**. And the US-based World Resources Institute is working with government bodies in Anhui Province to evaluate the potential of **agricultural nutrient trading in Chao Lake** – an interesting example of cross-fertilization of regional models.

### Outlook - Central & South Asia

Several new programs are on the horizon in South Asia. RUPES and local partner Loktak Development Authority are exploring the potential for a payment mechanism around India’s **Loktak Lake**, wherein the Authority is compensated for providing a sustainable supply of water to the local hydropower company. Demand is growing for water for hydropower generation at the same time that the lake is experiencing increased degradation due to steadily growing water abstraction for power, ecological impacts from damming the former floodplain wetlands, and urban sewage upstream.

In Nepal, RUPES is exploring with local stakeholders a payment for ecosystem services arrangement in **Shivapuri National Park** to protect downstream water benefits while improving livelihoods of local peoples inside the park.

Central Asia may soon host its first IWS mechanism: in **Kyrgyzstan’s Lake Issyk-Kul**, a PWS/REDD mechanism is in exploratory stages.

## Outlook - Southeast Asia

In Southeast Asia, program development has reached something of a turning point. Donor-driven pilots are maturing; RUPES and EPWS both wound down activity in 2012, though local stakeholders will continue to maintain and develop these compensation mechanisms.

Meanwhile, Vietnam's payments for forest ecosystem services program kicked off on a national scale in 2011, and based on the success of its pilots could rapidly become a significant model for a national IWS program. Unlike other national efforts like Mexico's or Costa Rica's, beneficiaries directly engage with watershed services providers to pay for specific services. Cambodia, Laos, and Thailand have all expressed interest in the model. The program is not without its snags – in Son La Province, Electricity of Viet Nam in 2011 simply didn't pay its required fees for the previous year, estimated at \$26.2 million, and the smallholders due to receive them felt they had little recourse for enforcement (Anh, 2012).

IWS is expected to continue to grow in Indonesia and the Philippines. As of 2011, nine new compensation mechanisms are under development – in **Loktak Lake, Aceh Province**, the **Kapuas Basin, Kuningan, Singkarak Lake**, and the **Upper Brantas** watershed in Indonesia, and in **Bakun, Kalahan**, and **Lantapan** in the Philippines.



# Europe



**Table 9: Summary Details, Europe**

<b>Number of active programs:</b>	<b>15</b>
<b>Number of programs in development:</b>	<b>3</b>
<b>Value of transactions in 2011:</b>	<b>\$2.7 million</b>
<b>Value of transactions 1991-2011:</b>	<b>\$57.7 million</b>
<b>Hectares managed for watershed services in 2011:</b>	<b>99 hectares</b>
<b>Hectares managed for watershed services / Units of pollution reduction 1991-2011:</b>	<b>65,030 hectares; 85,980 pounds nitrogen</b>

*Source: Ecosystem Marketplace.*

## General Status Update

Europe plays host to a number of long-running catchment protection initiatives that fall within the scope of “watershed payments,” though details on payments themselves and the impacts of these programs are often difficult to uncover.

Nutrient pollution, replenishment of groundwater supplies, and protecting general watershed functions against the pressures of development are common themes in the fifteen active programs we identified. In the majority of these programs, funding comes from the beneficiary of watershed protection. In three instances, compensation mechanisms have been initiated by private beverage companies; another nine are driven by a utility or municipality engaging private forest landowners and agricultural producers in protecting drinking water supplies. In one interesting example in Sweden, a local authority has covered costs of establishing blue mussel beds in Gullmar Fjord, having determined that mussel filtration of nitrate pollution is cheaper than an onshore treatment facility – a solution which has been proposed, among other places, in the United States’ Chesapeake Bay.

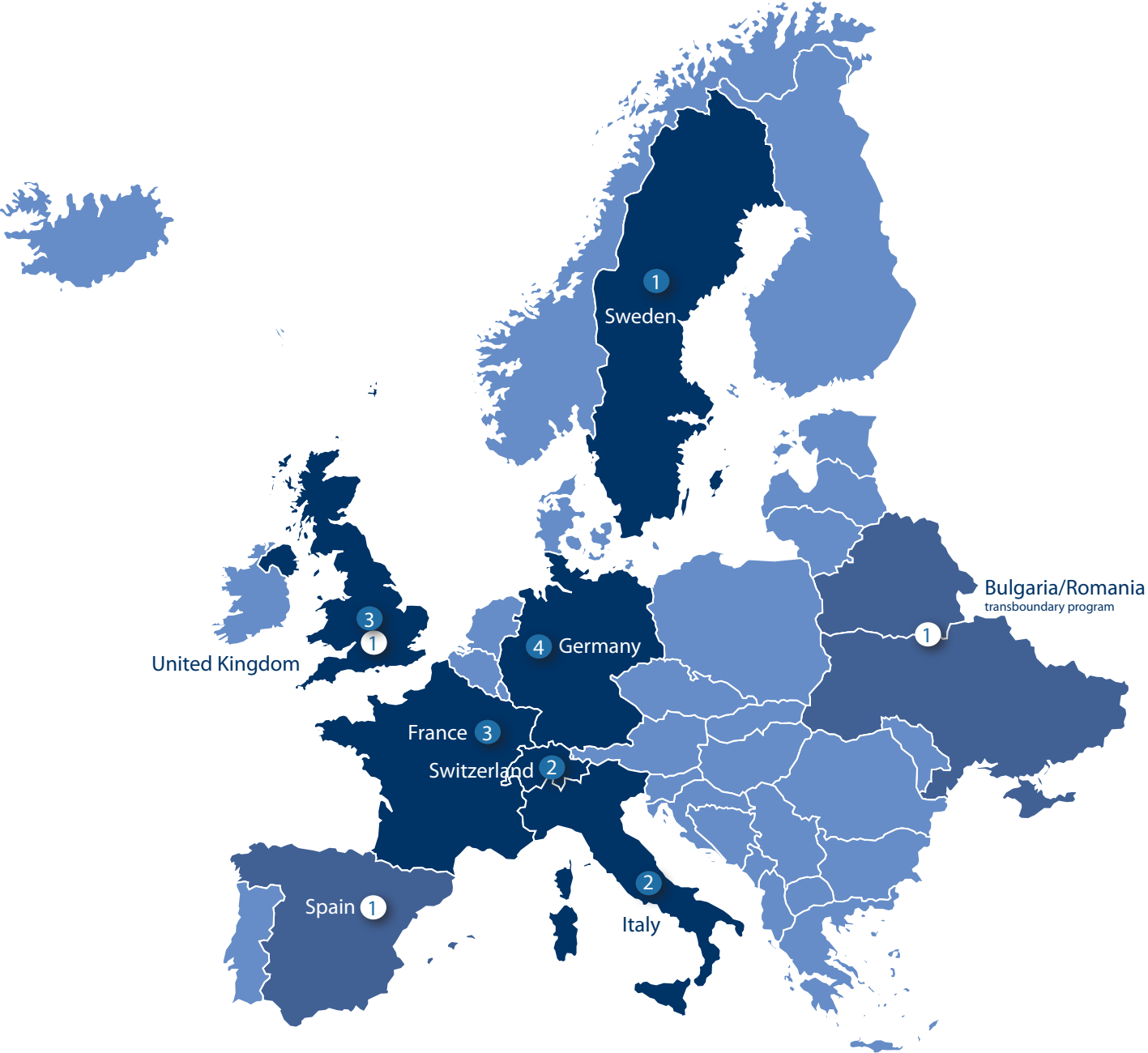
Sellers are generally private landowners, though the city of Munich, Germany and an Italian public water company, Romagna Acque S.p.A., have directly purchased land and interventions also take place on land managed by the ‘buyer’ in the cases of Italy’s Veneto Region, Switzerland’s Canton Basel-Stadt, and the UK’s SCAMP’s United Utilities.

With the exception of Switzerland and a program in development in the Danube Basin involving both Bulgaria and Romania, programs are concentrated in the EU-15 region.<sup>8</sup> Uptake of IWS has been slower in the 2004 Accession States and in Southern Europe, likely due to a combination of factors including varying levels of economic development, political receptivity, and uneven progress in implementing river basin management plans under the WFD.

Program distribution doesn’t always align with Europe’s water resource problems. Water scarcity issues including dry-season shortages and falling groundwater levels are especially severe in southern Europe. A deadly 5.1-magnitude earthquake in Spain in May 2011 appears to have actually been triggered by groundwater depletion (BBC News, 2012). Europe also faces wide-ranging issues with nutrient pollution from industry, wastewater treatment facilities, and nonpoint agricultural pollution. The latter is the target of a lively debate on reforming the EU’s Common Agricultural Policy, which effectively subsidizes agricultural intensification and is probably a major driver of increasing degradation of river basins over the past five decades. The EU has spent a good deal of policy effort and money attempting to address water quality issues, including the 1991 Urban Wastewater Treatment and Nitrates Directives and the 2000 Water Framework Directive, but efforts to reduce nitrate concentrations have failed to keep pace with agricultural intensification and other pressures (Esteban & Albiac, 2012).

<sup>8</sup> The “EU-15” are the fifteen member states belonging to the European Union prior to the accession of twelve new countries in 2004. Economically, the EU-15 tends to be wealthier, both in real GDP and GDP per capita terms

Map 4: Active and Developing Programs, Europe



Source: Ecosystem Marketplace.

The EU has been historically less receptive than North America and Oceania to incentive-based approaches, but with the scale and likely high costs of the WFD on the horizon, we may be witnessing a movement toward IWS. A blueprint for implementing the WFD to released in late 2012 emphasizes economic instruments and natural infrastructure to maximize cost-effectiveness (European Commission, 2012). But regulatory frameworks are slow to catch up; in one case in Italy detailed below, a public water company cannot pay land-owners cash for maintaining forest cover to limit erosion because the ‘service’ in question is not legally well-defined.

The UK government in particular has embraced an ecosystem services approach. Two active and one developing program were tracked in 2011; the same year also saw the establishment of an Ecosystem Markets Task Force and the release of the UK National Ecosystem Assessment (UK NEA) and a series of white papers from the Department for Food, Environment, and Rural Affairs (Defra) exploring the potential for PES in the nation (National Ecosystem Assessment, 2011; Dunn, 2011; URS Scott Wilson, 2011). Indeed, the Head of Economics for the UK NEA has identified both payments for ecosystem services and water as two of the top ten most promising opportunities for economic interventions for ecosystem services in the UK (Bateman, 2012).

The models that do exist in the EU are generally quite innovative. For example, we found two programs in Bulgaria/Romania and France/England cooperating on transboundary program development, experimentation in multiple countries with using forested areas to recharge groundwater, and the Swedish program mentioned earlier, where commercial mussel beds take the place of an onshore wastewater filtration plant.

Like North America, the lion’s share of funding for land management practices protecting water quality in Europe comes from agri-environmental programs. Payments frequently target water quality and supply, but are not included in analysis here as they also pursue a bundle of other environmental services.

## Transaction Activity

Across the fifteen active programs in 2011, payments totaled at least \$2.7 million. Similarly, historical payments are conservatively estimated to be at least \$57.7 million, protecting some 65,030 hectares. A Swedish mussel bed filtration program has posted nutrient load reductions of 85,980 lbs of nitrogen to date. Actual figures are probably much higher. Most programs tracked here have been in place for at least five years but don’t necessarily identify themselves as IWS, making them both hard to identify and transaction data difficult to obtain. Since higher-level policy support in the EU (with the exception of the United Kingdom) for IWS remains low, programs also tend to be small in scale and driven by local actors – which again makes for difficulty in tracking.

Per-hectare payments ran from about \$45 (Evian catchment protection in France) to \$1,400-10,170/ha (Veneto Region in Italy). Part of the reason for such a range is that some programs face large up-front costs for rehabilitation; subsequent annual maintenance payments are found to be far lower.

### Box 3: The Water Framework Directive in Europe

Water policy goals in the European Union are largely guided by the Water Framework Directive (WFD), which sets out a timeline for preventing further degradation and achieving ‘good status’ for all waters by 2015, through integrated river basin management plans to created and implemented by member states. Management of water resources is thereby set at a river basin level rather than along political boundaries, and guided by the “polluter pays” principle. The WFD provides guidance on good management and establishing water quality standards, but leaves the choice of specific policy interventions to Member States.

At the time of this report’s writing in late 2012, it looks unlikely that the goal of “good status” will be achieved by 2015 as planned. Almost half of Member States (thirteen out of 27) were unready to adopt approved river basin management plans by the 2010 deadline; consequently implementation is delayed in many countries. Many states have requested deadline extensions driven by disproportionately high costs of implementing the Directive and/or technical infeasibility of meeting Directive goals on time.

There is no dedicated funding stream for WFD implementation, though a number of EU funding instruments are potential sources of financing to meet water resource management goals, including the European Regional Development Fund, the European Agricultural Fund for Rural Development (EARFD), and the EU Cohesion Fund. Still, it is recognized that regional and rural development funding will be insufficient to achieve WFD goals, and there is considerable interest from many quarters in exploring investments in watershed services as a financing tool.

## France

In France, transaction figures rest largely on the well-known **Vittel** brand spring water (now owned by Nestlé Waters) program, which since the early 1980s has compensated farmers for minimizing nutrient and pesticide pollution to its aquifer. French law, which dictates that treated water cannot be sold as ‘natural mineral water’, has driven Vittel’s interest in preserving the purity of its source. Vittel set up a consulting firm, Agrivair, to manage efforts and provide technical assistance to land managers. Payment information for the program, approximately \$30 million, is only available for the first seven years of operation program (1992-1999). However, since compensation was designed to cover the costs of purchasing new farm equipment and pay off land-ownership debt, and included only a relatively small stipend (€200 annually), payments have tapered off significantly in recent years.<sup>9</sup> In recent years Agrivair has also expanded its focus to other issues impacting the aquifer, partnering with other stakeholders including the national forestry office, local spas and golf courses, and Gaz de France.

**Table 10: Tracking Activity in Europe, 2008-2011**

	2008	2011
<b>Programs identified</b>	5	17
<b>Annual transactions</b>	n/a	\$2.7 million
<b>Annual volume</b>	n/a	n/a
<b>Historical transactions</b>	\$30 million	\$57.7 million
<b>Historical volume</b>	3,900 hectares	64,730 hectares; 85,980 lbs N

*2008 figures come from the 2010 Ecosystem Marketplace report “State of Watershed Payments.” Increases in program payment values and volumes reflect better available information about programs in recent years, and not necessarily a “boom” in IWS during that period.*

*Source: Ecosystem Marketplace.*

Europe is notable for the relatively high profile of private sector-initiated programs, especially by beverage companies. In addition to the Vittel case in France, the **Evian** Company has initiated and largely funded efforts to protect the aquifer from which it bottles natural mineral water. Protection efforts include a mix of policy instruments working across multiple sectors, including some IWS-like support to agricultural producers in the catchment to manage their animal wastes and otherwise minimize negative impacts on the aquifer, as well as for practices favoring maintaining traditional agricultural landscapes. The Evian Company itself does not directly pay farmers or acquire land for protection, but rather provides about two-thirds of funds for a local association, APIEME, which leads decision-making about managing the aquifer.

A third French program uses a PWS-like mechanism to ensure adequate instream flows for ecological health. **Etablissement Public Territorial de Bassin Loire (EPTB Loire)**, which maintains two dams, Naussac and Villerest, levies a charge on water users to pay for dam operations supporting ecological flows in the Loire and Allier rivers. Charges are calculated to cover costs of operational changes and are set at different levels depending on the user’s sector, location, season and volume abstracted. Paying users, of which there are several hundred, include agricultural producers, drinking water companies, and private industries. Contributions total about €3 million annually as of 2009, the latest year for which transaction data is available (Greiber, van Ham, Jansse, & Gaworska, 2009).

## France/United Kingdom

An innovative cross-border partnership – the first of its kind we’ve seen - is piloting payments for watershed services programs at seven sites across France and England. The **WATER (“Wetted Land: the Assessment, Techniques & Economics of Restoration”) Project** is a collaboration between several English water trusts, led by Westcountry Rivers Trust, and several French environmental NGOs. The project aims to demonstrate a model Channel-wide framework for cooperating on the development of cost-effective models for catchment management. The WATER project will target a broad set of ecosystem services payments in its conservation work – including payments for water treatment, flood mitigation, carbon offsetting, biodiversity and catchment food branding – and are part of a larger workstream also examining wetlands and carbon sequestration payments. Payments in 2011 totaled \$1.5 million.

## United Kingdom

**Sustainable Catchment Management Programme (SCaMP)** was developed by United Utilities in association with the Royal Society for the Protection of Birds (RSPB) to protect peatland bog habitats in the upper catchment. Drainage and livestock grazing-caused

<sup>9</sup> Daniele Perrot-Maitre, personal communication, February 2010.

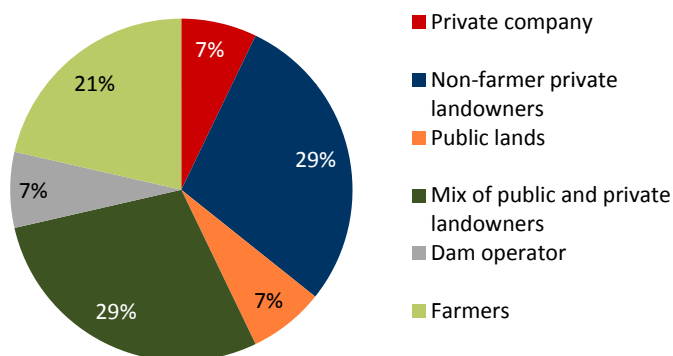


degradation of the upland heath and peatlands meant that designated nature conservation sites were in unfavorable condition, and that United Utilities was required to undertake additional treatment to get water to potable standards. Under the SCaMP project, the utility works with farmer tenants on agricultural management plans and supports farmer applications for agri-environmental payments from the national government. The project has also invested in restoration in blanket bog habitats and peat moorland, tree planting activities, and blocking drainage grips to improve water quality. In the project's second phase, activities have expanded to include a focus on the carbon sequestration services and wildlife values provided by peat habitats. Transaction information for 2011 is unavailable.

In Devon, water company South West Water has committed over \$14 million (£9 million) for catchment management projects in areas where it operates through the **Upstream Thinking** initiative, citing reduced treatment costs resulting from source water protection and a desire to go 'beyond compliance'. Upstream Thinking funds rehabilitation, protection, and implementing agricultural best management practices on private lands and in one National Park area. Conservation groups and other local stakeholders act as an intermediary and are responsible for implementation. Six projects are currently active, with a goal of restoring and/or protecting more than 3000 hectares. In the 2010/2011 year, 98.7 hectares were conserved.

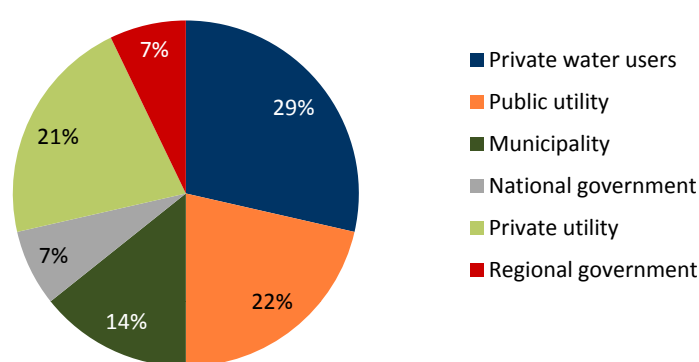
## Germany

**Figure 27: Active IWS Programs by Seller Type, Europe**



Source: Ecosystem Marketplace.

**Figure 28: Active IWS Programs by Buyer Type, Europe**



Source: Ecosystem Marketplace.

A voluntary, privately-driven investment in watershed services can also be found in Germany, where the **Bionade Corporation** has partnered with the NGO Trinkwasserwald e.V. (Drinking Water Forest Association) to create "drinking water forests" in Germany by afforesting and reforesting private and public lands with deciduous broad-leaved trees, which are understood to enhance groundwater replenishment. Bionade aims to voluntarily offset its own water use in doing so, with a target of about 100 million liters each year or 130 hectares of reforested lands.

Three other programs in Germany focus on water damage mitigation. The city of **Munich** since 1991 has worked with upstream farmers to encourage a switch to organic agriculture to protect its water supplies. The city makes per-hectare payments to compensate for foregone income, and also encourages enrollment in organic farming associations by covering the costs of agricultural inputs and technical support. Munich has also purchased land in critical parts of the catchment and established a protection zone in pumping areas. The majority of farmers in the catchments participate, with an estimated 3,800 hectares enrolled. Payments to farmers amount to roughly over one million dollars a year (or €830,000) and \$22 million to date.

In Lower Saxony and Bavaria payments are driven by legal requirements that public waterworks must compensate landowners for lost income where property restrictions in designated protected areas require management beyond a reasonable standard of good stewardship. Limited information is available about these two programs. In the municipality of **Kaufering**, nitrate concentrations in groundwater have been observed to be higher underlying spruce monoculture forests; meanwhile mixed stands with beech are associated with lower nitrate levels. The municipal water utility has engaged private forest landowners in designated protection areas, paying them to voluntarily convert spruce forests into mixed deciduous forests. Funding comes from an increase in water rates (Greiber, van Ham, Jansse, & Gaworska, 2009).

In **Lower Saxony**, groundwater supplies – the primary drinking water source in many areas – have experienced rising nitrate concentrations linked to agricultural intensification. The Water Association of Oldenburg and East Frisia (OOWV) in response initiated a groundwater protection program, declaring by legal ordinance eleven designated water protection areas. Private lands within these areas must comply with restrictions regarding land use. Landowners are eligible for payments from OOWV, the beneficiary, to cover foregone income and other costs in accordance with the national Water Act; OOWV also offers larger payments for additional management actions and has acquired lands directly in key areas.

## Switzerland

Similar legal requirements exist in Switzerland, where **Basel and its suburb Riehen** manage forests for groundwater replenishment capabilities, though it is unclear whether any private landowners are involved at present. Via a system of impoundment areas, water from the Rhine river is redirected into forested areas for recharge to the aquifer. Conversion of stands to desired species composition, such as the removal of hybrid poplars and planting of willows and wild cherry trees, also takes place. No transaction information is available about this program.

Switzerland's **National Nitrate Strategy** pays farmers for management activities reducing nitrate pollution in groundwater in areas near contaminated wells. Compensation is designed to make up for lost income due to changes in agricultural methods that go beyond legal requirements, as well as varying by measure and habitat type. Payments are disbursed annually in six-year contracts and range from \$170-1,660 per hectare. The program's budget for payments in 2011 is estimated at \$10.3 million.

## Italy

Facing aquifer depletion in Italy's **Veneto region**, the Pedemontano Brenta Consortium has embraced natural infrastructure-based methods for groundwater recharge. The Consortium is piloting managing forest areas for infiltration, flooding forest-wetlands during peak season in the winter to ensure adequate groundwater levels during the dry summer months. The basin water body has signed contracts with private landowners, with the regional government paying \$10,400 per hectare for forest infiltration area establishment and \$1400/year (€1100/year), for their maintenance. More than \$300,000 in funding is available, though relatively few farmers have expressed interest in participating. Eight hectares are under contract at present.

Another example can be found in **Romagna Acque S.p.A.**, a public water company, which compensates landowners for forest management practices that limit erosion, and thus sedimentation of the basin surrounding a key reservoir in the municipality of Bagno di Romagna. Funds come from Romagna Acque S.p.A.'s water tariff revenues. However, since the public water company is prohibited by Italian regulatory structures from making direct payments to landowners where the good or service in question is not well-defined, Romagna Acque S.p.A. has invested in forest roads useful to the landowners or sought to acquire land directly (Pettenella, Vidale, Gatto, & Secco, 2012).

## Sweden

An innovative approach to using 'green infrastructure' for water pollution filtration is active in Lysekil, Sweden, where the community in response to EU Urban Waste Water Treatment Directives was required to reduce nutrient-rich effluent into Gullmar Fjord. A study showed that contracting with a company farming blue mussels, which are effective at filtering out pollutants and preventing eutrophication, in the Fjord was far more cost-effective at removing nitrogen than investing in wastewater treatment facilities onshore, by a factor of about one third. Under the terms of the current contract, **Nordic Shell Holdings** will remove 39 megatons of nitrogen, with the Lysekil local authority paying for the costs for the mussel beds each year - half up front and the remainder when 50 percent of the mussels are harvested. Transaction values are not available for 2011.

## Outlook

Investments in watershed services in Europe, while generally remaining local in scale and relatively low in volume, look to remain steady in the coming years. Nestlé-Vittel's well-known payments for catchment protection in France just entered its third decade, while municipal source water protection programs continue to enjoy a reliable financing source in the form of user fees.

Many of these programs predate the very term "payments for ecosystem services". But several promising new self-identified PES initiatives are also on the horizon in Europe that aim to demonstrate ecosystem investment principles at a broader scale. A trans-boundary payment for ecosystem services project in the Danube Basin region of Bulgaria and Romania is in development, led by

WWF. Several local PES projects are planned under the initiative, contributing to overall basin management and helping to finance implementation of the “Lower Danube Green Corridor” conservation strategy. Incentives for agricultural management in the Danube through the national agri-environmental program and payments for biodiversity protection are also being explored.

In the United Kingdom, the Department for Environment, Food, and Rural Affairs (Defra) is supporting a pilot project, implemented by Natural England in partnership with local stakeholders, to develop payments for ecosystem services (PES) in upland areas in Cumbria, Yorkshire and South West England, largely on public lands.

The water industry in the UK is also building on the examples set by United Utilities’ **SCaMP, Upstream Thinking**, and other demonstration projects. At the last price review (PR09), the water industry regulator Ofwat approved more than \$96 million (£60 million) in funding for catchment management schemes in 100 water company catchments, which includes potential IWS opportunities that could increase following the next price review for 2014 (Ofwat, 2009).

At a broader scale, pressure is mounting from some quarters to more tightly link CAP payments in the 2014-2020 period to environmental performance, including stricter cross-compliance requirements with the WFD and expanding support for “ecological focus areas” on farmland such as riparian buffer zones and wetlands.<sup>10</sup>

Interest in cost-effective watershed protection strategies may also be on the rise. The Blueprint to Safeguard Europe’s Water Resources, released in late 2012 just as this report goes to print, sets an agenda for common implementation of the WFD through 2020. The Blueprint promisingly contains an emphasis on natural infrastructure approaches, driven by concerns about the increasing frequency and severity of droughts and floods in the region due to climate change and land-use change; it also recommends “greening” CAP payments to encourage investments in “Natural Water Retention Measures” such as buffer strips as well as suggesting investigating water trading, certifications, and other market mechanisms to rationalize water use in the region.

Another recent policy development germane to natural water infrastructure is the EU’s 2011-2020 biodiversity strategy, which prioritizes the development of a strategy for restoring degraded ecosystems and creating and maintaining an EU-wide green infrastructure network of connected natural areas. Though the preservation of biodiversity is the core objective, a landscape-level approach to ecological restoration and conservation will almost certainly benefit watershed functions as well. Rural Development Plans, Regional Development Plans, and the EU LIFE-Biodiversity fund have been identified as potential financing mechanisms, along with private sector-driven biodiversity offsets and potentially other privately-financed PES-like mechanisms.

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10 See, for example, European Environmental Bureau, 2012.



# Latin America



**Table 11: Summary Details, Latin America**

Number of active programs:	28
Number of programs in development:	8
Value of transactions in 2011:	\$87.1 million
Value of transactions 2001-2011:	\$528.9 million
Hectares managed for watershed services in 2011:	610,413 hectares
Hectares managed for watershed services 2001-2011:	3.4 million hectares

*Source: Ecosystem Marketplace.*

## General Status Update

Latin American countries are home to some of the world’s best-known watershed investment programs – as well as some of the planet’s most pressing environmental challenges. Deforestation and other land-use changes, coupled with climate effects on glaciers and montane cloud forests are putting serious pressure on Latin American water supplies.

Large-scale programs like Costa Rica’s national payments for ecosystem services program (parts of which we track here) and Mexico’s Payments for Hydrological Services program (PSAH) are well-known early PES initiatives, and our 2011 survey found programs like these alive and well and still constituting the lion’s share of payments.

But another model – the water fund – has also come into its own since our last report. These funds draw initial capital, usually from a mix of user fees and public, private and NGO sources, to endow a trust fund or some other dedicated account that invests in conservation projects chosen by a stakeholder group, technical committee or other intermediary. These funds offer the possibility of sustainable financing, landscape-level planning, and flexibility in selecting the most effective interventions. We tracked 23 fund mechanisms active in 2011, and several more in development.

Active programs are concentrated in Ecuador, Colombia, Brazil, and Mexico. We find a good deal of regional variation in program size and activity within these. Bolivia, for example, had five active programs in 2011 – the second-highest in Latin America – but at \$118,000 the second-lowest transaction volumes due to local-level focus and comparatively low payment rates.

Programs in Latin America are also noteworthy for a frequent focus on building community social capital, and using IWS as a tool to connect stakeholders and even resolve conflicts. This approach is reflected in the language used to talk about watershed investments. The term “payments for ecosystem services” is often passed over in favor of “reciprocal agreements for water” or “benefits-sharing mechanisms.” Compensation mechanisms may come paired with social marketing campaigns, social investments, and environmental awareness initiatives.

Nearly half of programs tracked reported that they pay land managers with in-kind compensation, such as agro-inputs and technical training, rather than in cash. These tend to be local-scale initiatives, though larger funds like **Quito’s Water Conservation Fund** (in Spanish, “Fondo para la Protección del Agua” – known as **FONAG**) also make use of in-kind compensation. Programs relying on in-kind compensation tend to be concentrated in Ecuador, Colombia, and Bolivia. The cash versus in-kind question is often debated in the PES literature; lessons generated at these sites will be useful in determining whether one is any more effective than the other.

Map 5: Active Programs, Latin America



Source: Ecosystem Marketplace.

A variety of payment mechanisms often makes programs difficult to compare. In-kind payments may be upfront or irregularly delivered and make it difficult to estimate values. Other contracts award compensation monthly, annually, or semi-annually. Some payments are made to individual households while others go to representative organizations, sometimes on communally-managed lands.

Seventeen of the 20 programs we tracked in the 2010 report are still active. Several others appear to be “on-hold” programs – active in name, but it is unclear whether any payments are actually taking place. There is a worrying trend of programs initiated by international development assistance or foundational support that cease to operate once the initial grant period ends. It may be the case that a pilot shows that PWS is simply not the right mechanism for an area. Still, this pattern underscores the need in project design for securing long-term sustainable financing mechanisms and deep stakeholder engagement.

## Transaction Activity

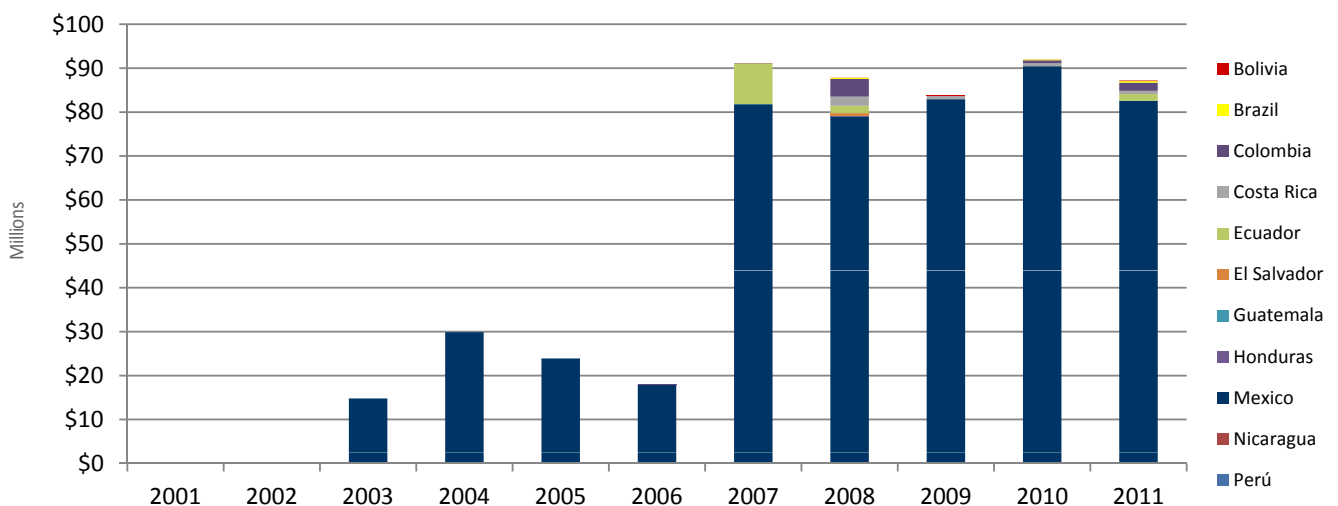
Altogether, we confirmed 28 active programs in the region in 2011 and eight in development. Another nine – mostly in Central America and Brazil– are believed active but could not be confirmed. Active programs responding to our survey reported more than \$84 million in payments in 2011, down from the previous year’s transactions, which totaled \$92 million (see Figure 29). This translates into 610,413 hectares protected in 2011 and nearly 3.4 million to date.

Total values since 2008 have stayed relatively stable, although number of programs and activity levels can vary considerably year-to-year. Eleven of the 36 active programs identified in our last report are now inactive or could not be confirmed. In their place, only seven initiatives have emerged.

Since the last report, we have also ceased tracking Costa Rica’s national Payments for Ecosystem Services program (PSA in Spanish) in the aggregate, as it targets an array of services including carbon and biodiversity. Where the national program has invested in hydrological services specifically with local partners, these are listed as individual programs.

Investments in watershed services in Latin America continue to come mostly from Mexico’s national **Payments for Hydrological Services** program (**PSAH** in Spanish). PSAH provides core and matching funds, financed through water fees, for conservation projects in forested areas critical to watershed services. Local ownership of watershed investment efforts and the development of local financing streams, particularly from water users, are emphasized. PSAH works with both private landowners and holders of communal, or ejidal, land. Payments are differentiated to reflect opportunity costs for landowners and ranged from \$28-100 per hectare in 2011. PSAH also leverages local stakeholder resources with matching funds, which are included in the figures presented in this report.

**Figure 29: Annual Watershed Investments by Year and Country 2001-2011, Latin America**



Source: Ecosystem Marketplace.

Another national-scale program, Ecuador's **Socio Páramo**, began investments in 2009. It pays farmers and indigenous communities in the country's high-altitude grasslands to protect these critical sources of water. Socio Páramo is part of a larger national program, Socio Bosque, which pays rural landholders for conservation of lands with high biodiversity, carbon sequestration, and/or hydrological values, which alleviating poverty and building social capital in poor and indigenous communities. 19,680 hectares were enrolled in Socio Páramo in 2011, with payments to participants estimated at \$137,000 that year. Compensation is scaled so that a landholder's per-hectare payments decrease with additional enrolled hectares. This is designed to build greater social equity into the program by discouraging very large landholders' reaping most of the economic benefits (de Koning, et al., 2011).

## The Water Fund

Probably the most significant development since our last report has been the emergence of water funds as the dominant model in the region. We've tracked at least 23 active fund-like mechanisms with several more in development. Ecuador is the leader in these mechanisms, though there are a growing number in Colombia, Brazil, and other countries. Many are developed with support from The Nature Conservancy, which has amassed considerable experience in implementing the model. Water funds in Latin America were responsible for at least \$3.8 million in watershed investments in 2011 – small in comparison to Mexico's national PSAH program, but impressive considering their local scales.

Funds generally rely on a mix of funds, including user contributions, public and private sources, and NGO support. Water user contributions are most often voluntary, though in several cases (for example, **FONAG**, **FORAGUA**, and **FONACRUZ** in Ecuador) water fee revenues have been earmarked or increased. Water funds also usually establish an endowment fund, of which the interest and perhaps some portion of the principal are directed toward conservation each year. A stakeholder board makes joint decisions about investments across the landscape. We use the term "fund" relatively loosely here, including in that category all programs where user contributions are managed by some representative group which makes decisions about watershed investments, and not just mechanisms involving a trust fund.

Several funds have secured private-sector funds, such as in Quito, Ecuador, where **FONAG** receives payments from a brewery and spring water company, and Colombia's **Valle del Cauca** where sugar mills and Bavaria Brewery among others have contributed. Still, private-sector support has yet to live up to the expectations set in earlier years, possibly because water is still often perceived as a public good and water resource management as properly the concern of the public sector. On the other hand, funds often rely heavily on NGO seed capital and support; donor financing is especially important in early stages to capitalize the fund if local stakeholders perceive the mechanism as risky or unenforceable.

One interesting example of the benefits of the water fund model is **FORAGUA**, a joint initiative by a number of small municipalities in the provinces of Loja, Zamora Chinchipe, and El Oro in southern Ecuador. These municipalities have pooled their resources to create a regional fund. FORAGUA offers a good case study in scaling up investments in watershed services: individually, these municipalities would have had difficulty paying to hire a secretariat to administer a fund or attracting significant donor aid, both of which they've been able to do collectively. The joint effort has also had something of a 'bandwagon' effect, with other municipalities also now expressing interest in participating in the fund, too.<sup>11</sup>

Funds have collectively invested at least \$3.8 million in watersheds across Latin America in 2011 and more than \$6 million to date. More than 125,000 hectares were restored and protected via water funds in 2011.

## Beyond Cash Payments

Another striking trend in Latin America is the frequent use of in-kind compensation, such as agro-inputs, training, and other resources in place of cash payments for protecting watershed services. Nearly half of the 28 surveyed active programs report that in-kind payments are their primary form of compensation. For instance, in Santa Cruz, Bolivia, the 415 families that participate in reciprocal agreements through the **FONACRUZ** fund receive beehives, fruit plants, and wire in return for their efforts. Participants in the **Alto Mayo** project in Perú can receive compensation for a range of best management practices, ranging from switching to honey production or raising guinea pigs to agroforestry and solid waste management.

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11 Pers. communication, Leander Raes, Universiteit Gent. August 30, 2012.

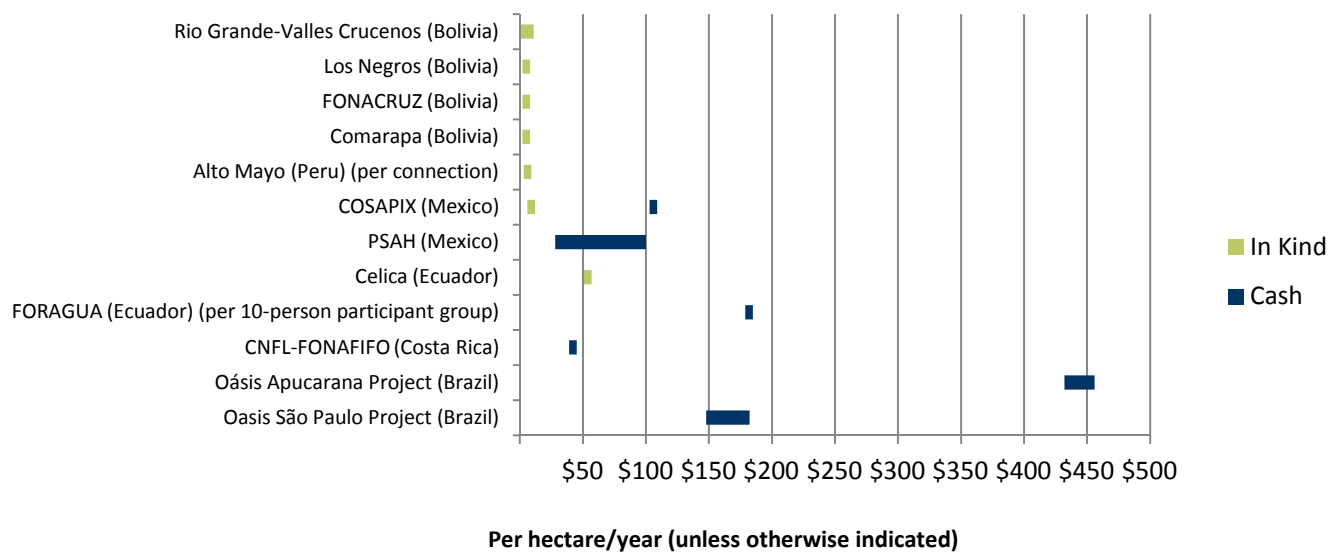


Table 12: Water Funds, Latin America		
Name	Country	Status
Comarapa	Bolivia	Active
FONACRUZ (Santa Cruz)	Bolivia	Active
Los Negros	Bolivia	Active
Mairana	Bolivia	Active
Rio Grande-Valles Crucenos	Bolivia	Active
Água e Floresta (Guandu)	Brazil	Active
Extrema Water Producers (São Paulo)	Brazil	Active
Oásis Apucarana (Paraná state)	Brazil	Active
Water Producers of the Piracicaba, Capivari and Jundiá basins (“PCJ”)	Brazil	Active
Bogotá Water Fund	Colombia	Active
Cundinamarca and Boyacá	Colombia	Active
Valle del Cauca	Colombia	Active
ESPH (Heredia)	Costa Rica	Active
FONAG (Quito)	Ecuador	Active
Celica	Ecuador	Active
Espindola (Colombo-Yacuri Forest)	Ecuador	Active
FONAPA (Cuenca)	Ecuador	Active
FORAGUA (Loja, El Oro and Zamora Chinchipe provinces)	Ecuador	Active
Pimampiro	Ecuador	Active
Tungurahua	Ecuador	Active
Cuencas y Ciudades (Saltillo)	Mexico	Active
Alto Mayo	Peru	Active
FOPAR (Riobamba)	Ecuador	Semi-active
Gran Chaco	Bolivia	In Development
Camboriu River Water Producers	Brazil	In Development
Sustainable Livestock Managers (Regional)	Colombia	In Development
Río El Ángel	Ecuador	In Development
Pro-Cuencas (Zamora)	Ecuador	In Development

Source: Ecosystem Marketplace.

Land managers themselves sometimes prefer in-kind compensation to cash: agro-inputs or technical training, for example, might better contribute to long-term livelihood improvement through income diversification or improved food security. Project developers also cite these benefits, and as well as the strengthening of community institutions and the superior ‘demonstration effects’ of concrete compensation like a beehive. In-kind payments may also be better received by those uncomfortable with a perceived commoditization of nature but amenable to a “reciprocal exchange.” On the other hand, it has been suggested that a large upfront non-rescindable payment might lower incentives for fulfilling contracts in the long-term or make enforcement of agreements much more difficult.<sup>12</sup> Fundación Natura Bolivia is currently carrying out a randomized control trial with **FONACRUZ** participants, to be completed in 2013, to evaluate whether cash or non-cash payments contribute to better development outcomes. The study is also looking for evidence that the model delivers superior conservation benefits than other alternatives.

**Figure 30: Average IWS Program Payment Ranges in 2011 (Cash and In-kind), Latin America**



Source: Ecosystem Marketplace.

### Direct Contracts

Other programs use bilateral contracts with buyers engaging directly with landholders on specific watershed investment projects.

One, Costa Rica’s National Power & Light Company (**Compañía Nacional de Fuerza y Luz S.A.**, or **CNFL**) was tracked in our last report. CNFL, faced with costly sedimentation and aquifer depletion issues, since 2001 has supported upstream landholders in switching to agroforestry. Payments are channeled through the National Forestry Fund (FONAFIFO) and average about \$40 per hectare. An estimated \$340,000 was paid out in 2011.

In Ecuador, another hydroelectric operator, EMAPAL, has also embraced a compensation mechanism in the **Tabacay River Basin**. Steep slopes, land clearing, and intensive livestock ranching have led to an array of water quality issues in the city of Azogues and surrounding areas. Participating households receive in-kind compensation for switching to more sustainable agricultural and land management measures; the hydroelectric operator works with the state Ministry of Environment to provide seeds, other inputs, and training, at an estimated value of \$65,000 annually.

In Mexico, an effort to implement integrated watershed management in the Pixquiac River Basin secured agreements with landowners and communal landholders on 1,170 hectares in 2011. The Pixquiac River Basin Committee manages the Pixquiac River Watershed Compensation for Ecosystem Services Program (Programa de Compensación por Servicios Ambientales de la subcuenca del río Pixquiac, or **COSAPIX**), channeling contributions from state and municipal governments and non-profit groups, matched 60:40 by the national PSAH program to total more than \$45,000 in 2011.

12 For further discussion of these issues, see (Wunder, 2005; Heyman & Ariely, 2004; and Goldman-Benner, et al., 2012).

Finally, a donor-funded program in Brazil aims to protect water supplies and quality for the Metropolitan Region of São Paulo. The Mitsubishi Foundation and the Institute Hedging Griffio have seeded the **São Paulo Oasis Project**, which engages landholders in protecting areas critical for watershed services, biodiversity, and carbon sequestration. Participants tend to be larger landholders; the program currently holds five-year contracts with fourteen landholders representing 748 hectares of land. Payments, which are in cash, are also on the higher side for the region, reaching up \$182.26/hectare/year and averaging \$147.78/ha/year. Just under \$120,000 was paid out in 2011.

### Strengthening Community Institutions and Environmental Education

Programs in Bolivia, Colombia, Ecuador, and Mexico all reported explicitly pro-poor social objectives including poverty alleviation, gender equality, and supporting indigenous rights and management of natural resources. About half report monitoring socio-economic impacts.

A focus on building social capital and community engagement on environmental issues also came through loud and clear. An intriguing model for building buy-in for watershed compensation are NGO Rare Conservation's "Pride Campaigns" that took place in Colombia, Ecuador, Peru and Bolivia from 2009-2011, building support for reciprocal water agreements.

Pride campaigns are social marketing efforts carried out by local partners. They focus on environmental education and behavior change, employing radio, television, public events to build support for compensation to upstream communities in exchange for their protecting critical watershed and biodiversity values. A Pride Campaign has contributed to the creation of at least one currently active compensation mechanisms, in Ecuador's **Tabacay River** watershed. Other programs initiated by these efforts are still in development; thirteen new campaigns are planned for 2012-14. Half of the 2009-2011 sites reported that they were able to facilitate agreements within year – a fifth of the normal time required; these campaigns have also generated \$90,000 from communities for non-cash incentives to participants.<sup>13</sup>

### Management Goals

Fourteen programs reported that afforestation and reforestation were central management interventions; these strategies were often linked with stated goals of regulating and restoring flows and recharging aquifers. The perceived link between forests and flows is well-documented (though not always well-substantiated) (Echavarría, 2007) but the emphasis on groundwater was somewhat higher than expected.

More than half of active programs tracked report that they reward interventions supporting a bundle of ecosystem services, including biodiversity, carbon sequestration, and landscape beauty. Three make additional payments (or "stack") for biodiversity (the **Bogotá Water Fund** in Colombia and **FORAGUA** and **Tabacay** in Ecuador) and three for carbon sequestration (the **FORAGUA**, **Tungurahua**, and **Pimampiro** funds in Ecuador).

## Outlook

### New Program Development

Latin America is due for a tremendous burst in activity in the coming years. Water funds in **Zamora** and **Carchi** provinces in Ecuador were close to becoming active as of 2011. In Colombia, a mechanism to reward livestock producers for sustainable management is also in advanced stages of development. In Brazil, a water fund for the **Camboriu River** basin in Brazil became active in 2012, where the **Ribeirão Taquarussu** and **Ribeirão Piripau Water Producers** funds are also in development. Fundación Natura Bolivia is also working to expand its model to the **Bolivian Gran Chaco** region in the near future.

Many more programs are proposed. Rare Conservation, as mentioned earlier, is supporting thirteen new Pride Campaigns across Latin America from 2012-2014. Meanwhile, a new public-private initiative, the Latin American Water Funds Partnership, supported by The Nature Conservancy, the FEMSA Foundation, the Inter-American Development Bank (IDB) and the Global Environment Facility (GEF), has committed \$27 million to develop and seed water funds across Latin America. The Partnership plans to support at least 32 funds in total, protecting more than 2.8 million hectares.

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13 Rare Program for Watershed Protection. Water for Life. Retrieved from [http://www.rareconservation.org/sites/rareconservation.org/files/WatershedProtectionResultsBrochureLR\\_Final.pdf](http://www.rareconservation.org/sites/rareconservation.org/files/WatershedProtectionResultsBrochureLR_Final.pdf).

## Policy

Policy and legal frameworks are also beginning to embrace an ecosystem services approach. Brazil's National Water Agency (ANA) has long supported a "Water Producer" approach at local and regional levels that channels water user fees and other funds toward compensation for landowners carrying out ecological restoration.

Other national governments are also turning to incentive-based mechanisms to address water resource challenges. Peru's Ministry of Environment (MINAM), in partnership with Forest Trends, in early 2012 announced the launch of a new Watershed Services Incubator to support IWS projects and policies. The Colombian and Ecuadorian governments are collaborating with The Nature Conservancy and other partners to develop spatial assessment tools to assess ecosystem services impacts of infrastructure projects. These mapping tools will help inform decisions about siting projects and regional planning.

In Mexico, we've tracked some interest in establishing environmental flow allocations in streams, which would set minimum flows for instream and riparian habitat protection – similar to existing legal requirements in South Africa.

## Social Engagement and "Selling" Ecosystem Services

The region offers rich experience in developing effective outreach strategies for compensation for ecosystem services. 'Social marketing' efforts like Pride Campaigns can be critical in strengthening capacity and overcoming concerns and resistance to compensation mechanisms. As Rare has found, efforts like these often significantly increase the pace of local buy-in.

There are also valuable lessons to be taken from the way that Latin American program developers communicate about incentive-based arrangements. Concerns about commoditizing nature are especially strong in many areas in Latin America, and the language of "market mechanisms" and "ecosystem services" is not often well-received. On the other hand, emphasis on a culture of reciprocal agreements and community stewardship is more likely to be welcomed. This should not be written off as a Latin American idiosyncrasy: the ecosystem services field has a global communication problem that's increasingly well-documented.<sup>14</sup> Lessons learned about crafting messages to appeal to a broader audience and putting an emphasis on social engagement are useful beyond the region's borders.

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<sup>14</sup> For further reading on this subject, see Morris, 2010 and Resource Media, 2012.

# North America



**Table 13: Summary Details, North America**

<b>Number of active programs:</b>	<b>68</b>
<b>Number of programs in development:</b>	<b>18</b>
<b>Value of transactions in 2011:</b>	<b>\$360.5 million</b>
<b>Value of transactions 1973-2011:</b>	<b>\$6.3 billion</b>
<b>Hectares managed for watershed services / Units of pollution reduction / Volume of instream flow restoration in 2011:</b>	<b>18,615 hectares; 343,136 lbs nitrogen; 96,819 lbs phosphorus; 3.745 million kCal/day; 8,080 acre-feet; 301.61 cubic feet per second</b>
<b>Hectares managed for watershed services / Units of pollution reduction / Volume of instream flow restoration 1973-2011:</b>	<b>642,849 hectares; 12,537,389 lbs nitrogen; 199,656 lbs phosphorus; 299 million kCal/day; 2,858,629 acre-feet; 858 cubic feet per second</b>

*Source: Ecosystem Marketplace.*

## General Status Update

Most watershed payment initiatives in North America are based in the United States. Programs are taking place in 28 states with one active in Ontario, Canada. Oregon, Washington, and Minnesota lead as far as active programs. A range of models are evident, including bilateral and trustee mechanisms for drinking water protection, trading and offsets, and instream buybacks. In this chapter, we'll consider each of these in turn in separate sections.

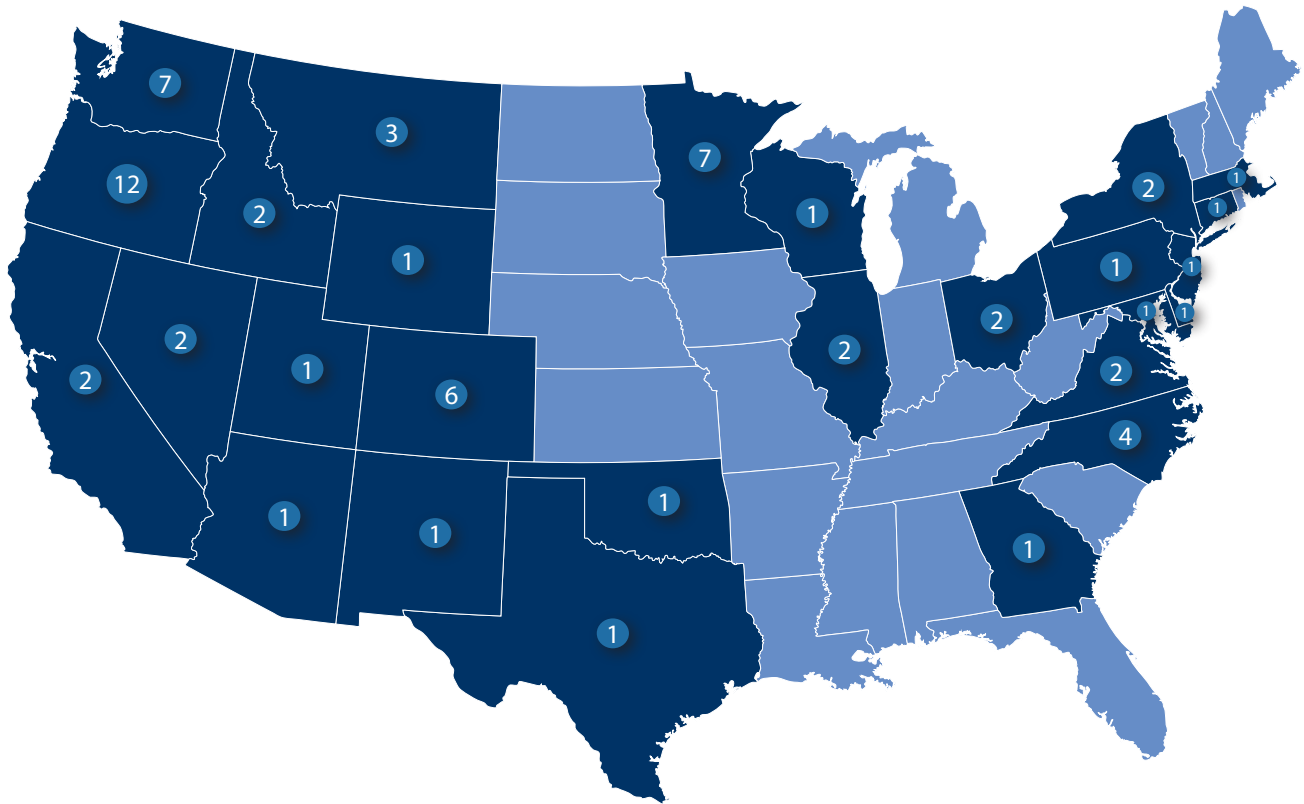
Across the country, municipal drinking water protection programs are maturing. Several new efforts have also appeared on the landscape since our last report, as municipalities consider investing in natural water infrastructure as a cost-effective alternative to treatment technologies. We're also seeing diversification in the funding streams used to pay for these investments, and a growing interest in some areas in user-financed programs and voluntary contribution mechanisms.

On the other hand, 2011 was a slow year for water quality trading (WQT). North America is home to nearly all of the world's WQT programs. Overall, there are 23 trading programs in the region; thirteen of these reported transaction activity in 2011 totaling nearly \$7.7 million. This is down from a recorded high in 2009 of \$10.7 million. The Chesapeake Bay Total Maximum Daily Load (see Box 5), which came into effect in January of that year, had yet to make its effects strongly felt – though signs indicate that trading saw a bounce in 2012. Similarly, in the Ohio River Basin and in Oregon, the year was spent developing new markets that we expect to show significant growth in the coming years.

Other factors might have come into play as well – high food prices may have led farmers to prefer increasing production over risking lower yields through nutrient management to generate credits. Slower economic activity overall likely dampened demand. Newer programs tend to focus on nonpoint source-generated credits, which can be (depending on transaction costs) cheaper than their point-source counterparts and thus might lead to lower overall payments. And many programs reported to us that point sources had not needed to trade in 2011 at all, as they had not hit their pollution limits thanks to technological upgrades.

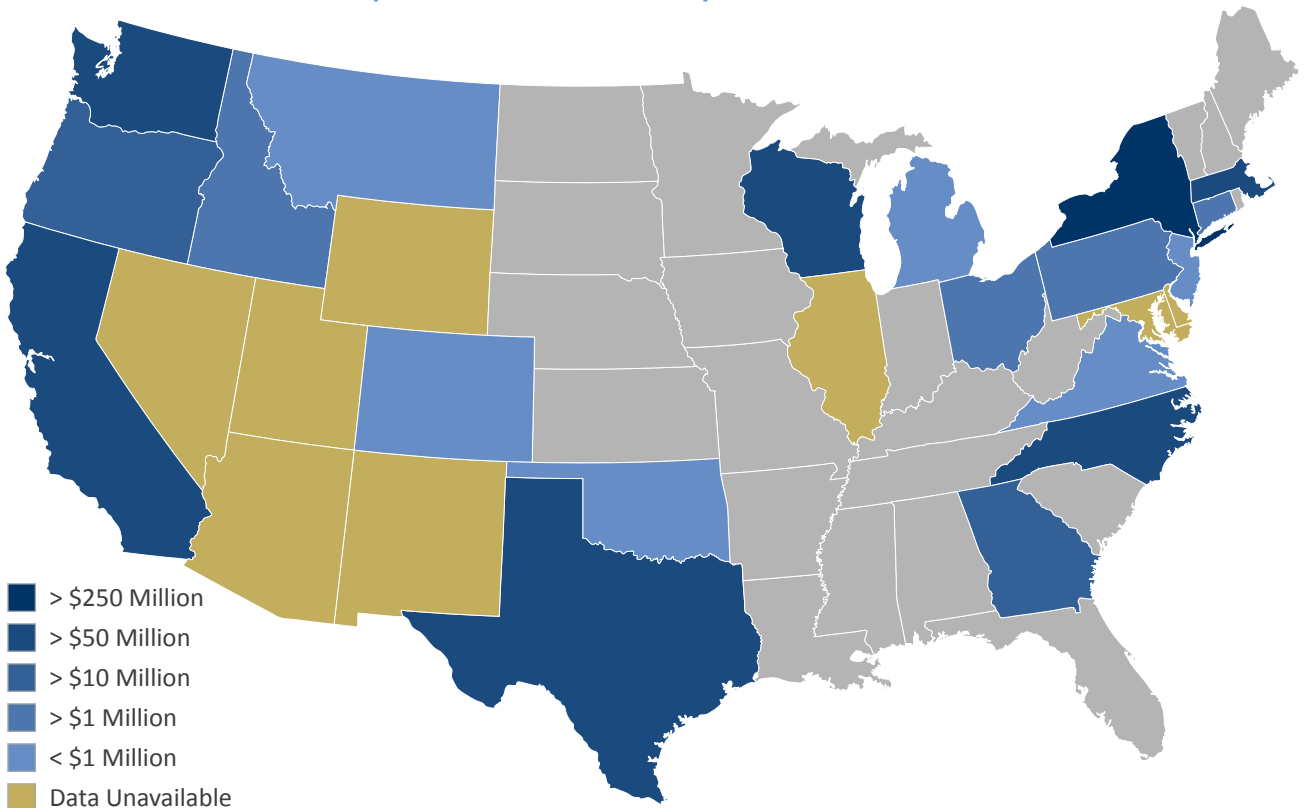
This report marks the first year we've tracked environmental water transactions, which take advantage of existing water rights markets to acquire diversion rights and then leave the water instream to support ecological health. These programs have been steadily increasing in the past decade and make up nearly a third of new program growth in North America from 2008-2011. Groundwater mitigation programs have also taken off in the last few years – an exciting new development as groundwater is often both over-used and under-regulated in North America.

Map 6: Active Programs by State, United States



Source: Ecosystem Marketplace.

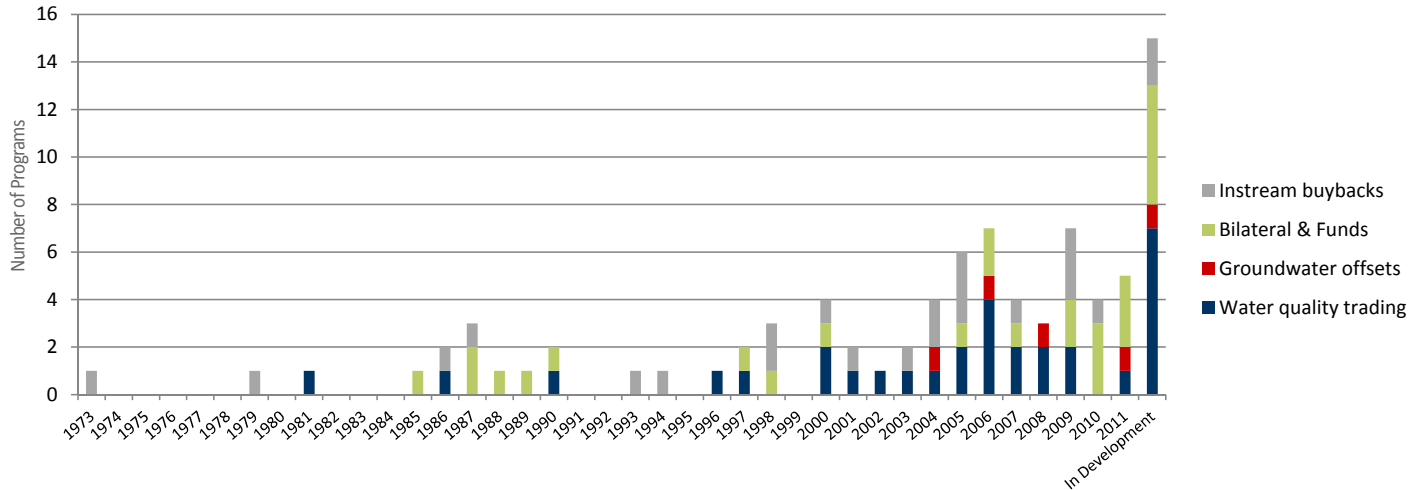
Map 7: Historical Transactions by State, United States



Source: Ecosystem Marketplace.

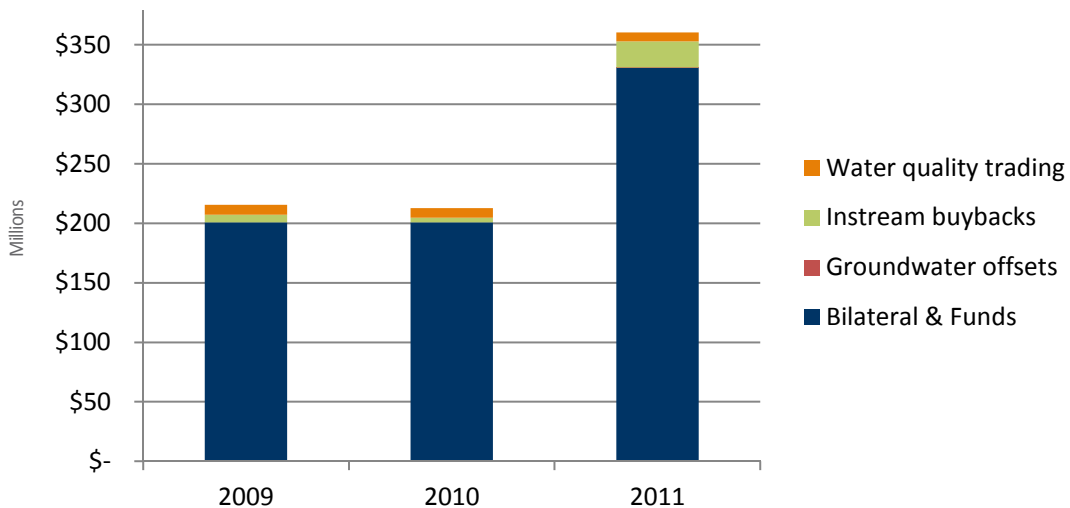
All of the programs identified in our 2010 report are still active, aside from the Chatfield Reservoir, which appears to not have experienced any trading of late. The Pennsylvania Water Quality Trading, developed in anticipation of a Total Maximum Daily Load (see Box 5), has been superseded by the Pennsylvania Chesapeake Nutrient Trading Program with the advent of the Chesapeake Bay TMDL in early 2011.

**Figure 31: New IWS Programs by Year and Type, North America**



Source: Ecosystem Marketplace.

**Figure 32: Annual IWS Transactions by Year and Program Type 2009-2011, North America**



Source: Ecosystem Marketplace.

## Transaction Activity - Bilateral Arrangements and Funds

In 2011, we tracked 21 programs investing in natural water infrastructure as a cost-effective strategy to secure water supplies and quality. The group is dominated by municipalities and cities taking steps to safeguard drinking water supplies against current pressures and future risks, although “buyers” also included a hydropower facility mitigating impacts, individual donation programs, and NGOs and other public good buyers interested in demonstrating natural capital interventions. These programs rely on bilateral and fund models to finance their activities.

#### Box 4: Federal Funding for Drinking Water Protection, United States

A long-standing source of federal financing has been EPA's 319 Program, which provides grants to states and tribes to implement nonpoint source projects and programs in accordance with section 319 of the Clean Water Act (CWA). Nonpoint source pollution reduction projects can be used to protect source-water areas and the general quality of water resources in a watershed. \$175 million was disbursed in 2011 via 319 grants, and more than \$3 billion since 1990.

The **Clean Water State Revolving Fund (CWSRF)** provides low-to-no interest loans for water quality projects, including source water assessment and protection efforts. State funds are capitalized by state and federal contributions; repaid loans return to the Fund and are rolled into new loans. States set funding priorities individually. The CWSRF has more than \$30 billion in capital today and funded almost \$3 billion worth of projects in 2011. Similarly, water managers can apply to the **Drinking Water State Revolving Fund (DWSRF)** for financing for infrastructure improvements, which in 2010 had a total appropriation of more than \$1.3 billion. The CWSRF and DWSRF are significant funding sources for watershed protection, though they are not included in our aggregated transaction data since they support a variety of projects beyond natural capital investment and are not true payment mechanisms.

**Table 14: Active Source Water Protection Programs, North America**

Name	Location	Total Investments	Hectares Protected	Funding Source
Carroll County	GA	\$11,840,455	759	Voter-approved sales tax increase
Catskills (New York City)	NY	\$1,500,000,000	510,745	City, state, and federal funds
Cedar River and Tolt River Watersheds (Seattle)	WA	\$82,000,000	40,670	Habitat Conservation Plan budget, utility budget
Conservation Reserve Enhancement Program (Tulsa)	OK	\$234,515	2,351	City, state, and federal funds
Edwards Aquifer (San Antonio)	TX	\$128,000,000	39,250	Voter-approved sales tax increase
Lambert Creek (Saint Paul)	MN	-	-	State and federal grants
Minnesota Clean Water Fund (Statewide)	MN	\$201,960,000	-	Voter-approved sales tax increase
Mountain Island Lake (Charlotte-Mecklenburg County)	NC	\$35,000,000	2,430	State and county government grants, foundation support, bond issue, dedicated fee on water bills
National Forest System Lands, Rocky Mountain Region (Denver)	CO	\$16,500,000	13,355	Water bill increase; Funds matched by US Forest Service
Nonpoint Source Implementation Grants	National	\$3,416,000,000	-	Federal funds
Quabbin-Wachusett (Metro Boston)	MA	\$130,846,485	29,755	State budget allocations, bond funds, ratepayer fees
Salt Lake City	UT	-	9,700	Water user fees
San Francisco	CA	\$50,000,000	-	Bond funds and operating budget allocation



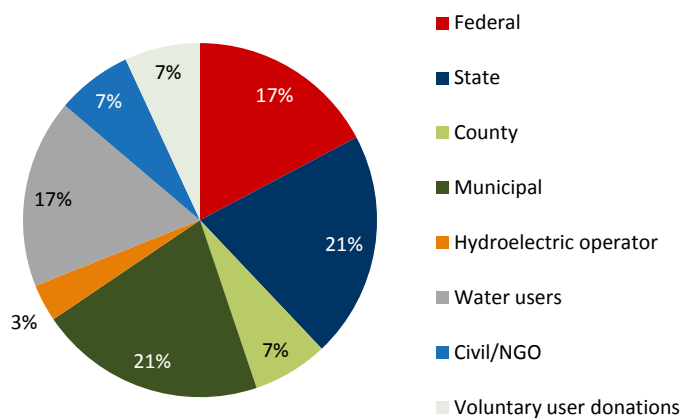
## Source Water Protection Strategies Going Strong

Drinking water protection initiatives, including well-known public programs established to protect **New York City's**, **Seattle's**, and **Massachusetts's Quabbin and Wachusett reservoirs'** watersheds continue to loom large on the landscape. Similar efforts were found in **San Francisco**, California; **Suffolk County**, New York; **Carroll County**, Georgia; **Denver**, Colorado; **San Antonio**, Texas; **Saint Paul**, Minnesota; **Charlotte-Mecklenburg County**, North Carolina; **Tulsa**, Oklahoma; and **Salt Lake City**, Utah.

Overall, these types of programs account for more than \$5.9 billion in investments since 1981. Payments in 2011 were at least \$4.6 million but probably somewhat higher than that, as recent spending data was difficult to obtain for this group. However, to the extent that these programs involve direct land acquisition – and nine of the twelve do – dollars transacted are likely to peak initially with upfront capital costs, followed by lower ongoing management costs. Only Denver Water reported new land coming under management in 2011.

Programs generally engage private landowners, often through a mix of conservation easements, ongoing payments for good management, or land acquisition. Sometimes this is driven by a municipality's strategy for compliance with drinking water standards;<sup>15</sup> other programs have engaged in watershed investment to pre-empt future regulation or voluntarily protect water quality or supply.

**Figure 33: Watershed Investors by Sector - Bilateral and Fund Arrangements, North America**



Source: Ecosystem Marketplace.

As for funding, programs to protect municipal water supplies are well-suited to a water fund model, as water user fees or a designated portion of local taxes can be directed into a dedicated “pot” for watershed protection and used to leverage other public or private funds, with the municipality or a water utility acting as a trustee and making decisions about investment. (See the introduction for more information on trustee-fund models.) We’ve identified several programs relying on voter-approved tax increases or water user fees (often as part of a larger funding ‘mix’), including in **San Antonio**, **Carroll County**, **Suffolk County**, **Denver**, and **Salt Lake City** (see Table 15). On the other hand, quite a few project developers also reported to us that they had found user fees an unpopular idea in their locality, especially given 2011’s slow economy.

Source-water protection programs are by definition local in scale, targeting water supplies for a specific city or municipality.

An example of a broader-scale fund can be found in **Minnesota’s Clean Water Fund**. Minnesota voters in 2008 approved a sales tax increase of three-eighths of one percent; one-third of those revenues are earmarked for a state Clean Water Fund to finance watershed protection and restoration projects around the state. Seven state agencies partner to administer funds and implement projects. The fund had a budget of \$150.8 million in 2011.

## Voluntary User Contributions: A New Trends in Financing?

Since the last report, we’ve tracked the emergence of a new species of watershed investment program - the voluntary individual user-financed mechanism. These initiatives are fairly small in terms of dollar values but we’re intrigued by their future potential, and the lessons they can offer on engaging the public on watershed conservation.

In Tucson, **Conserve to Enhance (C2E)** works with water utilities and non-profit groups to track consumers’ water use over time, and enables donation of the monetary value of conserved water directly to an environmental enhancement fund. In 2011, 60 households participated in the pilot (of which 45 received subsidies to implement rainwater harvesting practices), conserving over 1.1 million gallons of water. The monthly Tucson Water utility bill also has an opt-in check box for “riparian enhancement” that allows water customers to make donations to the C2E fund. Transaction data is not yet available for this program.

15 Efforts are often driven by the 1989 federal Surface Water Treatment Rule (SWTR), which establishes that if the water quality within a given watershed meets a certain standard, a permit can be issued exempting the watershed from the filtration requirements typically enforced by the Environmental Protection Agency. This is known as a filtration avoidance determination (FAD) or alternative to filtration (LAF). New York City, Seattle, San Francisco, Salt Lake City, and Quabbin-Wachusett all cite the Surface Water Treatment Rule as a key driver.

Another initiative where individuals support watershed investment is the National Forest Foundation (NFF)'s **Ski Conservation Fund and Forest Stewardship Fund**, which collects funds from participating ski resorts, lodges, and others, operating in national forest regions. NFF matches contributions at a 50 percent rate. Local nonprofit organizations implement funded projects, which are selected by representatives from the resorts and lodges, the NFF, and the US Forest Service. Many projects focus on watershed restoration and protection, through direct and indirect actions such as trail restoration, riparian and forest restoration, and restoration of eroded recreation areas. Transaction data was unavailable for 2011 at the time of this report's writing.

And in the Deschutes River Basin, the Avion Water Company allows ratepayers to donate to water rights leasing programs to restore instream flows, via a 'checkbox' option. Leases are facilitated by the **Deschutes River Conservancy's Blue Water Program**. Avion's consumers can choose to donate at four different levels ranging from \$1.60 to \$6.40 each month. 2010 donations totaled \$14,554 and enabled the protection of 2,624 acre-feet of water.<sup>16</sup>

**Table 15: A Sample of Watershed Investment Programs in North America: Where Are They Now?**

	New York City-Catskills Watershed Protection	Cedar River Watershed, Seattle	Quabbin and Wachusett Watersheds, Massachusetts	San Francisco Public Utilities Commission ("Hetch Hetchy" in 2010 report)
<b>Year established</b>	1997	1992	1985	1993
<b>Status in 2011</b>	Active	Active	Active	Active
<b>Transactions as of 2008</b>	\$1.5 billion	\$10.7 million	\$121 million	\$14.5 million
<b>Transactions as of 2011</b>	\$1.5 billion	\$82 million	\$130.8 million	\$50 million
<b>Units Protected/ Restored as of 2008</b>	510,745 ha	36,624 ha	52,486 ha	507,637 ha
<b>Units Protected/ Restored as of 2011</b>	510,745 ha	40,670 ha	n/a	n/a

### Privately Owned Forests: Tapping a New Supply

Payments for watershed services efforts have historically focused on engaging private agricultural producers, interventions on public lands, or outright land acquisition. But more than half of forestland in the United States is privately owned. Two new programs are working with private forest landowners in the east to protect landscapes critical to water supplies in the east. Both are in early stages but are expected to generate important knowledge about this as-yet untapped supply of watershed services.

The US Endowment for Forestry and Communities has funded two "Forests to Faucet" initiatives currently in their pilot stages in the **South Fork Rivanna River basin** in Virginia and in New York/New Jersey/Pennsylvania's **Delaware River Watershed**.

The pilot in **Virginia** compensates forestland owners for converting marginal agricultural land to tree cover and protecting high-quality standing forest. The Virginia Department of Forestry administers the program with support from non-profit conservation groups and other local stakeholders, and provides some funding as well; administrators are exploring the possibility of water utilities contributing in the post-pilot phase. About \$160,000 was paid out in 2011.

The **Upper Delaware River** watershed provides drinking water to more than fifteen million people in New York, New Jersey, and Pennsylvania. The Common Waters Fund, coordinated by the Pinchot Institute for Conservation, will secure conservation easements from forest landowners to protect downstream water quality and guard against urbanization pressures. This project is also planning for post-pilot funding, and is seeking support from foundations and downstream beneficiaries including businesses and other water users in the Delaware Basin. A first round of \$250,000 in landowner grants has been awarded as of the end of 2011 to fund forest management plans and practices on 48 properties, covering more than 13,000 acres in the basin.

<sup>16</sup> Please note that these payments are tracked as instream buybacks in our analysis.

## Co-Benefits

A number of programs tracked manage their watersheds for multiple benefits. **Carroll County** and **Suffolk County** both focus on restoring and protecting natural habitats. **Conserve to Enhance**, the **National Forest Foundation**, and **Saint Paul, Minnesota**, all report that biodiversity values, landscape beauty, and recreational benefits are integral to their efforts.

In **Seattle's Cedar River Watershed**, Seattle Public Utilities (SPU) manages lands under the terms of a 50-year Habitat Conservation Plan (HCP) in order to be assured of compliance under the US Endangered Species Act, as several imperiled fish species are present in the watershed. SPU anticipates spending a total of \$150 million by 2050 for the HCP, which includes funding for watershed restoration and protection projects.

Finally, we uncovered one case of “stacking” ecosystem services in **Carroll County, Georgia**, where streambank credits for mitigation have also been generated on some of the lands acquired for drinking water protection in the Chattahoochee Basin – a very interesting example of one way publicly-owned watershed lands might help to self-finance their management.

## Outlook - Bilateral and Fund Arrangements

### United States

Though long-running programs like New York City's efforts in the Catskills or the Quabbin/Wachusett reservoirs in Massachusetts look like they're slowing down in terms of dollars transacted, their impacts grow in value every year. Other municipalities have taken notice: a third of the source water protection programs tracked are new since our last report, and our research shows that several more are waiting in the wings. What's especially interesting is that all of these are considering a user-financed model – a promising new source of revenue as government budgets for water infrastructure remain tight in the US.

### New Programs in Development

In Florida, the **Florida Ranchlands Environmental Services Project**, which connects ranchers with state agencies to incentivize best management practices, shifted out of the pilot phase in 2012, with the South Florida Water Management District, the program's expected main buyer, taking over administration of the mechanism that same year.

A new mechanism in **Santa Fe**, New Mexico, was first proposed in the city's 2007 watershed management plan, in the ashes of the 2000 Cerro Grande Fire which cost Santa Fe more than \$970 million in compensation, suppression and rehabilitation. In 2008, the city and the US Forest Service finalized a cost-share agreement for managing lands in the Santa Fe River watershed, with Santa Fe's contributions coming out of its existing operating budget. Other municipalities in the west have also shown interest in models like Santa Fe's and Denver's, including **Ashland**, Oregon, and **Bozeman**, Montana, where wildfire risk on public forestlands threatens to pose crippling costs on water utilities in the event of a fire.

In Oregon, the **Eugene Water & Electric Board** (EWEB) envisions a “Voluntary Incentives Program” that compensates private landowners in the McKenzie River Watershed for protecting and restoring riparian zones. Payments would come from an established water fund, potentially capitalized by water user fees, utility budget allocations, corporate contributions, development impact fees, state or federal mitigation funds, or some mix of the above.

In California, just over the bay from San Francisco, a project to protect the **Mokelumne River watershed**, which supplies the East Bay Municipal Utility District, is in planning stages. It proposes to link East Bay water users to upstream private forest landowners via a ratepayer-funded compensation mechanism.

More voluntary contribution programs are also on the horizon. **Conserve to Enhance** is planning a second pilot in **Fort Collins**, Colorado. In southwestern Colorado, the **Rushing Rivers Program** works with ratepayers to ensure that water conservation savings benefit the environment, rather than just meeting new growth. Water providers commit to not diverting the quantity of water saved by participating customers, instead leaving it in the San Juan River to support instream flows. And in Milwaukee and Madison Wisconsin, the **H2O Score** program which helps water users monitor their consumption is piloting a mechanism wherein residents are actually paid a penny per gallon conserved (funds are put up by local businesses).

## IWS-Friendly Institutions

Another promising effort to catalyze investment in watershed protection takes a different approach. In Seattle, a stakeholder group, the WRIA 9 Watershed Ecosystem Forum, has drafted legislation proposing a **Watershed Investment District** to contribute to restoration of the Puget Sound basin. A watershed investment district is a legal body that can raise and disburse funding via taxes and utility fees for watershed and salmon habitat conservation. The district would be delineated by watershed boundaries instead of jurisdictional ones, which would contribute to better coordination of restoration efforts.

Several US states are also working to develop policies conducive to investments in ecosystem services, including working groups commissioned in Oregon and Maryland to explore opportunities for ecosystem services markets and recommendations for market frameworks, which both presented findings in 2011 (Oregon Sustainability Board, 2010; Ecosystem Services Working Group, 2011).

On a final note, utility investments in watersheds remain limited by the accounting standards they must adhere to, which are set by the US Governmental Accounting Standards Board (GASB). Under current rules, utilities cannot list watersheds as assets on their books beyond simple values of land and trees. That makes it difficult to justify capital improvement projects to better manage the watershed, since the utility can't borrow against the true economic value of their watershed assets. A working group including seven public utilities in the US and Canada has formed to propose amendments to GASB standards to correct this.

## Canada

In Canada, payments for ecosystem services have not been as widely embraced as in other developed countries, though examples are becoming more common. Our research concluded that the South National Phosphorus Trading Program (discussed in the next section) is the only active program in Canada, though a quasi-PWS mechanism was found in Manitoba in the form of a tax credit to farmers for rehabilitating and conserving riparian zones (Kenny, Elgie, Sawyer, & Wichtendahl, 2011).

## Transaction Activity - Water Quality Trading

Water quality programs have been steadily appearing (though not always sticking around) in North America in the past decade and make up half of newly developing programs. We've identified five new active programs since our last report in 2010 and eight in development.

In 2011, programs were active in thirteen US states and in Ontario with new markets coming online in Oregon, California, and Nevada. Minnesota, North Carolina, and Colorado led the nation in 2011 in number of active programs, while the largest markets by transaction volumes are found in Connecticut, North Carolina, and Virginia.

Water quality trading programs are generally driven by regulatory standards setting a maximum acceptable level of pollution in a given water body, implemented by capping point sources' (facilities discharging through a discrete conveyance, like a pipe) permitted discharge allowances. Facilities then can meet these standards by controlling pollution on-site (generally through technological upgrades) or by trading "credits" that represent a given amount of pollution reduction achieved elsewhere. Point sources (PS) may trade with other point sources, or with nonpoint sources (NPS) like farmers who reduce pollution loads through nutrient management or maintaining buffer zones around water bodies.

Total Maximum Daily Loads (TMDLs) remain the key driver of water quality trading in the US. The Chesapeake Bay TMDL has spurred a noticeable jump in market activity in Virginia and Pennsylvania, parts of which are drained by the Chesapeake Bay basin. However, in Maryland, despite the development of crediting tools and a public marketplace and registry, no trades were tracked in 2011. In West Virginia, parts of which are also subject to the Chesapeake TMDL, no formal trading program exists due to government resource constraints, though the state Department of Environmental Protection will review offsets for new development on a case-by-case basis.<sup>17</sup>

Overall 343,136 lbs of nitrogen and 96,800 pounds of phosphorus were tracked in 2011. Nitrogen volume is low as transaction data for the **Connecticut Nitrogen Exchange** (CNE), the biggest market for nitrogen, was unavailable at the time of the report. (For comparison, 493,133 nitrogen credits were sold on the CNE in 2010.) Volumes in the Chesapeake Bay basin are still low but growing, with the **Virginia Nutrient Credit Exchange** (which covers five basins) posting more than 246,000 lbs in 2011 and 61,000 credits sold at auction in **Pennsylvania**. Virginia trading also made up a major piece of the phosphorus pie, accounting for roughly 79,000 lbs marketed in 2011.

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17 Pers. Communication with Teresa M. Koon, WV DEP Division of Water and Waste Management, July 27 2012.

### Box 5: Water Quality Trading in the United States: The Regulatory Framework

Water quality markets are generally developed as a way to cost-effectively comply with water quality regulations. In the United States, commercial and public entities releasing pollutants into water bodies through a “discrete conveyance” like a pipe or man-made ditch (known as “point sources”) are required by the Clean Water Act to hold a National Pollutant Discharge Elimination System (NPDES) permit. NPDES permits set either technology-based or water quality standard-based limits on pollution. If water bodies experience degradation despite NPDES permit controls, a Total Maximum Daily Load (TMDL) may be set at the watershed scale, setting out recommended pollution limits.

TMDLs are generally implemented by focusing on reducing point source pollution. But in some cases it’s more cost-effective to achieve those reductions through an intervention by another party or at another site in the same watershed, such as a sewage treatment paying a nearby factory to reduce their pollution in place of the treatment plant’s doing so. Or the plant might instead contract with a farmer to adjust the timing or amount of fertilizer application on his fields in order to reduce nutrient pollution to the water body that the two share. Water quality “trades” like this have been going on since the early 1980s, but it wasn’t until 2003 that the US Environmental Protection Agency released a national water quality trading policy, which has been followed by guidance for permit writers and watershed planners.

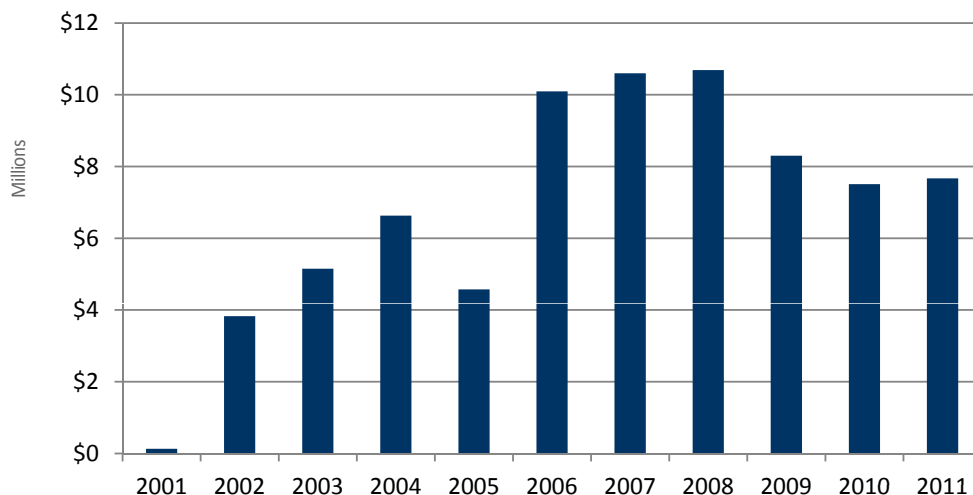
Not all water quality trading are driven by regulations: in the Conservation Marketplace of Minnesota and the Great Miami River programs, market development are “pre-compliance” – that is, they’ve been created in anticipation of a future TMDL but are currently voluntary.

Still, 2011 was a slow year for water quality markets, both in terms of dollar values and volumes traded. Transactions totaled \$7.7 million, down from a high in 2008 of \$10.6 million. No trades took place in 2011 in several programs including in the **Tar-Pamlico Basin** in North Carolina, and the **South Nation Total Phosphorus Management Program** in Ontario.

This is not necessarily a bad sign, environmentally speaking: when point source facilities do not exceed their load allocation for the year, trading is unnecessary. Technological upgrades, for example, often are followed by a drop in trading. In the **Connecticut Nitrogen Exchange**, for example, despite credit prices (which are set by the exchange) steadily increasing and load limits tightening to comply with the TMDL, volumes and dollars have fallen – in part because end of pipe loads have been dropping on average every year thanks to upgrades and new facilities (Nitrogen Credit Advisory Board, 2011).

Several programs focused on nonpoint source-generated credits also reported that they have exceeded regulatory expectations. In Ohio for example, the **Alpine Cheese Company** has reduced phosphorus loads by 20% more than required by paying farmers to implement nutrient management practices. The **Southern Minnesota Beer Sugar Cooperative** has surpassed its nutrient reduction requirements of 6,500 lbs annually, generating over 15,000 credits in both 2010 and 2011.

Figure 34: Annual Transactions 2001-2011, Water Quality Trading, North America



Source: Ecosystem Marketplace.

**Table 16: Active Water Quality Trading Programs, North America**

Program	State	Actors	2011 Trades	Trades to Date
Bear Creek	CO	PS-PS/NPS	82 lbs phosphorus	-
Chatfield Reservoir	CO	PS-PS/NPS	71 lbs phosphorus	-
Southern Minnesota Beet Sugar Cooperative	MN	PS-NPS	15,717 lbs phosphorus	69,066 lbs phosphorus
Conservation Marketplace of Minnesota	MN	Municipality-NPS	4076 lbs nitrogen	4,076 lbs nitrogen
North Carolina State Nutrient Offset Program	NC	PS/NPS-NPS	21,891.6 lbs nitrogen	1,438,012 lbs nitrogen
			1,121 lbs phosphorus	4,920 lbs phosphorus
Pennsylvania Chesapeake Bay Nutrient Trading Program	PA	PS-PS/NPS	61,859 lbs nitrogen	82,859 lbs nitrogen
			700 lbs phosphorus	700 lbs phosphorus
Virginia Nutrient Credit Exchange Program	VA	PS-PS/NPS	246,309 lbs nitrogen	246,309 lbs nitrogen
			79,128 lbs phosphorus	79,128 lbs phosphorus
Clean Water Services	OR	PS-NPS	295 million kCal/day	295 million kCal/day
Willamette Ecosystem Marketplace	OR	PS-NPS	3.745 million kCal/day	3.745 million kCal/day
Neuse River Compliance Association	NC	PS-PS	9,000 lbs nitrogen	1,670,000 lbs nitrogen
			-	6,000 lbs phosphorus
Alpine Cheese Company/ Sugar Creek	OH	PS-NPS	-	16,743 lbs phosphorus
South Nation Total Phosphorus Management Program	ON	PS-NPS	0	12,144 lbs phosphorus
Minnesota River Basin Phosphorus Trading Permit	MN	PS-PS	-	10,955 lbs phosphorus
Connecticut Nitrogen Credit Exchange Program	CT	PS-PS	-	9,032,133 lbs nitrogen
Tar-Pamlico Basin Association	NC	PS-PS/NPS	0	64,000 lbs nitrogen
Delaware Inland Bays	DE	PS-NPS	-	-
Dillon Reservoir Water Quality Management Program	CO	PS-PS/NPS	-	-
Great Miami River Watershed Water Quality Credit Trading Program	OH	PS-NPS	-	-
Las Vegas Wash	NV	PS-PS	-	-
Maryland Nutrient Trading	MD		-	-
Piasa Creek	IL	PS-NPS	-	-
Rahr Malting Co	MN	PS-NPS	-	-
Red Cedar River	WI	PS-NPS	-	-
Blanks fields indicate unavailable data.			96,819 lbs phosphorus	199,656 lbs phosphorus
			343,136 lbs nitrogen	12,537,389 lbs nitrogen
			298.745 million kCal/day	3.745 million kCal/day

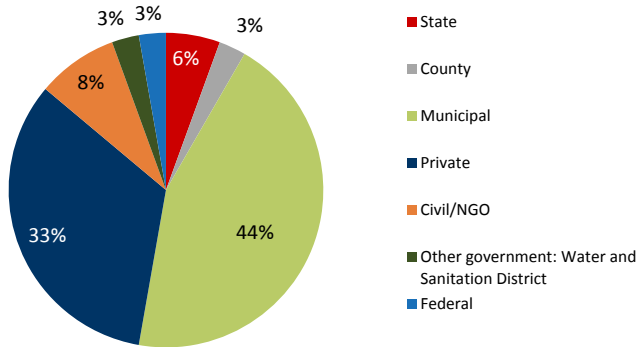
Table 17: Tracking Water Quality Trading 2008-2011, North America		
	2008	2011
Number of active programs:	12	23
Number of programs responding to our survey	9	17
Programs trading nitrogen credits	3	9
Programs trading phosphorus credits	9	15
Programs trading temperature credits	1	2
Annual dollars transacted	\$10.7 million	\$7.7 million
Total dollars transacted to date	\$52 million	\$94 million
Total lbs N reduction that year	7,623,937	343,136*
Total lbs P that year	124,145	96,819
Total lbs N reduction to date	42,261,620	n/a
Total lbs P reduction to date	331,139	n/a

\*This low number is largely due to nitrogen trading data for the Connecticut Nitrogen Exchange being unavailable for 2011.

A fall in the total value of payments may also mean that programs are becoming more efficient. Point sources are low-hanging fruit from the perspective of regulators, but nonpoint source pollution control is generally a bigger part of the problem and in some cases is cheaper to address – the difficulty is in enticing nonpoint sources to voluntarily participate in markets. In the Chesapeake, there is a concerted effort to engage farmers and other non-point sources. In Virginia, for example, point-to-point trading is allowed for existing facilities, but for any new point source pollution, nutrient reduction offsets must come from non-point sources implementing best management practices.

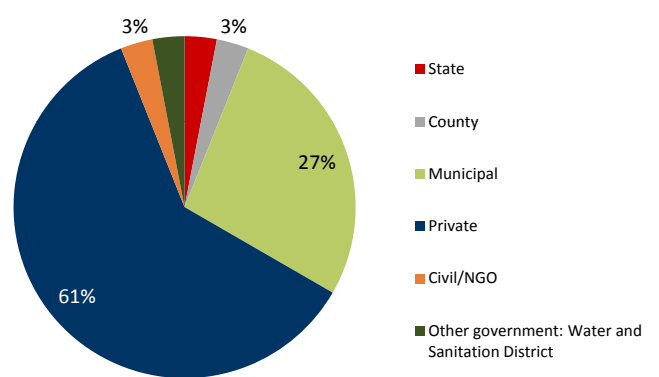
Where reductions are achieved through nonpoint interventions, costs also generally taper as the program matures. Upfront costs of agricultural best management practices are usually the biggest expense; annual maintenance payments thereafter tend to be fairly low. The **Alpine Cheese Company** has seen its costs fall significantly in recent years to about \$2/lb for phosphorus, now that only annual management payments to farmers are required.

Figure 35: Buyers by Sector, Water Quality Trading in North America



Source: Ecosystem Marketplace.

Figure 36: Sellers by Sector, Water Quality Trading in North America



Source: Ecosystem Marketplace.

### Credit Prices

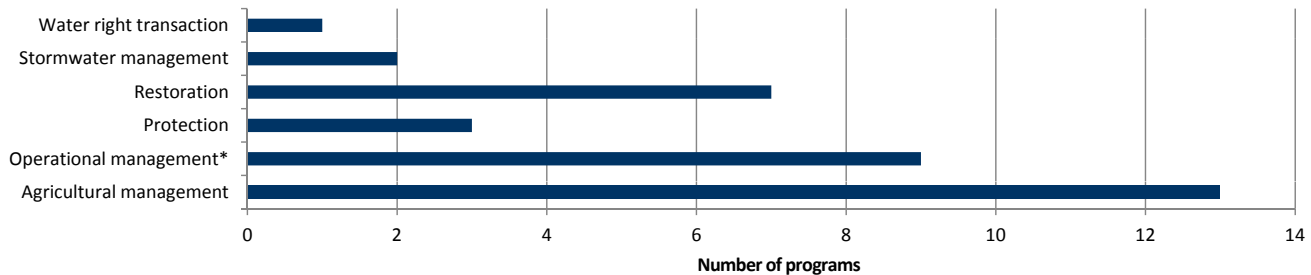
Information on credit prices remains difficult to obtain, particularly where transactions are direct contracts between private parties. Credit prices can be influenced by any number of factors: by the cost of intervention in both real terms and relative to alternative interventions or land uses, transaction costs, presence of subsidies on the seller side or grant funds on the buyer side, trading ratios, and crediting period. That last refers to how long credits are “good” for: some programs trade credits on an annual basis (“term” credits), while in other cases one payment will cover reductions for a period of years (“perpetual” credits). In the **Neuse River program** in North Carolina, which allows for both, annual credit prices are in the range of \$4-\$9 per lb, or \$490 per lb for a permanent sale.

### Bundling Multiple Co-Benefits

Several programs note that multiple co-benefits were bundled in their credits. The riparian restoration that cools streams to generate temperature credits for **Clean Water Services** and the **Willamette Partnership** also supports biodiversity by providing critical habitat.

The Willamette Partnership has developed protocols to allow landowners to generate multiple credit types – currently temperature, wetlands, salmonid habitat, and upland prairie habitat – on their properties, though the credits cannot overlap spatially. **Bear Creek** and the **Pennsylvania Chesapeake Bay Nutrient Trading Program** also reported that their nutrient credits support biodiversity and landscape beauty.

**Figure 37: Management Interventions Used to Generate Water Quality Credits, North America**



\*Operational management refers to technological upgrades at point source facilities. Note that many programs employ more than one type of intervention to generate credits.

Source: Ecosystem Marketplace.

## Outlook - Water Quality Trading

Water quality trading in the US continues to spread, with project developers exploring new applications. A slow 2011 appears to have been spent laying the groundwork in many places for a bounce in trading activity in 2012.

### New Areas of Growth

In the **Ohio River Basin**, a nitrogen and phosphorus trading program is in development led by the Electric Power Research Institute (EPRI) that could potentially span eight states; it would be the first interstate trading effort operating under a single trade plan, and the largest program of its kind. A pilot phase will take place in Indiana, Kentucky, and Ohio from 2012-2014 with trades planned between three large power plants and agricultural producers. The pilot is expected to deliver 45,000 lbs of nitrogen reduction and 15,000 lbs of phosphorus reduction each year. At scale, thousands of point-source buyers and more than 200,000 farmers could be involved.

We’re also intrigued by the rise of for-profit nutrient banks in Virginia, driven by Chesapeake TMDL requirements. Whereas 2011 saw three banks and one transaction in the state, 2012 looks to have been a boom year for the industry, with the number of established and proposed banks quadrupling and thirty transactions taking place.<sup>18</sup> Unlike the VA Nutrient Exchange, these banks are marketing nonpoint-generated perpetual credits. Potential buyers include groups like the state Department of Transportation and the US military.

Temperature trading is turning up across Oregon, with five new proposed programs identified. Two are entering their pilot phases. In the **Rogue River** basin, projects generating 14.52million kCals/day in credits for the City of Medford and the US Forest Service will begin in 2012. And in the Klamath basin, the **Klamath Tracking and Accounting Program** has begun a three-year pilot period. Both are working closely with the **Willamette Partnership** to share crediting protocols and other market infrastructure wherever possible.

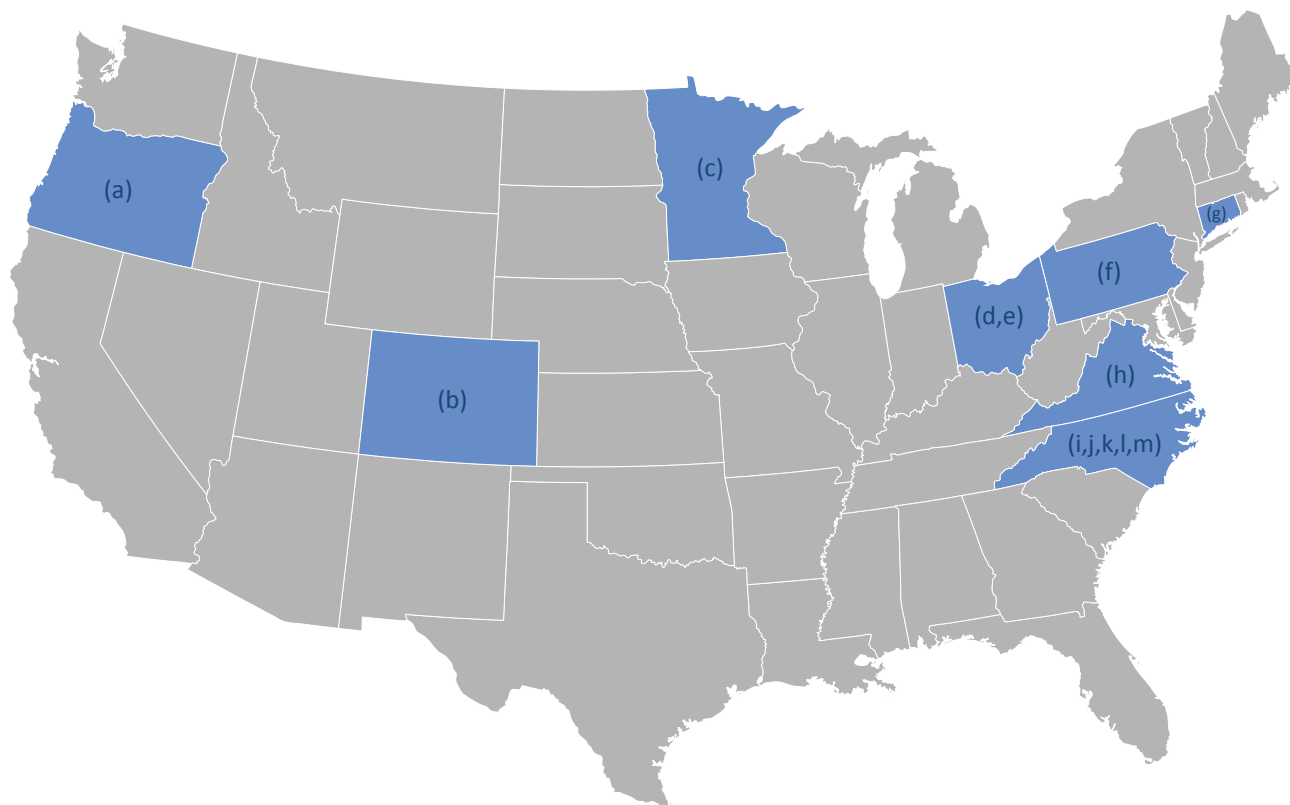
2011 also saw Wisconsin developing an adaptive management policy allowing point-source facilities to pay farmers and other nonpoint-source landowners for phosphorus reductions. The program is driven by numeric nutrient standards for water bodies – rather than pollution caps set for individual NPDES permit holders. The **Watershed Adaptive Management Option** also differs from water quality trading in that there are no trading ratios (which require buyers to purchase some greater ratio of credits than needed to provide a buffer against reductions not being achieved).

Finally, two other interesting water quality trading programs in development should be noted, in California’s **Sacramento River-San Joaquin Delta system** and in **Washington DC**. Limited information is available about the Delta program, but a methylmercury offset program has been proposed there as part of the Delta Mercury Control Program. The larger context for water quality improvement efforts is the Sacramento River-San Joaquin Delta’s Water Quality Control Plan that establishes a Total Maximum Daily Load for methylmercury. In Washington DC, a stormwater trading program is under study as a way to cost-effectively meet upcoming Municipal Separate Storm Sewer System (MS4) permit obligations by allowing regulated sites to fund off-site retention projects.

18 Pers. Communication, Brent Fults, Chesapeake Bay Nutrient Land Trust. November 13, 2012.



Map 8: 2011 Average Credit Prices by State, United States



- (a) OR: Clean Water Services: \$0.05/kCal/day
- (b) CO: Bear Creek: \$5000/lb P
- (c) MN: Southern Minnesota Beet Sugar Cooperative: \$4.00/acre P
- (d) OH: Alpine Cheese Company: \$2.00/lb P
- (e) OH: Great Miami River: \$1.52/lb N/P
- (f) CT: Connecticut Nitrogen Exchange: \$5.42/lb N
- (g) PA: Pennsylvania Chesapeake Bay Nutrient Auctions: \$3.10/lb N (spot); \$2.90/lb N (forward); \$4.73/lb P (spot)
- (h) VA: Cranston's Mill Pond Nutrient Bank: \$19,000/lb (perpetual)
- (i) NC: Jordan Lake: \$20.29/lb N; \$147.23/lb P
- (j) NC: Neuse River-Falls Lake: \$20.29/lb N; \$147.23/lb P
- (k) NC: Tar-Pamlico: \$18.92/lb N; \$147.23/lb P
- (l) NC: Neuse River (EEP): \$13.16/lb N
- (m) NC: Neuse River (Compliance Association trading): \$6.50/lb N (term); \$490/lb N (perpetual)

Source: Ecosystem Marketplace.

## Market Infrastructure

Some clear leaders in tools and infrastructure are beginning to emerge. As mentioned above, the **Willamette Partnership** has put considerable effort into developing market infrastructure that can be adapted to work in other basins. NutrientNet is a crediting tool and marketplace developed by the World Resources Institute that aims to provide a single platform for Chesapeake Bay states (Maryland, Pennsylvania, and West Virginia). It uses the US Department of Agriculture-developed Nutrient Tracking Tool (formerly known as the Nutrient Trading Tool), an interface that allows agricultural producers to calculate nutrient credits generated by different management practices. The Nutrient Tracking Tool has also been adapted for use in a number of other markets, including the upcoming Ohio River Basin trading program. Private-sector companies are also stepping up to support trading: the Markit platform, for example, is used by PENNVEST to host its regular nutrient credit auctions and by the Willamette Partnership as a credit registry.

The US Department of Agriculture Office of Environmental Markets (OEM), created in response to section 2709 of the 2008 Farm Bill, has also been focused on tool and protocol development recently. OEM is working with the Natural Resources Conservation Service, the Texas Institute for Applied Environmental Research, and other partners to improve the Nutrient Tracking Tool. OEM also aims to develop consistent policy relevant to ecosystem services across the US Department of Agriculture. A particular focus has been the Chesapeake Bay and outreach to agricultural producers and landowners to voluntarily help achieve the TMDL.

A major boost for water quality trading in the US came in 2012, when the US Department of Agriculture awarded \$6.5 million in Conservation Innovation Grants to support the development of twelve water quality trading markets around the country. Five of the grants focused on supporting trading in the Chesapeake Bay, while the largest grant at \$1.6 million went to the Willamette Partnership to develop guidance on cross-border water-quality trading in the Pacific Northwest.

## Transaction Activity - Environmental Water Markets: Instream Buybacks and Water Quantity Offsets

The third broad category of programs tracked in North America is environmental water markets. These include both groundwater offsets and instream buybacks, wherein water rights are appropriated for non-consumptive use. That is, rather than exercising the right to divert water from a stream or river, under an instream buyback the holder simply leaves the water instream. Water rights can be leased, purchased, or donated to an entity that holds them – often a state agency or a water trust. Rights are generally acquired from individual holders or large entities like the Federal Bureau of Reclamation.

In this report, we only track water rights purchases and leases that are for *instream use* – that is, we do not here attempt to assess the size of the entire Western water rights market, where rights can also be traded for agricultural or urban use.

A second sub-category are groundwater mitigation programs, which require that new wells or pumping be offset to protect a basin's groundwater supplies. Offsets can be purchased from established groundwater banks, which, depending on hydrological relationships, may convert surface water rights to groundwater use.

Programs like these are growing in scale and prominence in the US West, where the paper right to divert water can be legally separated from land ownership and traded. In the last few decades, states in the region have begun to legally recognize instream use as a “beneficial use” and allow the conversion of consumptive (such as for irrigation or municipal drinking supplies) to non-consumptive use. Rights may be permanently acquired or leased. Leasing is often a popular option for water rights holders unwilling to part with their right altogether. Given the region's “use it or lose it” approach to water use, leasing also allows the owner to retain their legal claim during periods when they may not need to exercise it. And since timing of flows is as important as the presence of flows themselves, leasing allows the payer to ensure that water is available at important times, such as during the dry summer and fall months.

Environmental water acquisition and leasing support natural flow regimes in rivers and streams, which are critical for supporting aquatic and riparian habitats – thus by definition, these programs “bundle” hydrological and biodiversity values. Instream flow augmentation also benefits scenic and recreational values. From a hydropower perspective, adequate flows are also necessary for power generation.

### Environmental Water Markets in Action

Our study found 25 programs active in 2011, including state programs in Oregon, Washington, Montana, Colorado, Idaho, and Wyoming. Transaction activity was also driven by non-profit groups effectively acting as buyers for the public good, acquiring rights and either holding them or donating them to state programs. Other buyers included the Federal Bureau of Reclamation and a hydroelectric facility driven by Endangered Species Act requirements and mitigation requirements for hydroelectric license renewal, respectively. Altogether these programs funded \$22 million in instream buybacks in 2011, representing at least 9643 acre-feet (AF) returned to western rivers.<sup>19</sup> Since 1986, transactions add up to at least \$227 million, or 2.8 million AF.

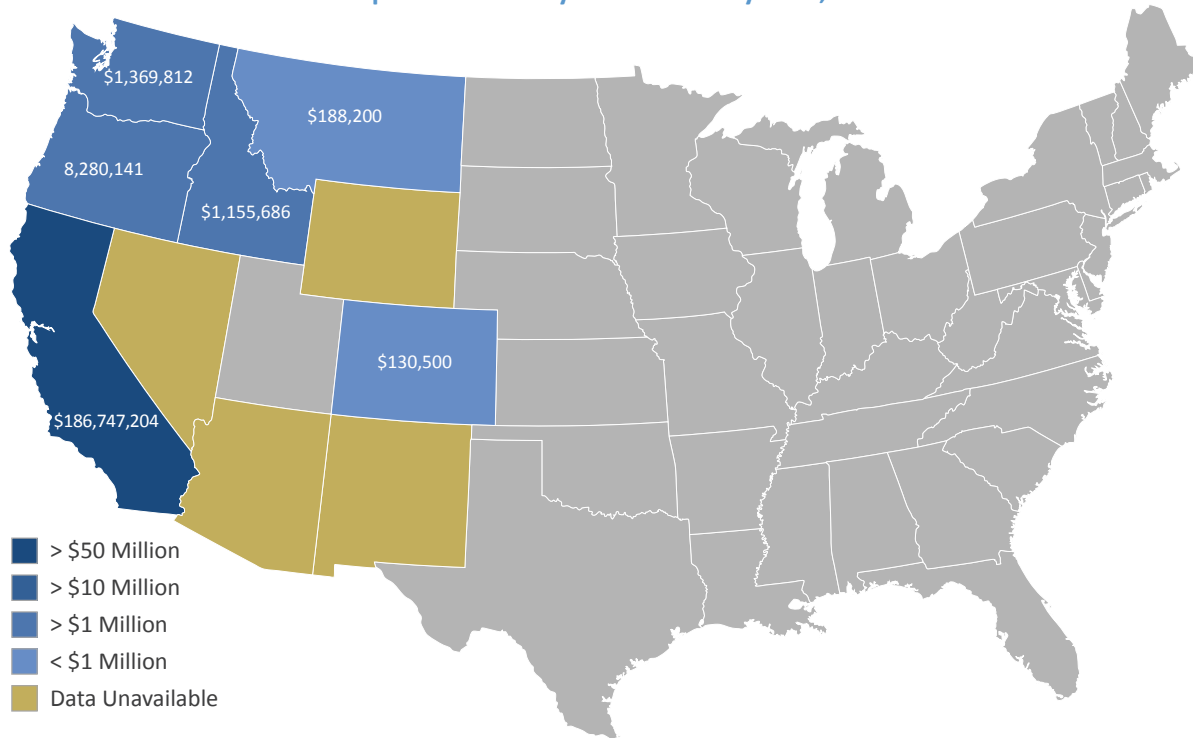
It should be stressed that these figures are conservative ones, and actual transactions are probably higher. Scarborough (2010) estimates that transactions between 1987 and 2007 exceeded \$500 million, adjusted for inflation. Water markets in the region often lack transparency to an extreme degree due to high transaction costs, disconnects between paper claims and actual historical use, and lack of centralized information about prices and trading. In that spirit, this section should be considered only an initial attempt at tracking environmental water markets. Our data comes mostly from personal interviews and survey responses, and also rests heavily on the **Columbia Basin Water Transactions Program** (CBWTP)'s public database.<sup>20</sup> On a final note, since rights are often acquired by non-profit groups and then donated to state trust programs, and our study engaged both, we have been wary of double-counting transactions and have tried to err on the side of conservatism in our aggregate numbers.

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19 An acre-foot is the quantity of water required to inundate an acre of land a foot deep, or about 1.2 megaliters. Note that some programs use cubic feet per second (cfs). Cfs measures volume over time and so isn't strictly comparable to acre-feet, a static measure more commonly used for water that is impounded, such as behind a reservoir. We have not attempted to convert between the two and simply report both. One acre-foot produces roughly 0.5 cfs per day.

20 <http://www.cbwtp.org>

Map 9: Instream Buybacks in 2011 by State, United States



Source: Ecosystem Marketplace.

The majority of instream buybacks take place on a voluntary basis, with state agencies or non-profit groups funding activities essentially as a public good provider, and water rights holders voluntarily selling or leasing their claims. One example of a polluter paying for instream mitigation was found in Oregon, where Portland General Electric and the Confederated Tribes of the Warm Springs Reservation, co-owners of the Pelton Round Butte hydroelectric facility, have established the **Pelton Round Butte Water Rights Fund** to acquire or lease instream water rights or participate in water conservation projects that benefit aquatic habitat, as required under the terms of a 2005 hydroelectric license renewal. In Idaho, the federal Bureau of Reclamation has acquired natural flow rights in the **Snake River Basin** in order to stay on the right side of the Endangered Species Act, based on biological opinions from the National Oceanic and Atmospheric Administration Fisheries. Finally, in California's Central Valley Region, the **Central Valley Improvement Project** since 1992 has been required by the US Congress to restore critical fish and wildlife habitat. Water acquisition efforts to meet that mandate are a joint effort between the US Bureau of Reclamation and the US Fish & Wildlife Service.

Most states have a dedicated body for instream flow rights purchases and leasing (see Table 19). In practice, these take very different forms, as legal frameworks for water rights vary from state to state. Beyond different policies on who can legally hold rights for instream use, varying levels of public support and funding, and the presence of drivers like imperiled species concerns leave us with a range of models and activity levels across the West. Where instream buyback programs are present, there is usually a very motivated conservation group or state agency standing behind them. But on the other hand, regional variation has led to innovation, and in some cases cross-fertilization; Montana's Trout Unlimited chapter, for example, is currently exploring whether Washington's groundwater mitigation banking model might work in their own state (Bates, 2009).

### Emerging Models for Watershed Protection

Beyond state efforts, non-profit groups are becoming the dominant actor in funding instream flow restoration in the US West. We tracked eleven different programs in operation responsible for at least \$3.8 million in payments in 2011, concentrated in the Pacific Northwest. Groups like Oregon's **Deschutes River Conservancy**, **Freshwater Trust**, and **Klamath Basin Rangeland Transactions Program**, **Trout Unlimited's Washington and Montana Water Projects**, Montana's **Clark Fork Coalition**, and the **Colorado Water Trust** have returned at least 282,000 acre-feet to streams in the region since 1995. Conservation groups also commonly act as an initiator and facilitator for contracts between private rights holders and state programs. These groups are often able to leverage their own funds with other financing sources including cost-share arrangements with the Columbia Basin Water Transactions Program (which is funded largely by the Bonneville Power Administration and is a major source of funding for IFT in the West), mitigation funds, state support, and landowners themselves.

**Table 18: State Instream Acquisition/Leasing Programs Active in 2011, United States**

State	Framework
<b>Colorado</b>	The Colorado Water Conservation Board (CWCB)'s Instream Flow Program acquires and holds water rights designated for instream non-consumptive use to protect fisheries, riparian zones, and critical wildlife habitat. Rights are acquired through appropriation and through voluntary leases, loans, sales, and donations. Rights are also often offered voluntarily to the Board, as it is the only entity in the state that can legally hold instream flow rights. Voluntary donations are eligible for a tax credit of up to 50 percent. Private landowners, municipalities, the Colorado Water Trust, and the Nature Conservancy have all donated rights to the CWCB in the past.
<b>Idaho</b>	Idaho's Water Resource Board operates a Water Supply Bank and a number of rental pools to facilitate the marketing of water rights for instream flows and water storage in reservoirs. The "Board's bank" manages natural flow rights and privately held storage. The majority of rental contracts are for irrigation purposes, although a number of agreements have been for the purposes of restoring instream flows (seven out of fifty contracts in 2010, though volume is unclear). Minimum flow requirements or diversion moratoria in some areas have driven Water Supply Bank activity around flow restoration. Roughly ten percent of transactions are parties renting out their own leased water, possibly because the Idaho Water Resources Board is the only entity in the state that can legally hold permanent instream rights.
<b>Montana</b>	Montana's Department of Fish, Wildlife & Parks leases water rights from rights holders for instream flow protection, particularly to address seasonal low flows or drought conditions in tributaries of rivers critical to fish spawning habitats. The leasing program is active only in the 40 streams for which FWP is authorized to hold leases. Leases generally cover water use during the summer and fall seasons e.g. the period of lowest flows.
<b>New Mexico</b>	New Mexico's Strategic Water Reserve, operated by the New Mexico Interstate Stream Commission, may acquire and lease water rights to protect species by restoring instream flows and assist the state in complying with interstate river compacts that govern withdrawals by individual states in a river system.
<b>Oregon</b>	The Oregon Water Resources Department coordinates instream transfers and leases, as well as allocations from conserved water, for flow restoration. Both individual and 'pooled' leases (with groups such as irrigation districts) are held. More than 1,100 instream leases have been signed as of 2009. The Department works both directly with water right holders (whom it does not pay, but only holds rights in trust) and acts as trustee for leases initiated by conservation groups.
<b>Washington</b>	The Washington Water Acquisition Program is a voluntary program to increase stream flows in watersheds with vulnerable salmon and trout populations. A state trust holds water rights acquired through direct purchases, reverse auctions, leases, and donations. The program also works with the state Water Irrigation Efficiencies Program participants to place conserved water in trust.
<b>Wyoming</b>	The Wyoming Game and Fish Department oversees the transfer of water rights to instream flow rights. Activities have largely consisted of the state transferring fish hatchery water rights to in-stream use and the acquisition of water in reservoirs. The first transaction with a private rights holder took place in late 2011, with a landowner agreeing to convert an irrigation right to an instream right in order to protect the unused right from diversion.

Another intriguing model for attracting private-sector funding is the Bonneville Environmental Foundation (BEF)'s **Water Restoration Certificate** project. Every thousand gallons of restored flows from BEF restoration projects represents a single 'Water Restoration Certificate' which private buyers can purchase. Past buyers include the National Hockey League and the Big Sky Brewing company; both used certificates to voluntarily offset their water use impacts. Projects are vetted by the US Fish & Wildlife Foundation and generally implemented on small farmers' lands. Monitoring and technical assistance are contributed by local land and water trusts. Management actions include conservation of agricultural water use and riparian restoration projects. To date projects have been implemented in the Lower Willamette, Middle Rogue, Upper Deschutes, and Upper Missouri watersheds.

### Groundwater Mitigation Activity

2011 saw continued development of a new mechanism in the Pacific Northwest – groundwater mitigation banks to offset new groundwater pumping in basins where groundwater has been over-extracted or is under serious pressure. We identified four such

banks. Driven by moratoria on new groundwater pumping, major new development (low-volume users are exempt) can offset new wells by buying mitigation credits from these banks, which in turn undertake streamflow augmentation activities.

Limited information is available to date about these banks' transaction activities. Under the **Walla Walla Exempt Well Mitigation Program**, new developers pay a fee of \$2,000 for mitigation credits, with three such offsets taking place in 2011. Recent price information (determined by instream lease prices) is available for the **Deschutes River Conservancy's Groundwater Mitigation Bank**, at \$70 per credit or \$126 per acre-foot. The Deschutes River Conservancy also administers a separate **Water Alliance Water Bank** in the basin. And the **Kittitas Water Exchange**, a subset of the larger state water banking program, reported 95 acre-feet transacted in 2011.

Finally, the **Walla Walla Water Bank** allows holders to bank instream and groundwater rights, though no actual financial transaction occurs. "Sellers" can place their water right into a non-use agreement for any amount of time, up to the ten years allotted to this pilot program. The program is voluntary and provides water rights holders a way to preserve their water right for the future without being subject to state 'use it or lose it' policies. Slightly more than 8000 acre-feet have been restored to the basin since 2010 through this mechanism.

## Outlook - Environmental Water Markets: Instream Buybacks and Water Quantity Offsets

### United States

Creating the supporting infrastructure needed for conservation market mechanisms can be a long, expensive process. That's why environmental water markets have attracted our interest: using an existing market (for water rights trading) to achieve ecological goals is a promising way to get quick results and rationalize water allocation in the US West.

### Transboundary Markets

The first transboundary instream buyback initiative we've seen is under development in the Colorado River, where the **Delta Water Trust**, a partnership between the Sonoran Institute, Pronatura Noreste, and the Environmental Defense Fund, aims to raise \$2 million to acquire up to 8,000 acre-feet of water rights from Mexican rights holders to restore flows to the Delta. In Mexico, legal barriers and transaction costs related to rights transfers are lower than in the US.

### Quantity-Quality Crossovers

There is also some intriguing initial evidence that flow restoration might be a means to address water quality pollution. **Clean Water Services**, for example, has met part of their temperature cap via flow augmentation. Similarly, flow restoration in Prickly Pear Creek, overseen by the **Clark Fork Coalition** (formerly the Montana Water Trust) has been one part of the strategy to meet the Lake Helena TMDL in Montana. Where possible, environmental water transactions might offer a way to side-step some of the difficulties of developing water quality trading programs. However, these arrangements are highly dependent on the receptivity of regulators, which varies from place-to-place (Frey, 2011).

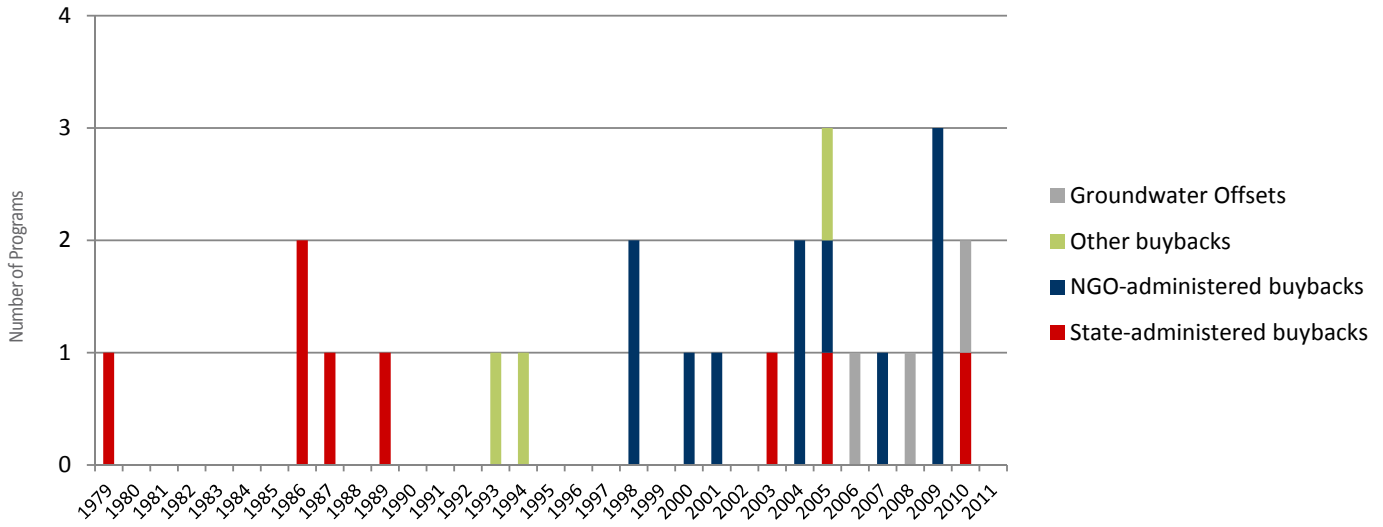
### Market Potential

These transactions remain mostly voluntary, relying on non-profit organizations and state leasing/acquisition programs to act as public good providers of instream flow restoration. Some private companies have stepped up to voluntarily offset their water use, including the National Hockey League and Big Sky Brewery (through BEF's Water Restoration Certificates) and the Deschutes Brewery (through the Deschutes River Conservancy's leasing program). Greater private participation, both voluntary and for required mitigation, would help to diversify the funding mix for flow augmentation.

It should be noted that urban demand for drinking water continues to grow, while agricultural producers are increasingly finding that selling their water rights is much more lucrative than continuing to farm. Where instream flow buyers encounter urban buyers, the former are not likely to outbid the latter. In other words, environmental water transactions are a very effective tool, but they are not a panacea for the West's water problems.

The US also lacks a large guaranteed source of demand like Australia's national water buyback program. Decisions about water law and allocations are largely left to the states, and it is difficult to imagine that a federal 'cap' or buyback initiative would be politically feasible in the West.

**Figure 38: New Instream Buybacks and Groundwater Offset Programs by Year and Type, North America**



Source: Ecosystem Marketplace.



**Table 19: Summary Details, Oceania**

Number of active programs:	5
Number of programs in development:	1
Value of transactions in 2011:	\$149.2 million
Value of transactions 1992-2011:	\$1.8 billion
Units of pollution reduction / volume of instream flow restoration in 2011:	127,822 megaliters; 49.749 salinity credits
Units of pollution reduction / volume of instream flow restoration 1992-2011:	1,280,600 megaliters; 222,581 lbs nitrogen reduction

Source: Ecosystem Marketplace.

## General Status Update

Australia and New Zealand, with a combined population of 25 million and GDP of \$2 trillion, are dwarfed by the European Union (503 million, \$17 trillion) and the United States (314 million, \$15 trillion). Yet Oceania has emerged as a leader in government support for investments in watershed services thanks to ambitious programs, innovative design, and national-level policies.

Australia is home to several long-running water quality trading and instream buyback programs, distinguished by both their large scales and careful program design. Market mechanisms are central to efforts to address two of the country’s biggest freshwater concerns: high levels of salinity and over-withdrawal of water in the Murray-Darling Basin, a major river basin in southeastern Australia and the country’s agricultural ‘breadbasket’ (see Box 6).

All four active Australian programs identified target salinity, either by means of salinity trading programs (the **Hunter River Salinity Trading Scheme**—perhaps the most successful water quality trading program in the world—and the **Murray-Darling Basin Salinity Credits Scheme**) or through augmenting instream flows to dilute salt concentrations in water bodies (the Commonwealth’s “**Restoring the Balance in the Murray-Darling Basin**” initiative, the largest of its kind on the planet, and New South Wales’ “**Water for the Environment**” programs).

Our study also found two programs in New Zealand—one active in **Lake Taupo** and one in development in the **Rotorua Lakes catchment**—which both employ a nutrient trading model to control nutrient pollution. In all cases, government has been the initiator, either providing funding itself or putting the necessary regulatory drivers in place.

Buyers vary by program; in the Murray-Darling Basin Salinity Credits Scheme, states are responsible for managing their respective contributions to salinity in the basin. In the Hunter River trading program, private point-source dischargers such as power stations and mining companies can trade to meet their regulatory obligations.

The Lake Taupo program in New Zealand extends its nitrogen load limits to non-point sources as well, with trade being driven to date by a dairy company and the publicly-funded Lake Taupo Protection Trust, which seeks to reduce overall loads by 20 percent over time by purchasing and retiring nitrogen allowances. These are unique elements; requiring non-point source participation while guaranteeing some minimum level of market activity via the Trust’s purchasing efforts both point to a market that has potential to be both effective and robust.

Instream buybacks are the largest source of market activity in the region. Australia’s national government’s massive water rights buyback program (supported by a similar program at the state level in New South Wales) is the biggest of its kind in the world, with a budget of \$3.2 billion over ten years. Here, the government pays for improvement of instream supplies, buying water allowances on the open market and leaving the water in the river system to restore health to the severely-stressed basin. The buybacks—which are not without controversy—accompany a basin-wide limit (“The Cap”) on diversions, massive investments in irrigation efficiency, and efforts to streamline markets for water rights trading for consumptive uses like irrigation.

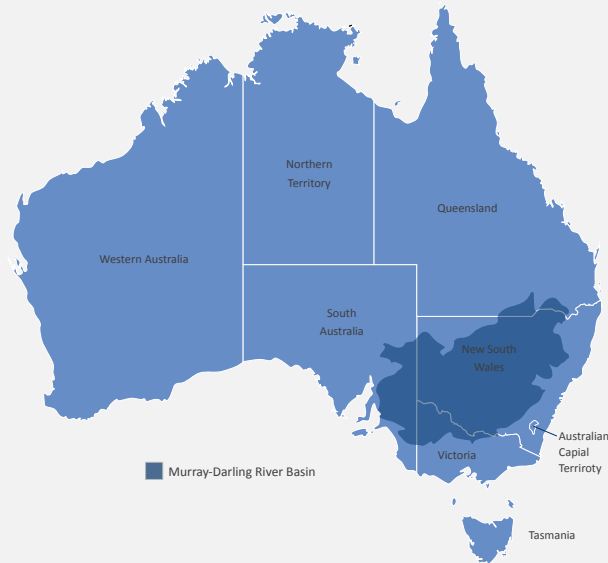
Australia has a rich history of policy experimentation with market-based instruments to achieve its environmental goals for watershed health, biodiversity, and carbon sequestration; several programs that include hydrological services among a targeted “bundle” of ecosystem services are also detailed later in this chapter.

**Box 6: The Murray-Darling Basin, Australia**

At more than 106 million hectares, the Murray-Darling system is a large basin that drains fourteen percent of the country’s land-mass. It spans parts of four states (New South Wales, Victoria, Queensland, and South Australia) and most of the Australian Capital Territory. Any intervention in the basin must consider impacts at the whole-basin level, and Australia is notable in that three of its five watershed payment programs are regional in scale and often require considerable cooperation between states/territories, the Murray-Darling Basin Authority (MDBA)(which reports to the Commonwealth Government), and other governmental bodies.

Years of unsustainable extraction of water from the Murray-Darling basin for agriculture and other uses have also contributed to degradation of the Basin’s ecosystems. Over-withdrawal of water means that instream flows are insufficient to sustain aquatic, riparian, and wetland habitats. Low flows also aggravate water quality pollution problems: pollutant concentrations increase as the water available for dilution decreases.

High salinity levels – referring the concentrations of dissolved salts in water or earth – occur when naturally occurring salts in rocks and sediments are mobilized, often through human disturbances such as irrigation and clearing of vegetation. Excess salinity leads to reduced agricultural outputs, degraded soil structures, and harm to native habitats and aquatic species – all of which are currently being experienced in the Murray-Darling.



**Table 20: Tracking Activity in Oceania, 2008-2011**

	2008	2011 excluding instream buybacks	2011 including instream buybacks
Programs identified	2	4	6
Annual transactions	\$167,149	n/a	\$149.2 million
Annual volume	n/a	49.749 salinity credits	127,822 megaliters; 49.749 salinity credits
Historical transactions	\$356,175	\$727,000	\$1.8 billion
Historical volume	n/a	222,581 lbs nitrogen reduction	1,280,600 megaliters; 222,581 lbs nitrogen reduction

2008 data comes from Ecosystem Marketplace’s 2010 *State of Watershed Payments* report. 2011 figures are presented with and without instream buybacks, which were not tracked in the 2010 report.



# Transaction Activity - Water Quality Trading

## Australia

The **Murray-Darling Basin Salinity Credits Scheme** is a credit and debit mechanism administered under the Basin Salinity Management Strategy (BSMS), a fifteen-year plan to stabilize salinity levels in the basin, which tracks states' respective contributions to salinity in the river system.

Reductions are carried out through long-term land management activities and 'salt interception' projects capturing saline flows (to be disposed of usually via evaporation). These actions are tracked as credits on a basin-wide salinity register maintained by the Murray-Darling Basin Authority BSMS. New development is counted as a debit and must be offset. Offsets are based on the estimated economic value of salinity impacts, and require states to either pay for actions within their own borders or invest in joint works, such as funding salt interception schemes in other areas where projects may be more cost-effective. In 2011, the "A" register posted a total of 49,749 credits, and nearly \$8.8 million was invested in salt interception schemes diverting 324,162 tonnes of salt from the river system.

In New South Wales, the **Hunter River Salinity Trading Scheme** is driven by the 1997 Protection of the Environment Operations Act, which establishes a system of load-based licensing for dischargers like mining companies or power stations that caps pollution emissions and links license fees to environmental impacts.

In order to reduce salinity in the river system, which drains the largest coastal catchment in the state, one thousand tradable discharge credits were initially allocated free of charge to license holders, based on a formula that took into account the environmental performance, salty water by-product, employment and economic output of each license holder. A credit allows its holder to discharge in a river 'block' at times of high flow, determined by flow levels and ambient salinity. During high flow conditions, discharge limits are relaxed. Credit holders can invest in technologies to mitigate salinity and sell their extra credits, or buy credits from each other if they overshoot their allocation.

The program's design allows unusual flexibility and efficiency in credit allocation – a major factor in the scheme's success. A 24-hour online credit exchange allows participants to rapidly take advantage of high flow periods. Credits have different lifespans, with 200 expiring every other year from 2004 - 2012. Two hundred credits, replacing those that expire, are sold at public auction every two years, allowing new businesses in the basin to buy into the market and existing companies to augment their credit holdings as needed. At the 2010 auction, average credit price was \$1660 (up from \$520 at the initial 2004 auction). The Hunter River Salinity Trading Scheme is fully self-financed; an annual fee paid by participants covers the program's administrative costs.

For the trading cycle ending in 2010, low rainfall meant that Hunter River flows were insufficient to allow any industries to discharge. No trades therefore occurred, though results from that year's credit auction totaled about \$320,000. No auction took place in 2011. Proceeds from auctions to date amount to about \$727,000.

## New Zealand

In the **Lake Taupo** basin, a nonpoint-to-nonpoint source water quality trading program has been active since 2009. To date the Lake Taupo Protection Trust and a dairy operation have bought allowances representing nutrient reductions on 19,000 hectares of forested and agricultural lands. Transaction information about the latter, a private contract, is unavailable. The Trust's purchasing to date translates into a total of 222,581 pounds of nitrogen reduction in the catchment. The Trust has paid \$300-\$400 per kg/ha/year, paid out over time.

The Lake Taupo basin program is driven by a nitrogen load cap on agricultural producers, including some indigenous farmers, set out by the public Waikato Regional Council (WRC). The program is unique among water quality trading programs in that all nitrogen pollution in the catchment – both point-source and nonpoint-source – is subject to the cap. Farmers receive tradable nitrogen allowances based on impacts during a single year between 2001 and 2005 which landowners themselves select. The WRC also plans to reduce nutrient pollution by twenty percent via the Lake Taupo Protection Trust's purchasing nitrogen allowances on the open market, with an ultimate goal of retiring 183 tonnes. The Trust is funded by national, regional and local governments.

**Table 21: Active and Developing Programs, Oceania**

Name	Country	Status	Payer Type	Driver	Payment Type	Co-Benefits
New South Wales Water for the Environment programs	Australia	Active	Public good payer	Government initiative	Cash	Biodiversity, Carbon sequestration, Landscape beauty
Restoring the Balance in the Murray-Darling Basin	Australia	Active	Public good payer	Government initiative	Cash	Biodiversity
Murray-Darling Basin Salinity Credits Scheme	Australia	Active	Polluter pays	Mandatory	Cash	
Hunter River Salinity Trading Scheme	Australia	Active	Polluter pays	Mandatory	Cash	
Lake Taupo Trading Program	New Zealand	Active	Polluter pays	Mandatory	Cash	
Rotorua Lakes Trading Program	New Zealand	In Development	Polluter pays	Mandatory	Cash	

## Transaction Activity - Instream Buybacks

The water allowance buyback program, **Restoring the Balance in the Murray-Darling Basin**, is a massive effort that uses existing water rights markets in the basin to dedicate water to instream uses, where increased flows are greatly needed to support aquatic, wetland, and riparian ecosystems. Over ten years, the Australian government plans to purchase \$3.2 billion dollars' worth of water rights – approximately 2,750 billion liters of water each year - in the Murray-Darling Basin. Water entitlements bought by the program will be returned to the river system and its wetlands. Entitlements are purchased from willing irrigators on the open market through regular tenders and some ad-hoc purchasing. Rights are held and managed by the Commonwealth Environmental Water Holder.

As of 30 April 2011, since the program's first year of operation in 2007-2008 the government has bought \$1.7 billion worth of water, representing 977.1 gigalitres. Three new tenders have taken place since for the 2011-2012 year, with \$144 million budgeted to purchase entitlements. Prices per ML of water in the 2011 tenders ranged from \$734-\$1,944.

The policy framework for instream buybacks in Australia is shaped by the Commonwealth Water Act of 2007. The Water Act established the Murray-Darling Basin Authority and instructed it to monitor state and territorial compliance with 'The Cap', a policy that limits diversions from the basin to 1993 levels, or 11,000 GL each year. The MDBA is charged with overseeing a comprehensive Basin Plan including the Water for the Future initiative, which commits over \$12 billion to programs improving irrigation efficiency, purchasing water allowances to restore instream flows (via the **Restoring the Balance in the Murray-Darling** program detailed here), and funding other environmental restoration and infrastructure projects.

The New South Wales government's **Water for the Environment** programs also restore environmental flows through water license purchasing and water savings projects. Current initiatives include Riverbank, a government-supported fund (the first of its kind in Australia) that makes environmental water purchases to restore flows and functions in New South Wales' wetlands and river systems; Water for Rivers which similarly recovers water through water infrastructure investments and water purchases; and the Hawkesbury–Nepean River Recovery Program, which aims to test market trading in a new area and address flow regulation and nutrient loading issues below major supply dams in that river system. The program also aims to protect and incorporate into management the cultural values associated with iconic wetlands in the region by Aboriginal groups. In 2011-2012, 6,822 megaliters (ML) of water holdings were purchased by the NSW government and an estimated \$5.6 million transacted.

## Other Activity

A quasi-water quality trading program can be found in New South Wales in the **South Creek Bubble Licensing Scheme**. This is a ‘bubble permit’ covering three sewage treatment plants in the South Creek area of the Hawkesbury-Nepean River. Under the terms of the agreement with the New South Wales Environmental Protection Authority, the three plants face an aggregate cap on phosphorus and nitrogen, giving them flexibility in how they adjust their individual loads to meet regulatory requirements. No cash actually changes hands, but cost savings through trading are estimated at over \$46 million.

Australia is also home to a number of initiatives financing restoration and protection of a ‘bundle’ of ecosystem services. These programs do not figure in this report’s statistics given the difficulty of parsing watershed services from other targeted services like carbon sequestration and habitat conservation, but are worth discussing in brief.

The National Action Plan for Salinity and Water Quality National (NAPSWQ) began funding a **Market-Based Instruments Pilots Program** in 2003 that provided \$10.3 million in funds for two successive rounds of pilots, some of which remain active in some capacity. Budget for the program came from the national and state/territorial governments. A number of funded projects focused on water quality issues, particularly salinity and nutrient pollution.

State and territorial governments have also provided funding for restoration and conservation using tenders, essentially a reverse auction where landowners submit competitive bids to receive grants for projects. The **EcoTender** pilot in Victoria for example has carried out four demonstration tenders as of 2011. Landowner bids that offer the most significant environmental outcomes most cost-effectively were awarded contracts by the Victoria government’s Department of Sustainability and Environment. In the pilot projects, 72 percent of proposals delivered improved watershed functions. Nearly all tenders enhanced multiple environmental services. Ultimately the pilot has funded \$4.6 million worth of restoration and protection projects on 1684 hectares. No new tenders are planned; DSE now supports regional environmental tenders implemented by catchment management authorities or Landcare Networks. Other Natural Resource Management bodies and catchment authorities have also expressed interest in using tenders and other market-based instruments to fund restoration and conservation projects.

Reforestation and vegetation management activities under the BSMS to control salinity, while not employing any innovative financing mechanism, nevertheless reflect a “natural infrastructure” investment approach. Projects in Victoria, for example, have created and protected native vegetation and forest stands on more than 8,000 hectares to date, in order to enhance groundwater replenishment and limit salt discharges.

## Outlook

A history of policy support and relative success with market-based mechanisms in Oceania suggest continued interest in investments in watershed services in the region, though the overall volume of funding may decline as the Australian government buybacks program for water allowances in the Murray-Darling draws down as planned in 2017-2018.

Programs in the region rely on government backing, either through funding directly or a supportive regulatory framework. That is both a strength and a weakness; investments in watershed services in Oceania have benefitted from significant public financing and policy support, but activity may taper off in future years if and when the government steps back from its role as a public good payer. Commonwealth funding for instream buybacks in the Murray-Darling, for example, has only a ten-year lifespan.

### Australia

In Australia, the Basin Plan and cap on diversions also continue to be quite politically contentious, with some state governments and agricultural interests sharply critical of the buybacks’ effect on food production and local agricultural economies, while on the other hand the South Australian government and environmentalists argue the current goal of 2750 GL is inadequate to restore health to the Basin. States historically have taken a tug-of-war approach to water management in the Basin; the **Restoring the Balance** initiative represents an attempt toward increased centralization and improved cooperation, though progress has been uneven. At the time of this report’s writing, the Basin Plan remains in draft form and subject to revision.

Meanwhile, many catchment authorities and Natural Resource Management bodies have expressed interest in testing incentive-based mechanisms compensating landowners for good stewardship. These initiatives, which often target a bundle of environmental services rather than water quality alone, draw on lessons learned from state- and NAPSWQ-funded demonstrations of environmental tenders.

## New Zealand

In New Zealand, freshwater management is largely the domain of local government. The pollution targets that can drive trading in a water quality trading program in New Zealand are set by regional councils. The central government, however, establishes policy frameworks guiding regional decisions. The national “Fresh Start for Fresh Water” program in 2011 released a National Water Policy Statement that signaled intent to move as a country toward a “limits-based regime” of enforceable quality and quantity limits nationally (New Zealand Government, 2011). These targets would be a useful tool for regional authorities interested in mechanisms like nutrient trading and instream buybacks.

A nitrogen trading program modeled on the Lake Taupo market is also in development for **Lake Rotorua**, one of thirteen major lakes in the Bay of Plenty region. The lake has significant cultural and tourism values but has steadily degraded as land use around the lake has intensified in recent decades. The Regional Council (BoPRC) has set water quality targets, upgraded sewerage and stormwater systems, and addressed harmful land management practices. Still, further intervention is needed to control nitrogen and phosphorus discharges. A nitrogen trading program is being planned with initial funding expected to come from the BoPRC and several government ministries and credits generated by private landowners in the catchment.

# The Global Outlook



## Charting New Waters in 2012 and Beyond

We've seen watershed payment programs nearly double in number and geographic spread over the past four years. These four years have also seen government cutbacks, austerity measures, down-sized corporate environmental departments, and unprecedented economic and political uncertainty, including the largest global recession in recent memory.

Such continued growth in management systems for a natural resource in the midst of a major global economic downturn should be raising eyebrows. Leaders and communities around the world are recognizing water security as a serious problem and taking creative steps to address it.

This report attempts to capture activity that has taken place over the course of a year, 2011, that is already in our past. But in our research, we've also come across new developments, ongoing trends, and future projections. In this section, we summarize the most important of these.

### The Good News

Our survey turned up nearly half as many programs in development as those that are active. If history is any guide, some of these may not reach the implementation stage, whether due to policy change, lack of demand or supply, low stakeholder engagement, or – too often – lack of a sustainable financing mechanism once the initial grant or capital funding runs out. But interest in IWS clearly continues to grow, with countries like Gabon, Ghana, Kyrgyzstan, Malawi, Bulgaria, and Romania in line to implement their first IWS in 2012 and the coming years.

### Key Program Trends to Watch for in 2012 and Beyond

**China's embrace of "eco-compensation" is an unprecedented use of incentives for watershed protection.** 91% of payments tracked in 2011 originated in China, and investments in watershed services are expected to grow even more, as eco-compensation settles into its new role as a key element of environmental policy in the most recent Five-Year plan and new land-zoning framework, a new national 'eco-compensation' ordinance, and ramped-up government funding for pilots.

**Water funds show no sign of slowing down in Latin America.** We've tracked eight new funds since our 2008 baseline, and another seven set to launch in 2012 and beyond. A new \$27 million dollar partnership between The Nature Conservancy, the FEMSA Foundation, the Inter-American Development Bank and the Global Environment Facility aims to have 32 funds capitalized across Latin America by 2015.

**Latin American transactions overall are expected to see a jump in 2012.** Between new water funds coming online and increased funding for national programs like Mexico's **PSAH** and Ecuador's **Socio Páramo**, relatively modest activity in Latin America appears to have turned the corner in 2012 based on our initial tracking.

**Water quality markets in the United States are expected to see a 2012 bounce** as well, with an uptick in overall economic activity and a surge of regulatory drivers behind new growth. New water quality standards in the Chesapeake Bay watershed made themselves felt in 2012. Trading is expected to kick off in the near future in the **Ohio River Basin**, the first interstate water quality trading program under a single set of rules. We're also tracking the emergence of a new player in water quality trading: private nutrient banks, which are repurposing the wetland banking model for nutrient credits. In Virginia, banks look to have quadrupled in number in 2012 and been behind a big piece of trading activity in the state.

**Transboundary programs are slowly emerging.** We tracked a developing program in the **Danube Basin**, as well as a new effort to restore instream flows in the **Colorado River**, which flows from the United States into Mexico, with a coalition of American and Mexican NGOs working together to secure instream flow rights.

**Increased experimentation with stacking and bundling of multiple ecosystem services is everywhere.** We've heard about streambank credits in Georgia, programs linking with carbon in Indonesia, bundled payments for landscape beauty by tourism operators in Vietnam, and more. While in 2011 payments still tended to come from 'inside' existing programs – that is, from the same buyers that also paid for watershed services, rather than new sources of financing – in 2012 and beyond we expect to see increased cross-investment between ecosystem markets. We've heard about pollinator credits stacking with water quality, wetland banks pursuing both carbon and nutrient accreditation, water funds linking to international carbon markets, and more.

**Climate risk adaptation and mitigation are increasingly cited as a driver of watershed investment.** Protecting water supplies from climate change effects like natural disasters, glacier melt, and food insecurity were much more frequently reported as program drivers than in our last survey, though it's not always clear how these concerns are translating into management. Better information about how IWS can increase resilience to climate effects and natural disasters and the cost-effectiveness of doing so will likely strengthen the usefulness of IWS mechanisms as a tool for communities in long-term planning. IWS as a risk mitigation strategy is already being taken up in locales from New York City and Denver to Peru and the Philippines.

## ... and the Bad News

**We have seen little movement from the private sector to tackle their water-related risk.** Fifty-three programs tracked use some private sector funding, but these are nearly always regulation-driven and public or NGO-initiated. This trend is echoed in a recent Deloitte report (CDP Global Water Report) showing that over half of responding Global 500 companies report having experienced water-related challenges, yet are failing to take action to improve water stewardship (except for a few progressive and clearly exposed businesses, namely certain beverage companies). This speaks to both the need for more private sector action but also better engagement of the private sector by government, better policy and regulatory frameworks, and better assessment and management tools that can make IWS a workable strategy for water resource management.

**In many regions and particularly Africa and Latin America, new or developing programs identified in 2008 no longer existed by 2011.** This seems to be directly linked to initial grant monies running out and programs struggling to stay operative thereafter. Of course, sometimes an IWS mechanism may simply not be appropriate to a given locale or water resource problem. But it's an unwelcome trend nonetheless, and underscores how long-term financing and local ownership are essential.

**Survey responses suggest that socio-economic monitoring is relatively rare.** Only sixteen cases of monitoring these impacts were reported. In contrast, 126 programs confirmed that environmental monitoring takes place.

## The Bottom Line

We hope you'll come away from this report convinced of two things: firstly, that the widespread adoption of ecological investment mechanisms is a key part of any strategy for ensuring secure and sustainable water systems – and secondly, that accurate tracking of these financing mechanisms and making information about them freely available to decision makers around the world is crucial to timely and widespread adoption. The latter conviction drives this report and the rest of our work at Ecosystem Marketplace.

The global landscape in 2011 looks very different from what we found in 2008 in our first report. Water insecurity has sharpened the need for scaling up investment in our ecological infrastructure, while patchy global economic growth has underlined the need to do so cost-effectively.

This report tracks a rich and diverse portfolio of programs around the world that have found creative ways to finance safe drinking water and instream supplies. Models for watershed investment have both multiplied and matured since our last report, and show great promise in 2012 and beyond.

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