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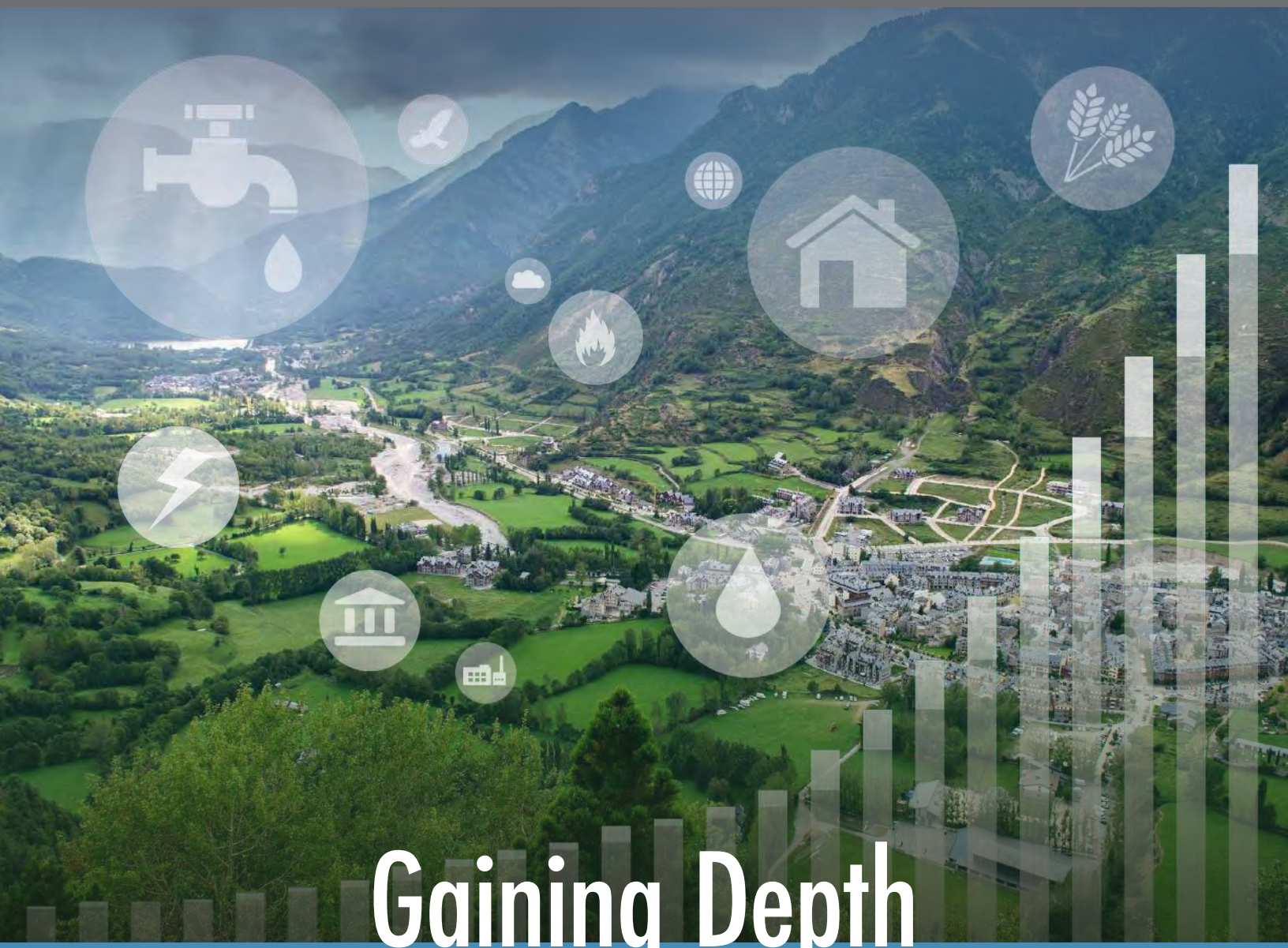

Gaining Depth

State of Watershed Investment 2014

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About Forest Trends' Ecosystem Marketplace

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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Forest Trends is a Washington, DC-based international non-profit organization whose mission is to maintain, restore, and enhance forests and connected natural ecosystems, which provide life-sustaining processes, by promoting incentives stemming from a broad range of ecosystem services and products. Specifically, Forest Trends seeks to catalyze the development of integrated carbon, water, and biodiversity incentives that deliver real conservation outcomes and benefits to local communities and other stewards of our natural resources. Forest Trends analyzes strategic market and policy issues, catalyzes connections between producers, communities and investors, and develops new financial tools to help markets work for conservation and people.

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Gaining Depth

State of Watershed Investment 2014

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Executive Summary

Introduction and Key Findings

Last year, governments, businesses, and donors channeled $12.3 billion (B) toward nature-based solutions to the global water crisis. Water users and public funders were paying land managers to repair and protect forests, wetlands, and other natural systems as a flexible, cost-effective strategy to ensure clean and reliable water supplies, resilience to natural disasters, and sustainable livelihoods. These deals paid for watershed protection and restoration across more than 365 million (M) hectares (ha) worldwide in 2013, an area larger than India.

The value of *investment in watershed services*[1] *(IWS)* – referring to funding for *watershed* restoration or protection that delivers benefits to society like aquifer recharge or erosion control – has been growing at an average rate of 12% per year. The number of operational

Box 1: Key Findings

- In 2013, governments, businesses, and donors channeled **$12.3B** toward nature-based solutions to the global water crisis that rehabilitated and/or protected more than **365M** ha of water-critical ecosystems worldwide.
- At least $7.3B or 59% of this value flowed to programs compensating landowners for sustainably managing their farms, forests, and other productive lands. IWS delivered important income support for an estimated **7M households** that received payments and co-benefits (such as increased harvest revenues) in 2013.
- The number of projects reporting environmental outcomes **nearly tripled** (from 77 in 2011 to 219 in 2013), as developers worked to demonstrate their projects' utility and return on investment (ROI). Altogether 54% of projects reported on monitoring and evaluation practices for hydrological and other biophysical outcomes in 2013, up from 40% in 2011.
- By value, the field was still dominated by national public subsidy programs, which account for more than 88% of funding – and which came primarily from Chinese government agencies. Investment by water users with significant dependencies on healthy watersheds was still relatively low. Water utilities' engagement with IWS grew considerably in recent years (to $8.9M in 2013) but remained small relative to the sector's risk exposure. The energy and agriculture sectors similarly had very low participation rates as buyers, collectively investing around $18.2M in 2013 – or less than 1% of global transactions. This under-investment suggests that **nexus risks and dependencies** (i.e., vulnerabilities related to shared resource dependencies between our water, energy, and food systems) are not being fully managed. One third of buyers report using nature-based solutions either to manage agricultural water use and pollution, or to build resilience against storms, flooding, and wildfire. But other nexus challenges that often hinge on watershed health, like food security and water-related energy risks, have attracted little investment.
- Meanwhile, companies in the **food and beverage** industry contributed nearly one-quarter of all private sector investments ($8.8M). Driven primarily by concerns for water quality and future supply, 88% of buyers in the food and beverage industry acted voluntarily, compared to the private sector average of 31%.
- Leaders in the field **refined program design** in 2012-2013, aiming to better demonstrate ROI to buyers and investors, and to deliver new tools like project development standards and natural capital accounting approaches. National governments also revamped public subsidy programs, linking payments to performance (as in Mexico) and leveraging millions in private-sector contributions (in South Africa).

[1] Terms in *blue italics* are defined in the Glossary on page xxvii

Box 2: Scope – Investigating Demand for Natural Infrastructure for Water

This report tracks a range of financial mechanisms utilized by buyers and suppliers of *watershed services*, which are the water-related benefits that healthy landscapes provide to society. Water resource managers often find that it is more cost-effective to manage problems like pollution or floods at their source – on the natural landscape – rather than only through built infrastructure such as storm walls or treatment plants. Forests or wetlands, for example, naturally filter out pollutants, regulate river flows, recharge groundwater, and absorb flooding.

By tracking funding flows between buyers and sellers, we can estimate the scale of demand for watershed services worldwide and their perceived value.

Throughout this report, we distinguish between *buyers* – who make payments to operational programs for watershed services – and *program investors*, who contribute initial capital to develop programs. The term *investment* (as opposed to *program investment*) is used more broadly throughout the report to refer to any funding flowing from buyers to operational programs.

programs grew by two thirds between 2011 and 2013, expanding in both scale and sophistication as program developers introduced new tools to track returns on watershed investment, coordinated efforts across political boundaries, and delivered additional benefits like sustainable livelihoods and biodiversity protection.

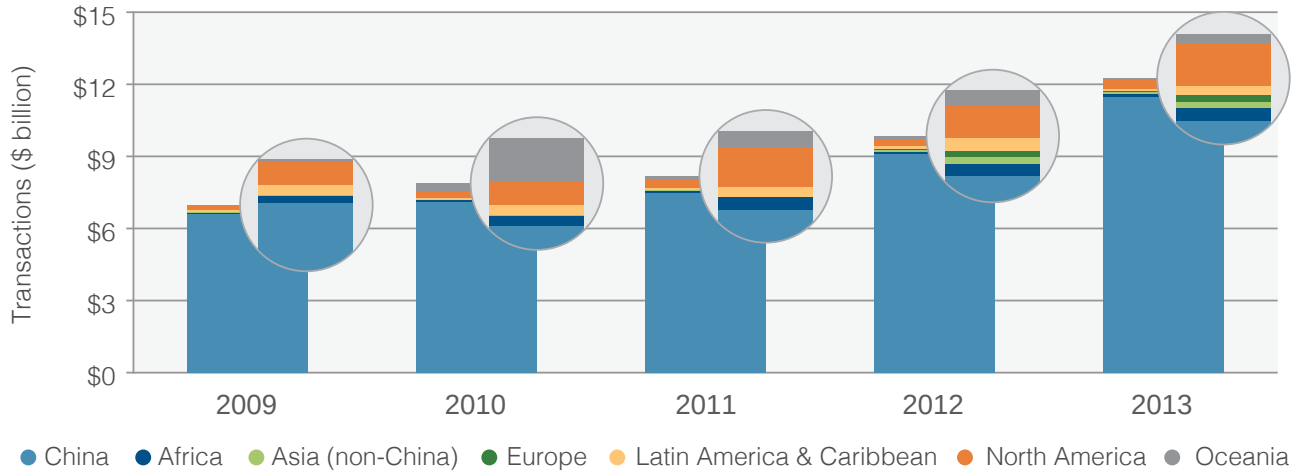
Outcomes: Watershed Investment in 2013

In 2013, $12.3B invested in natural infrastructure for water, led by Chinese government spending

Total watershed investment reached $12.3B in 2013, up from $8.2B tracked in this 2011 report edition. At least 72% of 2013's market value (or $9.9B) was the result of national government actions, ranging from direct national government funding for IWS programs to the implementation of high-level policies that direct funds toward IWS, such as Vietnam's Payment for Forest Environmental Services program.

As in previous years, China continued to pour billions of dollars into compensation for watershed restoration and management (Figure 1). Like China, South Africa and Ecuador also steadily ramped up program budgets for national-scale IWS initiatives. By contrast, large national programs in Australia, Costa Rica, Mexico, and the United States saw funding fall slightly in 2013.[2]

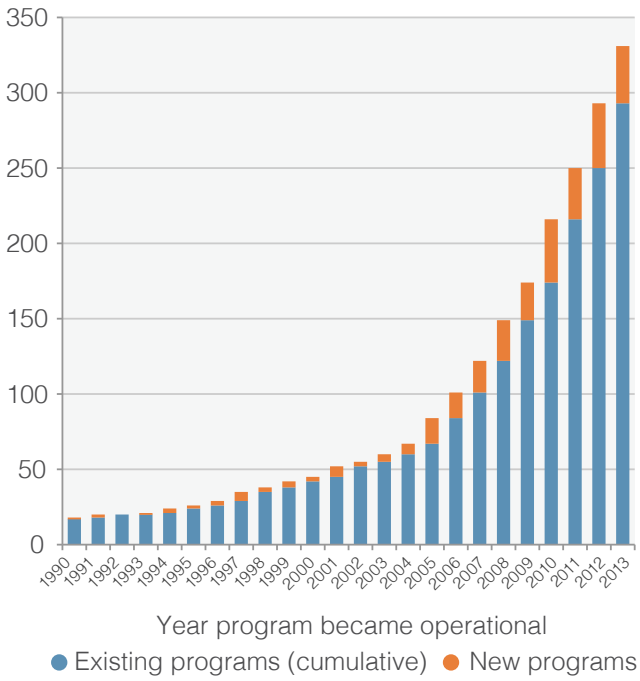
Figure 1: Value of Global IWS by Region, 2009-2013



Note: Based on 454 programs tracked, valued at $12.3B in 2013.
Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

[2] Ecosystem Marketplace collected data on 2010-2011 via a 2014 survey effort; data was last collected in 2012 for 2010 2011.

Figure 2: Count of Newly Operational Programs, 1990-2013



Notes: Start dates were not reported for all 403 active/pilot programs in our dataset.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Program development: Surge in new programs, with private landowners the main suppliers and beneficiaries

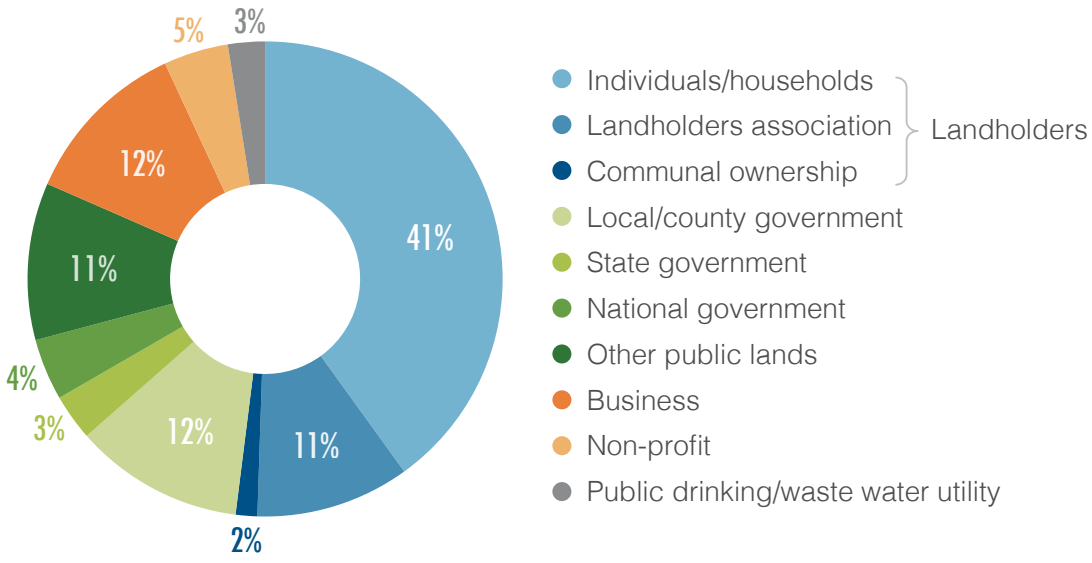
This report tracked 345 active programs worldwide in 2013, seeing operational program numbers grow by two-thirds from those tracked in the 2011 report edition (Figure 2). Overall, this represents a 14% annual growth rate in the number of new programs financed and reported since 2008 (the earliest year for which transaction data is available).

Landholders remained the biggest beneficiary of IWS worldwide (Figure 3), seeing at least $7.3B transacted to more than 7M households in exchange for sustainable land management that protects watershed health. The significant value of investment on privately held lands points to the fact that IWS, especially when administered by the public sector, is often structured to deliver both conservation and livelihood benefits. One in every four programs active in 2013 provided suppliers with technical training, inputs (such as seedlings or tools), or tenure security as a reward for participation. The public sector was the second-largest supplier, with public lands comprising 30% of total hectares managed for watershed values.

Land area impact: Programs impacted more than 365M ha worldwide

IWS delivered finance for watersheds spanning more than 365M ha worldwide, an area larger than India. Program developers favored activities supporting

Figure 3: Proportion of Suppliers by Type, 2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Table 1: Land Area Funded and Managed for Watershed Services, 2013

Total area in 2013	Sustainably managed productive lands	Multifunctional landscapes	Restoration/ protection of natural areas	Urban green infrastructure
365M ha	176M ha	142M ha	46M ha	98,800 ha
An area roughly equal to…				
India 	Libya 	Peru 	Sweden 	Berlin

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

sustainable management on 176M ha of "productive lands" (i.e., agricultural lands and forests responsibly managed for wood and non-timber products) (Table 1), pointing both to landholders' mutual interest in reliable, clean water supplies and buyers' attraction to productive lands' potential for multiple, stable revenue streams. Other program developers combined multiple strategies – restoration and protection as well as sustainable agriculture and forest management – on 142M ha.

Regions: High-level leadership wobbles, while programs on the ground seek scale

Global investments still dominated by Asia

In **Asia**, China's leadership continues to embrace eco-compensation programs to mitigate environmental damages and build local capacity for natural resource management. Chinese government spending ($11.5B) accounted for 94% of IWS reported in 2013; since 1999, the country has spent an estimated $41.6B. Recent years also saw Vietnam's new national Payment for Forest Environmental Services program accelerate from 0 to 60 mph. In 2013, water users like hydropower operators and utilities collectively paid $54M to Vietnamese forest-based communities for watershed services.

South Africa leads in Africa, with a new focus on leveraging private funds in 2013

In **Africa**, South Africa's "Working for Water" program continued to scale up, leveraging more than $10M from private-sector partners in 2013 alone. But elsewhere on the continent, progress in launching stable IWS mechanisms remained elusive due to difficulty securing buyers and a frequent lack of policy support for natural infrastructure investment. Recent interest in *natural capital accounting (NCA)* among African national governments, including the ten country signatories to 2012's Gaborone Declaration – which committed countries to integrating natural capital assets into their national accounting systems – may draw high-level attention to natural infrastructure investment, however.

Water Framework Directive drives investment in Europe

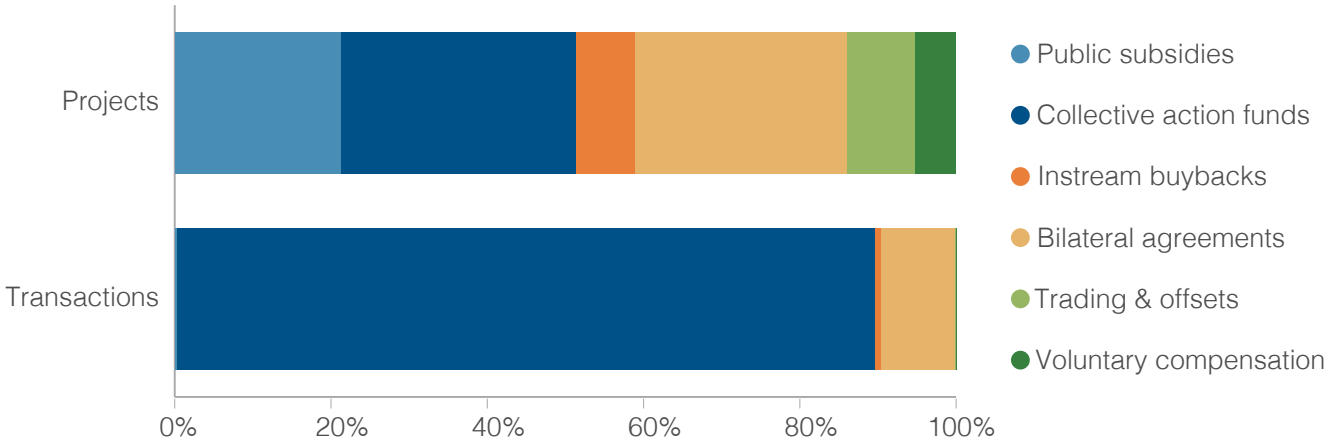
In **Europe**, 2013 saw tightening standards under the EU Water Framework Directive drive strong interest in natural infrastructure, especially among UK-based private water utilities seeking cost savings. EU decision-makers also passed an array of IWS-friendly policies, including a new Green Infrastructure Strategy integrating natural infrastructure into existing agricultural and regional funding mechanisms and a new EU financing facility for publicly and privately led natural infrastructure projects. However, political uncertainty and uneven country-level commitment to implementation could limit the reach of these initiatives.

Water funds show strength in Latin America

In **Latin American and the Caribbean**, virtually all growth in transactions in 2012-2013 was driven by mid-sized programs (defined as transacting between $500,000-$1M/year), led by ever-multiplying water

Figure 4: Comparison of Project Types (by Count) and Funding Sources (by Value), 2013

% share of all active/pilot programs; % share of total transaction values



Note: See the Watershed Investment 101 chapter for an explanation of the program types in this figure.
Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

funds. Peru and Colombia both passed ground-breaking legislation supporting watershed investment in 2013, the effects of which will be felt in the coming years.

Funding flowed to forests and water quality markets in North America

In **North America**, *water quality trading* hit a $10.7M "high" last year, as markets gained scale and new actors entered the scene, including private entrepreneurs developing credits for the market. Cost-share agreements to manage wildfire risk on the United States' forested public lands also flourished, though the country still faces an enormous backlog of restoration needs on public lands, covering as much as 48M hectares.[3]

In Oceania, Australia steps back from public watershed investment

Oceania saw the value of domestic watershed investment slip, as a change in Australia's government hastened budget cuts for programs to restore water to the Murray-Darling Basin. But at a smaller scale, water quality trading and nascent municipal stormwater offset programs reported transacting nearly $1M in their first two years of operation.

Watershed Finance: Who's Investing and Why?

Programs pursue financial stability through buyer diversity, collaboration

IWS still relies mainly on *public subsidies* for watershed protection, which in 2013 accounted at least 88% of funding globally (Figure 4). But programs have diversified their financing structures over the last two years, seeking a broader funding base in light of financing challenges encountered in other environmental markets (like the cash-strapped global carbon offset market) and taking advantage of a growing body of experience with water fund models. Notably, *collective action funds* – which pool multiple program investor contributions – made up one of every three new programs, a departure from past years when simpler *bilateral deals* were the norm. Such funds were particularly active in Latin America, where water trust funds attracted more than $65M in long-term watershed project finance.

Private sector: Watershed investment by business totaled $41M in 2013

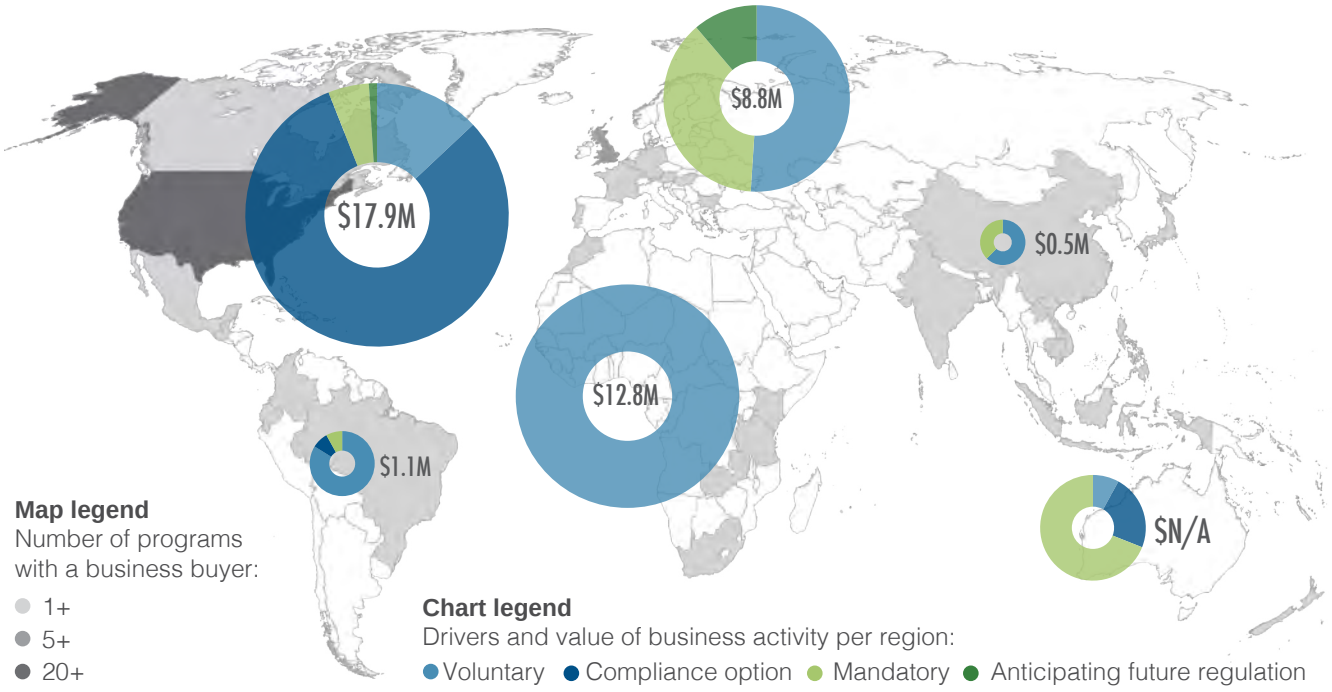
Meanwhile, business demand for watershed services picked up last year, as the private sector spent $41M on IWS activities, up from an estimated $19-26M in 2011.[4] The bulk of business investment – over 95% – was in

[3] The Nature Conservancy. 2013. *Restoring America's Forests.* Accessed at http://www.nature.org/ourinitiatives/habitats/forests/restoring-americas-forests.xml.

[4] Forest Trends' Ecosystem Marketplace. 2013. *State of Watershed Payments: Executive Summary for Business.* Available online: http://www.forest-trends.org/publication_details.php?publicationID=4159.

Figure 5: Business Activity by Region

(Value of Transaction by Driver and Number of Active/Pilot Programs with a Business Buyer by Region)



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

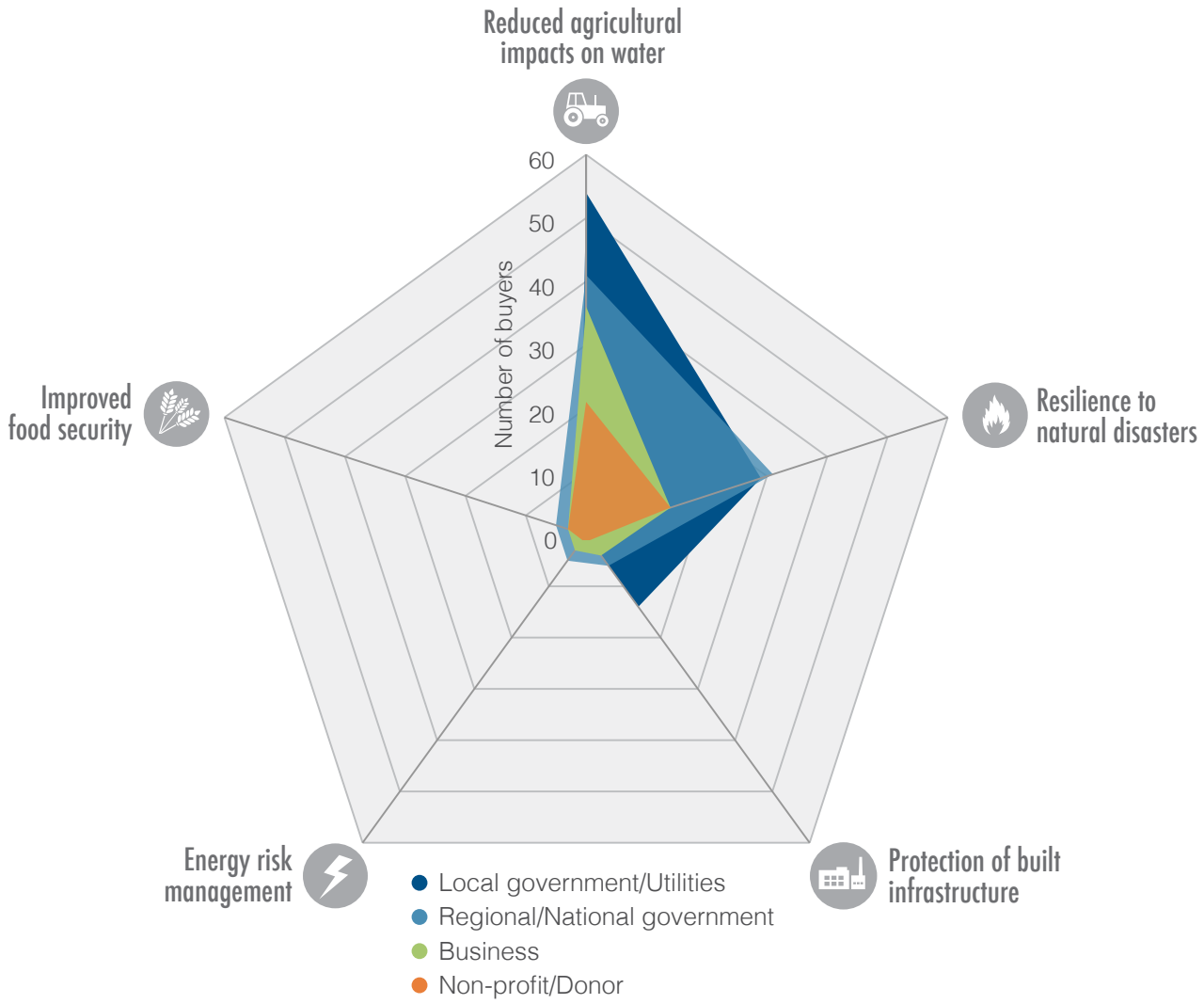
Table 2: Top Investment Motivations by Buyer Sector, 2013

	Business	Local government	State/Provincial government	National government	NGOs/ Donors	Drinking water utilities	Waste water utilities
1.	Regulatory compliance	Water quality risks	Water quality risks	Water quality risks	Water quality risks	Regulatory compliance	Regulatory compliance
2.	Water availability risks	Water availability risks	Water availability risks	Water availability risks	Water quality risks, Biodiversity protection	Water availability risks	Cost abatement
3.	Water quality risks	Regulatory compliance	Biodiversity protection	Biodiversity protection	Local livelihoods	Wildfire risk	Water quality risks
4.	CSR/Reputational risk	Biodiversity protection	Regulatory compliance	Wildfire risk	Wildfire risk	Regulatory compliance	Water availability risks
5.	Biodiversity protection	Local livelihoods	Local livelihoods	Local livelihoods	Climate change risk	Protection of existing or planned infrastructure	Weather-related risks

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 6: Water-Energy-Food Drivers for IWS by Buyer Type and Motivation

(Number of Buyers by Profit Status)



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

North America, Africa, and Europe, driven in large part by regulatory frameworks facilitating IWS (in North America and Europe) and governments successfully leveraging private-sector contributions (in South Africa) (Figure 5).

As in previous years, the beverage industry and private water utilities were leaders in the field, with at least $8.8M in transactions reported by beverage companies and $8.9M by water companies. The Coca-Cola Company and its partner bottling companies stood out in 2012-2013, involved in 20 IWS programs around the world as both initial program investors and ultimately buyers of at least $2.2M in watershed services to date. Beer giant SABMiller and its subsidiaries also invested in *water stewardship*, valued at $1.3M at five sites in Africa, Asia, and South America. The food and beverage industry is unique in that the majority of buyers (88%) pay for watershed protection voluntarily – compared to the private-sector average of 31%.

Private-sector energy companies (here referring to the extraction, processing, generation, and distribution industries as a whole) spent $9.3M on IWS in 2013, mainly spurred by regulatory requirements (which drove 93% of this sector's spending last year).[5] Despite relatively high spending compared to other private

[5] Altogether, public- and private-energy spending in the energy sector amounted to $59M in 2013, mainly driven by Vietnam's national policy requiring major water users like hydropower operators to compensate landholders for forest management.

-sector buyers, the energy industry accounted for only 4% of buyers overall.

Other sectors – often despite significant risk exposure[6] – appear to be less engaged in IWS strategies. The agricultural/forestry/fisheries sector reported even lower participation than the energy sector, with <1% of buyers and only an estimated $35,000 reported in transactions in 2013.

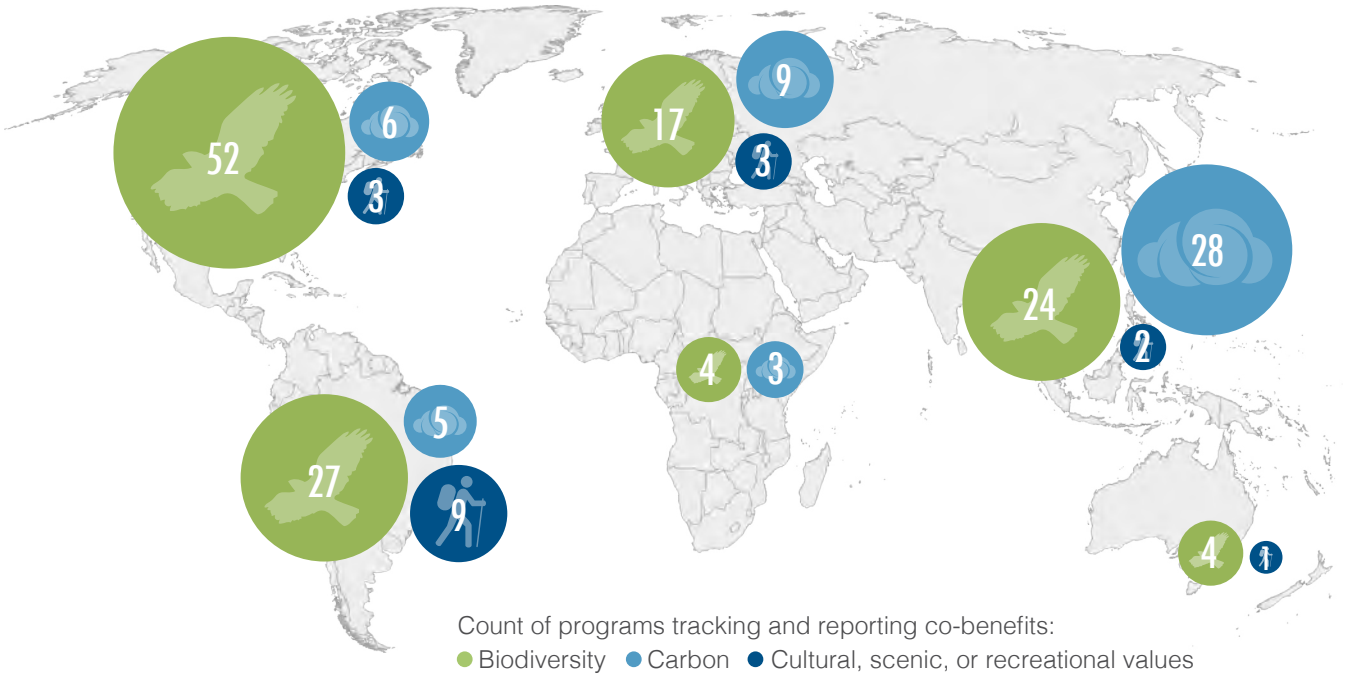
Motivations: Water quality and availability remain primary drivers for 94% of buyers

Watershed investments are driven by a host of interests and concerns related to water quality and availability, corporate reputation, cost savings, and biodiversity protection – among others. In 2013, the desire to ensure water quality and address availability risks drove the largest volume of watershed investment (Table 2).

Other investment motivations varied by sector. Natural infrastructure solutions are typically attractive to buyers because of their holistic potential to deliver multiple benefits beyond water security – including supporting water, energy, and food systems at an integrated landscape scale. Utilities and cities reported using natural infrastructure to extend the life of built infrastructure by slowing sedimentation rates in hydropower reservoirs or reducing water treatment systems' workload. Businesses, in contrast, were driven to comply with or prepare for regulatory requirements, as well as by corporate social responsibility (CSR) motives, while NGOs were especially attracted to IWS' additional social and environmental benefits (i.e., "co-benefits") like supporting sustainable local livelihoods and bolstering climate change resilience.

Experts acknowledge that energy, food, and water systems will require tremendous investment to keep pace with growing demand and climate pressures in the coming decades. Even more importantly, all of these systems are deeply interdependent, a relationship known as the water-energy-food-climate "nexus." What is often missing from discussions about this "nexus" is the recognition that natural infrastructure plays an important role in addressing water, energy, and food security challenges in an integrated way, allowing societies to manage and minimize trade-offs, maximize resilience in the face of changing conditions including

Figure 7: Count of Programs Tracking and Reporting Co-Benefits by Benefit Type and Region, 2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

[6] Carbon Disclosure Project. 2013. *CDP Global Water Report 2013.* Available online: https://www.cdproject.net/cdpresults/cdp-global-water-report-2013.pdf

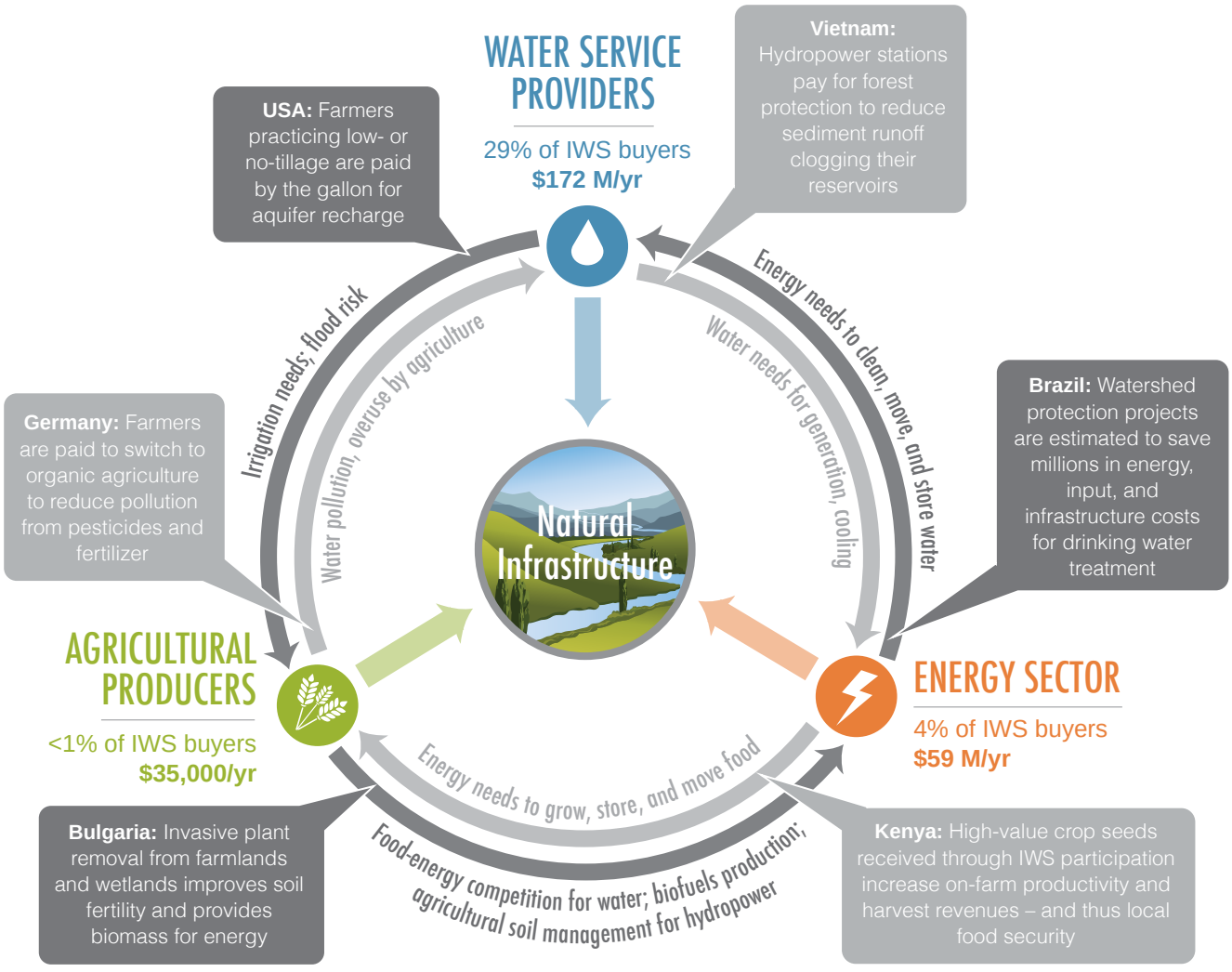
climate change, and create sustainable solutions that are "wins" for water, energy, and food security.

We find evidence of buyers already managing these interrelated issues with IWS strategies – 21% of buyers in 2013 aimed to reduce agricultural water use and pollution, and 12% said they planned to use nature-based solutions to increase resilience to flooding, wildfires, and other natural disasters (Figure 6). But other nexus challenges, including ensuring sufficient agricultural production for growing populations, managing water-related energy risk, or complementing built infrastructure with resilient "green" elements, received little attention from buyers in 2013. Overall, survey results indicate less activity from private-sector buyers than from public-sector buyers, who have shown more interest in using natural infrastructure strategies to manage agricultural impacts and increase disaster resilience.

Co-finance: Enthusiasm for environmental co-benefits, but little additional funding

Both buyers and project developers expressed enthusiasm about the potential of IWS to deliver "co-benefits" like wildlife habitat protection and carbon sequestration. A full 128 programs manage their lands for increased biodiversity values – predominantly in North America where cities' protection of forested watersheds and *instream buybacks* initiatives have strong habitat benefits. Another 51 programs say they manage their lands for carbon storage performance (Figure 8). Altogether, programs with biodiversity and/or

Figure 8: Nexus Investments in Natural Infrastructure for Energy, Agriculture, and Water



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

greenhouse gas targets accounted for more than $6.1B in transactions in 2013, spanning 242M ha.

Multiple benefits are a frequently cited reason for choosing watershed protection over (or in tandem with) built water infrastructure. Some program developers report that the presence of co-benefits tips the balance (sheet) in favor of nature-based strategies in a cost-benefit analysis.

Emerging Trends: Issues and Challenges

Natural infrastructure investment for energy and food security low, relative to risk exposure

While water systems managers are increasingly supportive of nature-based strategies and nearly a third of watershed investment flows to sustainable agriculture, the energy and agriculture sectors' investment doesn't reflect their actual dependence on healthy watersheds and tremendous water risk exposure.[7] Climate risk also appears to be on most programs' back burner, with relatively few programs or buyers driven by or considering climate change in their design (only 16% of active/pilot programs). These imbalances mean that energy and food systems' reliance on watershed health may not be matched with sufficient awareness and investment flowing back into natural infrastructure assets (Figure 8).

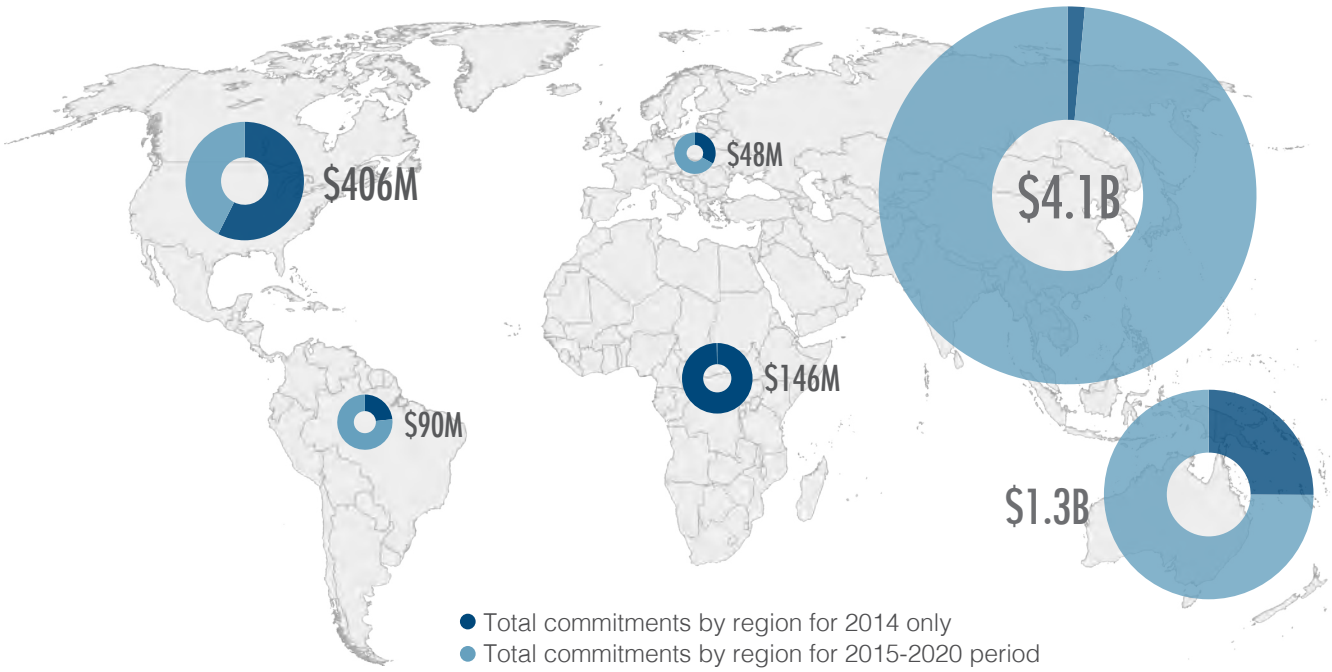
Forty-two percent of buyers already committed future funding, but finance gap persists

Survey respondents on the demand side reported committing an additional $6B to support program activities in future years (Figure 9) – mostly via government budgets in China, Australia, and South Africa – including $904M that buyers reported committing to programs in 2014 alone. This "future finance" figure is likely an underestimation, as 42% of buyers say they have committed to additional transactions, but only 18% reported specific figures.

Unstable finance and legal barriers slow program growth

Despite what appears to be a strong showing among buyers to commit to future funding, program developers routinely cited a lack of buyers and early-stage capital for project development as among their greatest challenges. Indeed, early-stage financing of programs predominantly remains dependent on government and foundation grants to get programs off the ground. In only one third (58) of reporting programs did watershed service buyers fund the program's initial design. Market participants suggest that under-investment may be linked to uncertainty around long-term regulatory drivers for IWS, as well as a lack of clear information generated by programs about ROI. Reflecting this,

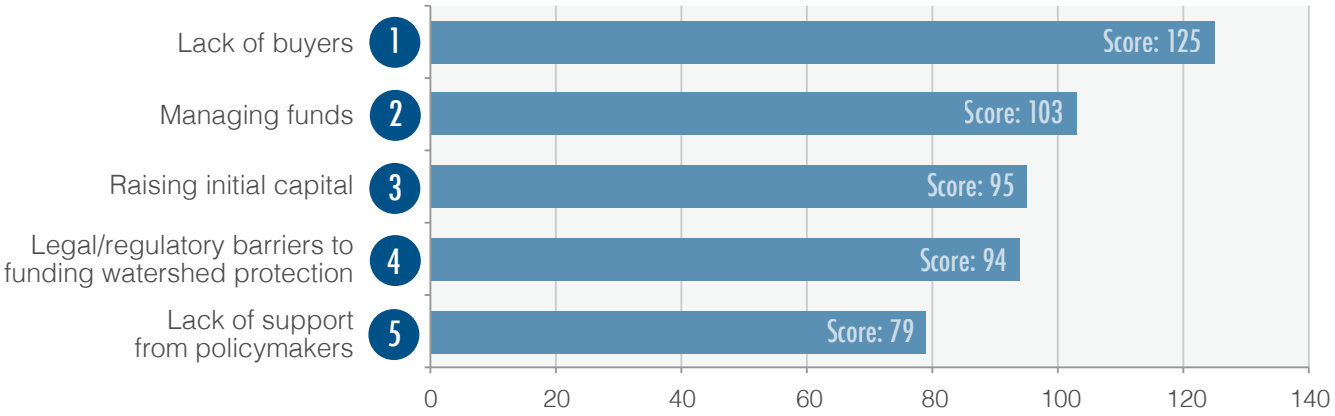
Figure 9: Funding Commitments 2014 and 2015-2020 by Region



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

[7] Ibid.

Figure 10: Top Five Challenges Reported by Program Developers



Notes: Scores for program challenges were calculated based on number of programs reporting that challenge, multiplied by the rank (1-5) assigned by the respondent. For this group of survey respondents, theoretically the highest score possible was 415.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

survey respondents ranked difficulties in getting policy and regulatory support close behind obtaining access to early finance in their ranking of key market challenges (Figure 10).

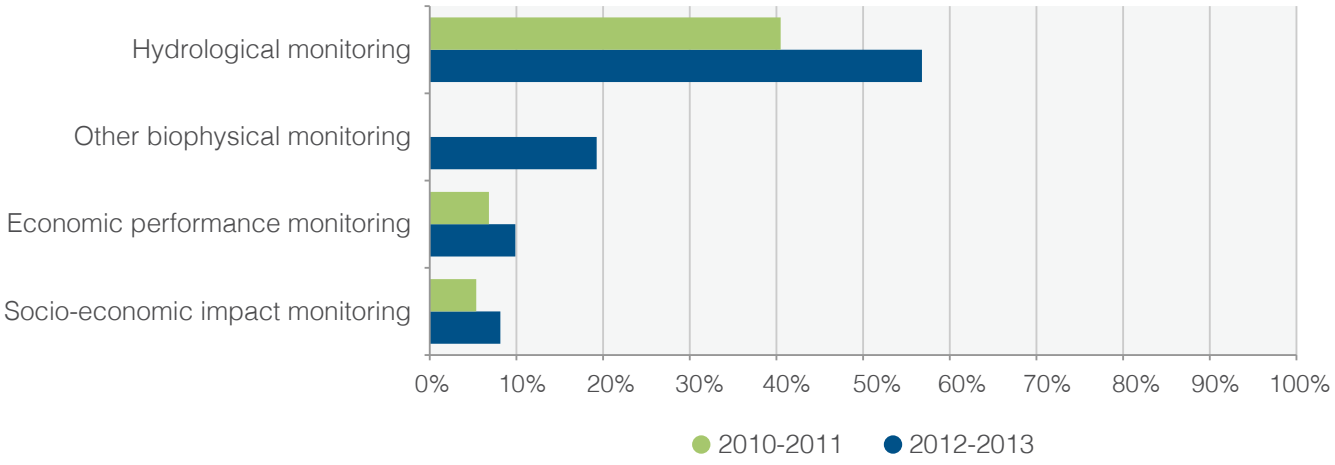
Even when money is flowing, program administrators report challenges in managing funds. Several respondents cited difficulties ensuring that money is actually being disbursed to suppliers by local intermediaries (such as a community board). Some respondents noted cash flow challenges typically associated with unpredictable financing for ecosystem service provision. In rare cases, respondents pointed to issues with safekeeping funds: one program found it necessary to house their money in the local police station.

Monitoring and Evaluation improves, but not yet the norm

Monitoring and Evaluation (M&E) showed signs of improved rigor in 2012 and 2013, with 54% of programs reporting some form of environmental monitoring in 2013 as IWS increased its focus on demonstrating outcomes (Figure 11). Altogether the number of programs reporting environmental outcomes nearly tripled, from 77 in 2011 to 219 in 2013, this occurred despite the fact that watershed services like instream flow regulation can be difficult to measure over time or link to specific activities. Programs also report lagging M&E resources and capacity, particularly in rural and developing areas.

Figure 11: Program Monitoring Rates, 2010-2013

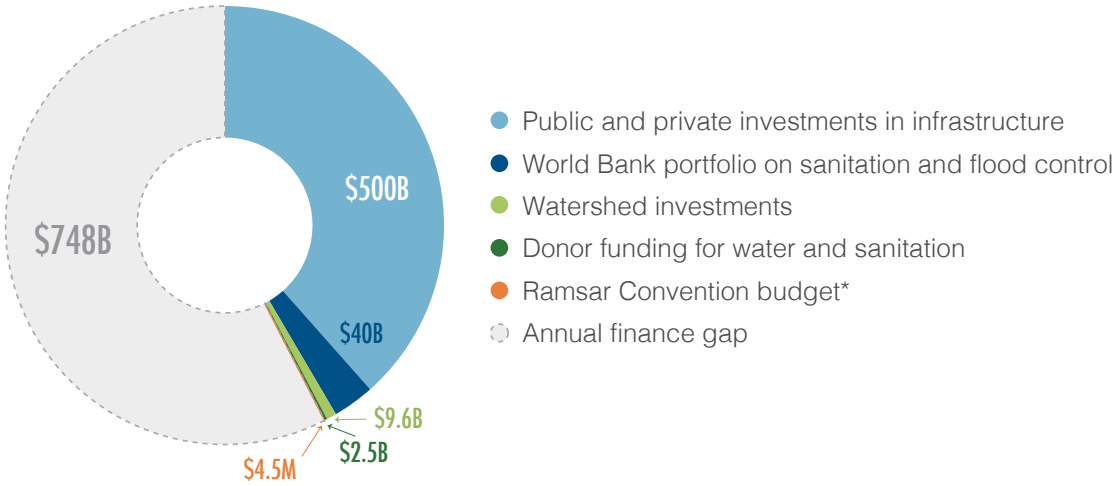
(% share of programs)



Notes: "Other biophysical monitoring" data is not available for 2010-2011.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 12: Annual Water Infrastructure Spending versus Global Need, 2013



Notes: Annual water infrastructure investment need based on OECD, 2007 (see Footnote 10).* "Ramsar Convention budget" refers to funds designated for wetlands protection under the Ramsar Convention on Wetlands.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Programs typically track implementation in terms of behavior or practice change (e.g., number of hectares sustainably managed) instead of more targeted metrics like "gallons of water" or "pounds of pollution avoided," which can be very expensive to monitor (comprising as much as 40% of program costs in water quality trading markets, for example). But recent tracking suggests a definite shift toward performance-based finance that links payments to specific outcomes – such as $0.03 paid to farmers for every ten gallons of groundwater supplies stored, recovered, or otherwise enhanced (i.e., groundwater "recharge") for improved irrigation practices. Outcome-based programs accounted for 31% of active/pilot programs in 2013, up from 20% in 2011.

Progress in demonstrating program performance appeared to be at least partly driven by private buyers and program investors desiring typical decision-support metrics like ROI – which program developers have not historically provided – and public sector entities seeking to justify their deployment of taxpayer/ratepayer funds. In response to these demands, programs cite significant interest in demonstrating performance in both ecological and economic terms.

Outlook: Scaling up Watershed Investment

In pursuit of financial and environmental ROI

Leaders in the field are looking to the private sector, climate finance and the re-allocation of infrastructure spending as promising avenues for securing new finance and greater market stability. The first is already in early stages, with efforts underway to develop tools to understand ROI and design projects that are more attractive to business buyers and investors. Recently, high-level conversations have taken place, mainly in the United States, about how to better connect private and institutional capital with conservation. Reports released in 2013-2014 – including from Credit Suisse/WWF/McKinsey & Co., the Conservation Finance Alliance, and Imprint Capital – all noted a lack of investable conservation projects and called for project developers to better quantify performance and demonstrate projects' ROI.[8]

An understanding of buyer ROI (e.g., the quantifiable ecological benefits received for every dollar invested, as opposed to purely financial returns for program investors) may be even closer. In 2013, a number of programs reported testing new methodologies for quantifying economic, hydrological, and other biophysical outcomes, particularly in the UK, USA, and

[8] WWF, Credit Suisse Group AG and McKinsey & Company. 2014. *Conservation Finance: Moving beyond donor funding toward an investor-driven approach.* Available online at: https://www.credit-suisse.com/media/cc/docs/responsibility/conservation-finance-en.pdf.
Conservation Finance Alliance. 2014. *Supporting biodiversity conservation ventures: Assessing the Impact Investing sector for an investment strategy to support environmental entrepreneurism.* Available online at: http://conservationfinance.org/upload/library/arquivo20140521115214.pdf.
Imprint Capital. 2013. The Conservation Investment Landscape. [Presentation.] Available online at: http://conservationfinance.org/upload/library/arquivo20130321085507.pdf.

Latin America.[9] Last year also saw cross-fertilization of successful approaches between industry leaders. For example, a methodology for estimating groundwater replenishment originally developed for The Coca-Cola Company is now being harnessed by The Nature Conservancy to estimate the hydrological performance of a water fund in Monterrey, Mexico, and for restoration work on public forest lands in the United States.

In pursuit of more economic appeals to buyers, 14 programs in 2012-2013 carried out cost-savings analyses and reported that IWS saves buyers and society more broadly at least $3.8B/year, collectively – significantly more than the $159.9M invested into those same programs in 2013. This finding suggests that actual net benefits for all 405 operational IWS programs are also quite significant. But hard numbers remain unavailable, since currently there is little consistency in methods to estimate cost-savings or benefits of watershed investment – not to mention that hydrological monitoring data is not always available, as discussed above. Most program developers who carried out such an analysis focused on relatively simple calculations of avoided costs. Fewer programs attempted to explicitly quantify benefits, like additional hydropower generation made possible by the program or tons of carbon sequestered by tree planting.

Standardized approaches for implementation and monitoring may also smooth the path for private-sector funding. One such offering last year was the Alliance for Water Stewardship's newly launched Water Stewardship Standard, designed for businesses and other water users interested in collective action models for managing water risks and dependencies. Nestlé and General Mills have already signed on as partners to support the standard's roll-out.

The field eyes new sources of finance

Climate finance rarely seeps into the watershed investment space, despite IWS' strong potential as an adaptation strategy and the severe threats posed to water supplies by climate change. The Climate Investment Funds supported by a number of donor countries and administered by multilateral development banks do currently fund forest conservation and sustainable agriculture, which theoretically also support watershed values. But to date, no dedicated climate facility exists focusing specifically on financing or evaluating watershed protection. Most adaptation finance for water is instead related to sanitation and flood control.

Beyond the adaptation realm, Organisation for Economic Co-operation and Development (OECD) estimates that simply meeting basic water needs, including access to water, sanitation, and flood control will require over $1 trillion (T) in annual spending on water infrastructure by 2025 – leaving an annual gap of over $700B.[10] Currently, most estimates – and most investments, in practice – focus on engineered solutions (Figure 12). Examples of successful IWS approaches suggest, however, that integrating natural infrastructure solutions into drinking water and wastewater management, and disaster risk mitigation can deliver cost-effective results and require less capital up front. Where this is the case, putting more natural infrastructure into the mix can make existing funding go further and help address the water infrastructure funding gap.

Getting natural asset values on the books

Securing finance that is sized in equal measure to watersheds' contributions to society ultimately depends in part on recognizing natural capital's value as an economic asset. Doing so has the potential to drive new investments in natural infrastructure, not to mention illuminate clearly the risks natural capital degradation poses to society's access to sustainable water, energy, food – and ultimately to a healthy planet.

One potential solution, natural capital accounting (NCA), made great strides in 2012 and 2013. For example, the World Bank-led WAVES (Wealth Accounting and Valuation of Ecosystem Services) Partnership piloted ecosystem services integration into national accounts in multiple countries and will soon release global guidance on implementing ecosystem accounting pilots. Other critical developments include new regional commitments like Africa's 2012 Gaborone Declaration. The Natural Capital Declaration, which launched at Rio +20 in 2012 with backing from 39 major financial institutions, entered its second phase in 2013 with a roadmap for implementing commitments to employ and regularly report on NCA by 2020.

Still, NCA is an enormous undertaking, requiring decision-makers to consider the values of assets long implicitly understood as having no value. Thus it may take some time to fully implement new accounting approaches, and, most importantly, integrate these values into public and private investment priorities.

[9] Forest Trends' Ecosystem Marketplace. 2014. Gaining Depth: *State of Watershed Investment 2014*. Washington, DC: Forest Trends. http://www.forest-trends.org/documents/files/SOWI2014.pdf

[10] Organisation for Economic Co-operation and Development (OECD). 2007. *Infrastructure to 2030 (Volume 2): Mapping Policy for Electricity, Water and Transport*. Available online: http://www.oecd.org/futures/infrastructureto2030/infrastructureto2030volume2mappingpolicyforelectricitywaterandtransport.htm.

In the interim, dozens of governments and companies and countless other water users aren't hesitating to act, as this report demonstrates. IWS program developers and program investors are already connecting the dots between water, climate, energy, and food security challenges – and looking to nature for solutions.

But getting IWS to the needed scale will require that it be understood not just as a conservation issue, but also as a strategic investment in meeting future global demand for water, food, and energy. In the *State of Watershed Investment 2014* report, we document efforts to mainstream natural infrastructure approaches – from demonstrating their role in managing "nexus" trade-offs, to innovative financing structures attracting new buyers, to programs generating the data on outcomes and ROI that make it possible for decision-makers and investors to back IWS programs. These activities set the stage for significant future investment in our planet's natural assets in 2014 and beyond.

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Acronyms and Glossary

ANA	National Water Agency (Brazil)
APFC	Forest Producers Association of Coruche
ARA	Reciprocal water agreement
CAP	Common Agricultural Policy
CAR	Rural Environmental Registry System (Brazil)
CBA	Cost-benefit analysis
CEA	Cost effectiveness analysis
CFUG	Community Forestry User Groups
CIVics	Community Investment Vehicles
CONAFOR	National Forestry Commission (Mexico)
CONDESAN	Consortium for Sustainable Development of the Andean Ecoregion
CRA	Cotas de Reserva Ambiental (Brazil)
CSR	Corporate Social Responsibility
CTL	Coal-to-liquids
DDOE	District Department of the Environment (USA – Washington DC)
Defra	Department for Environment, Food and Rural Affairs (United Kingdom)
EAFRD	European Agricultural Fund for Rural Development
EAGF	European Agricultural Guarantee Fund
EC	European Commission
EEP	Ecosystem Enhancement Program (NC, USA)
EMSP	Environmental Management Support Program
EPA	Environmental Protection Agency (USA)
EPRI	Electric Power Research Institute
FECF	Forest Ecosystem Compensation Fund
FONACRUZ	Water Fund of Santa Cruz (Bolivia)
FONAG	Water Fund (Quito)
FSC	Forest Stewardship Council
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEP	Gross Ecosystem Product
GHG	Greenhouse Gas
IUCN	International Union for the Conservation of Nature
IWS	Investment in Watershed Services
IWSS	International Water Stewardship Standard
LAWFP	Latin American Water Funds Partnership
LIFE	Financial Instrument for the Environment
LUI	Land User Incentive Program
LVBC	Lake Victoria Basin Commission
M&E	Monitoring and Evaluation
MDB	Murray-Darling Basin
MDBA	Murray-Darling Basin Authority (Australia)
MINAM	Ministry of Environment (Peru)
MLPSA	Local Mechanisms for Payments for Environmental Services (Mexico)
NatLab	Natural Infrastructure Innovative Financing Lab
NCA	Natural Capital Accounting
NFF	National Forest Foundation
NGO	Non-Governmental Organization
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint source

NRCS	Natural Resources Conservation Service (USA)
NWRM	Natural Water Retention Measures
OECD	Organization for Economic Cooperation and Development
OEM	Office of Environmental Markets (USA)
Ofwat	Water Services Regulation Authority (UK)
P&R	Principles and Requirements
P3	Public private partnership
PCJ	Piracicaba-Capivari-Jundiai basins
PENNVEST	Pennsylvania Infrastructure Investment Authority (PA, USA)
PES	Payment for Ecosystem Services
PFES	Payment for Forest Environmental Services (Vietnam)
PRESA	Pro-poor Rewards for Environmental Services in Africa
PS	Point Source
PSA	Payment for Environmental Services (Costa Rica)
PSAH	National Program for Hydrological Environmental Services (Mexico)
QA/QC	Quality Assurance/Quality Control
REDD	Reducing Emissions from Deforestation and Forest Degradation
RLF	Revolving Loan Fund
ROI	Return on Investment
RtB	Restoring the Balance in the Murray-Darling Basin
RUPES	Rewarding the Upland Poor in Asia for Environmental Services They Provide
S&C	Standards and Certifications
SCaMP	Sustainable Catchment Management Program (UK)
SDC	Swiss Agency for Development and Cooperation
SIP	Strategic Integrated Projects
SRCs	Stormwater Retention Credits
SSSI	Site of Special Scientific Interest
SUNASS	National Superintendency of Water and Sanitation Services (Peru)
SWP	Source Water Protection
SWW	South West Water
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
USDA	United States Department of Agriculture (USA)
USFS	United States Forest Service (USA)
UU	United Utilities
WAVES	Wealth Accounting and the Valuation of Ecosystem Services
WFD	Water Framework Directive (EU)
WfW	Working for Water (South Africa)
WQT	Water Quality Trading
WRC	Water Restoration Certificate
WRI	World Resources Institute
WRRDA	Water Resources Reform and Development Act
WWF	World Wide Fund for Nature/World Wildlife Fund

Bilateral agreements: These agreements involve a single water user compensating one or more parties for activities that deliver hydrological benefits to them.

Collective action funds: Financial mechanisms that pool resources from multiple water users in a basin (and sometimes from NGOs or governments acting in the public interest) to support coordinated incentive-driven interventions across the landscape. Many collective action funds, especially in Latin America, use a trust fund to manage pooled capital, using the interest for watershed investment.

Ecosystem services: The benefits that society receives from ecosystems. These include provisioning (such as food and raw materials), regulating (such as natural purification of water and carbon sequestration), supporting (such as crop pollination), and cultural (such as recreational use or spiritual values) services.

Green infrastructure: Installations of natural infrastructure elements integrated into a built environment that are typically designed to control stormwater or floodwaters,

provide habitat for species, and/or manage air quality. Examples of green infrastructure include green roofs, bioswales, rain gardens, or streetside tree planting.

Instream buybacks: These programs buy or lease water use rights in existing water markets. Governments or NGOs acting in the public interest buy credits in order to not use the water – instead, dedicating rights to instream use to ensure a minimum level of flows and protect wildlife and habitats.

Investment in watershed services ("IWS"): Transactional arrangements (in cash or in-kind) between two or more parties that compensate a land manager for restoring, maintaining, or enhancing the natural infrastructure that maintains clean water supplies.

Natural capital: The natural "stock" of healthy ecosystems that provide ongoing flows of environmental goods and services such as water filtration, crop pollination, or climate regulation.

Natural capital accounting: The inclusion of the total "stocks" and "flows" of natural resources and environmental services for a defined region, in physical or financial terms, within a government or corporate accounting framework.

Natural infrastructure for water: Natural systems like wetlands, forests, or grasslands that underpin the global water system and perform important functions such as pollution filtration, water storage, or protection against flooding that are often supplemented or replaced by engineered infrastructure.

Public subsidies: Large-scale programs that reward land managers for activities enhancing or protecting ecosystem services. The funder does not necessarily benefit directly from activities.

Trading and offsets: These mechanisms allow water users facing regulatory obligations to manage their impacts on watersheds by compensating others for activities that improve water quality, availability, or other water-related values. Compensatory activities may be packaged as a credit or some other unit traded in an established "market," defined by watershed boundaries.

Voluntary compensation: Activities funded by companies and other organizations seeking to mitigate for their own impacts voluntarily.

Water quality trading: Two or more parties trade water quality credits, usually measured in pounds of pollution reduction to offset impacts and/or meet compliance with clean water standards. Water quality trading may take place through direct contracts or through some type of market exchange, often a clearinghouse or auction mechanism. The most common types of credits are for nitrogen, phosphorus, and thermal load (i.e., temperature) reduction.

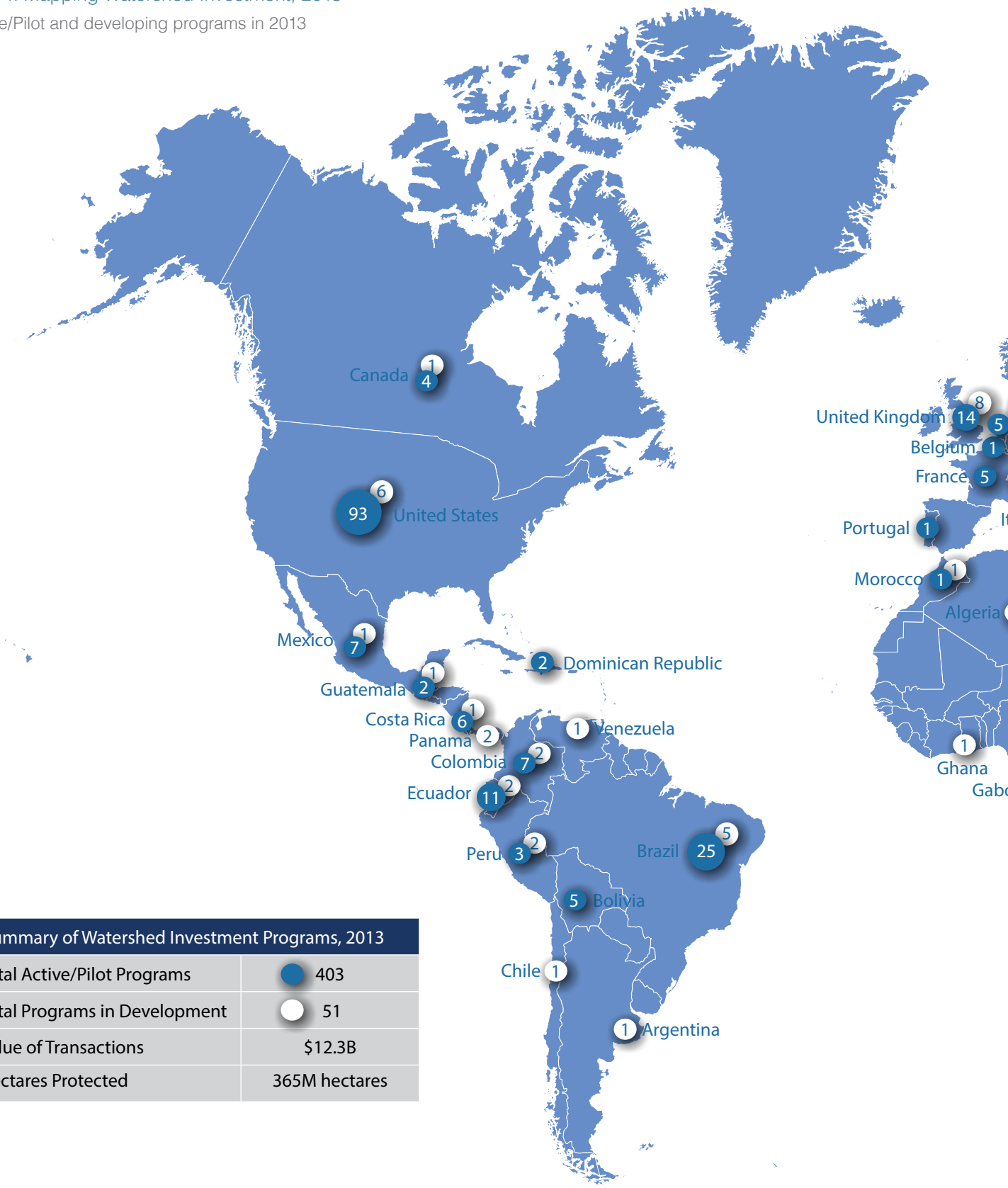
Water stewardship: Broadly, an approach to business water management and reporting that considers water use and impacts across the value chain and incorporates goals and actions related to watershed management, stakeholder engagement, public policy, and transparency into a company's strategy on water.

Watershed: An area of land drained by a river system or other body of water, also referred to as a "catchment" or "basin."

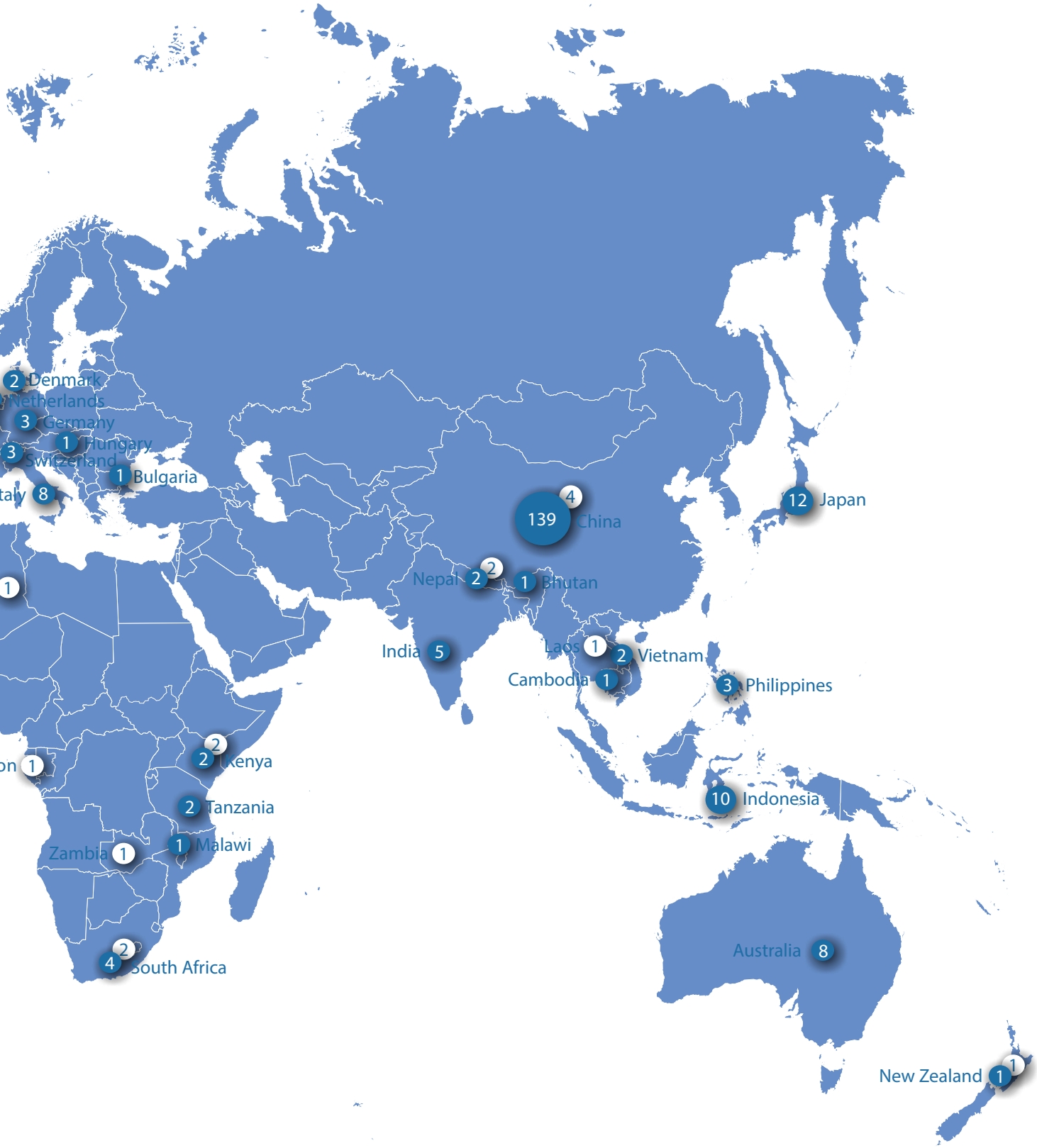
Watershed services: The benefits to society provided by healthy natural systems (like forests or wetlands); examples of such benefits include aquifer recharge, flow regulation, erosion control, and water purification.

Map 1: Mapping Watershed Investment, 2013

Active/Pilot and developing programs in 2013



Summary of Watershed Investment Programs, 2013	
Total Active/Pilot Programs	403
Total Programs in Development	51
Value of Transactions	$12.3B
Hectares Protected	365M hectares


2 Denmark
Netherlands
3 Germany
1 Hungary
3
Switzerland
1 Bulgaria
8
1
4
139 China
12 Japan
2
Nepal 2
1 Bhutan
India 5
Laos 1
2 Vietnam
Cambodia 1
3 Philippines
2
2 Kenya
1
2 Tanzania
1 Malawi
Zambia 1
10 Indonesia
2
4 South Africa
Australia 8
1
New Zealand 1

Foreword

As this report was being prepared in the summer of 2014, the state of California had begun to roll out mandatory restrictions on water use, imposing criminal penalties of up to $500 per day for otherwise everyday activities like hosing down driveways. State Governor Jerry Brown previously made two emergency drought declarations and implored citizens to voluntarily conserve water in the face of the worst drought in a century of record-keeping. Drought is driving up food and energy prices, increasing wildfire risk in California forests, and crippling the agricultural economy.

As Forest Trends' Ecosystem Marketplace reported in July 2014, Princeton University scientists recently found that deforestation in Brazil might be making California's drought even worse.[11] Tropical forest loss in the Amazon has been linked to less rainfall in the Sierra Nevada, reducing snowpack by as much as 50%. That gives state regulators one more reason to recognize forest carbon offsets generated in Latin America in California's carbon market. More broadly, it is another way that climate change is illuminating our interconnectedness and interdependencies – and making its presence known through escalating water risk.

Such interconnections between water, energy, food, and climate permeate the *State of Watershed Investment 2014*, the third report in this series that this year looks at more than 400 creative and cost-effective financing strategies implemented worldwide to repair and protect our "natural infrastructure" – the forests, wetlands, prairies, and natural coastlines that filter out pollution, recharge aquifers, and provide us with a buffer against the worst effects of a changing climate.

This year, a new chapter on emerging issues in the field reflects a growing interest in measuring the performance of watershed investments in both ecological and dollar terms. New programs tracked in this survey period – spanning 2012 and 2013 – were also notable for the emphasis on collective action made by water users beginning to connect the dots that join their common use of a single landscape. These and many other trends that have emerged since we last tracked market activity in 2011 are channeled through real stories that demonstrate the value of natural infrastructure strategies much better than data alone.

The creation of this global report requires outreach to hundreds of organizations that willingly take the time to complete our surveys and, in some cases, participate in detailed interviews. Despite tremendous efforts to contact and collect data from as many programs as possible, we are acutely aware of the limitations of a survey-based analysis. We caution readers to understand our reporting methodology and to consider reported numbers as conservative.

We thank those who contributed data for fostering a more transparent and effective sector and hope that this report will continue to inspire other programs to share data with us. Throughout 2014, Ecosystem Marketplace will continue to track trends and questions illuminated in this report. If you have questions about its content or are interested in supporting the production of this analysis, contact us at info@ecosystemmarketplace.com. We also encourage you to visit our specialized information portal on watershed investments, www.watershedconnect.org, where you can sign up for free monthly news briefings, read ongoing news coverage of key issues in conservation finance, and browse the inventory of programs that underpins this report.

Michael Jenkins

President and CEO
Forest Trends

Molly Peters-Stanley

Director
Forest Trends' Ecosystem Marketplace

[11] Gonzalez 2014; Medvigy et al. 2013.

1. Watershed Investment 101

1.1 What Is Watershed Investment?

This report tracks the flow of funding that supports the creation, enhancement, or protection of natural infrastructure critical to clean, secure water supplies. "Buyers" in this context are those willing to pay to ensure healthy landscapes in exchange for benefits like clean water, aquifer recharge, reduced flooding risk, and other watershed services that are provided by healthy landscapes (Box 1.1).

Of course, there is no marketplace where a buyer can go to directly finance interventions that deliver services like aquifer recharge or floodwater storage. There is rarely a market-determined price for watershed services and even the unit of delivery varies – buyers might pay for hectares of land sustainably managed or pounds of pollution kept out of water bodies.

Hydrological benefits from *natural infrastructure*[12] – like forests, wetlands, and meadows – are also highly localized. Thus, investments usually are local, too, in contrast to markets for greenhouse gas emissions reductions where transactions and benefits span the globe and are based on the exchange of a clearly defined unit (one tonne of carbon dioxide). Primarily because benefits are local and varied, contracts for natural watershed infrastructure services take a multitude of forms.

However, common to most watershed investment projects is the recognition that natural systems can complement or substitute for "grey" (i.e., engineered) infrastructure. Forests or wetlands, for example, can filter out water pollution, regulate stream flows, recharge aquifers, and absorb flooding, thus limiting the need for engineered infrastructure to perform these functions.

1.2 How Does It Work?

All investment mechanisms (Table 3) originate with a water service provider, government, business, or other party that attaches value to a watershed service, or set of services, and agrees to compensate providers of that service (or services) accordingly. For example, a beverage company might be willing to pay local farmers $100,000 per year to reduce pesticide use, when treatment of polluted water would otherwise cost $150,000 per year. In this scenario, an individual farmer might be willing to curtail their pesticide use for $3,000 per year, assuming that this amount would cover their costs to switch to organic methods or otherwise compensate them for foregone income.

Box 3: Benefits of Watershed Services

Healthy watersheds support a complex network of ecosystem services and offer numerous benefits – like plant pollination or flood protection – each with their own unique value to ecology and economies. Some of these services (like pollination) cannot be reproduced with existing technology. In other cases, integrating nature-based and engineered solutions can reduce operating costs or prolong the lifespan of built infrastructure. For example, reforesting hillsides can reduce erosion and limit sedimentation in a hydropower station's reservoir – protecting the turbines from damage and prolonging the life of the reservoir.

Consider these examples of watershed services provided by healthy landscapes:

Filtration of nutrients and contaminants: Standing forests stabilize soils, while forests and wetlands filter pollutants, improving water quality by trapping sediments and pollutants before they enter surface waters.

Flow regulation and water supply: Healthy forests, wetlands, and grasslands can act as natural "sponges" that absorb water – recharging groundwater supplies, reducing flood risk, and maintaining stream flows at healthy normal levels.

Aquatic productivity: Water quality in coastal fisheries can be strongly affected by the condition of adjacent upstream watersheds. In other words, what happens on the mountain ridges – for better or worse – impacts the reefs.

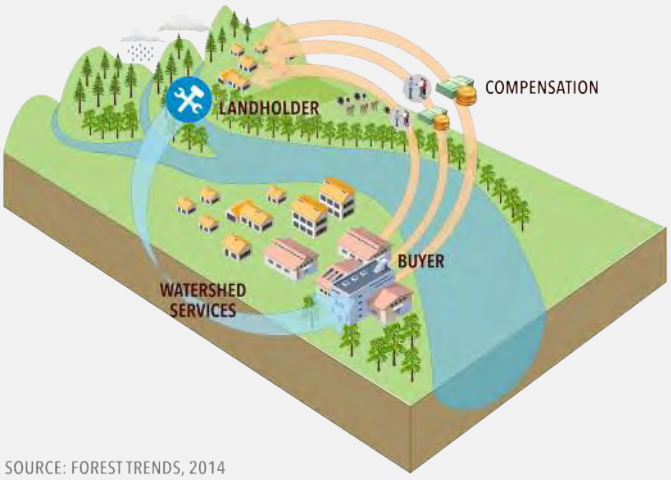
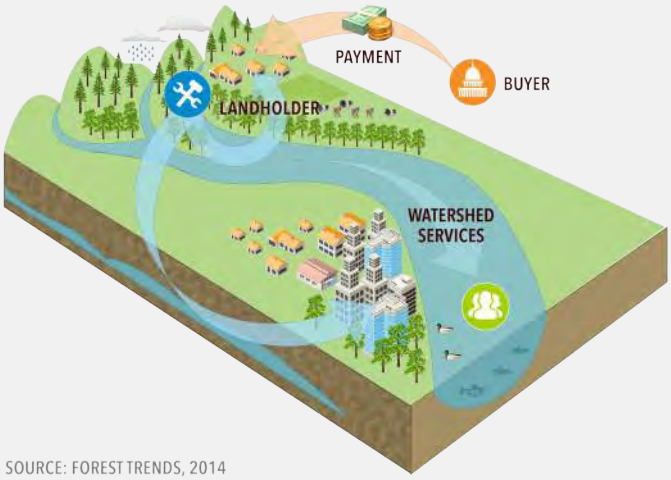
[12] Terms in *blue italics* are defined in the Glossary on page xviii.

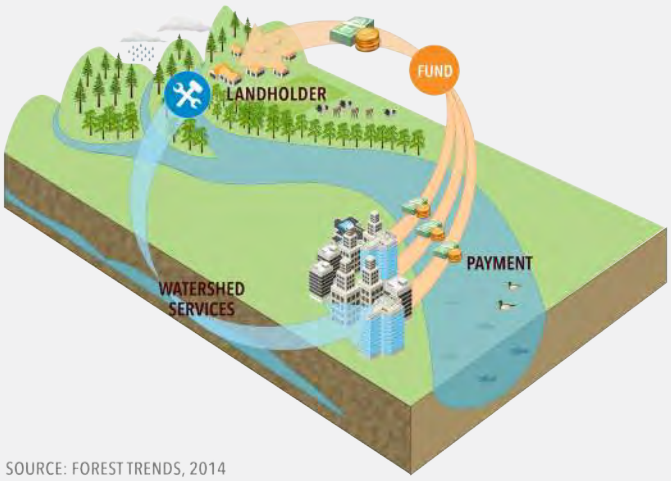
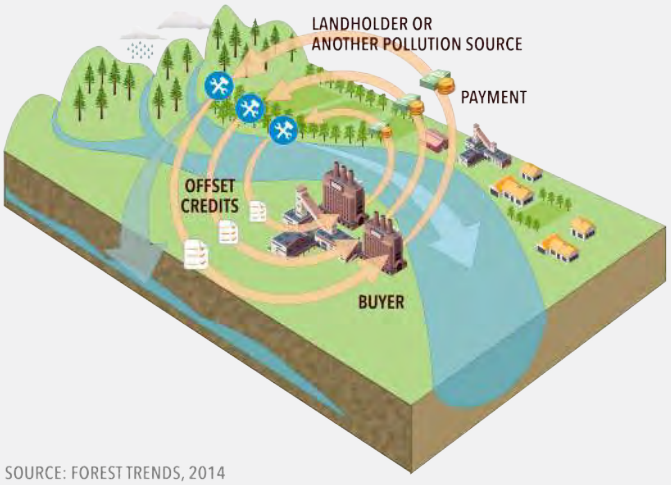
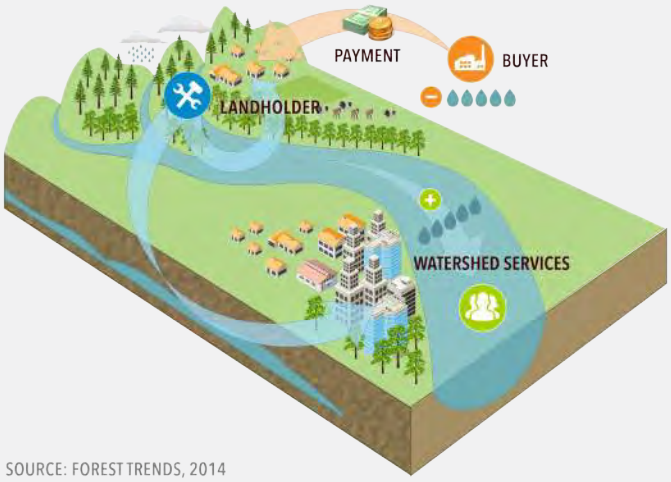
This is only one example. In practice, the nature of investments varies according to the buyer's specific goals and the general context. One business may decide to partner directly with landholders located near its water source, while another may prefer to contribute to a public watershed restoration fund that handles the management decisions. For example, a single entity with a very clear watershed service need may gravitate toward a bilateral arrangement. Other program types require fairly sophisticated regulatory frameworks and institutional capacity (such as trading and offsets) or a certain type of property rights regime for water (such as *instream buybacks*). Table 4 outlines some of the key considerations that drive *investment in watershed services (IWS)* design.

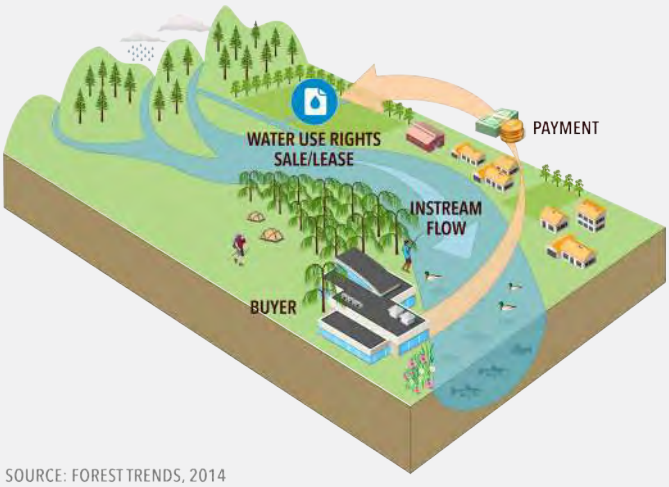
1.3 What Does this Report Track and Why?

This report investigates the size, scope, and transactional trends of investments in natural infrastructure for water, tracking watershed service "buyers" and "suppliers" that utilize a range of financial mechanisms. Estimating the global value of transactions for watershed services is intended to illustrate the scale and makeup of demand for watershed services. And in tracking key program details – like actors, goals, management activities, as well as ecological, economic, and social impacts performance – this research offers readers a better understanding of best practices, risks involved in market engagement, and the potential scalability of nature-based watershed interventions.

Table 3: Program Types Tracked in this Report

Investment mechanism		Examples
Bilateral agreements		
 SOURCE: FOREST TRENDS, 2014	Bilateral agreements involve a single (typically downstream) water user compensating one or more parties for activities that deliver hydrological benefits to the payer.	Nestlé Waters (formerly Vittel), New York City-Catskills Watershed Protection Program
Public subsidies		
 SOURCE: FOREST TRENDS, 2014	Public subsidies leverage public finance for large-scale programs that reward land managers for enhancing or protecting ecosystem services. The funder does not necessarily benefit personally from activities.	China's Conversion of Cropland to Forests and Grassland Program, Costa Rica's National Payments for Environmental Services program

Investment mechanism		Examples
Collective action funds		
 SOURCE: FOREST TRENDS, 2014	Collective action funds pool resources from multiple water users in a basin (and sometimes from NGOs or government acting in the public interest) to financially incentivize coordinated interventions across a landscape.	The Quito Water Fund ("FONAG")
Trading and offset mechanisms		
 SOURCE: FOREST TRENDS, 2014	Trading and offset mechanisms allow water users facing regulatory obligations to manage their impacts on watersheds by compensating others for off-site activities that improve water quality, availability, or other water-related values. Compensatory activities may be packaged as a credit or some other unit traded in an established "market," defined by watershed boundaries.	Ohio River Basin Trading Project
Voluntary compensation		
 SOURCE: FOREST TRENDS, 2014	Voluntary compensation refers to activities funded by companies and other organizations seeking to mitigate for their own impacts on watershed services voluntarily. "Mitigation" is not always intended as offsetting, i.e., outcomes paid for may not be exact matches for impacts biophysically, temporally, or spatially.	Bonneville Environmental Foundation's Water Restoration Certificates, Coca-Cola's "replenishment" payments in the Paw-Paw River watershed

Investment mechanism		Examples
Instream buyback programs		
 SOURCE: FOREST TRENDS, 2014	Instream buyback programs involve governments or NGOs that act in the public interest by buying or leasing water use rights in existing water markets, which are not used but instead set aside to ensure a minimum level of flows and protect wildlife and habitats.	Restoring the Balance in the Murray-Darling Basin
For examples of the above program types, please visit our global program inventory at http://www.watershedconnect.org/programs		

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Table 4: Key Program Characteristics

Who is the buyer?	
	Is the investor a direct beneficiary of the project? Are they a polluter compensating for their own impacts? Or are they acting on behalf of others to support the provision of a public good?
Is there a regulatory driver?	
	Does a policy or regulatory framework require watershed investments or permit investments as a compliance option? Or are buyers acting voluntarily?
How performance-based is the agreement?	
	Does the agreement require verified delivery of watershed services in order for the supplier to be paid? Or are the conditions for payment looser or less clearly defined?
What are the terms of payment?	
	Does payment occur bilaterally between investor and provider? Or is payment facilitated by an intermediary or fund mechanism or via an established local marketplace?

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

2. Methodology: Frequently Asked Questions

2.1 What Does this Report Series Track?

The *State of Watershed Investment* series is designed to estimate annual transactions for watershed services globally, as well as trends in demand and supply, program design, and documented outcomes. Data comes primarily from program administrators through a biannual survey. The report's scope includes any type of financial mechanism linking a buyer and seller in which the exchange is intended to ensure the supplier's provision of watershed services (or some proxy indicator). For more information on the types of programs tracked in this report, please see the "Watershed Investment 101" chapter.

2.2 Where Does Your Data Come from?

Ecosystem Marketplace gathers data through a biannual global survey of program administrators; ongoing desk tracking through program reports, donor reports and databases, statistical yearbooks, and credit registries; and interviews with program administrators and market intermediaries. The survey, which gathered data on activity in 2012 and 2013, was available online and disseminated via personal email and Ecosystem Marketplace news briefs between April 1 and June 30, 2014.

2.3 What Was the Response Rate for this Report?

Overall, the data collection rate was 407 programs, or 83% of the 488 programs identified in a scoping exercise (Figure 13). Survey respondents represented an array of sectors, governments, businesses, and regulators, as described in greater detail in the "Global Overview" chapter.

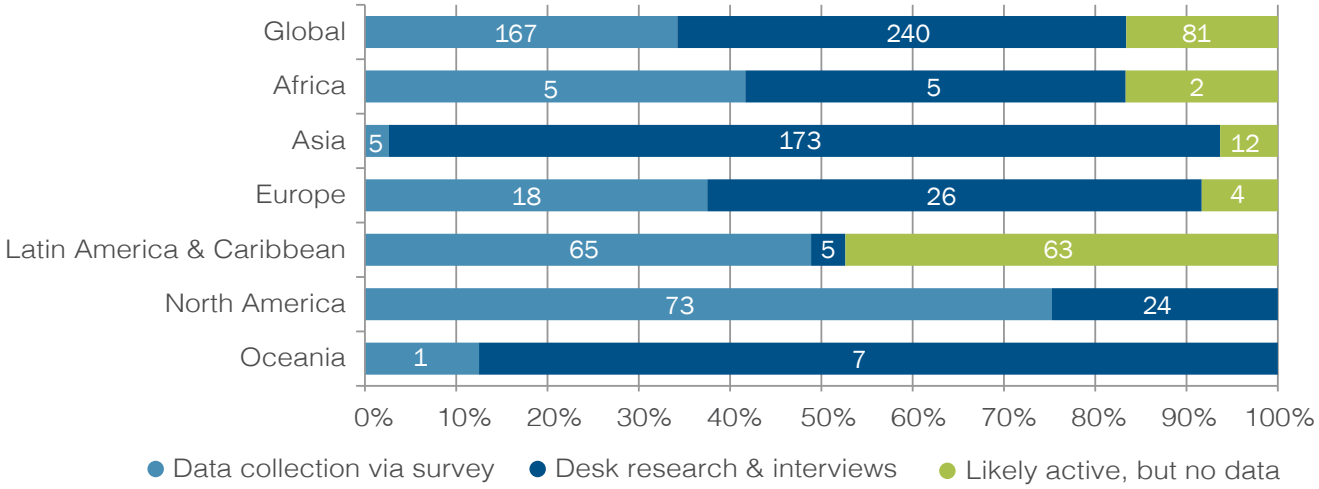
In total, we received survey data from 167 program administrators overseeing active or developing watershed investment programs in 2013 and gathered data on another 240 programs through desk research and interviews with market actors. With respect to geographic distribution, the data collection rate was highest for North America (99%) and lowest for Latin America and the Caribbean (53%).

2.4 How Does Ecosystem Marketplace Ensure the Confidentiality of Survey Responses and Reported Data?

In general, Ecosystem Marketplace reports only aggregate data. Any program-specific transaction data

Figure 13: Data Collection: by the Numbers, 2013

(Number and total share of data collection methods)



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

mentioned in this report was already public information or approved by the supplier; otherwise it is treated as confidential. We do not share supplier information with third parties without prior permission.

2.5 How Do You Calculate Aggregate Transaction Values?

All transaction figures presented in this text were either reported by programs or obtained via desk research. For programs that reported credit volume data but not price data, we use the market-wide average credit price to determine overall market value. Where no transaction or price data is available, we do not extrapolate to estimate market size. In other words, this report represents our most comprehensive picture of global watershed investments yet, but it is by no means the complete picture.

2.6 How Does this Report Define a Transaction?

We consider transactions to occur at the point of exchange between a buyer and a program administrator or a buyer and seller directly. For compliance credits, we count transaction values toward the compliance year of the credit when it will actually be retired; a "forward" credit sold in 2012 for the 2013 compliance year would thus be included in 2013 transaction values.

2.7 Do You Screen Programs for Quality?

Ecosystem Marketplace does not apply quality screens to programs or credits, as the aim of this report is to provide the most comprehensive picture possible on watershed investment activity. We do follow up with survey respondents or third parties where necessary to clarify or confirm data that is incomplete or raises a red flag.

2.8 How Can I Find Out More about Specific Programs?

A portion of the dataset underlying this report is available publicly in a web-based program inventory that we maintain, at http://www.watershedconnect.org/programs.

2.9 My Program Is Not Included in this Report and I Think that It Should Have Been.

We encourage you to contact report authors (at info@ecosystemmarketplace.com). You can also submit a program profile online at http://www.watershedconnect.org/programs.

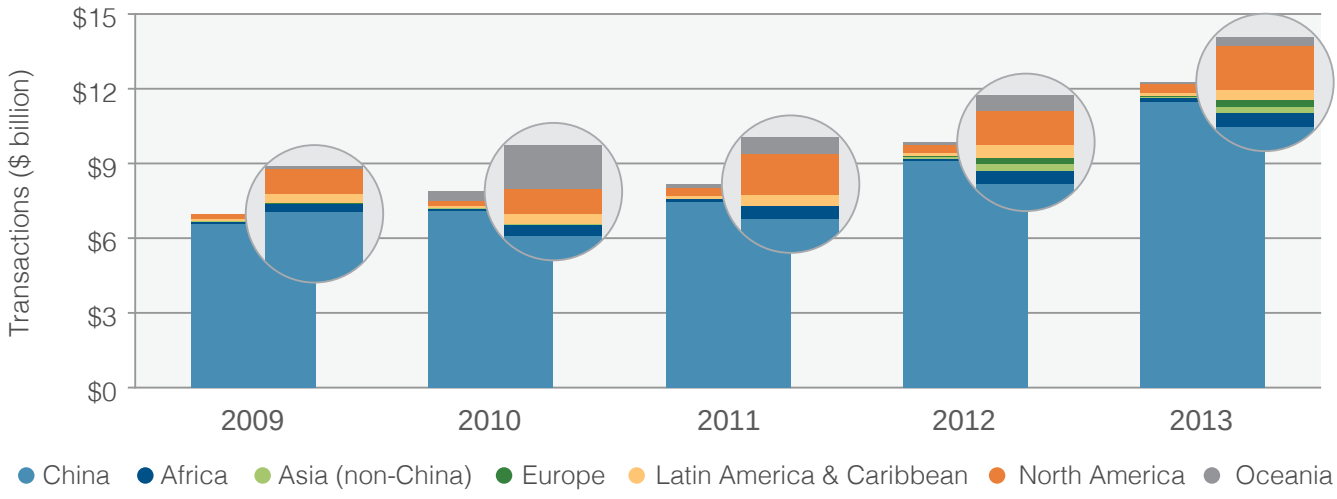
3. Global Overview

Table 5: Summary Details – Global

	2011	2012	2013
Operational programs	205	363	403
Programs in development	76	83	51
Value	$8.2B	$9.8B	$12.3B
Land area under management for watershed services	195M ha	n/a*	365M ha
New land area under management for watershed services, per annum	117M ha	n/a	1.7M ha**

Notes: *Given our data collection cycle (which takes place every other year), data on ha protected in 2012 is unavailable, as the survey asks respondents to indicate total ha under management and ha added in the last twelve months.
**New land under management for watershed services in 2013 is unavailable for China.
Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 14: Value of Global Investment in Watershed Services by Region



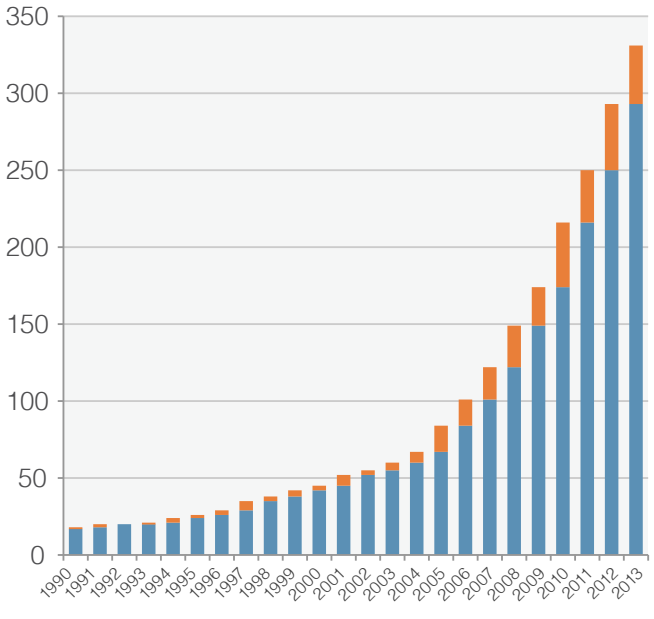
Note: Based on 454 programs tracked, valued at $12.3B in 2013.
Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

3.1 Value: $12.3B Invested in Watershed Service Provision, Led by Spending in China

In 2013, projects that enhance and protect natural watershed infrastructure attracted significant funding from governments, businesses, and others seeking to safeguard water supplies, manage pollution, and mitigate water-related risks such as flooding or wetland loss. These buyers paid $12.3B to support such interventions in 2013, nearly $2.5B billion more than in 2012; this represents a 12% annual growth in funding over the last five years (Figure 14).[13] Growth was led by investments in China. Spending actually fell slightly

[13] Transactions are tracked at the point of exchange between buyers and suppliers or buyers and an intermediary party. Ecosystem Marketplace collected data on 2012-2013 activity via a 2014 survey effort; data was last collected in 2012 for 2009-2011.

Figure 15: Count of Newly Operational Programs, 1990-2013



Notes: Start dates were not reported for all 403 active/pilot programs in our dataset.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

across some previously well-financed national programs in Australia, Costa Rica, Mexico, and the United States that underwent budget cuts in 2012.

This report identified 403 fully operational or pilot programs and another 51 programs under development worldwide in 2013, a two-thirds increase over the number of operational programs tracked in the 2011 report (Figure 15). Overall, this represents a 14% annual growth rate in the number of new programs financed and reported since 2008 (the earliest year for which transaction data is available).

3.2 Supply: 365M ha Protected; 7M Households Compensated for Management

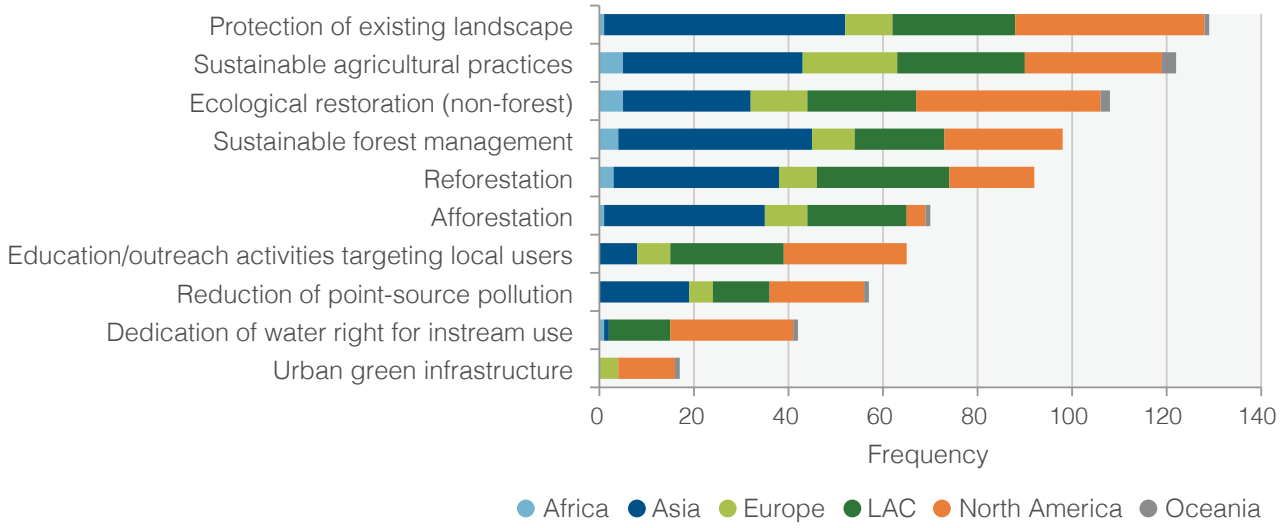
IWS delivered finance for watersheds spanning more than 365M ha worldwide, a land area larger than India. Most commonly, program developers sustainably managed 176M ha of "productive lands", or agricultural lands and forests responsibly managed for food, wood, and non-timber products (Table 6, Figure 16), pointing to the mutual benefits of IWS on these lands. Here, landholders also benefit from reliable supplies of clean water, while watershed service buyers benefit from the stability in land management when multiple stable revenue streams are available to landholders. Protection of existing natural landscapes meanwhile was the primary strategy on another 46M ha. Other program developers combined multiple strategies – restoration and protection as well as sustainable agriculture

Table 6: Land Area Funded and Managed for Watershed Services in 2013

Total area in 2013	Sustainably managed productive lands	Multifunctional landscapes	Restoration/ protection of natural areas	Urban green infrastructure
365M ha	176M ha	142M ha	46M ha	98,800 ha
An area roughly equal to…				
India 	Libya 	Peru 	Sweden 	Berlin

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 16: Watershed Management Interventions by Frequency and Region, 2013



Note: Based on 454 programs tracked, valued at $12.3B in 2013.
Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

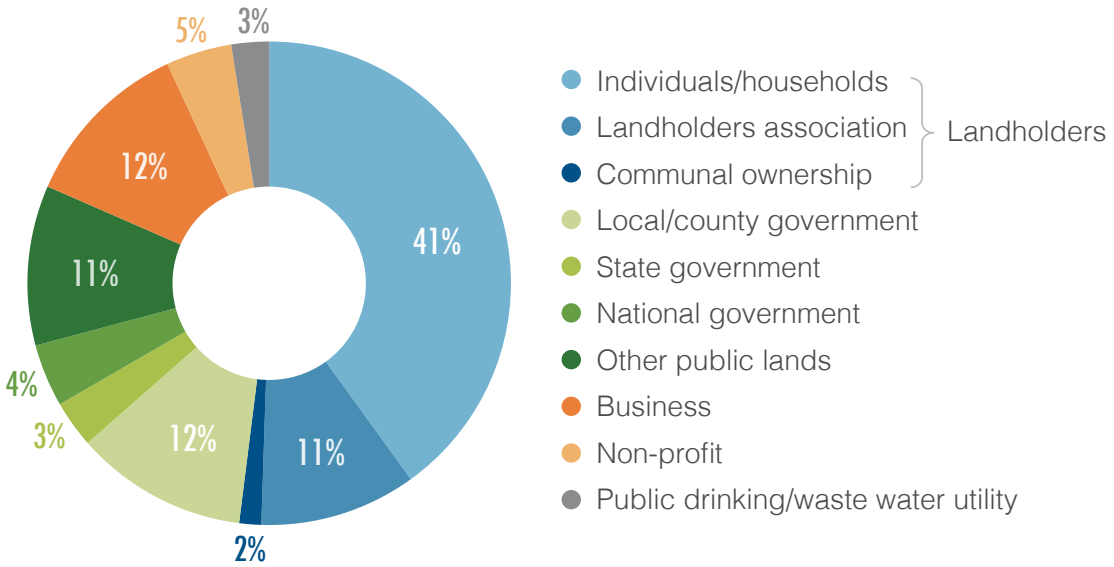
and forest management – on 142M ha managed as "multifunctional landscapes."

As in previous years, landholders were again the most significant beneficiary of IWS worldwide (Figure 17), seeing at least $7.3B transacted to programs compensating more than 7 million households in exchange for sustainable land management that protects watershed health. The significant value of investment in interventions impacting privately and collectively held lands points to the fact that IWS, especially when administered by the public sector, is well-suited to deliver both conservation and livelihood benefits. Behind landholders, the public sector was the second-largest provider, with public lands comprising 30% of total ha managed for watershed values.

Payment: A quarter of suppliers received compensation beyond cash, while payment rates varied considerably

Suppliers of watershed services frequently received payment in non-cash form. One in every four programs active in 2013 provided suppliers with technical training,

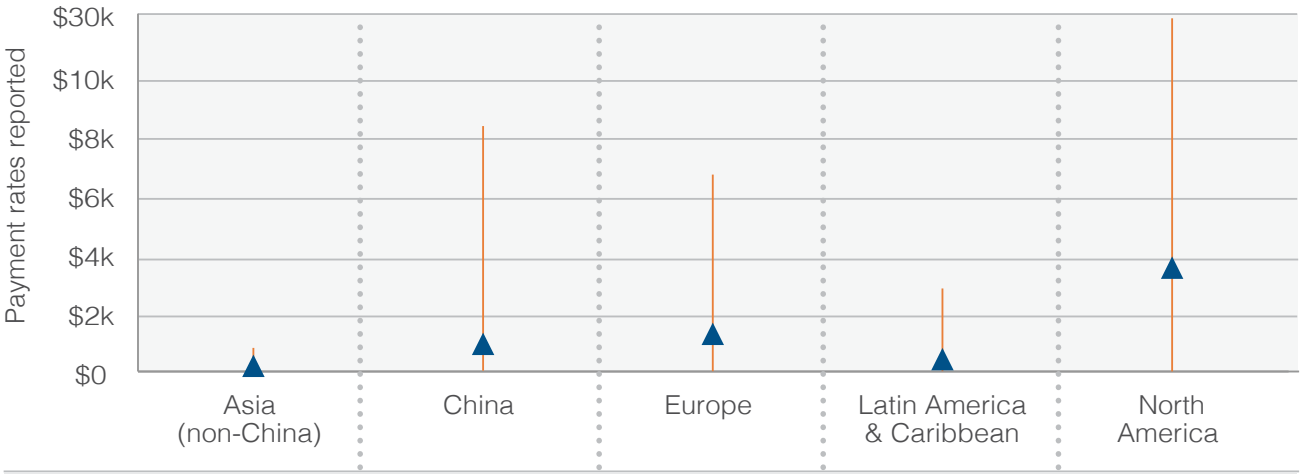
Figure 17: Share of Suppliers by Type, 2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 18: Per-hectare Payment Rates Reported by Region

(Amount paid to suppliers per hectare per year)



	Asia (non-China)	China	Europe	Latin America & Caribbean	North America
Low	$10.6 Sustainable forest management and protection	$75.0 Afforestation/ reforestation and forest protection	$23.2 Sustainable forest management	$20.0 Afforestation/ reforestation and forest protection	$6.0 Planting cover crops to reduce nitrogen runoff
High	$800.0 Sustainable agricultural practices to limit soil erosion	$8,250.0 Rice farmers switching to dryland crops	$6,831.0 Afforestation	$3,000.0 Ecological restoration (including reforestation)	$29,542.0 Ecological restoration (including reforestation)
▲ Mean	$345.4	$985.1	$1,554.8	$445.6	$3,832.6

Note: Insufficient data to report payment details for Africa and Oceania.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

inputs (such as seedlings or tools), or tenure security as a reward for participation, complementing, or replacing cash payments.

Per-hectare payment rates received by suppliers varied significantly according to the type and intensity of intervention, local input costs, opportunity costs for the supplier, transactions costs, and a host of other factors. North American programs reported both the highest ($29,542 for each hectare of land restored/ reforested and placed under conservation easement) and lowest payment values ($6 per hectare for planting cover crops) in 2013 (Figure 18), mainly a reflection of the considerable variation in underlying costs of different interventions.

3.3 Demand: National Governments, Local Water Service Providers Take Lead

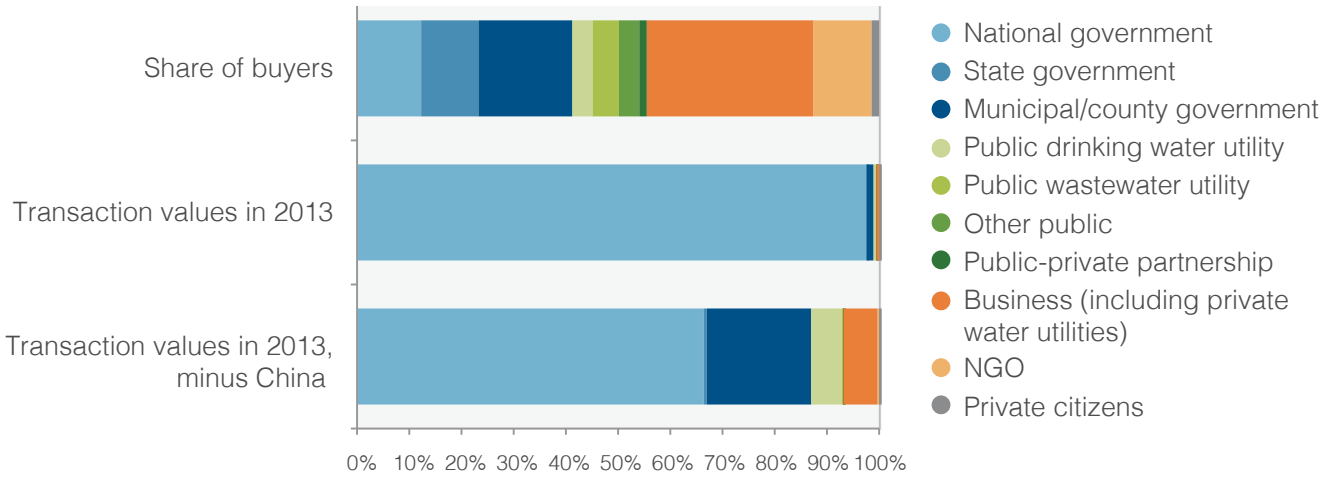
National governments represented only 12% of the total number of reported buyers of watershed services, but were responsible for the majority of the spending globally – responsible for at least $9.9B (Figure 19). As in previous years, China continued to pour billions of dollars into compensation to rural households and landholder groups for watershed restoration and management. South Africa and Ecuador also steadily ramped up program budgets for national-scale IWS initiatives, although large national programs in Australia, Costa Rica, Mexico, and the United States all experienced funding cut-backs, driving an overall decline in global investment from when China is not considered.

Even excluding funding from China's central government – the world's most significant contributor to IWS – sovereign governments accounted for 66% of spending. Country-level policies mandating IWS from other parties, such as regulated entities, delivered another $47.8M in 2013, underlining the key role of government in driving demand.

The next-largest share of transactions came from local public water service providers: municipal governments

Figure 19: Buyers by Participation and Transaction Value Share, 2013

(Share of buyers, share of value transacted)



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

and public water utilities. These actors accounted for 29% of buyers investing at least $163M in 2013.[14]

Private sector shows interest but also caution

Businesses comprised the largest single group of investors by number (32%), though their overall contributions were slight (less than one percent of transaction values). Businesses – led by the food and beverage industry, private water utilities, and the energy sector – spent a total of $41M in 2013 – up from an estimated $19-26M in 2011.[15] The median transaction value for a private sector buyer was $5,170.

The bulk of business investment – over 95% – was in North America, Africa, and Europe, driven in large part by regulatory frameworks facilitating IWS (in North America and Europe) and governments successfully leveraging private-sector contributions in South Africa through a new initiative under the national Working for Water program (Map 2).

As in previous years, the value of payments attributed to the beverage industry and private water utilities led the field, with at least $8.8M in transactions reported by beverage companies and $8.9M by water companies. The food and beverage sector also leads in terms of the number of active buyers (Figure 20). The Coca-Cola Company and its partner bottling companies stood out in 2012-2013, involved in 20 IWS programs around the world as both initial program investors and ultimately buyers of at least $2.2M in watershed services to date. Beer giant SABMiller and its subsidiaries also invested in water stewardship, valued at $1.3M allocated to five sites in Africa, Asia, and South America.

The food and beverage industry is unique in that the majority of buyers (88%) pay for watershed protection voluntarily – compared to the private-sector average of 31%. Private-sector energy companies (here referring to the extraction, processing, generation, and distribution industries as a whole) spent $9.3M on IWS in 2013, mainly spurred by regulatory requirements (which drove 93% of this sector's spending last year).[16] Similarly, actors in the service industry, consumer staples, and real estate sector typically were driven by regulatory compliance to participate in water quality trading markets.

Voluntary investment outpaces regulation-driven demand

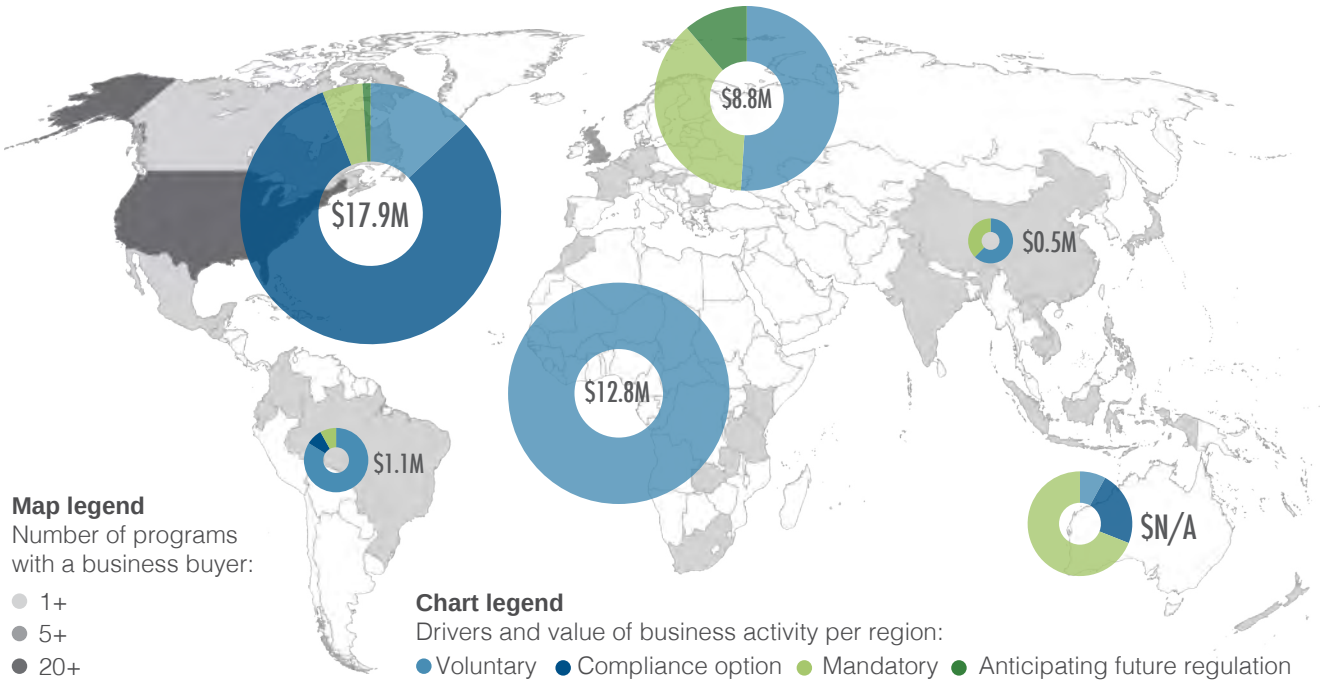
Despite the strong role of government in encouraging IWS, the relative importance of policy and regulatory drivers actually declined from 2011-2013 (Figure 21). While the share of buyers reporting that investment was compliance-driven in 2011 accounted for 62% of all buyers, in 2013 that share fell to 51%. Governments

[14] When private water utilities (which here are discussed in the context of business investments) are included in this group, local water service providers spent at least $172M in 2013.

[15] Transaction data can be difficult to obtain. In 2013, it was available for 36% of private-sector buyers, suggesting that actual investments may be a good deal higher than $41M.

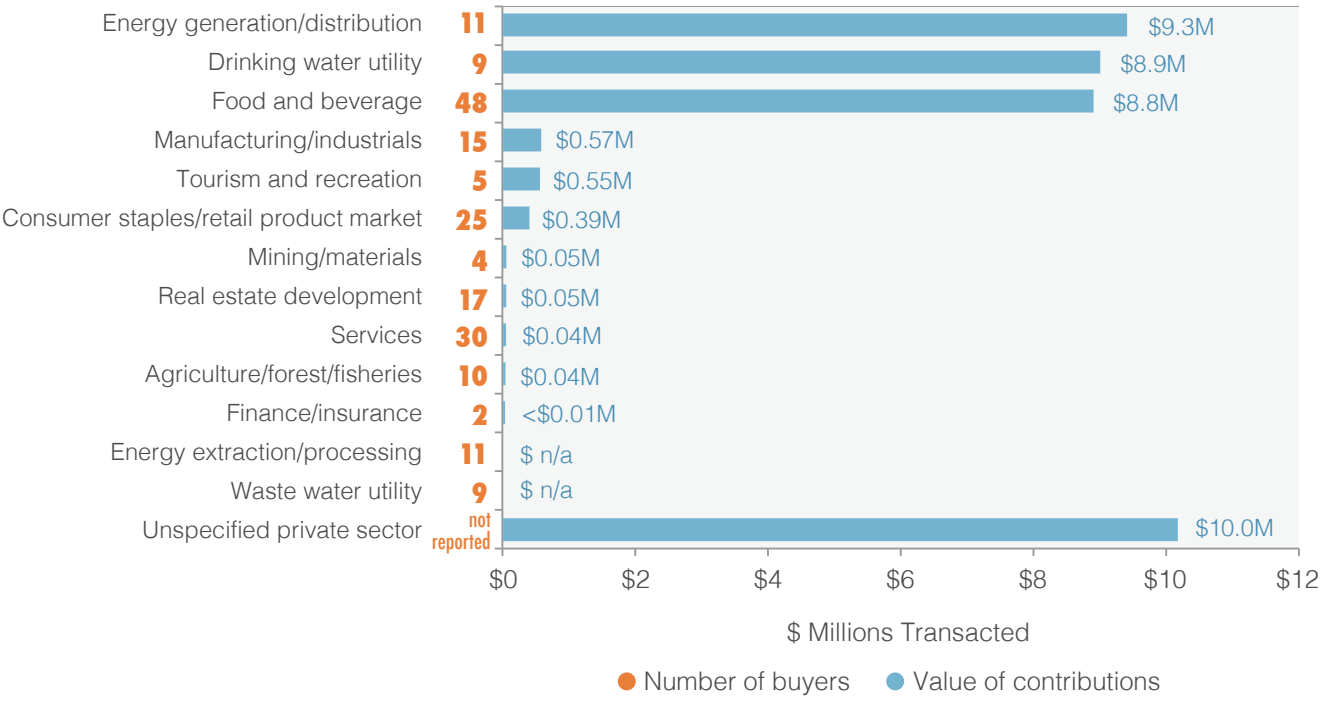
[16] Altogether, public and private energy sector spending amounted to $59M in 2013, mainly driven by Vietnam's national policy requiring major water users like hydropower operators to compensate landholders for forest management.

Map 2: Count, Value, and Drivers of Private-Sector Investment in Watershed Services by Region



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

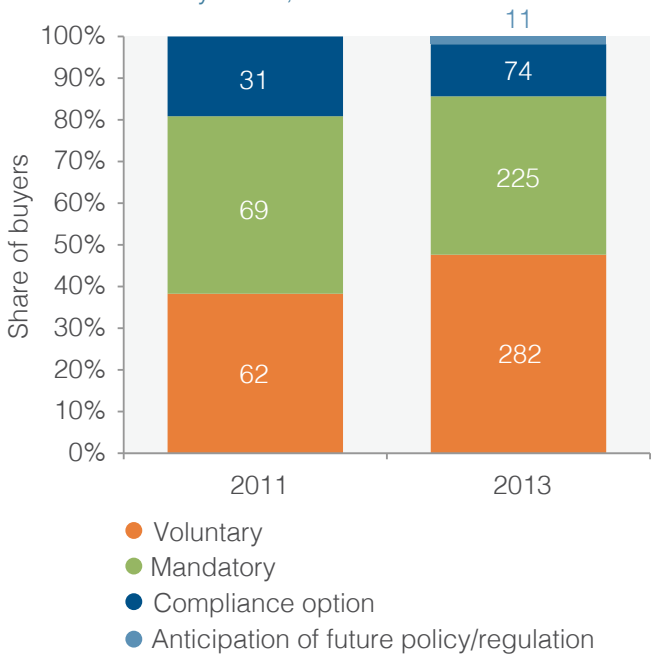
Figure 20: Count and Value of Business Investment Activity by Sector, 2013



Note: Transaction data for 2013 was unavailable for the energy extraction/processing and private wastewater utility sectors. Survey respondents reported $10M in private-sector funding where specific sectoral contributions could not be clearly estimated.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 21: Share and Count of IWS Buyers by Driver, 2011 and 2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

didn't scale back IWS policy during this time – the number of buyers driven by voluntary investment simply grew faster.

Maintaining surface and groundwater supplies are leading program goals

Enhancing quantity-related watershed services like instream flow and groundwater recharge were the top-ranked IWS program goals reported by program administrators (Figure 22). Close behind was wetland conservation, which provides a bundle of watershed services typically including sediment and nutrient pollution retention, groundwater recharge, shoreline stabilization, and flood control. Frequently reported program objectives also included various measures of improved water quality such as reducing nitrogen, sediment, and phosphorus loading. Taken as a whole, water quality was a driving objective for 52% of programs.

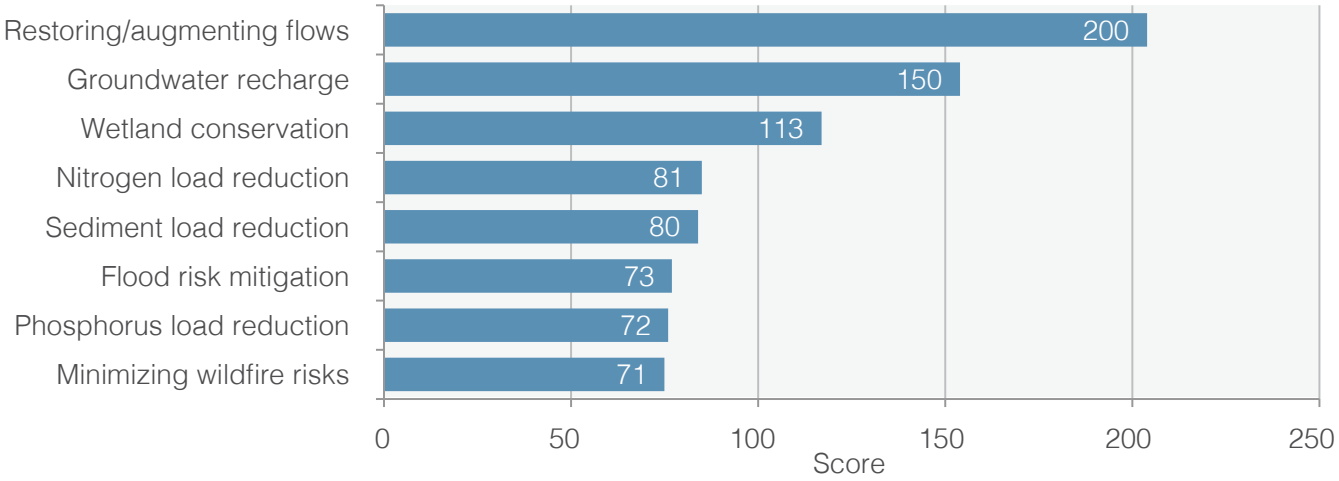
Buyers seek investments with multiple (sometimes non-water-related) benefits

Beyond water-related objectives, IWS is often driven by a host of other concerns like corporate reputation, cost savings, and biodiversity protection. Natural infrastructure solutions are sometimes attractive to buyers because of their potential to deliver these multiple benefits. In 2013, the desire to ensure water quality and address supply disruptions drove the largest share of watershed investment value across all buyer sectors (89%). Significantly, however, co-benefits deriving from watershed investment – such as reduced operational costs or enhanced local livelihoods – were particularly prioritized by governments and civil society (Table 7).

Businesses, on the other hand, were frequently driven to comply with or prepare for regulatory requirements. Corporate social responsibility (CSR) and concerns about reputation were another fairly important impetus, with around 20% of private-sector buyers reporting this motive.

Both buyers and program developers also expressed enthusiasm about the potential of IWS to deliver environmental co-benefits like wildlife habitat protection

Figure 22: Top-Ranked Watershed Services Goals as Reported by Programs



Note: Scores for watershed services goals were calculated based on number of programs reporting the respective challenge, multiplied by the rank (1-3) assigned by the respondent.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Table 7: Top Investment Motivations by Buyer Sector, 2013

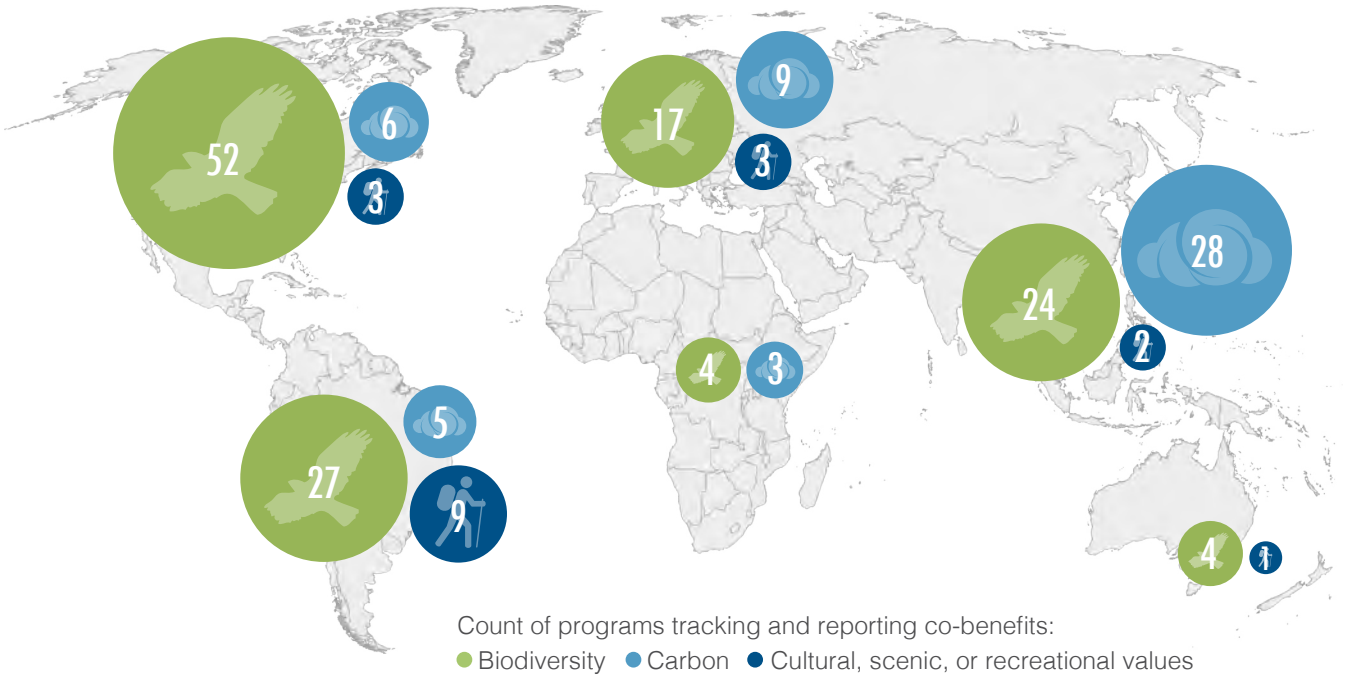
	Business	Local government	State/Provincial government	National government	NGOs/ Donors	Drinking water utilities	Waste water utilities
1.							
2.							
3.							
4.							
5.							

Regulatory compliance
Water availability risks
Water quality risks
CSR/Reputational risk
Biodiversity protection
Local livelihoods
Wildfire risk
Climate change risk
Protection of existing or planned infrastructure
Cost abatement
Weather-related risks

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Map 3: Count of Programs Tracking and Reporting Co-Benefits by Benefit Type and Region, 2013

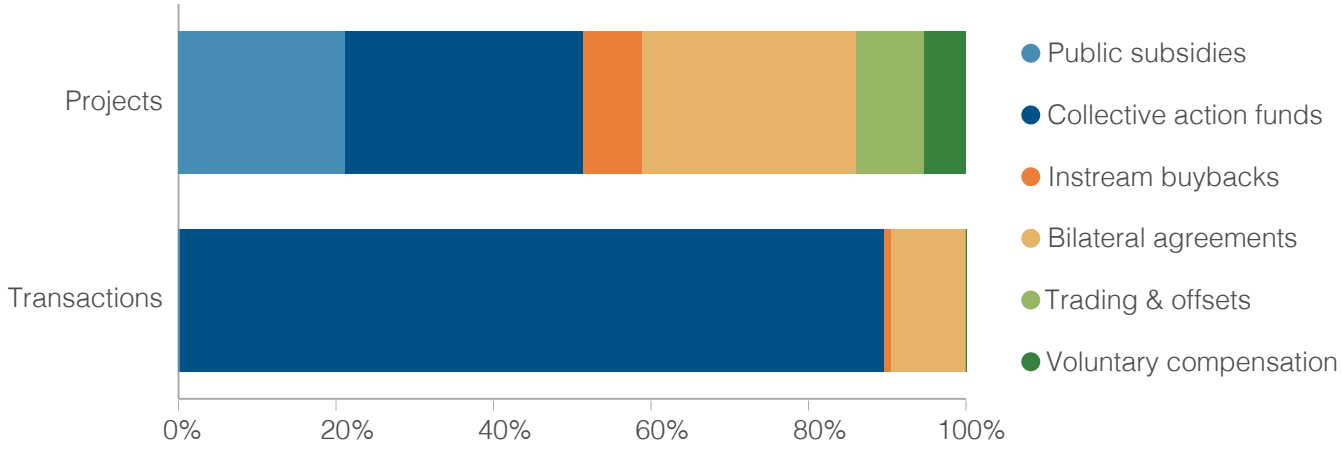
(Number of Programs)



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 23: Comparison of Project Types (by Count) and Funding Sources (by Value), 2013

(Share of all active/pilot programs; share of total transaction values)



*Note: See the Watershed Investment 101 chapter for an explanation of the program types in this figure.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

and carbon sequestration. A full 128 programs manage their lands for increased biodiversity values – predominantly in North America where both cities' protection of forested watersheds and instream buybacks initiatives have strong habitat benefits. Another 51 programs say they manage their lands for carbon storage performance (Map 3). Altogether, programs with biodiversity and/or greenhouse gas targets accounted for more than $6.1B in transactions in 2013, spanning 242M ha.

A number of programs (163) also used IWS strategies to comprehensively manage interrelated water, energy, food, and climate challenges, such as reducing agricultural water pollution and overuse or increasing the resilience of built infrastructure systems to flooding, wildfires, and other natural disasters with "green" elements.[17]

3.4 Program Models: Global Performance in 2013

IWS still relies heavily on *public subsidies* for watershed protection, which in 2013 accounted at least 88% of funding globally (Figure 23), reflecting the predominance of financing from national governments.[18]

But programs have diversified their financing structures in recent years, seeking a broader funding base in light of financing challenges encountered in other environmental markets (like the cash-strapped global carbon offset market) and/or cut-backs in funding for some national government programs. Programs are also taking advantage of a growing body of experience with water fund models (Figure 24).

Collective action funds were the fastest-growing model in 2012-2013

Notably, *collective action funds* – which pool multiple program investor contributions – made up one of every three new programs, a departure from past years when simpler *bilateral deals* were the norm. A third of new programs in 2012-2013 take a collective action model, which often offers more flexibility in choosing interventions at a landscape level. Where an endowment fund is created, these models can also provide a sustainable long-term financing stream.

Collective action fund projects grew rapidly in Latin America, in particular, where the Latin American Water Funds Partnership committed $19M in start-up capital through 2016. Funds in the region leveraged another $65M in 2012-2013 from project investors looking to manage water risk.

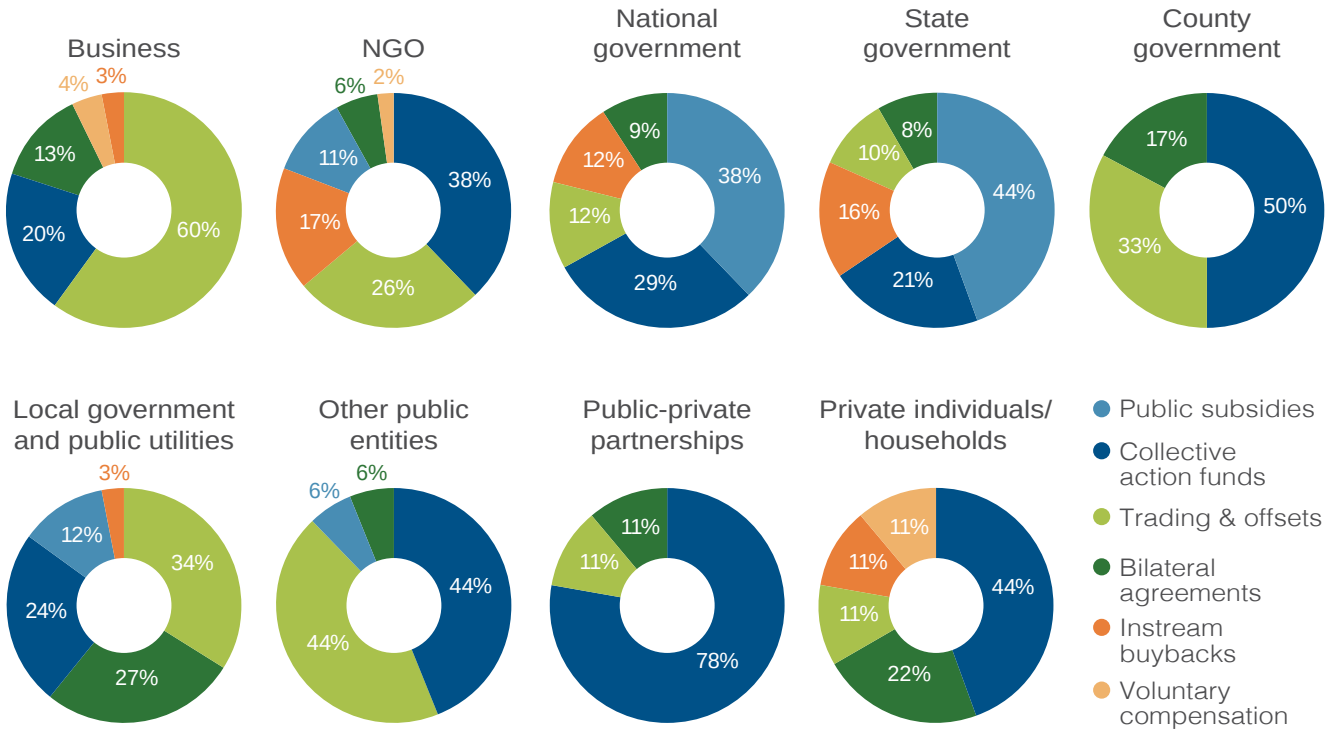
Water quality trading sees growth in Chesapeake Bay markets and in private-sector supply

Water quality trading markets strengthened in 2013 (Figure 25), when markets in North America rebounded

[17] See Chapter 4 for a discussion of linkages between natural infrastructure investment and the water-energy-food-climate "nexus" challenge.

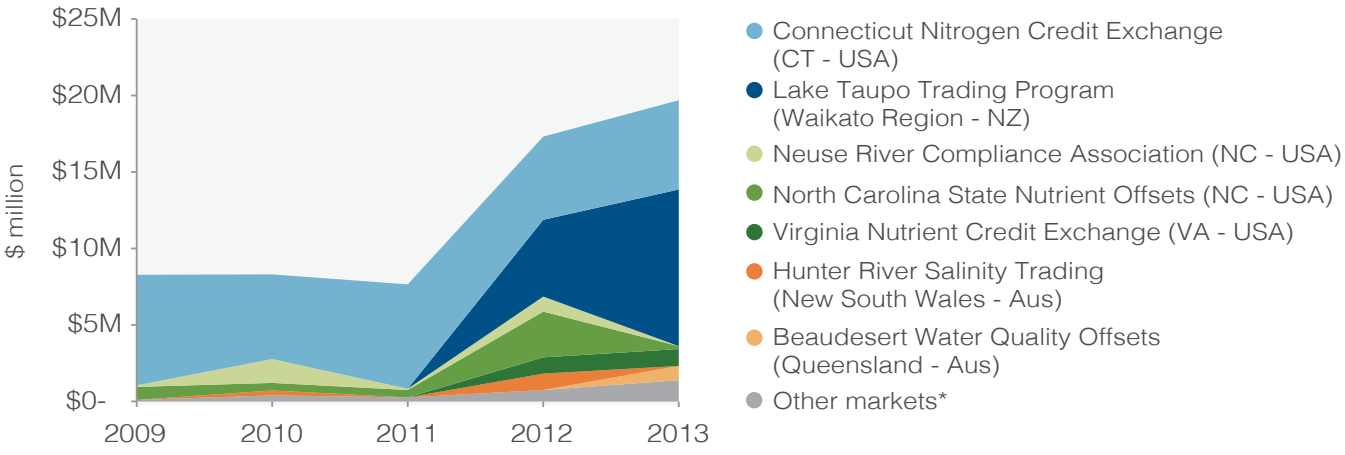
[18] See Chapter 1 for an introduction to the key program types discussed in this report.

Figure 24: Buyer Participation by Program Type, 2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 25: Historical Annual Value of Water Quality Markets



Note: Other markets (collectively <5% of 2013 aggregate value) are South Nation Total Phosphorus Management (ON - Can); Ohio River Basin Trading (OH, IN, KY - USA); Great Miami River Watershed Trading (OH - USA); Bear Creek Watershed Association (CO - USA); State of Maryland Nutrient Trading Program (MD - USA); Medford Temperature Trading (OR - USA) Pennsylvania Chesapeake Bay Nutrient Trading (PA - USA). Sole-source offset programs are not included in this figure.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

to a value of $11.1M following a slump in 2010-2011. New markets opened their doors in the Pacific Northwest and the Ohio River Basin and picked up speed in states located in the Chesapeake Bay watershed. In New Zealand, the Lake Taupo nitrogen trading program also hit a high point with at least $10.2M in transactions in 2013. But that market's biggest buyer, the Lake Taupo Protection Trust, announced in June 2013 it would withdraw from future trading, having made arrangements to achieve its remaining nitrogen reduction goals by purchasing and managing land in the catchment.

The private sector has appeared as a significant supplier of credits in Virginia, North Carolina, and Pennsylvania water quality trading markets. Private nutrient mitigation banks – which restore and permanently protect lands to improve water quality – transacted at least $2.9M in credit sales in the Pennsylvania Chesapeake markets and in North Carolina's nutrient offset program.[19] This report survey tracked a total of 30 private nutrient banks active in the US in 2013.

Instream buybacks slow in Australia, speed up in US

Instream buybacks – the purchase and retirement of water rights to ensure that river systems maintain ecologically healthy flow levels – slowed as the Australian national government stepped back from its purchase program in the Murray-Darling River system and smaller state-level programs wrapped up their own buyback activities in 2010-2011. Buybacks were never very popular with farmers and some state governments in Australia, who predicted negative impacts to local agricultural economies.[20] When the new Coalition Government took the reins from the Labor Party in September 2013, it announced that it was cutting the program's scope and spending levels, which had already begun to wind down.

In the US, however, similar programs reported a steady upward trajectory. State agencies are increasingly receptive to the mechanism to protect water-starved streams, and a number of US companies such as Whitewave Foods (makers of Silk Soymilk), the National Hockey League, and Ted's Montana Grill, now use buybacks to symbolically offset their water use.[21]

Despite the drop in global transaction values for instream buybacks from 2010-2013, the volume of water restored to the river system has steadily risen to more than 6M mega liters (ML), since 80% of buybacks by volume between 2010-2013 are permanently protected (Figure 26).[22]

[19] Transaction values for the Virginia trading programs were unavailable for 2013. For credit volumes, please see the North America chapter.

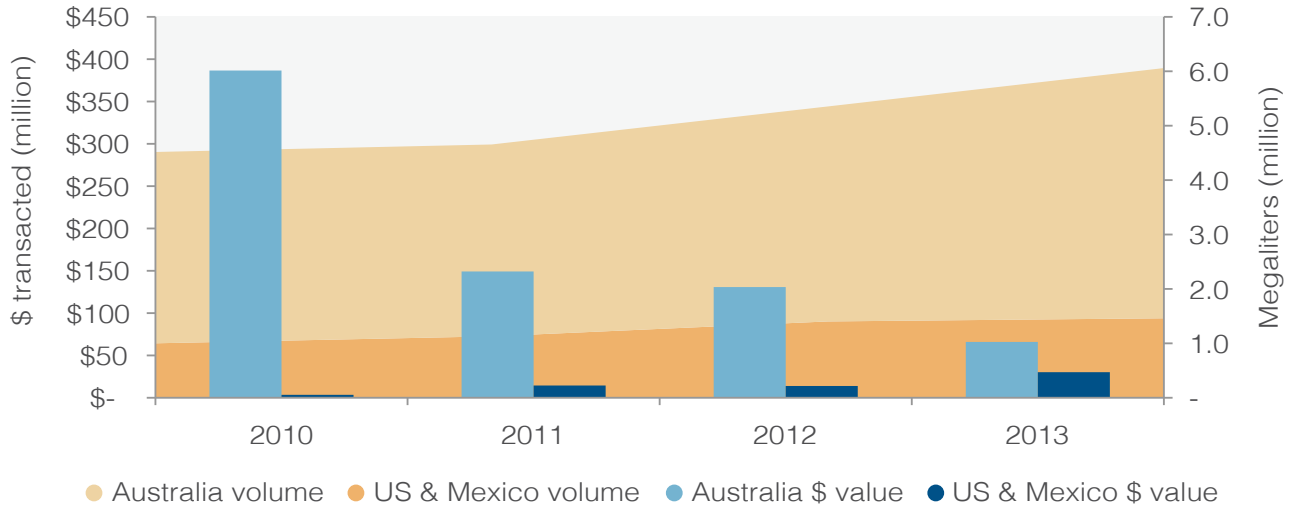
[20] In fact, a recent study in South Australia suggested that the sale of water rights to the government has actually so far been linked to farmers' reducing their debt, modernizing operations, and increasing productivity (Wheeler et al. 2013). See the Oceania chapter for more information.

[21] Buybacks are not intended as true mitigation for water use, as the water restored instream through the buyback mechanism is not an exact match spatially or temporally for the buyer's actual use. Instream, the objective is to achieve an overall "balance" of withdrawal and instream augmentation at a broad basin level.

[22] See the North America chapter for a discussion of permanent acquisition versus leasing of instream water rights.

Figure 26: Annual Transaction Value and Cumulative Instream Flow Augmentation Globally, 2010-2013

(Value transacted and ML of instream flow restored/augmented)



Note: This figure reflects only buybacks reported by volume of water although some buybacks contracts set payments in terms of flow (for example, 20 cubic feet per second). As the two measurements are not directly comparable, we have shown only volume outcomes here, which are the greater of the two.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

4. Monitoring and Methodologies

Watershed investment is not without its challenges. This report identifies an array of challenges to growth, including often weak policy/regulatory support and difficulties in securing project development finance in early stages and stable sources of demand thereafter. Programs often also face internal resource constraints. Technical and financial capacity for monitoring continues to be a challenge for many programs, but 2012 and 2013 saw significant increases in monitoring and evaluation (M&E) nonetheless. Programs responded to these challenges with an increased focus on M&E, outcome-based finance, and new standards and certifications for watershed protection projects.

4.1 Program Growth Challenged by Unstable Finance and Legal Barriers

Program developers routinely cited a lack of buyers and early-stage capital for project development as their greatest challenges (Figure 27). Project development can often be a fairly expensive and lengthy process, requiring extensive scoping and design to establish scientific baselines, map stakeholders, and assess potential watershed interventions and appropriate investment mechanisms.

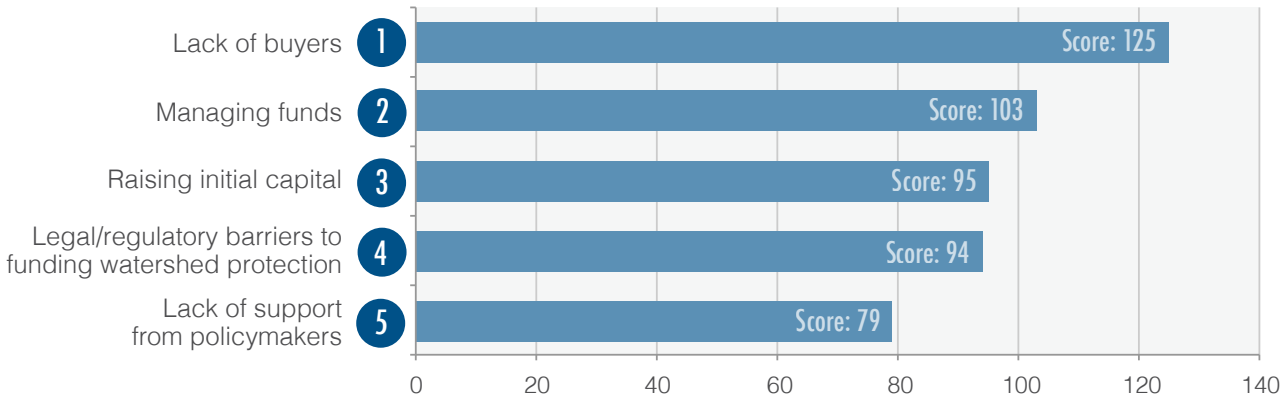
To date, early-stage financing of programs predominantly remains dependent on government and foundation grants to get programs off the ground (Figure 28). In only one-third (58) of reporting programs did watershed service buyers fund the program's initial design. Market participants suggest that under-investment may be linked to uncertainty around long-term regulatory drivers for IWS, as well as a lack of clear information generated by programs about *return on investment (ROI)*.

Some mechanisms introduced in 2012-2013 aim to alleviate the early-stage capital pinch. Initiatives like the Latin American Water Funds Partnership and the proposed joint European Commission-European Investment Bank's natural infrastructure financing facility take on the challenge of providing seed capital to nascent programs. But early-stage finance needs to be scaled up further: Raising initial capital was the third-greatest challenge reported by program developers (Figure 27).

Even when money *is* flowing, program administrators report challenges in managing funds. Several respondents cited difficulties ensuring that money is actually being disbursed to suppliers by local intermediaries (such as a community board). Some respondents noted cash flow challenges typically associated with unpredictable financing for ecosystem service provision. In rare cases, respondents pointed to issues with safekeeping funds: one program found it necessary to house their money in the local police station.

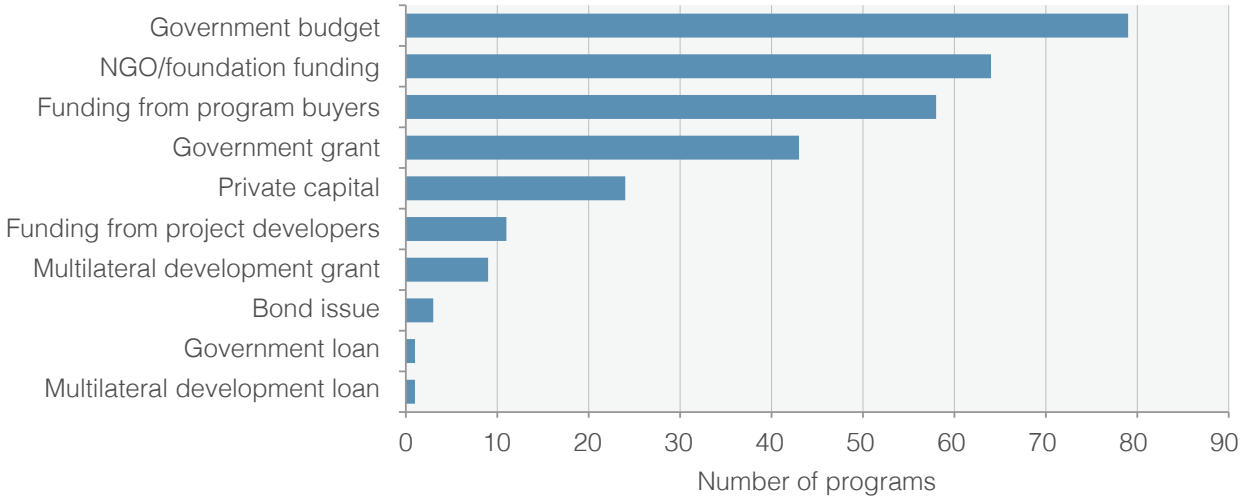
Survey respondents ranked difficulties in obtaining policy and regulatory support close behind these

Figure 27: Top Five Challenges Reported by Program Developers



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 28: Count of Programs Reporting Planning-Stage Funding Source by Funder Category



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

funding-related challenges. Several reported that interested utilities and municipalities were constrained by fiduciary responsibilities to their ratepayer or taxpayers. In other cases, public buyers were unable to make payments to landholders located outside of their political jurisdiction.

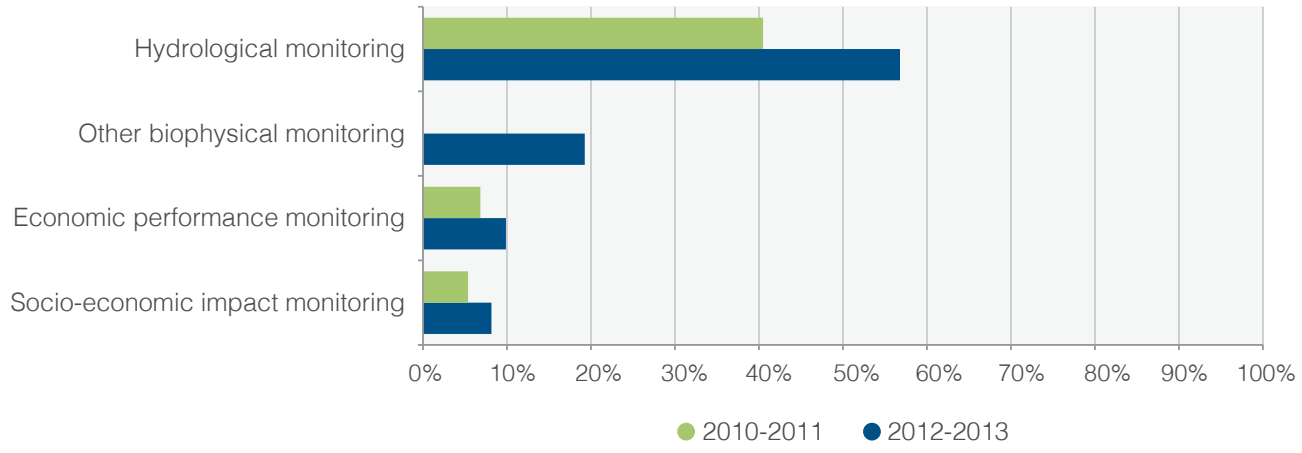
Sometimes, legal structures stand in the way of watershed investment: in the US state of Wyoming, for example, it is not possible to lease a water right for short-term instream flow augmentation. Finally, some compliance-driven buyers reported concerns about regulatory risk: that is, whether watershed investment would be sufficient to meet their legal obligations for environmental protection.

4.2 Monitoring and Evaluation Improves in 2012-2013, but Not Yet the Norm

The share of programs that reported ongoing monitoring of hydrological and other biophysical outcomes to Ecosystem Marketplace in 2012-2013 increased to 55%, from 45% in 2010-2011 (Figure 29). In absolute numbers, 219 programs said that they carried out monitoring of hydrological, other biophysical, economic

Figure 29: Program Monitoring Rates, 2010-2013

(% share of programs)

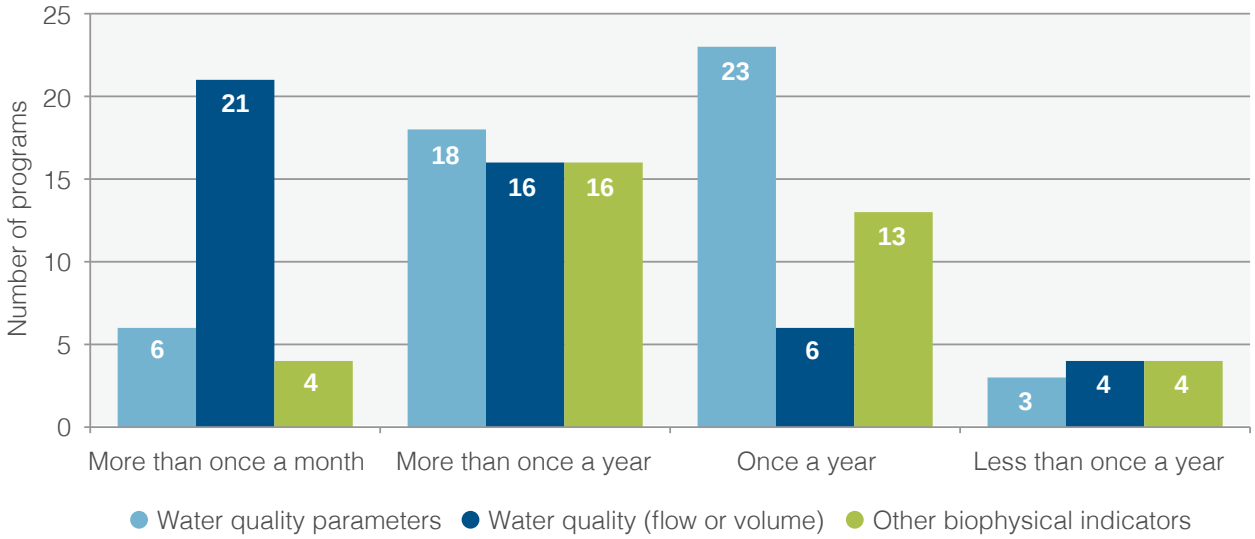


Note: "Other biophysical monitoring" data is not available for 2010-2011.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 30: Monitoring Frequency Reported by Monitoring Type

(Count of responses to question, "How frequently does monitoring take place?")

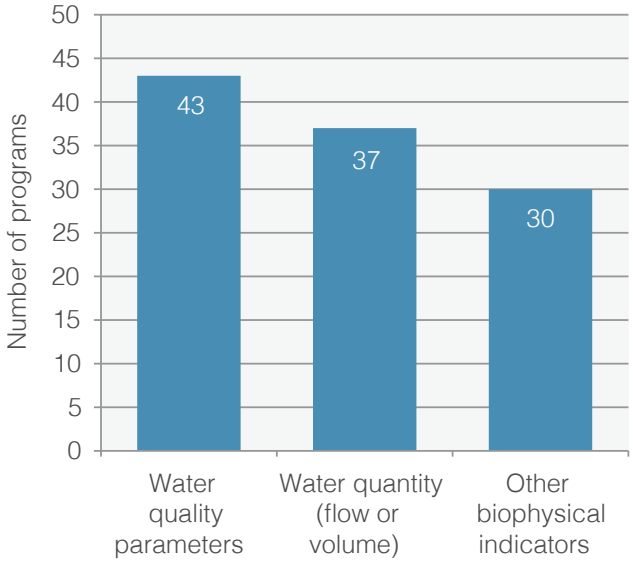


Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

performance, and/or socio-economic impact indicators, compared to 77 for the earlier period.

This finding reflects a growing focus on demonstrating performance, as programs increasingly measure specific metrics like "gallons of aquifer recharge" or "jobs created by reforestation projects." Historically many programs have tracked implementation in simpler terms, e.g., the number of hectares where IWS has shifted land management practices, which provides useful information about a program's spatial coverage but less about the level of specific benefits being delivered. But even in these terms, reporting has increased: there are 236 programs reporting land area under management (in ha) in 2013 that did not do so in our 2011 survey, accounting for 209M ha newly tracked in this dataset.

Figure 31: Count of Programs Required by Buyers to Conduct Monitoring by Monitoring Type



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Behind these numbers, monitoring practices vary widely by program type, frequency, level of detail, and choice of metrics (Figure 32 and Table 8). For example, a nutrient trading project may focus on nitrogen and phosphorus loading more than on other water quality parameters and perhaps not at all on biophysical indicators like species diversity at the site.

Programs report resource, technical challenges for monitoring

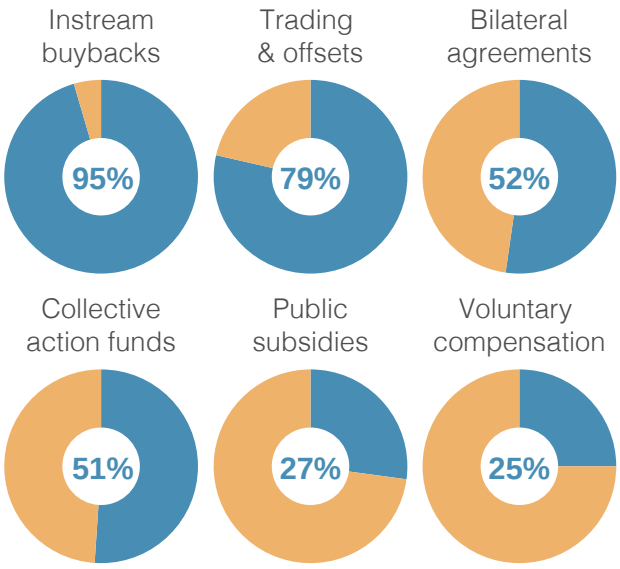
IWS program developers must contend with resource constraints, choice of metrics, and real-world ecological complexities in their efforts to monitor performance. "Lack of scientific data on program outcomes" was a commonly reported challenge by survey respondents.

"It can be challenging to design monitoring protocols and metrics that are sufficiently informative while still being simple," explains one respondent based in the United States. "They need to be useful to the land manager but still meet environmental standards, and not be overly burdensome so that the land manager will adopt it."

Programs may prefer simpler metrics (like "ha under management" versus "cubic meters of increased flow")

Figure 32: Use of Hydrologic Monitoring by Program Type, Globally

(Share of programs reporting ongoing water quality and/or quantity monitoring, by type)



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

because more targeted metrics are very resource-intensive to measure. Monitoring instream flow levels, for example, requires specialized equipment, personnel trained in using it, and repeated field visits to collect data. Programs report that resources and capacity for M&E are often limited, especially in rural and developing areas.

It is also sometimes difficult to attribute watershed-wide environmental outcomes back to a specific activity, such as a reforestation project, further complicating efforts to demonstrate a program's benefits and limiting the usefulness of monitoring, at least for this purpose. Restoration efforts might deliver changes non-linearly (e.g., showing increasing returns over time, step-wise improvements, or time lags in delivery), or interactions or third-party effects downstream can change or cancel out benefits. And some natural infrastructure values, such as floodwater absorption, are only noticeable during rare events.

Where payment is not outcome-based, programs report lower monitoring rates

Monitoring rates appear to be linked to programs' "conditionality;" in other words the requirement that suppliers deliver some level of performance in order to receive payment. More market-like mechanisms (which also typically have strict conditionality) reported higher rates of hydrologic monitoring. Meanwhile, programs with looser conditionality, especially public subsidies for which conservation and livelihoods support are twin goals, may not be so strict in monitoring performance (Figure 32).

This report survey found no significant difference in biophysical monitoring rates based on buyers' profit status: Of programs with private-sector buyers, 56% reported ongoing biophysical monitoring, compared to 55% overall. But the presence of private-sector buyers was associated with higher economic performance monitoring rates (18% compared to 10%) and social impacts monitoring (13% compared to 8%).

Programs report low monitoring of co-benefits

Uneven monitoring rates make it difficult to assess whether programs are delivering on benefits. Only 20% of programs that co-manage for biodiversity benefits report doing any biophysical monitoring, for example. Voluntary compensation programs also have very low monitoring rates, though many of these projects are selected based on extensive modeling of outcomes prior to beginning restoration/protection.

Seventeen percent of programs cite local livelihoods or other social impacts (such as gender equity or poverty alleviation) as a goal. But just 8% of programs report monitoring these kinds of impacts, a proportion that has not increased since last tracked in 2011. Monitoring here is quite diverse, reflecting varying program contexts and goals (Table 8).

4.3 A Shift Toward Outcome-Based Payments

Despite reported challenges related to monitoring, recent tracking suggests a definite shift toward outcome-based finance that links payments to specific outcomes, such as $0.03 paid to farmers for every ten gallons of groundwater supplies stored, recovered, or otherwise enhanced (i.e., groundwater "recharge") for improved irrigation practices. Outcome-based programs accounted for 31% of active/pilot programs in 2013, up from 20% in 2011 (Figure 33). The largest share of this group was attributed to trading and offsets programs (35%), followed by bilateral agreements (27%) and collective action funds (22%).[23]

[23] Instream buybacks programs take as their basis of payment the transfer of a water right and thus also link payments to delivery of a specific outcome (measured in flow or volume) but here are counted separately.

Table 8: Metrics Reported by Programs Monitoring Socio-Economic Impacts, by Region

	Asia	Africa	Europe	Lat. America	North America	Oceania
NUMBER OF PROGRAMS MONITORING SOCIO-ECONOMIC IMPACTS	**6**	**3**	**4**	**14**	**6**	**0**
Additional income		x		x	x	
Employment levels	x	x		x	x	
Time saved collecting water and firewood by gender		x				
Gender equity		x				
Soil productivity		x			x	
Crop yields		x				
Meals per day		x				
Ability to pay for health services		x				
Ability to pay for school contributions		x				
Number of households receiving solar cookers and wood-saving stoves				x		
Number of households receiving agro-inputs (seeds, tools)		x		x		
Number of households receiving payment	x	x	x	x	x	
Social capital	x					
Local attitudes toward watershed protection					x	
Changes in knowledge/practice in watershed stewardship by landholders					x	

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

4.4 New Interest in Quantified Outcomes and ROI, but Methodologies Remain Experimental

Interest in both strengthened monitoring of outcomes and in payment-for-performance seems to have been driven forward in 2012-2013 by buyers and program investors desiring typical decision-support metrics like ROI, which program developers have not historically provided. For example, public sector entities seeking to justify their deployment of taxpayer/ratepayer funds may require some kind of ROI measure.[24] Economic analysis is also required when buyers are considering alternative investments, such as weighing the merits of natural infrastructure versus grey infrastructure (see Box 5 for an example). In response to these demands and in the interests of scaling up investment, programs cite significant interest in demonstrating performance in both biophysical and economic terms.

We distinguish between *buyer* ROI, referring to the quantified biophysical benefits received for every dollar invested, and *program investor* ROI, which is concerned with financial returns deriving from the investment.

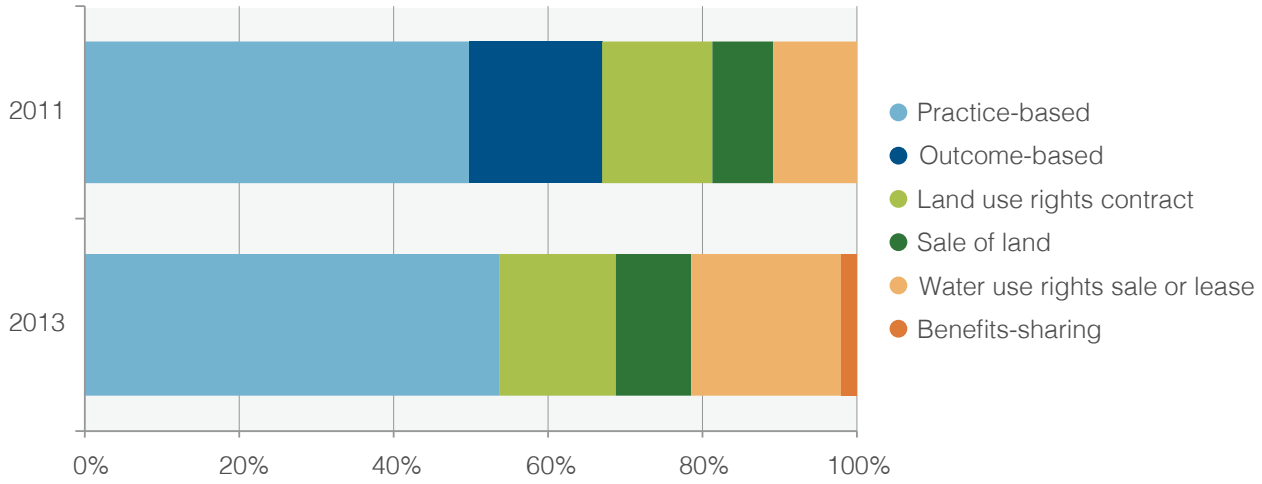
Buyers push programs to track performance in environmental and economic terms

Seeking a better grasp on buyer ROI, a number of programs reported testing new methodologies for quantifying hydrologic and other biophysical outcomes, particularly in the UK, US, and Latin America. The year 2013 also saw cross-fertilization of successful approaches between industry leaders. For example, a methodology for estimating groundwater replenishment originally developed for The Coca-Cola Company is

[24] The UK national water regulator, for example, requires utilities to conduct a cost-benefit analysis and demonstrate community support as a condition of approval for watershed management plans. See Chapter 7.

Figure 33: Outcome-Based Payments by Type, 2011-2013

(Share of active and pilot programs by basis of payment)



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

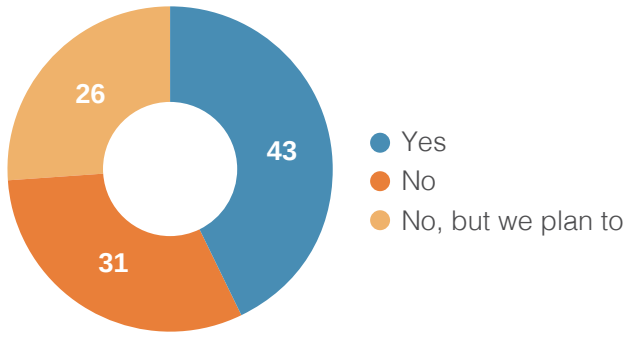
now being harnessed by The Nature Conservancy to estimate the hydrological performance of a water fund in Monterrey, Mexico, and for restoration work on public forest lands in the United States.

Programs also reported growing interest in tracking their own economic performance in terms of costs savings or benefits associated with watershed investment (Figure 34). But approaches to economic appraisal varied considerably, reflecting the fact that tools or methodologies for tracking economic performance are not yet well established or widely used (Box 4).

Program developers most often simply estimate the capital and/or operational costs avoided through watershed investment, such as not needing to build or upgrade a treatment plant, to justify a proposed IWS strategy (Figure 35). Once program design has begun, several programs have estimated cost-effectiveness of different intervention options (such as planting cover crops versus excluding cattle from streambanks) in order to optimize investment. And finally, some program administrators have carried out a full cost-benefit analysis (CBA), going beyond estimates of avoided costs to considering program outcomes and their values to buyers and often society as a whole.[25]

Figure 34: Share of Programs Tracking or Planning to Track Economic Performance

(Share of responses to the question, "Does the program measure the value of its outcomes (like reduced pollution or increased supplies) in economic terms?")



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

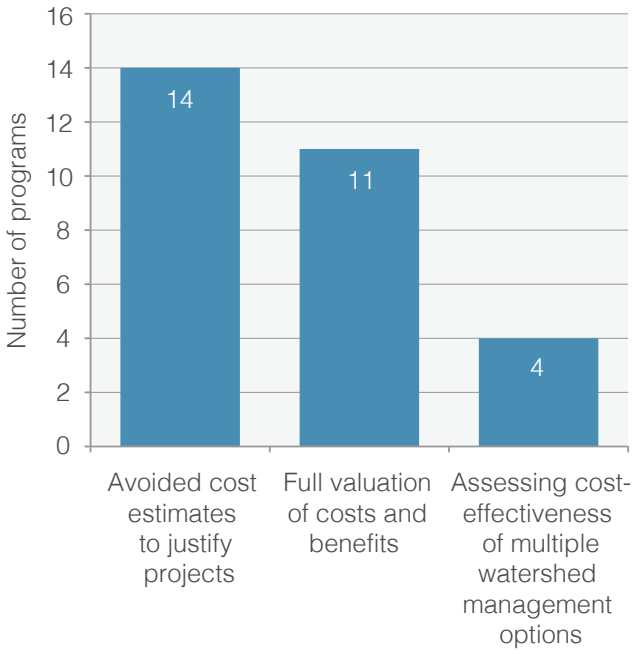
Cost savings estimates top $3.7B, though few programs track this data

Only 14 programs furnished cost-savings data, but that small sample estimated that these programs are collectively saving in excess of $3.7B each year through natural infrastructure strategies, a sum significantly greater than the $159.9M invested into those same programs in 2013. This finding suggests that actual net benefits for all 403 operational IWS programs are also quite significant. But hard numbers remain unavailable, since as discussed above there is currently little consistency in methods to estimate cost-savings or benefits of watershed investment.

[25] We find that how broadly costs and benefits are defined varies quite a bit. Some programs value a range of environmental services associated with the program: One program that focused on reducing wildfire risk included costs associated with fire suppression, sedimentation and clean-up, infrastructure damage, water-supply remediation, habitat loss, loss of recreation opportunities, wilderness values, and carbon storage. Others focus more narrowly on watershed services only, which can have a significant effect on CBA results. See case study Box 13 "United Utilities' Sustainable Catchment Management Program" for an example.

Figure 35: Approaches Taken by Programs to Demonstrate Economic Performance

(Frequency of method reported)



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Program investors sounding drum for ROI info, but little available

Programs are also beginning to heed calls from program investors for better information on financial ROI associated with watershed investment programs, in an effort to attract initial capital. To date most program investors have little or no expectation of a financial return: Few watershed investment programs have demonstrated the ability to generate cash flows for investors over time.[26]

But recently, high-level conversations have taken place, mainly in the US, about how to better connect private and institutional capital with conservation. Reports released in 2013-2014, including from Credit Suisse/ WWF/McKinsey & Co., the Conservation Finance Alliance, and Imprint Capital, all noted a lack of investment-ready conservation projects and called for project developers to better quantify performance and demonstrate projects' ROI.[27]

[26] See the "North America" chapter's discussion of P3s for green infrastructure as one example.

[27] WWF, Credit Suisse Group AG, and McKinsey & Company 2014. (This report describes conservation finance as being "ten years or more behind the field of social impact investing."); Conservation Finance Alliance 2014; Imprint Capital 2013.

Market infrastructure and standards mature

Market infrastructure for transactions remained relatively basic in 2013. Compensation most often passes directly from buyer to supplier, though the growing popularity of collective action models is reflected in a shift in 2013 toward channeling payments through a third party – most often a conservation group – or fund (Table 9). But several initiatives advanced new standards to certify watershed investment approaches or outcomes, which suggests a step toward meeting demand for better tracking of performance.

Values transacted via a market exchange – an auction mechanism, trading platform, or through existing markets – fell from 2011 to 2013 as government buybacks spending in Australia's Murray-Darling declined. Outside of this program, just under $8M in activity took place on exchanges in 2013.

Most exchanges are hosted by regional governments, which also oversee the regulatory frameworks driving trading. Private-sector efforts to provide market infrastructure are rare. Markit Environmental Registry hosts regulatory water quality credit auctions for the Pennsylvania Infrastructure Investment Authority (PENNVEST) and provides credit registry services for the Willamette Ecosystem Marketplace (OR - US) and the Ohio River Basin Trading Project (OH/IN/KY - US). But on the whole, exchange arrangements remain ad hoc: markets are likely still too small to support more sophisticated infrastructure.

Unlike carbon markets, few project standards exist in the IWS space. Watershed investment outcomes are highly localized and can be difficult to quantify. Currently, no widely used guidance on managing water risks at a watershed or supply-chain level exists. In the field, some developers are using existing standards and certifications (S&C) as a proxy project certification or verification framework: six European IWS programs in 2013 used organic agriculture certification or Forest Stewardship Council (FSC) certification to verify project activities and increase benefits of participation for landowners.

Two new initiatives – both in the pilot stage in 2013 – attempt to standardize project development. The Alliance for Water Stewardship released a beta version of its International Water Stewardship Standard (IWSS) in early 2013.[28] In May 2014, a full standard was launched, in tandem with public corporate commitments by Nestlé and General Mills. The IWSS – the first standard specifically focusing on watershed-scale risk management – requires water users to assess

[28] Alliance for Water Stewardship 2014.

Box 4: Key Considerations in Quantifying Performance

Moving beyond site-level monitoring to estimating a program's net benefits in a watershed – whether measured in environmental, economic, or other metrics – can become very complicated very quickly, thanks to the complexity of ecosystems and a lack of predictive models or methodologies that can be easily and accurately applied in any local context.

Nevertheless, in 2012 and 2013 many program developers reported interest in more rigorously quantifying outcomes, both to improve program effectiveness and attract new funding. Based on information provided in survey responses, a variety of approaches are currently being taken with no dominant methodology to date. This is largely because program developers face a number of considerations in deciding how to track performance, which ultimately shape their choice of approach, including:

- **Is it necessary?** Quantifying outcomes is nearly always a costly exercise, and, depending on the type of intervention and buyer demand, programs may find that simple measures like "ha under management" are sufficient.
- **What kind of information is available?** The availability of local biophysical data and applicable models and methodologies can constrain which approaches are feasible for programs.
- **What kind of information is required?** Metrics choice can be shaped by program capacity, available local data, usefulness of the metric to buyers, and degree of flexibility of comparison across different interventions. Once indicators are chosen, programs must ask whether buyers require ongoing monitoring or will be satisfied with predictive modeling of outcomes or ex post evaluation.
- **Should performance be monetized?** Is it informative and useful to value outcomes in dollar amounts or are biophysical indicators more appropriate?
- **Methodological questions:** Programs must work through issues such as defining temporal and geographic scale of interest, interventions being considered, economic discounting, and dealing with uncertainty.

risk at a basin level and engage in individual and collective action to achieve (1) good water governance; (2) sustainable water balance; (3) good water quality status, and (4) healthy status of important water-related areas. Meanwhile, the Gold Standard released its Water Benefit Certificates methodology in September 2014, which certifies water quantity outcomes from a number of landscape interventions.[29]

Table 9: Exchange Mechanisms by Use and Value, 2011 and 2013

	Number of Programs		Value	
	2011	2013	2011	2013
Directly between buyer(s) and supplier(s)	85	79	$6,308M	$7,736M
Through an intermediary party or fund	55	72	$278.3M	$400.8M
Through a market exchange	10	11	$151.5M	$67.9M

Notes: For some transactions, exchange mechanism was not reported or could not be determined.
Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

[29] The Gold Standard 2014.

Box 5: Case Study: On the Gulf Coast, Entergy Makes the Business Case for Climate Resilience Through "Soft Path" Infrastructure

When Hurricanes Katrina and Rita blew through the Gulf in 2005, Entergy, a utility serving 2.8M customers in the region, lost its New Orleans headquarters for a year.

"We're uniquely at risk due to the geographic location of our company and our customers," says Brent Dorsey, Director of Entergy's corporate environmental programs. "Every few years, taking a direct hit from a hurricane is difficult to recover from. Our customers can't afford for us to keep rebuilding the system."

Instead, the company is looking to build resilience to climate risk, both in its own operations and on the Gulf's landscape. In 2010, Entergy hired McKinsey & Company to quantify climate risk across the company's assets. They used a statistical model by the reinsurance company Swiss Re to simulate 10,000 possible "hurricane years," looking at the multitude of different possible pathways of hurricanes across the Gulf and how the likelihood and strength of storms might change under different climate scenarios.

The analysis found that Entergy's infrastructure – which includes 500,000 miles of transmission lines and 300 generation facilities – is vulnerable to storms even without climate change. Under a moderate climate change scenario, cumulative losses from wind, sea level rise, and storm surge could cost Entergy $370B (in 2010 dollars) over the next two decades.

Entergy had already been adapting its "grey" infrastructure to the impacts of more intense and frequent storms: the company is elevating substations, replacing damaged wooden structures with metal and concrete, and strengthening transmission and distribution lines and conductors. But the severity of climate risks has changed Entergy's calculus around some of the resiliency measures that might otherwise be considered too expensive.

For instance, wetland restoration comes out at 3.31 on the company's cost-benefit analysis, meaning that for every $3.31 invested, Entergy would get $1.00 worth of "casualty loss reduction value." However, when all of the co-benefits of wetlands – water purification, fisheries, recreation, and carbon sequestration – are included, natural infrastructure values begin to win out.

Restoring the wetlands became a major component of Entergy's efforts. Coastal Louisiana suffers one of the fastest rates of wetland loss in the world, with restoration costs estimated in the tens to hundreds of billions of dollars, the company notes, requiring industries and communities to be resilient to survive.

Entergy has invested $150,000 to help develop a wetlands carbon methodology that will allow landowners to quantify the carbon sequestered by restoration projects. Entergy also financed the first pilot project testing the methodology and plans to purchase some of the carbon offsets produced by the restoration work. The company sees wetlands as a kind of natural insurance that will buffer their infrastructure in an uncertain climate future.

"We're really interested in wetland restoration because we see the wetlands as a natural barrier," Dorsey says. "We saw we were physically at risk to the impacts of climate. We know we are going to have to adapt."

Box 6: The Water-Energy-Food Nexus and Natural Infrastructure

Experts acknowledge that energy, food, and water systems will require tremendous investment to keep pace with growing demand and climate pressures in the coming decades. Even more importantly, all of these systems are deeply interdependent, a relationship known as the water-energy-food-climate "nexus." What is often missing from discussions about this nexus is the recognition that natural infrastructure plays an important role in addressing water, energy, and food security challenges in an integrated way, allowing societies to manage and minimize trade-offs, maximize resilience in the face of changing conditions including climate change, and create sustainable solutions that are "wins" for water, energy, and food security.

Water, energy, and food systems are linked through shared resource dependencies.

Deep interconnections between water, energy, and food systems mean that small changes in one system can lead to cascading effects in the others and increase the likelihood of nexus-wide collapse.[30] The relationships that link water, energy, and food are complex:

- Energy is needed to make water accessible and safe for human use – energy to pump groundwater for irrigation, operate drinking water treatment and wastewater treatment plants, pump water through distribution systems, and operate flood control structures such as tide barriers and flood gates. In the US, energy costs can be 25%-30% of a water utility's total operating costs.
- Water is needed for energy extraction, processing, transport, and generation. In 2010, 15% of water withdrawals globally were for energy-related activities, such as for extracting fossil fuels, growing biofuels, generating hydroelectricity, and cooling power plants.[31]
- Water is also critical for food production: Water is needed to irrigate crops, pasture, or forage for livestock; to process raw materials into foods and beverages; and to support aquaculture and wild capture fisheries (an essential source of protein). Agriculture is already the largest user of water globally, and water demand is expected to grow by more than 50% by 2030, due to population growth and changing food preferences. According to WRI's Aqueduct project, which maps food production against water risk, today more than 50% of the world's crop production is in areas of water scarcity/high water risk.[32]

Nexus trade-offs and cascading effects are increasingly common.

There is a clear need for more integrated management of water, agricultural, and energy production systems. A lack of attention to the nexus increases the risk that we will not achieve sustainable levels of water, food, or energy. Trade-offs across the nexus are already appearing and affecting people and economies around the world:

- In the summer of 2012, a delayed and shortened monsoon in India reduced hydropower output at the same time that electricity demand was running high, contributing to two days of blackouts, which affected an estimated 660M people.
- In China, drought limited hydropower generation in the Yangtze River Basin, which contributed to a spike in coal demand – and prices – and forced some provinces to implement strict energy efficiency measures and electricity rationing.
- Also in China, over the past several years, dozens of planned coal-to-liquids (CTL) projects have been abandoned, due in part to concerns that they would place heavy burdens on scarce water resources.

[30] World Economic Forum 2014.

[31] International Energy Association 2012.

[32] World Resources Institute 2014.

- Hydroelectric energy production has already decimated fish populations in many rivers around the world. Yet planned massive dam building in the Mekong and Amazon systems will affect fisheries that supply millions of people with food.
- In California, after three years of drought, more than 200,000 ha of farmland was predicted to be abandoned in 2014, as water scarcity and competition between agricultural and urban users drove the price of water up. As California is the world's ninth-largest agricultural economy, large shifts in production in the state impact global food supplies and prices.
- In 2013, water shortages shut down thermal power plants in India, decreased energy production in power plants in the United States, and threatened hydropower generation in many countries, including Sri Lanka, China, and Brazil.

Nature's role in the nexus is often overlooked.

Natural infrastructure is an often neglected but critical part of the nexus. Nature-based solutions are also promising avenues for addressing trade-offs in the nexus. Some aspects of nature in the nexus:

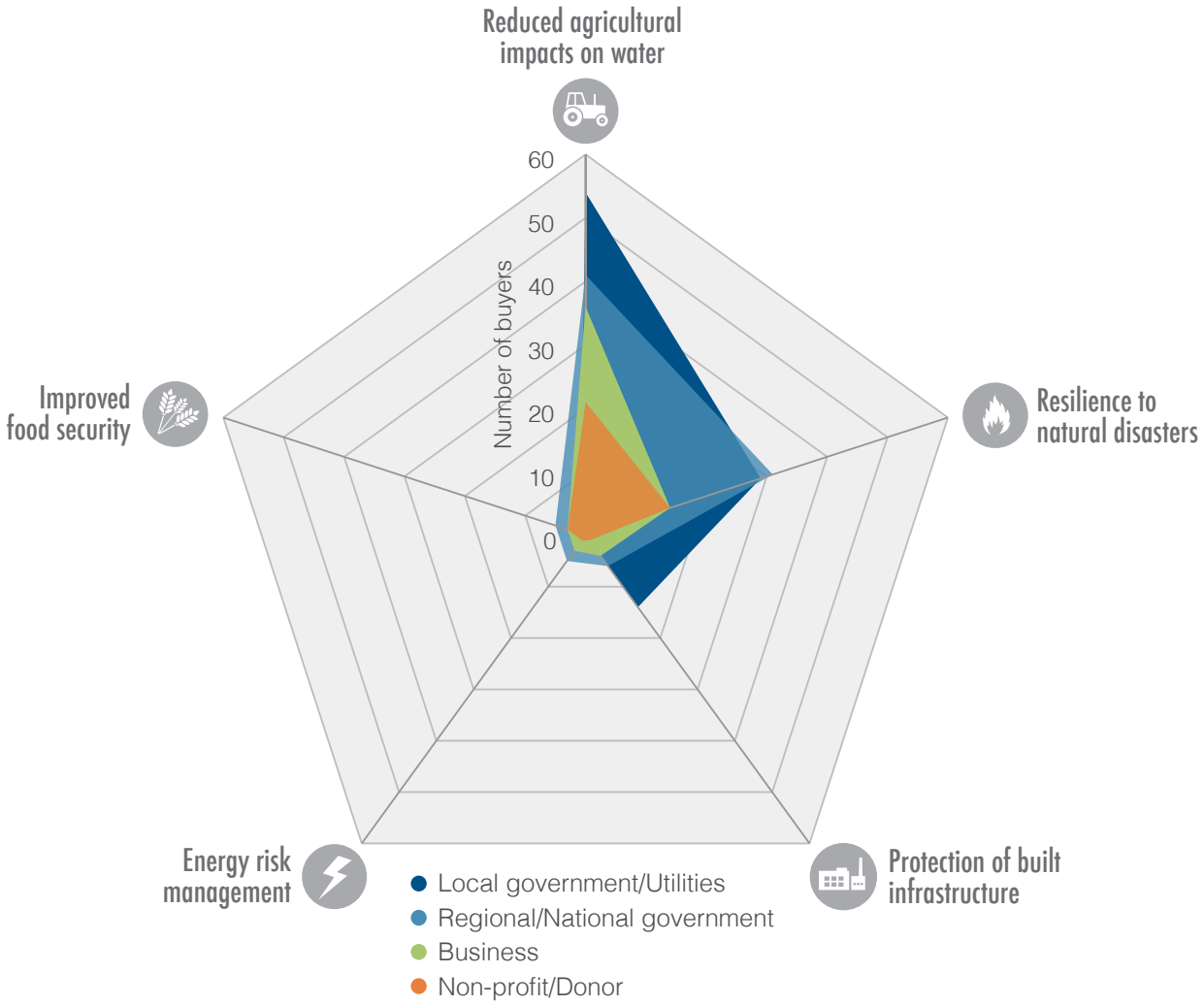
- Natural infrastructure is crucial for maintaining the global water system. Natural systems like forests, wetlands, and grasslands all contribute to maintaining and regulating surface and groundwater supplies of freshwater and the many water-related ecosystem services that are critical to human well-being.
- Natural infrastructure is also critical for food security, as a source of water for drinking and irrigation, food (such as wild foods and fish), genetic material for improving existing or developing new crops, pollination, and pest/disease control.

Nature-based solutions for water can address water, energy, and food security together.

- Healthy forests, wetlands, and floodplains that filter water, thereby removing sediments, toxins, and nutrients, improve water quality while reducing the need for energy-intensive water treatment plants.
- Green infrastructure in cities – green roofs, rain gardens, green streets, restored urban waterways – can greatly reduce the energy costs of stormwater management, avoiding highly energy-intensive construction, and operation of detention and conveyance structures.
- Use of filter-feeding shellfish such as mussels and oysters to remove excess nutrients from treated wastewater eliminate the need for energy-intensive advanced treatment while providing high-quality animal feed and/or organic fertilizer for food production.
- Sustainable agricultural practices – organic agriculture, eco-agriculture, multi-functional agricultural landscapes – can conserve water, improve water quality, improve the quality and safety of food, reduce erosion and soil loss, reduce the need for energy-intensive inorganic fertilizers, and mitigate climate change through reducing Greenhouse Gas (GHG) emissions.
- Marine algae can be grown for biofuels, providing an alternative source of energy and also takes in nitrogen and phosphorus and can improve water quality by removing excess nutrients from the water (e.g., from septic, agricultural, or wastewater-treatment runoff).

Figure 36: Water-Energy-Food Drivers for IWS by Buyer Type and Motivation

(Number of Buyers by Profit Status)



Source: Forest Trends' Ecosystem Marketplace, *State of Watershed Investment 2014.*

4.5 Natural Infrastructure Investment for Energy and Food Security Remains Low, Relative to Risk Exposure

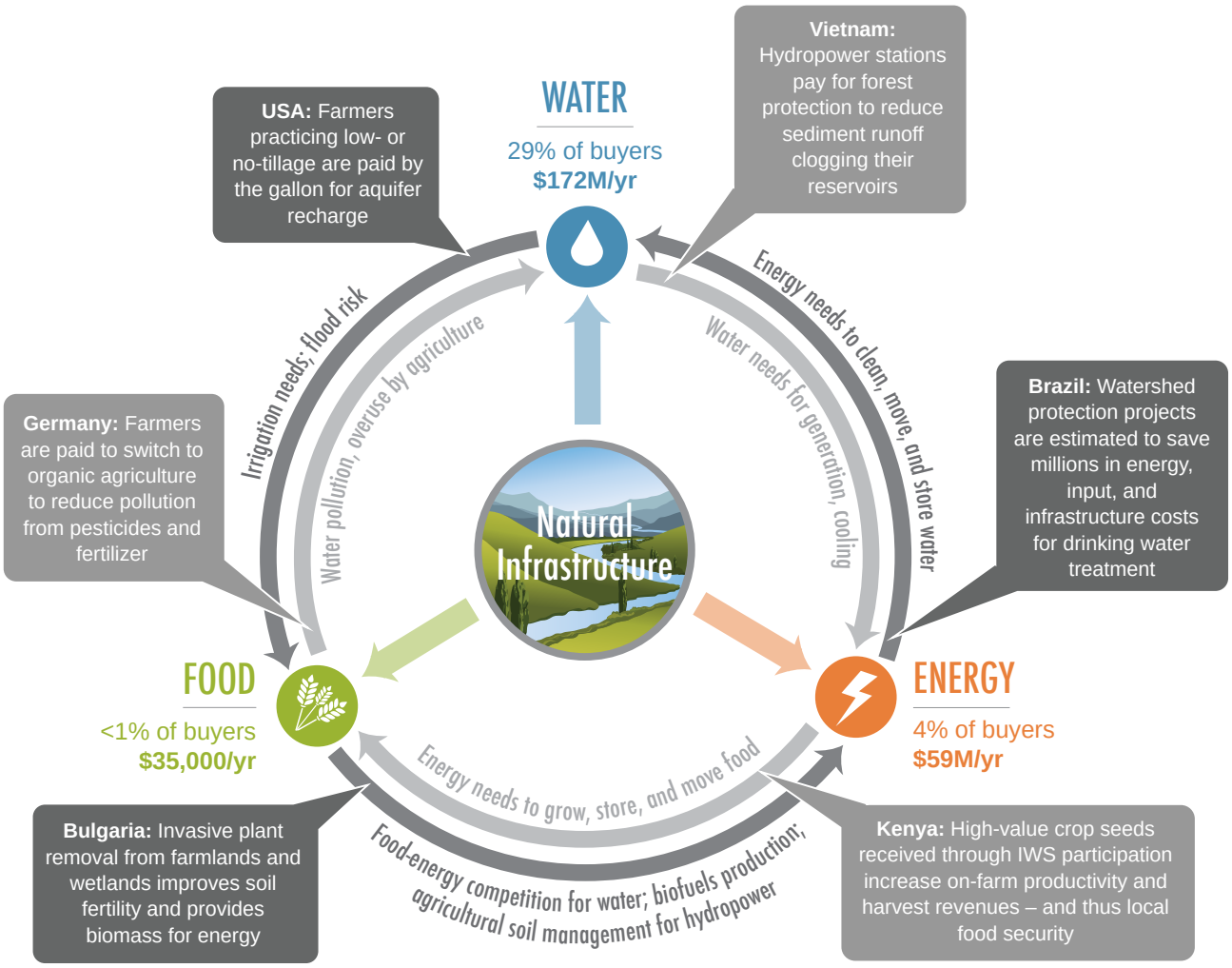
As noted earlier in this report,[33] natural infrastructure solutions are often attractive to buyers because of their ability to deliver multiple benefits beyond water security, including supporting water, energy, and food systems at an integrated landscape level.

Viewed through a nexus lens, investment patterns appear to be somewhat uncoupled from actual nexus risks or dependencies. We find evidence of buyers already managing interrelated water, energy, and food system challenges with IWS strategies: in 2013, 21% of buyers, for example, aimed to reduce agricultural water overuse and pollution, and 12% said they planned to use nature-based solutions to increase resilience to flooding, wildfires, and other natural disasters (Figure 36). Nearly a third of buyers in 2013 were water service providers, delivering $172M for IWS (Figure 37).

But other nexus challenges, including ensuring sufficient agricultural production for growing populations, managing water-related energy risk, or complementing built infrastructure with resilient "green" elements, received little attention from buyers in 2013. These imbalances mean that energy and food systems' reliance on watershed health may not be matched with sufficient awareness and investment flowing back into natural infrastructure assets (Figure 37). Survey results also

[33] See Chapter 3.

Figure 37: Nexus Investments in Natural Infrastructure for Energy, Agriculture, and Water



Source: Forest Trends' Ecosystem Marketplace, *State of Watershed Investment 2014.*

indicate less activity from private-sector buyers than from public-sector buyers, who have shown more interest in using natural infrastructure strategies to manage agricultural impacts and increase disaster resilience.

Climate risk also appears to be on most programs' back burner, with relatively few programs or buyers driven by or considering climate change in their design (only 16% of active/pilot programs).

5. Africa

Table 10: Summary Details - Africa

	2011	2013
Operational programs	6	9
Programs in development	10	9
Values	$109.3M	$152M
Total land area managed for watershed services	5.7M ha	6.9M ha
New land area managed for watershed services, per annum	162,115 ha	201,292 ha

Notes: Given our data collection cycle (which takes place every other year), data on ha protected in 2012 is unavailable, as the survey asks respondents to indicate total ha under management and ha added in the last twelve months.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014*.

Key Findings

- Between 2008 and 2013, transaction values grew an average of 23% a year, driven in the main by South Africa's national **Working for Water (WfW)** Program.
- Business was a buyer in three-quarters of projects. The private sector spent $12M on watershed protection in 2013, all on a purely voluntary basis.
- Project developers struggled to move programs into the operational stage, most commonly citing problems such as a dearth of buyers and legal barriers to investment. A lack of supportive policy frameworks in many countries appears to be a major barrier to scale.
- Ten countries committed to implementing natural capital accounting at the national level, which could demonstrate Africa's enormous natural capital asset values.

5.1 Introduction

Last year, Africa ranked third in the world in both global transaction values and scale of land under watershed management. Those impressive numbers are mostly thanks to South Africa's long-running public works program for catchment restoration, **Working for Water (WfW)**. But a closer look at the continent finds some interesting changes afoot.

A history of frustration in getting projects off the ground is driving program developers to experiment with new funding structures and sources. **WfW** itself is retooling its investment model, shifting from a purely government-supported approach to leveraging funding from other water users.

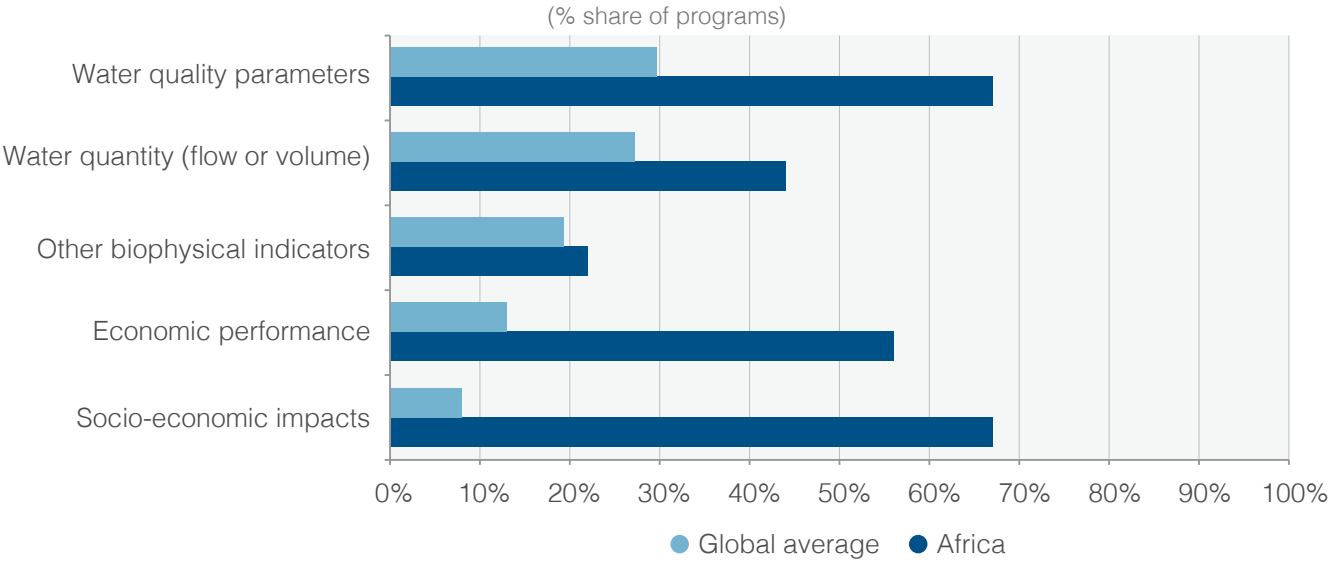
So far, most IWS in Africa has been purely voluntary. Few countries in Africa have established policy or regulatory frameworks as drivers supporting watershed investment. That could change: in 2012, ten African nations signed the Gaborone Declaration, committing to integrate natural capital assets into national accounting systems. Better understanding of natural asset values could potentially justify investment in those natural assets – though accounting efforts are in very early stages. To date, only Botswana and Madagascar have begun implementing natural capital accounting in collaboration with the World Bank's Wealth Accounting and the Valuation of Ecosystem Services (WAVES) Partnership.

The Kenyan Senate in mid-June 2013 passed a motion applying a "polluter pays" principle to the country's water bodies, requiring compensation for affected parties. Under a new administration in 2013, Kenya also began decentralizing its water sector, shifting responsibility for managing utilities to the country's 47 counties. In the past, legal frameworks governing the

Map 4: Active and Developing Programs in Africa, 2013

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 38: Monitoring Rates, Africa and Globally, 2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

water sector have constrained Kenyan utilities from participating in IWS arrangements.[34] But officials from the national Water Resources Management Authority have indicated that as part of ongoing reforms, they will encourage counties to begin setting aside a share of revenues for watershed management incentives.[35]

In 2012, South Africa's National Treasury allocated $76M for a new Green Fund to be administered by the Development Bank of Southern Africa. The Green Fund will finance projects helping the country to transition to a "green economy" – a potential source of much-needed early-stage capital for IWS. In 2012-2013, the fund moved several PES proposals delivering watershed benefits along its pipeline for approval.[36]

Finally, in Tanzania, language in the 2009 Water Act permits market-based mechanisms for watershed protection. Revisions to the country's National Forest Policy also make note of PES. But absent any high-level guidance or implementation support, these inclusions seem to have had little effect to date.

5.2 Impacts

Conservation the main focus for 6.9M ha protected in 2013, but small programs emphasize productive lands

IWS programs restored, managed, or protected 6.9M ha in 2013 across the continent. Measured by sheer area, programs in Africa place a bigger emphasis on restoring and protecting landscapes – mostly thanks to **WfW's** outsized influence (which accounted for 99.5% of lands managed for watershed services in 2013).

But that masks the relatively high emphasis on sustainable agriculture, agro-forestry and, other support for sustainable productive lands among small-scale projects, which total only 31,911 ha but are the focus of half of all active programs tracked.

Programs report knock-on benefits for smallholder livelihoods and industry

Programs have also estimated spinoff benefits, such as increased harvest incomes for farmers switching to alternative production methods under a watershed investment program (outside of any payments coming directly from program participation). Here, our data is incomplete, but programs reported at least $411,650 in add-on income benefits in 2013, in addition to direct program compensation.

Reduced water risk is expected to translate into benefits for the private sector as well. In Morocco, where the Coca-Cola Africa Foundation, Coca-Cola Morocco, the NGO ALCESDAM (the Association for the Fight Against Desertification in Morocco), and three Coca-Cola bottling partners are funding reforestation of 60 ha of oases to combat desertification, increased revenues linked to improved supply security, estimated for five sectors, are projected at $43M a year.[37]

[34] FAO 2013a.

[35] Ooska News 2013.

[36] South Africa Green Fund 2012.

[37] ISRIC 2011.

An IWS program in Tanzania's **Uluguru Mountains** (in Morogoro District) has documented a ten-fold increase in incomes linked to increased crop productivity; similar outcomes are reported in **Lake Naivasha**, Kenya, where harvest revenues have reached 30 times the value of the original $17 crop voucher provided to participants.[38] In Malawi's **Shire River Basin**, project administrators estimate that beekeeping and aquaculture have generated around $50 per year per household, in a country where annual income is around $388 per capita.[39]

Data on the number of households directly impacted is difficult to obtain, but across Africa it is very conservatively estimated to be upward of 26,000 people each year.

Cost-savings from watershed protection 23 times the value of funds spent

Eight programs (two active, three pilot, and three still in design) report using some form of economic analysis to justify activities and evaluate performance. Several were able to provide Ecosystem Marketplace with data from cost-savings studies, representing avoided costs from challenges ranging from invasive plant impacts, lower surface flows, and reduced electrical generation.

Remarkably, avoided costs associated with watershed protection in Africa are estimated to be at least $3.28B each year – nearly nine times the total amount of money invested in watershed values that has been spent to date on the continent, and 23 times spending levels in 2013.[40]

Overall, monitoring rates reported by African programs are quite high compared to global averages, especially in terms of socio-economic and economic performance monitoring (Figure 38). This is reportedly linked to stronger engagement by private-sector buyers with an interest in demonstrated outcomes.

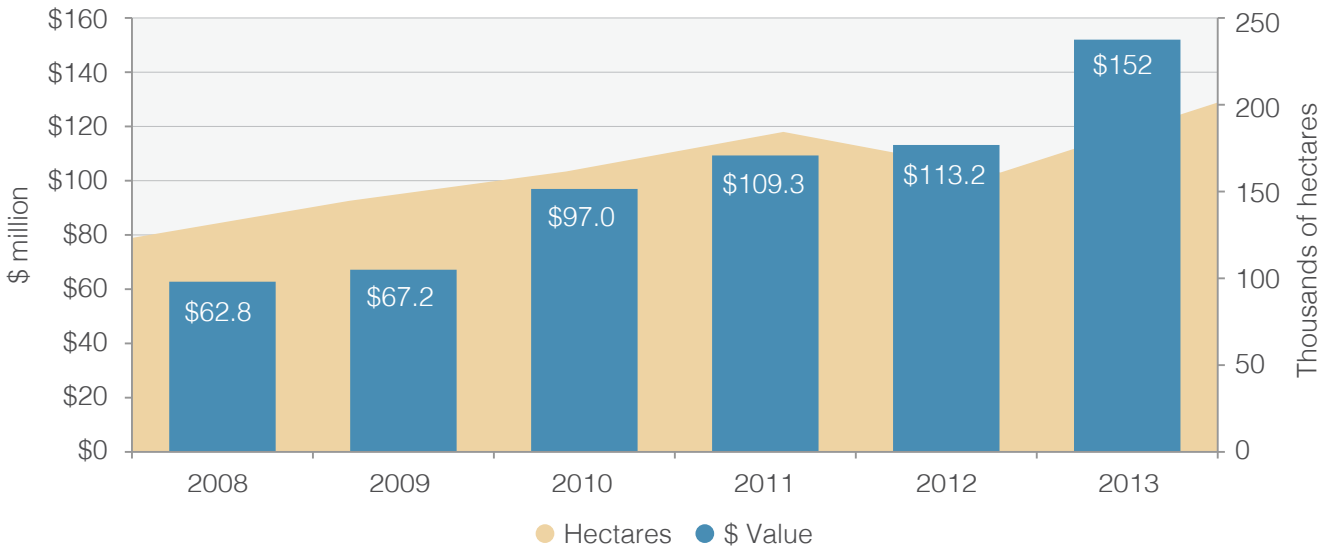
5.3 Investment

South African government leads in the way in natural infrastructure spending

Annual transaction values in Africa have increased an average of 23% per year since our tracking began in 2008 (Figure 39). The engine of that growth is **Working for Water** – and its success in attracting co-investment from the private sector.

WfW is a largely government-funded public works program that since 1996 has hired the long-term unemployed to provide "catchment protection services" – mainly the removal of water-greedy invasive plants – with an emphasis on skills development for workers. Funding comes mostly from the government's

Figure 39: Annual Transaction Value and New Hectares Protected in Africa, 2008-2013



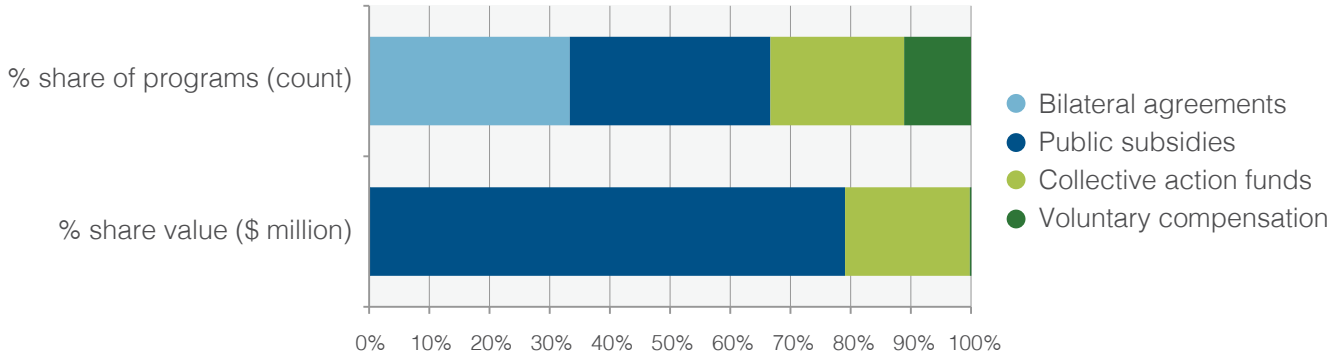
Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

[38] FAO 2013b.

[39] United Nations Statistics Division 2013.

[40] The majority of estimated cost-savings values are associated with Working for Water. See de Lange and Van Wilgen 2010.

Figure 40: Comparison of Program Types In Africa, by Count and Transaction Values, 2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

poverty relief fund, complemented by funds from the Department of Environmental Affair's Natural Resource Management program, water use fees for households, and charitable donations.

The private sector spends >$12M in 2013 while public finance falls short of early-stage needs

Business plays a relatively strong role in watershed investments in Africa, accounting for 8% of transactions in 2013 – the second-greatest share across all buyer groups and all on a purely voluntary basis.

To some extent, the private sector has followed **WfW's** lead. Companies participating in WWF-South Africa's **Water Balance Program** also pay for invasive plant species removal in degraded catchments. The resulting improvements in water supply and quality are understood as compensation, restoring an amount of water to the ecosystem roughly proportional to the company's use (Box 7).

That approach was first piloted at a **South Africa Breweries** (**SAB**, a SABMiller subsidiary) site in the Eastern Cape. SABMiller has continued engagement with both WWF and **WfW**, driven by water risk. A water footprint assessment in George in the Southwestern Cape, for example, found that hops farms supplying SAB would see 41% of surface water lost by 2032, at a cost to farms of $700,000 a year. The resulting water insecurity would also exacerbate local poverty. SAB has committed $1.1M to date through **WfW** and additional funds for local monitoring and management in areas where it operates. SABMiller has also signed an MOU (along with Coca-Cola Kwanza Ltd.) to pay for watershed protection in the **Uluguru Mountains** supplying water to Dar es Salaam in Tanzania.

WfW itself has begun to shift its focus from a purely public-funded program to leveraging support from business, private landowners, and water users. Through its new **Land User Incentives (LUIs)** program, **WfW** administrators can structure up to two-thirds of program budget as incentives to unlock third-party investments in watershed services. So far, actual resources committed in the first round of the LUIs are a long way from the ceiling, totaling around $10.5M in 2013, but these collective action-style commitments are expected to grow significantly in the next decade. In the meantime, public subsidies constitute the lion's share of funding (Figure 40).

Overall, 42% of buyers have committed future funding, amounting to $150.4M earmarked for 2014. Leaving aside **WfW**, which accounts for most of this sum, $9.1M is already committed over the next three years.

Despite these encouraging signs of growth, the African continent is still a difficult place to get an IWS program to the operational stage. Out of ten in-development projects identified by Ecosystem Marketplace in 2011, four remained in planning phases in 2013 and six apparently no longer existed at all. A lack of demand is the main problem reported by survey respondents, but project developers also repeatedly cite poor support from policy-makers. Instead, start-up capital for program design and planning is mainly delivered by non-profit, foundation, and multilateral development banks. The sole exceptions are **WfW** and a still-developing effort to protect the **Itawa Springs** in Ndola, Zambia, where design funding is being contributed by Zambian Breweries (another SABMiller subsidiary) and GIZ under the Water Futures Partnership umbrella.

Eco-markets crossovers

A few programs have looked to other sources of conservation finance to fill in the demand gap. In 2012-2013 Pro-poor Rewards for Environmental Services in Africa (PRESA), Ecotrust Uganda, and

Box 7: Case Study: Water Balance Program Addresses Use Onsite and "Beyond the Fence"

WWF-South Africa's Water Balance Program partners with private companies to invest in water security in South Africa. Companies pay for removal of water-greedy alien invasive plant species to improve catchment health and for companies to "balance" their own operational water use – which also creates local jobs. This is not a true offset but rather a loosely quantified approach, aiming to return water to ecosystems and help companies invest in the country's water security by addressing a major threat to the health of South Africa's most important water source areas.

Participating companies commit to a "Review" process to measure and review operational water use; to "Reduce" by developing and implementing an on-site water use reduction strategy over time; and to "Replenish" by investing in projects that contribute to ecosystem health and water supplies approximately in proportion to operational water use.

The Water Balance Program in this sense addresses both demand and supply issues, with a dual emphasis on facility-level and watershed-level management. The project was originally piloted at two South African Breweries sites in the Eastern & Western Cape. Currently, Nedbank Group, manufacturer Sonae Novobord, and retailer Woolworths are participating. To date, more than 1,500 ha have been cleared or committed to clearing, more than 1,700 ML of water prevented from being lost to invasive plants, and approximately 25,865 person-days of work created. Recently, the Water Balance Program partnered with the government's **Working for Water Land User Incentives Program**, leveraging matching funds on three new restoration projects in the Riviersonderend and Pongola catchments.

Box 8: Case Study: Finding the Means to Protect the Sasumua Reservoir

Pro-poor Rewards for Environmental Services in Africa (PRESA) has led the development of a watershed payment mechanism around the Sasumua Reservoir in Kenya, where land degradation from upstream deforestation and agricultural practices is delivering increasing amounts of sediment, nutrient runoff, and other pollution to the reservoir.

To date, a program investor is still being sought. The buyer that was originally envisioned, Nairobi City Water and Sewerage Company, has so far felt that savings from the program would not justify a change in their management approach; sediment is seen as a relatively minor problem compared to other challenges.

An initial cost benefit analysis by PRESA estimated that watershed protection efforts would reduce sediment yields by 20% and lead to alum (an input in treatment) cost savings of $23,256 a year. On the other hand, estimated costs to the company for the watershed investment mechanism were $20,349 in the first year and $3,290 a year thereafter. A more detailed probabilistic model (the results of which are currently being verified) later showed that net present value of benefits exceeded $120,000 per year, which suggests a much stronger business case for watershed protection.

The proposed IWS program also faces challenges related to institutional frameworks; the water company itself lacks legal authority to raise water fees, though water users are willing to pay more. Similarly, legal barriers stand in the way of securing public financing for the project through Kenya's national Water Services Trust Fund, since payments to farmers fall outside its mandate.

Therefore project developers are recalibrating by refining the program's business case and beginning conversations with the Kenya Energy Generation Company about watershed investment efforts in a catchment where hydroelectric dams are located. New finance and cooperative opportunities may also come from engaging with other collective action funds in the area and a new pilot by a local microfinance company offering low-interest "green" loans to farmers practicing sustainable land management.

Nature Harness Initiatives in investigated using REDD incentives through the Plan Vivo framework to support watershed management in the mountains of the Albertine Rift of Uganda. Potential buyers include hydropower producers, local agro-industry (tea and tobacco), tourism operators, and carbon offset buyers. And the $21M "Watershed Approach to Sustainable Coffee Production in Burundi" program funded by the Global Environment Facility (GEF) and partners, which aims to deliver benefits for water, soil, biodiversity, and diversification of livelihoods, is exploring sustainable certifications (e.g., shade-grown, organic, or fair trade coffee) as a mechanism to incentivize projects. But these efforts are still in early stages.

Water funds leap the Atlantic

Another possible answer to weak demand was piloted last year: Africa's first water fund, located in Kenya's **Tana River** basin. Sedimentation from farmland areas upstream of Nairobi threatens hydroelectric generation and is driving water treatment costs upward by as much as a third. The Nature Conservancy is supporting a new endowment fund for watershed protection in the basin with partners KENGEN (the Kenyan power utility), Nairobi Water and Sewerage Company, Kenya's Water Resources Management Authority, and the International Center for Tropical Agriculture (CIAT). Potential private-sector stakeholders including The Coca-Cola Company and East African Breweries are also being engaged.

5.4 Outlook

In October 2013, signatories to the Gaborone Declaration released a joint framework for implementing natural capital accounting at a national level. There is a long road ahead – countries need to develop baselines and roadmaps at national levels – but the commitment is promising.

Africa has seen broad economic growth across the continent in recent years, largely based on global demand for its natural resources. In coming years, accounting systems taking a full reckoning of the continent's wealth, including the true cost of resource depletion, will be a useful tool for decision-makers seeking genuine growth. Hard data on natural capital values can help support the case for IWS and other investments in conservation.

Nationally, IWS proposed but not in the pipeline just yet

It will probably be years before these accounting initiatives translate into policy protecting natural capital. In the meantime, not much appears to be on the horizon.

In South Africa, a new National Infrastructure Plan was adopted in 2012, including eighteen Strategic Integrated Projects (SIPs) for targeted investment. In 2013, a nineteenth SIP was proposed, specifically dedicated to ecological infrastructure investments for water security.[41] That SIP was awaiting approval as this report goes to press, but represents a groundbreaking elevation of the natural infrastructure concept to the level of other infrastructure spending. Roughly $78B has been earmarked by the South African government for infrastructure in the coming years.

In East Africa, the Lake Victoria Basin Commission (LVBC) – a transnational institution supported by the Republics of Burundi, Kenya, Rwanda, the United Republic of Tanzania, and the Republic of Uganda – is exploring funding options for a regional environmental trust fund to improve management of the Lake Victoria basin. The LVBC has identified ecosystem markets as the "largest most sustainable funding sources" for a trust fund and recommended investigating REDD and CDM finance, watershed payment schemes, and fisheries resources-linked payments.[42]

Barriers to local buy-in

While high-level policy support slowly advances, project developers are largely left to their own devices to secure initial capital and interested buyers. So far, they have relied heavily on multinational companies and donors for funding. Cities and utilities report frequent barriers to participating in IWS: Program developers report legal challenges to using public funds for watershed protection, a lack of local governance of water resources, and, in at least one case, difficulty working with government partners. An effort to protect Nairobi's Sasumua Reservoir has experienced ongoing problems with legal barriers to a local water utility paying for watershed management (Box 8).

Collective action grows on water risk

In South Africa, **WfW** expects to see private contributions through its LUIs program as much as triple in the next few years, making it a model well worth watching.

A recent program review has suggested other new directions for **WfW**, namely targeting money and efforts better – focusing on priority areas and interventions delivering best return on investment – strengthening monitoring and evaluation, and greater engagement with private landholders.[43]

[41] SANBI 2014.

[42] East African Community, Lake Victoria Basin Secretariat, year unknown.

[43] Van Wilgen et al. 2012.

In Nairobi, water risk is making collaborators out of former competitors. East African Breweries subsidiaries, BASF, British American Tobacco, Coca-Cola Nairobi Bottlers, Chandaria Industries, government officials, the German development department GIZ, and other stakeholders in 2013 formed a task force to collectively address problems in the Tana River watershed. The effort is in its early stages, but members have agreed to share best practices and jointly commit to specific interventions to protect the watershed. "We realized we couldn't do it on our own and that to make a real difference in the broader watershed, businesses will have to work together with new partners, many of whom we hadn't worked with before," Michael Alexander, global head of environment for Diageo (East African Breweries' parent company), told the Guardian.[44]

[44] The Guardian 2014.

6. Asia

Chapter co-author: Michael Bennett, Senior Researcher, Forest Trends

Table 11: Summary Details - Asia

	2011	2013
Operational programs	83	175
Programs in development	34	7
Values	$7.5B	$11.5B
Total land area managed for watershed services	110.7M ha	339.6M ha
**New land area managed for watershed services, per annum	115,974 ha	887 ha

Notes: Given our data collection cycle (which takes place every other year), data on ha protected in 2012 is unavailable, as the survey asks respondents to indicate total ha under management and ha added in the last twelve months.

.**New land under management in 2013" not available for China.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Key Findings

- China continues to lead Asia and the world in watershed investment. Total transaction values in Asia exceeded $11.5B in 2013, with more than $11.48B (>99%) invested in China.
- The rest of Asia collectively saw $52M in investment, led by Vietnam, where the national **Payment for Forest Environmental Services (PFES)** program has scaled up rapidly since 2011.
- In 2013, nearly 340M ha in Asia was under management for watershed services. Programs here tended to focus on paying for sustainable management on productive landscapes and on forest projects: 67% of programs funded afforestation/reforestation, sustainable forest management, or forest protection efforts.
- Outside of China, where public subsidies dominated spending, programs were far more reliant on local buyers and the private sector. With $50M spent in 2013, hydropower producers were the largest buyer by transaction values, largely through Vietnam's **PFES** program. Public drinking water utilities ($1M) and local government ($1M) were a distant second and third in terms of spending, although as a group, local water service providers were a buyer in more than a quarter of programs.
- Excluding Chinese activity and Vietnam's new national **PFES** program, other Asian programs show signs of slowdown. In this group, transaction values have fallen every year since 2009.

6.1 Introduction

Asia is a study in contrasts. It is an economic powerhouse, but also one of the most water-insecure regions in the world.[45] China is at once the world leader in watershed investment programs and home to more than 300M rural people who lack access to safe drinking water.[46]

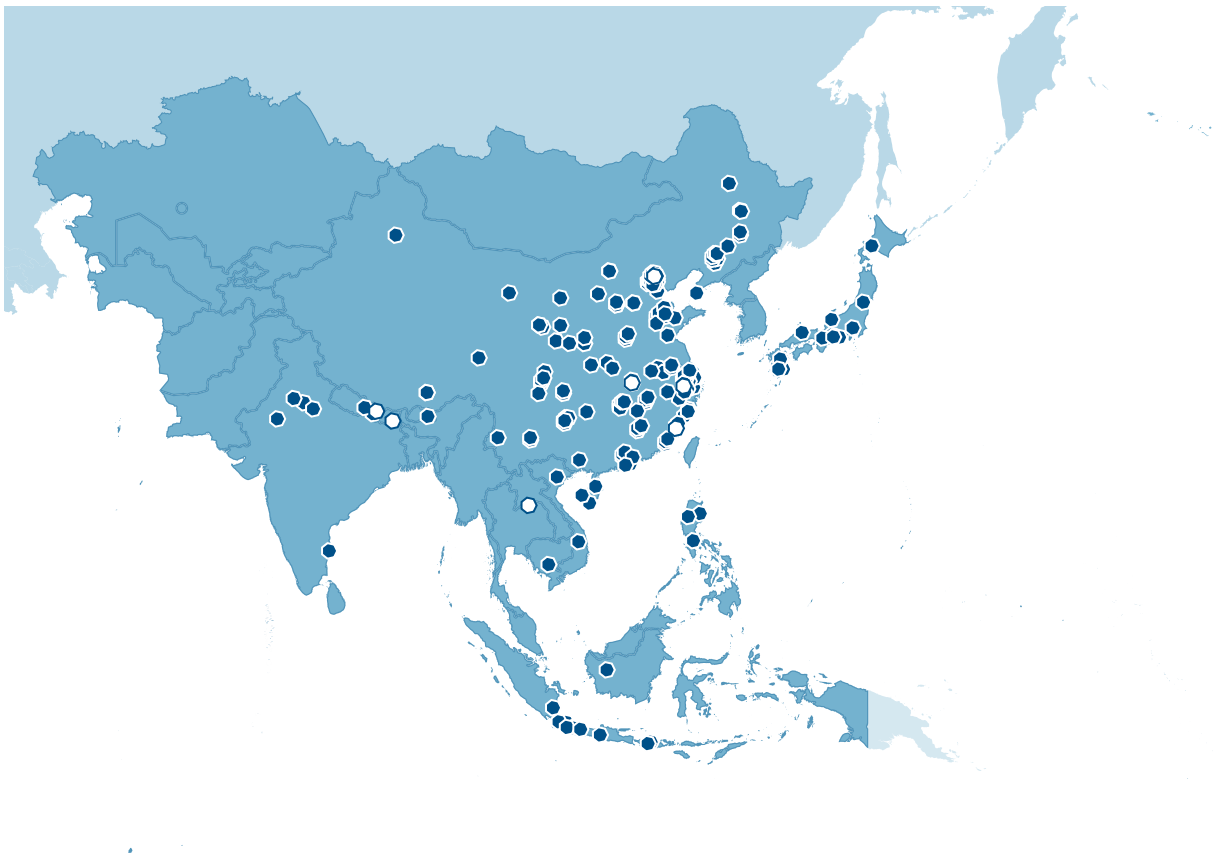
And Asia's rapidly developing hydropower sector is both the region's largest buyer of watershed services outside of China and also one of the greatest threats to its ecosystems.

In all of the above cases, Asia's experiences offer valuable lessons in attaining economic growth without running down natural capital. Many of the region's challenges are linked to soaring demand for clean water, energy, and food, and the trade-offs that can occur between these three production systems.

[45] Asian Development Bank and Asia-Pacific Water Forum 2013.

[46] Zhang and Bennett 2011.

Map 5: Active and Developing Programs in Asia, 2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Table 12: Total Land Area and Population of National Key Ecological Function Zones in China

	Land Area		Population	
Key Ecological Function Zone	Hectares	%	Number	%
Water Source Protection	124M	32%	31M	28%
Water and Soil Conservation	25M	6%	36M	31%
Anti-Desertification	121M	31%	13M	11%
Biodiversity Conservation	116M	30%	34M	30%
TOTAL	386M	100%	114M	100%

Source: State Council 2010.

Spotlight on China: facing national water crisis, country pursues incentives for watershed protection

China's three decades of growth have driven both degraded watersheds and the country's drive to invest on a massive scale in their protection. Since 2007, central leadership has emphasized a shift to a more sustainable economic development paradigm in its ongoing calls for the establishment of an "ecological civilization," most recently in its 18th CCP Party Congress and 12th five-year plan.[47]

An important milestone was the government's "No. 1 Central Document" for 2011 (this document prioritizes government work for a given year), which explicitly targeted water resources conservation and management, with planned spending to total about $650B through 2020. This was followed in 2012 by *State Council Views on Implementing the Strictest Water Resources Management System*, which detailed a "Three Red Lines" policy defining new objectives for overseeing water withdrawals, use efficiency, and discharges of pollution.

At the same time, China is expanding a national fiscal transfer system for funding "Key Ecological Function Zones" as laid out in the *National Key Function Regional Zoning Plan* in 2010. The plan sets development restrictions on areas deemed to be important ecological or agricultural zones and establishes a fiscal transfer system to fund environmental protection in these zones. It also reforms the framework for local officials' performance evaluation, placing greater emphasis on environmental criteria.

To date, there are 436 county-level administrative districts across the country designated as "National Key Ecological Function Areas" within restricted development zones.[48] These areas total 386M ha (~40% of China's land area) and are home to 113M people (around 8.5% of the total population) (Table 12).

Water-related ecosystem functions are clearly an important driver of this zoning system. The largest ecological function category in terms of land area is "water source protection," making up almost one-third of the total land area of these zones, while "water and soil conservation" is the most important in terms of population. This category contains nearly a third of the total population of these zones.[49]

Vietnam scales up its payment for forest environmental services program

In 2011, Vietnam expanded its **Payment for Forest Environmental Services (PFES)** program to the national level, following pilot projects in Lam Dong and Son La provinces and the passage of Decree No. 99 ordering national implementation. Under **PFES**, commercial and state-owned beneficiaries of environmental services are required to pay fees to households and community organizations that protect forest resources.

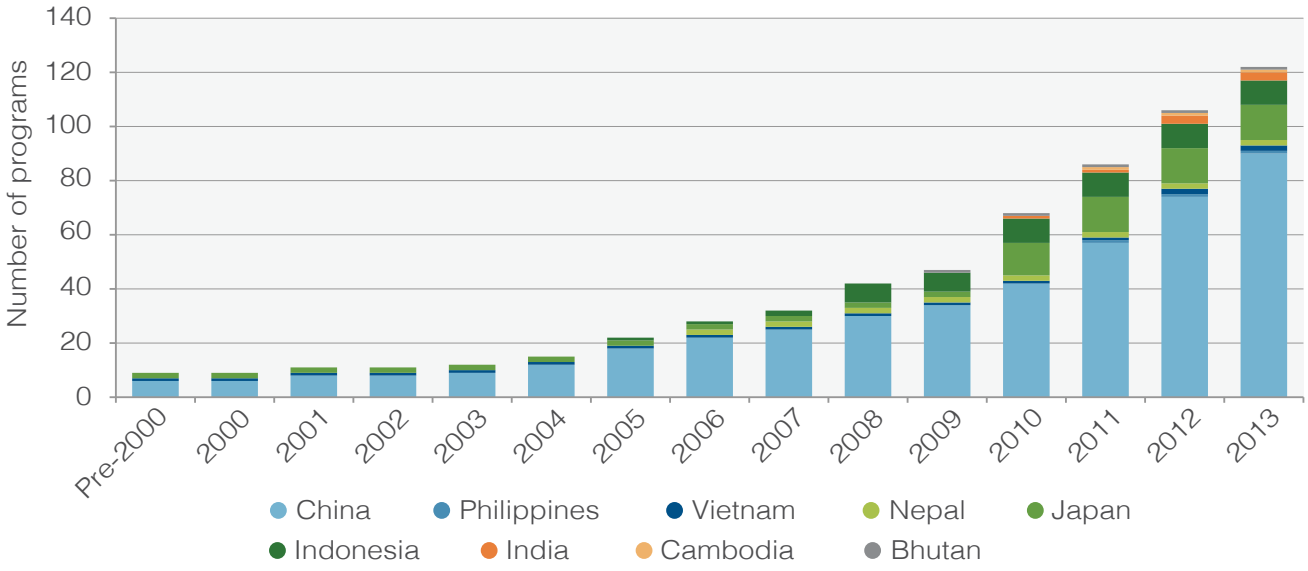
Ultimately the program will encompass a range of environmental services including watershed services, biodiversity and landscape beauty, carbon sequestration, and forest provision of aquaculture services (such as spawning grounds), though to date only the first two have been active. National-level and provincial Forest Protection and Development Funds administer contracts and payments.

[47] "Ecological civilization" can be generally viewed as the Chinese government's term for "sustainable development."

[48] The 436 county-level administrative districts are Key Ecological Function Areas that are in "Restricted Development Zones." An additional number of counties that are Key Ecological Function Areas also exist in "Banned Development Zones."

[49] Zhang and Bennett 2011.

Figure 41: Growth in Operational Programs in Asia, 1999-2013



Notes: Start dates were not reported for all 175 active/pilot programs in our dataset.
Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Vietnam is the second country in Asia to establish a national-scale watershed services, following China, though in many respects **PFES** in Vietnam differs from China's strategy in that it relies on users of watershed services for funding rather than public subsidies. Though the Vietnamese government isn't the end buyer of watershed services through **PFES**, the program is nonetheless driven by government goals for forest management and protection.[50]

China's rapid program expansion not matched elsewhere in Asia

Chinese expansion of IWS initiatives drove a burst in program growth: in the last three years 28 new programs were counted in China (Figure 41). Overall, operational programs totaled 175 at the end of 2013, making Asia the leading region in watershed investment by both program count and investment values. But activity remains centered in China. Elsewhere in Asia, program growth has been sluggish recently, after a surge between 2008 and 2010, when the Rewarding Upland Poor for Environmental Services They Provide (RUPES) program initiated a number of projects in Southeast Asia and in Japan The Coca-Cola Company and its bottling partners invested in ten new forest restoration projects. Outside of China, only three programs have reached the operational stage since 2011 in Asia.

[50] Suhardiman et al. 2013.

6.2 Impacts

Nearly 340M ha under management with focus on productive landscapes and forest projects

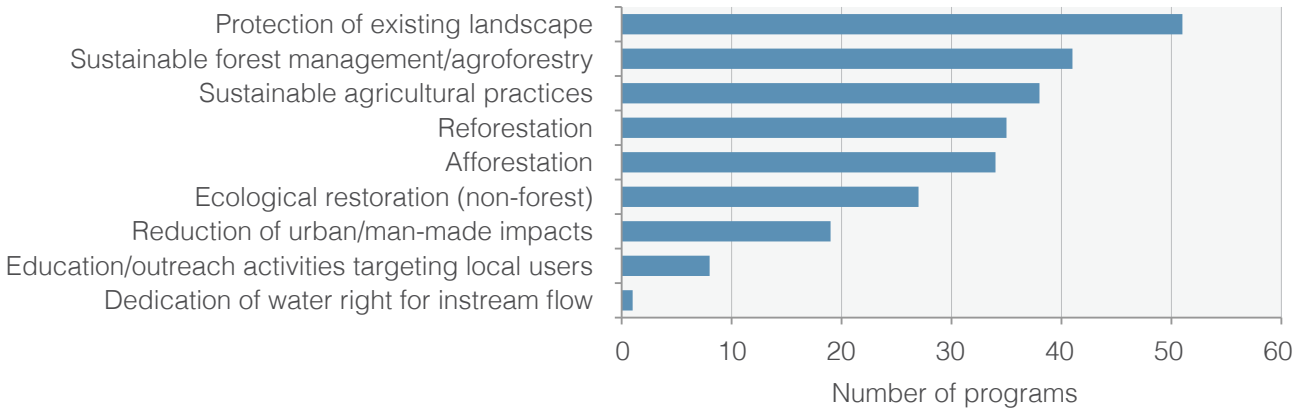
Asian programs emphasize paying for sustainable management of productive landscapes (Figure 42). At least 176M hectares were managed by programs rewarding landholders for practicing sustainable agriculture or agroforestry. Even beyond working lands, forests were also a common focal point for investment, with 117 programs (out of 175) reporting carrying out afforestation/reforestation, sustainable management, and/or forest protection.

Asian programs report low monitoring rates, limited by a broader lack of monitoring data

Survey results suggest that less monitoring is taking place in Asia compared to other parts of the world (Figure 43), with the exception of monitoring for non-hydrological biophysical indicators. Here, monitoring forest cover appears to be a common proxy indicator for assumed watershed services, especially in China. Meanwhile, low monitoring rates for socio-economic impacts are notable, given that 43% of buyers report that supporting local livelihoods or addressing poverty is a key motivation.

Despite a range of water quality indicator-based targets in the government's recent five-year plans, the state of China's water quality and quantity monitoring and evaluation system remains a persistent challenge for watershed investment programs.

Figure 42: Management Interventions Reported by Programs, Asia



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Many local and provincial governments have only anecdotal evidence regarding key water quality and supply stressors and their levels of impacts on local watersheds. Monitoring stations are sparsely distributed across watersheds, and indicators are often based on measurements unevenly adhering to Quality Assurance/Quality Control (QA/QC) procedures. Different components of water quality and quantity are also monitored separately by the Ministry of Water Resources and the Ministry of Environmental Protection, with no protocols or platforms for sharing data to produce a more comprehensive picture.

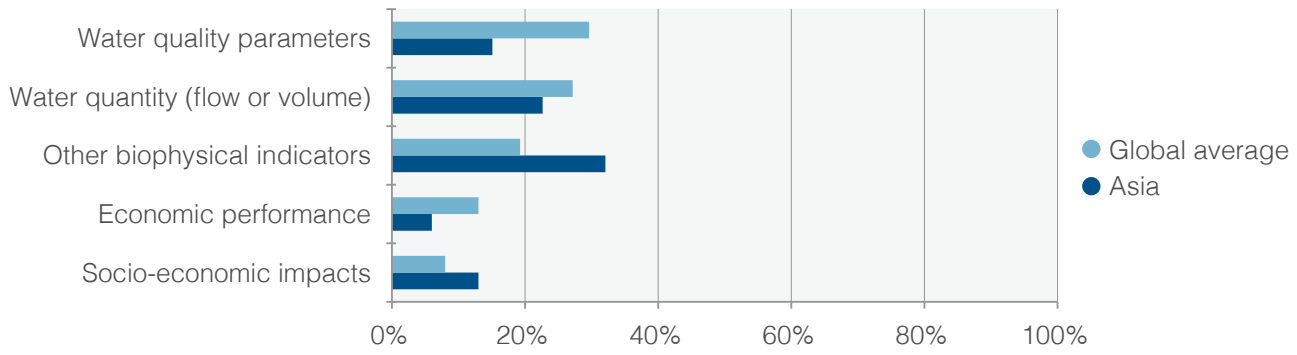
As a result of these barriers, most programs targeting watershed outcomes use land-use indicators (such as forest cover) as proxies for watershed service provision, though these approaches have been prone to problems. Forestry programs, for example, have been criticized for paying insufficient attention to the selection of tree species in afforestation activities, in some instances resulting in fast-growing exotics being introduced in plantations to the potential detriment of local biodiversity.[51]

Vietnam encounters M&E challenges linked to baseline and supplier data

M&E of Vietnam's **PFES** also has been constrained by information availability. An evaluation report, for example, found that a lack of complete forest inventory and baseline data and the sheer number of suppliers have complicated efforts to understand program impacts – for instance, Son La Province's program fund estimates it needs contracts for 64,000 different forest managers.[52] The government has taken note, having identified improving forest data and M&E as priorities in the coming years.

Figure 43: Monitoring Rates, Asia and Globally, 2013

(% share of programs)

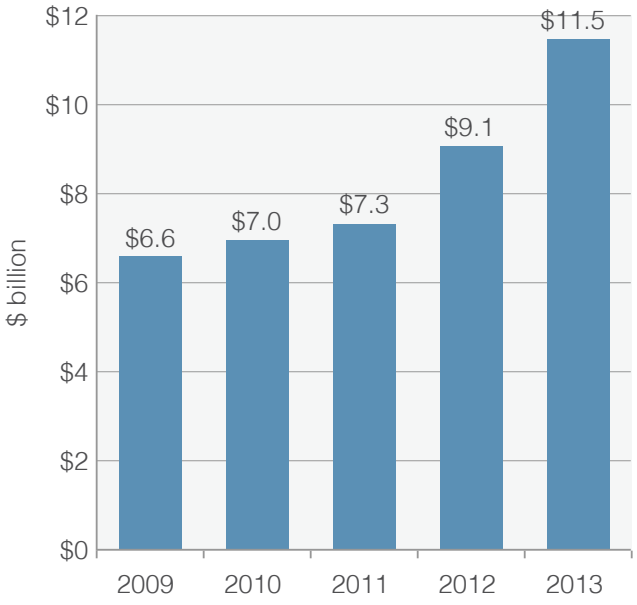


Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

[51] Xu 2011.

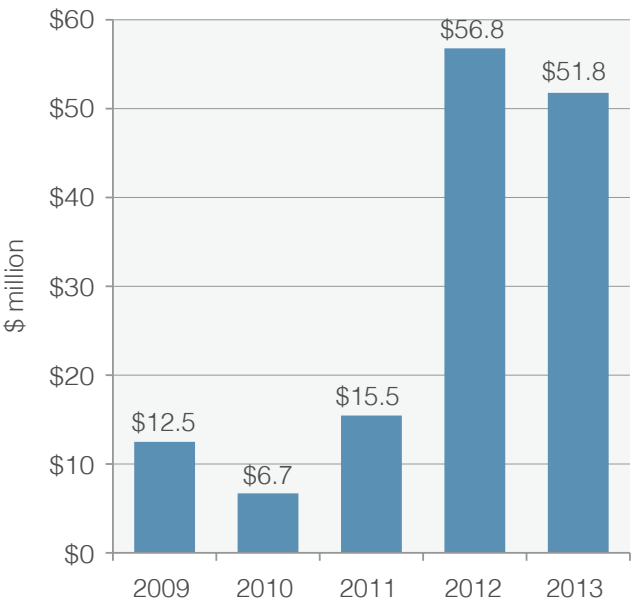
[52] Pham et al. 2013.

Figure 44: Transaction Values in China, 2009-2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 45: Transaction Values in Asia (excluding China), 2009-2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

6.3 Investment

China-led investment tops $11.5B in 2013; national governments dominate demand

Total transaction values reached $11.5B in 2013, with more than $11.48B (99%) invested in China (Figure 44). The rest of Asia collectively saw $52M in investment, with Vietnam as the frontrunner (Figure 45). Market size grew significantly from 2012's $9.1B, though partly because of improved availability of data for several large programs.

In China, demand was decidedly top-down, where programs transacting nearly $10B were entirely funded by the central government. Another $572M in spending in 2013 came from cost-share partnerships between the central and local governments (Table 13).

However, provincial-level programs in China have driven significant growth in program numbers and transactions in recent years, particularly provincial **Forest Ecosystem Compensation Fund (FECF)** programs (Figure 46). **FECFs** have grown from a single program in 1999 to 27 in 2013. These programs are based on language in China's Forest Law stipulating that compensation should be made to areas zones as "ecological public benefit forests," including as sources of important watershed services. These funds are some of the earliest forms of eco-compensation in the country, making payments for the protection of standing forest area across China. While payment rates have been quite low, they have increased gradually each year.

In 2013, the standard subsidy for publicly owned forests enrolled was US$0.80/ha/year (CNY5/mu/year) and US$1.61/ha/year (CNY10/mu/year) for collectively or individually owned lands.[53]

Programs targeting source water protection (a distinct "ecological function" zoning designation in China) also increased markedly in recent years, from two programs in the year 2000 transacting an estimated $56M, to 38 programs by 2013 delivering $1.1B to interventions – such as forest conservation or reduction of agricultural pollution – protecting source water zones.

[53] A national survey of public-benefit forest area conducted in 2007 found that 81% of "ecological public benefit forest" land was categorized as being in "headwaters," "river banks," "wetlands," "coastal protection forest belts, mangroves and the western coast," and "areas suffering from severe desertification or soil erosion."

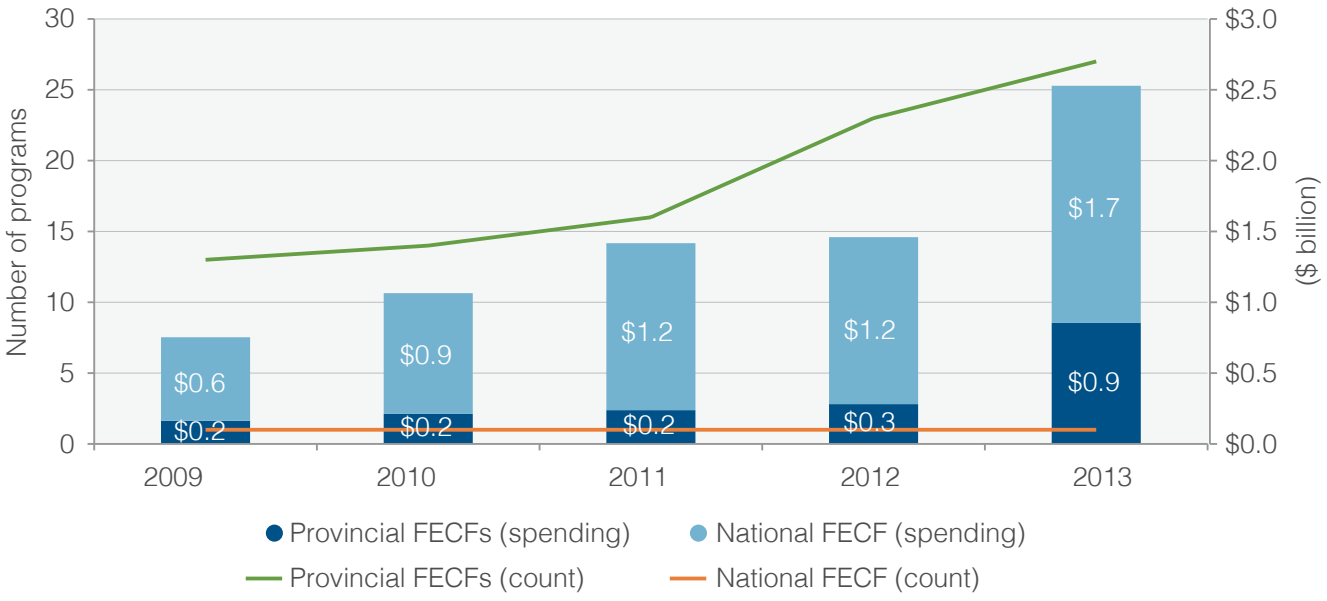
A mu is the unit of land used in China, one mu is approximately 700-800 m^2

Table 13: Buyers in China by Type and Investment Activity, 2013

	Number of programs funded	2013 transactions	Total ha under management in 2013
Local government (municipal/county)	33	$29.5M	0.5M
Provincial government	32	$374.4M	73.9M
National government	14	$9,970M	186.6M
Matching funds: provincial + local govt.	2	$46.9M	n/a
Matching funds: central + local govt.	10	$571.9M	18.4M
Quasi-private entities	4	n/a	0.001M

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 46: Chinese National and Provincial Forest Ecological Compensation Funds (FECFs) by Count and Spending, 2009-2013



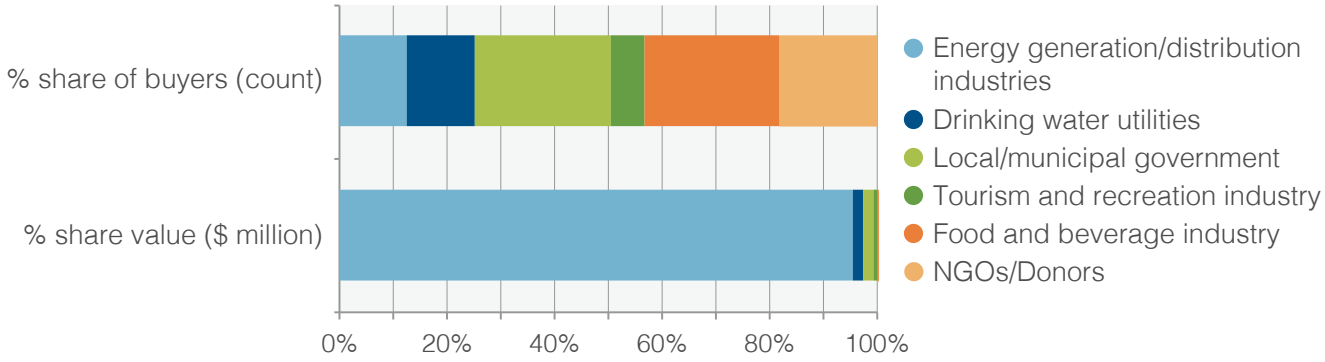
Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Elsewhere in Asia, business and local buyers play a leading role

Outside of China, programs were far more reliant on local buyers and the private sector (Figure 47). With $49.8M spent in 2013, hydropower producers were the largest buyer by transaction values, largely through Vietnam's **PFES** program, which drove a significant jump in investment in that country as major users of watershed services like hydropower operators and water utilities began paying mandatory fees to central and provincial-level funds compensating communities for forest protection.

Watershed services payments collected from **PFES** buyers appeared to fall somewhat from 2012 to 2013. Reasons for the drop are somewhat unclear, as 2013 transaction values could only be estimated at the time of this report's writing. Other estimates put 2013 values as high as $80M, but this report utilizes a more conservative figure of $51M. Payment rates are based on buyers' productive output: $0.001 (VND 20)/kWh

Figure 47: Excluding China, Buyers in Asia by Count and Value, 2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

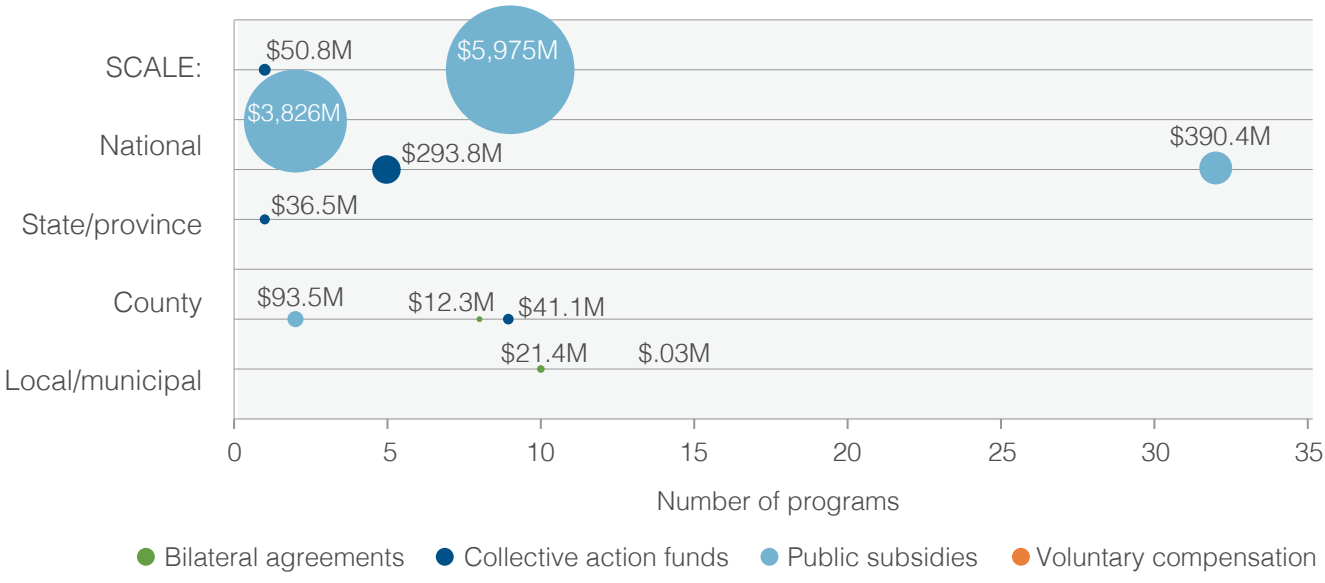
produced for hydropower plants, $0.002/m^3 of clean water produced for water supply companies and 1-2% of gross revenue for ecotourism companies[54] – which means that annual transaction values are somewhat dependent on larger economic movements.

Elsewhere, six programs in Cambodia, Indonesia, Nepal, and the Philippines also reported hydropower buyers. Public drinking water utilities ($1M) and local government ($1M) were a distant second and third in terms of buyer spending, although as a group local water service providers were a buyer in more than a quarter of programs.

Public subsidy programs deliver 98% of funding; but little growth where public support is absent

Most spending in Asia in 2013 flowed through Chinese public subsidy programs ($10.5B). Collective action funds, meanwhile, reported $383M in transactions that year and bilateral agreements $33.6M. Program types tended to be clustered by scale: public subsidies, for example, were typically operational at a state or national level and transacted significant amounts of money in 2013, while collective action funds were usually somewhat smaller in terms of both geographic scale and value (Figure 48), the exception here being

Figure 48: Program Types in Asia by Count, Scale, and Transaction Values, 2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

[54] In Vietnamese Dong, payment rates are 20 VND/kWh and 40 VND/m^3.

the national-level Vietnam **PFES** program. Bilateral agreements were the most complex program type to track, appearing mostly at a local or county level.

When Chinese activity and Vietnam's new national **PFES** program – the two major sources of growth in 2011-2013 – are set aside, other Asian programs show signs of stalling in recent years. In this group, transaction values have actually fallen every year since 2009 (Figure 49).

It is somewhat difficult to explain the fall in transactions; many programs in this group have benefited from extensive program design and demonstration, networks to share experience (such as through the RUPES initiative), and initial support from NGOs, donors, and buyers. The decline in transactions, in these cases, seems to be a result of challenges turning recognized watershed services values into sustainable cash flows.

6.4 Outlook

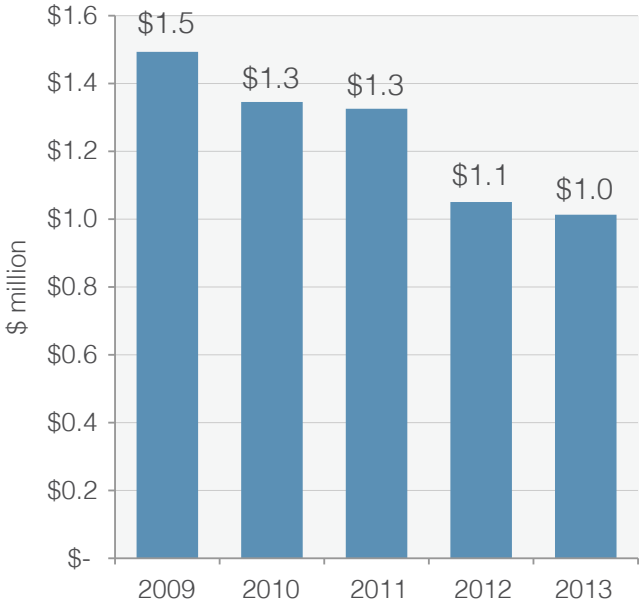
Despite challenges for integration, capacity in China, no plans to slow watershed investment

Recent market tracking suggests that institutional barriers and capacity remain key challenges to achieving more effective and efficient watershed management investment in China. Institutionally, few incentives exist for interagency cooperation and information-sharing, slowing progress toward more integrated water resource management. Technical capacity at both provincial and national government levels to develop and implement regulatory frameworks and management regimes also appears to not yet match the current level of investment. While the government is beginning to recognize these challenges, management plans still tend to focus more on outcome-based water quality targets and indicators, rather than improving underlying capacity and comprehensiveness of the management and monitoring system.

At the prompting of China's central government, watershed investment programs in 2012 and 2013 strove to become more comprehensive and integrated, targeting multiple sectoral interventions and combining multiple funding tranches from different line agencies. But the structure of funding expenditures and activities to date suggests that these programs, while on paper integrated, remain limited by a lack of effective cooperation between agencies. For example, land-use interventions remain siloed according to public, agency-specific purviews such as forestry (afforestation projects), agriculture (non-point source pollution control), and water (soil erosion prevention and control).

With respect to program design, government actors continue to develop watershed investment programs through heavily top-down, programmatic modes in which

Figure 49: Transactions in Asia, excluding China and Vietnam PFES, 2009-2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

local communities are reportedly often not consulted during the design phases nor given autonomy of participation choice. This results in higher transactions costs and diminished outcomes, thanks to reduced local buy-in.

That said, local water resource challenges combined with central government encouragement of natural infrastructure strategies can also force local governments to take action. In Changsha municipality in Hunan Province, for example, the impacts of bad environmental performance on the national cadre evaluations of county government officients appeared to be a stronger motivator for managing water quality than monetary penalties and rewards. Still, some local and provincial officials struggle to enforce environmental compensation regulations. In a recent case, an oil field in China was taken to court after the company refused to pay "eco-compensation" fees amounting to nearly $140M (CNY850M) to the Yulin government for water and soil losses in Shaanxi Province.

Nationally, the Chinese government appears committed to prioritizing investments in water resources and watershed protection for the foreseeable future. In a major meeting of the Communist Party November 2013 in China, the Party committed to establishing a "red line" for ecological protection at a national scale, with eco-compensation and resource pricing as the key tools for policing degradation.

"The red line is to limit economic development of environmentally vulnerable regions, such as river sources," explained Xia Guang, Director of the Policy Research Center for Environment and Economy under the Ministry of Environmental Protection.[55]

The approach has already been used at local and provincial levels where eco-compensation mechanisms are in place to mitigate impacts or influence polluters' behavior. Local governments are both pressured and encouraged by the central government to improve and make more comprehensive water resource management frameworks for key watersheds. The significant remaining gaps in monitoring and enforcement capacity and ambiguities in the delineation of water-related roles and responsibilities across different ministries and sectors can be viewed as opportunities for provincial and national governments to benefit from international experience by directly incorporating best practice into ongoing institutional and management innovations.

The Chinese government is also experimenting with a number of measures tracking progress toward a green economy, such as a pilot gross ecosystem product (GEP) evaluation system in Inner Mongolia's Kubuqi Desert, and an "environmental credit" rating system for businesses to reflect environmental performance.[56]

Chinese mega-cities partnership focuses on natural infrastructure for source water protection

The fall of 2013 also saw a partnership to demonstrate nature-based solutions for protecting drinking water sources in China's "mega-cities" launch in Beijing. The project, led by IUCN, includes a mix of public, NGO, and academic partners, including the Beijing Forestry Society, Forest Trends, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Chinese Research Academy of Environmental Sciences, Global Water Partnership China, Guangdong Academy of Forestry, Center for Rural Drinking Water Safety, and the Ministry of Water Resources. Funded by EU China, efforts will include pilots in Beijing's Miyun Watershed and Guangzhou's Jiaquan Watershed, an assessment of 30-50 Chinese mega-cities' water management, and an investigation of long-term management and financing mechanisms to share across the partnership.

Improving the PFES, where "stacking" is still an open question

An evaluation of Vietnam's national **PFES** program in its first three years of operation identified some key successes in the program's implementation, as well as areas needing improvement.

Since 2009 (when a pilot phase began) the program has generated more than $85M to date for forest protection. The Vietnamese government has also rapidly developed an institutional structure requiring beneficiaries of healthy watersheds (such as utilities) to pay for ongoing protection. The collective action fund mechanism employed by **PFES** provides a useful model for other national governments that, unlike China, may not have significant financial resources to support a public subsidy program. To date, **PFES** has relied mainly on hydropower producers, who accounted for 98% of program revenues in 2013.

Yet, the program is still being refined. **PFES** has encountered some difficulties collecting payments from buyers, who in turn expressed doubts that their payments were being used effectively for forest protection. Incomplete information on forest inventories and ownership, low technical and financial capacity, and coordination difficulties all contribute to low disbursement rates. An evaluation found that only 46% of revenues collected have been distributed to suppliers.[57] Another study found that in Lam Dong Province, only 10% of households received **PFES** payments; the remainder could not access program benefits because their land tenure was unrecognized.[58] Payment rates for protection (which in the pilot phase ranged from $3-14/ha) also may be too low to compete with other uses of forest land.

In theory, however, Forest Protection and Development Funds that collect and disburse revenues could support stacked payments for landscape beauty, forest carbon sequestration and storage, or aquaculture services, which might also help to address the problem of insufficient payment levels. A program structured in this way has yet to emerge. It also remains unclear how **PFES** will coordinate with REDD+ payments for carbon sequestration as Vietnam begins piloting a REDD+ mechanism in the 2013-2016 period.

In Indonesia, signs of national-level support for PES

Indonesia's Ministry of Environment indicated in 2013 that it would speed up preparation of regulations to implement the country's Environment Law (32/2009), including frameworks encouraging PES.[59] The country has had for some years laws on the books supporting natural infrastructure protection. National water

[55] Global Times China 2013.

[56] People's Republic of China Ministry of Environmental Protection 2014.

[57] Pham et al. 2013.

[58] To et al. 2012.

[59] World Agroforestry Centre 2013.

regulations allow water companies to internalize costs of watershed restoration as an operating cost, for example, while the national spatial planning law requires that 30% forest cover be maintained in order to protect watershed functions. Often these policies are not enforced, though recently, the Indonesian government has shown signs of stricter enforcement of forest protection laws, such as a $30M fine levied in early 2014 against a palm oil company for destroying a protected peat forest.[60] Forthcoming regulations scaling up PES could represent a step change for Indonesia, which has long been home to a number of locally oriented PES initiatives.

Rapid hydropower development in Asia – a new threat to, or impetus for, investment in natural capital?

In 2014, breakneck hydropower construction in Asia showed signs of slowing, as governments faced increasing opposition to dams' social and environmental impacts.[61] Large hydropower projects can displace upstream communities from homes and agricultural lands and have devastating effects on local biodiversity, even as downstream communities may benefit from increased water storage, expansion of irrigated agriculture, flood control, and low-cost electricity generation.

Concerns about the uneven impacts of hydropower development are driving some interest in a financial mechanism to share benefits more equitably and channel funding toward watershed protection, which can both mitigate negative impacts and prolong the life of reservoirs and hydroelectric turbines.

For example, Bhutan's Sustainable Hydropower Development Policy (2008) includes a "plough back" mechanism requiring at least 1% of royalties to be shared annually with the Ministry of Agriculture and Forests for promoting sustainable agriculture and land-use practices in catchment areas. The Bhutan government has supported a payment for ecosystem services pilot that would more directly compensate communities for watershed protection benefiting hydropower, though progress in planning stages has been slow.[62]

In Lao PDR, a new initiative aims to encourage a watershed approach to hydropower development. The Environmental Management Support Program (EMSP), funded by the government of Finland, works with the Ministry of Natural Resources and Environment to ensure that large investment projects include a funding tranche for watershed management. Watershed management and planning components are part of EMSP's Standard Environmental and Social Obligations for hydropower concession agreements, which have been included in all large hydropower concession agreements since 2010.

These are promising developments; hydropower development in the region is likely to continue at a rapid pace, but much can be done to improve planning to maintain natural capital and share benefits more equitably. Mangla Dam in Pakistan presents a worrying alternative: it was previously the site of a PES mechanism to address sedimentation in the watershed, and since 2010 watershed strategies have been abandoned. Dam operators chose to simply raise the height of the dam to address sedimentation, displacing people and incurring significant environmental costs.[63]

Stakes are perhaps highest in the Mekong Basin, where a dozen new dams are planned on the main channel and more than 70 on tributaries of the Lower Mekong, raising significant concerns about the dams' effects on fisheries and livelihoods.[64] But here, crafting a framework for protecting natural capital and sharing benefits poses significant challenges: of the six countries sharing the Greater Mekong Basin (China, Myanmar, Vietnam, Thailand, Lao PDR, and Cambodia) only China and Vietnam have experience with large-scale watershed investment mechanisms. Watershed governance in the basin has historically been challenging, with upstream and downstream countries often at odds over management,[65] while the Mekong River Commission – a regional platform for sharing information and establishing prior consultation on proposed hydropower projects – lacks the power to enforce commitments by its members, a fact highlighted in 2013 when the Laos government decided to move ahead with the controversial Xayaburi dam project against strong opposition by Cambodia, Vietnam, and Thailand.[66]

[60] Mongabay 2014.

[61] Wall Street Journal, February 23, 2014.

[62] Norbu 2012.

[63] Bakshi and Trivedi 2011.

[64] Orr et al. 2012.

[65] Chaudhury 2009.

[66] Chiangrai Times, April 8, 2014.

Box 9: Case Study: Scaling Up Outcome-Based Payments in the Sumberjaya River Care Program

In the Way Besai watershed, located on the western coast of Sumatra in Indonesia, watershed functions have been under pressure for decades from deforestation, as forests are converted for coffee plantations and other agricultural production. Forest clearing and degradation in turn have led to high rates of sedimentation in a local hydroelectric plant's reservoir, creating conflict between the hydropower operator and local communities.

The World Agroforestry Centre (ICRAF)'s RUPES initiative led the development of a payment mechanism between the Way Besai hydroelectric company (PLTA Way Besai) and communities in the Way Besai sub-catchment to demonstrate that agricultural management practices could limit erosion to the reservoir.

Payments are conditional on the level of erosion reduction: Payment rates increase with reduction achieved. Communities install vegetated buffer strips, terracing, sediment pits, and check dams; they are also eligible to receive money to purchase livestock, cash payments, and (if maximum erosion reduction is achieved) the installation of a local micro-hydro system providing electricity to the community. Communities are trained to carry out monitoring with technical support from the University of Lampung in recent years.

The mechanism was first tested in the village of Gunung Sari. ICRAF was the buyer in the first pilot phase, with PLTA Way Besai invited to observe. In a second phase, an initial one-year $1,100 contract was signed between the community of Buluh Kapur and PLTA Way Besai in 2008. That demonstration phase delivered a 20% reduction in sediment. In 2011, the mechanism was expanded to include the community of Talang Anyar. Administration of the program also shifted to a local farmer association, FKKT HKm. Recently the contract with PT PLN was renegotiated, and the program has also established an agreement with the UNDP program Strengthening Community-based Forest and Watershed Management.

In addition to direct benefits from participation, communities have reported improved productivity in agricultural output from soil and water conservation activities. At present the hydropower company must seek board approval for each contract renewal; ICRAF and partners are advocating for allowing state-owned companies like PLTA to be able to internalize PES mechanisms in their operating budget.

Note: Based on Beria and Pasha 2013.

Box 10: Case Study: Sharing the Benefits of Healthy Fisheries in Nepal's Rupa Lake

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, nutrient and chemical pollution, and invasive plant species 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 representing 25% of fisheries profits to Community Forestry User Groups (CFUGs) and to Community Development Groups through the Rupa Lake Watershed Conservation Fund. Eighteen CFUGs participate and receive annual payments for reforestation and other catchment protection activities such as planting native winter cover crops. The NGO Local Initiatives for Biodiversity Research and Development (LI-BIRD) provides technical support and capacity-building for the program. Participants receive training in soil and water conservation management practices and wetland and biodiversity conservation.

The Cooperative also financially supports schools and annual scholarships in the upper catchment to increase environmental education. Incentive payments for water hyacinth removal are available. The cooperative has established a revolving loan fund offering no-collateral, low-interest loans to lenders who carry out conservation activities such as planting medicinal and bee forage plants as well as fodder trees.

Note: Based on Sthapit et al. 2013, and Kugel and Huseynli 2013.

7. Europe

Lead author of this chapter: Alessandro Leonardi, Department of Land Environment Agriculture and Forestry, University of Padua, and ETIFOR Associate[67]

Table 14: Summary Details - Europe

	2011	2013
Operational programs	15	44
Programs in development	3	8
Values	$2.7M	$60.8M
Total land area managed for watershed services	65,030 ha	1.8M ha
New land area managed for watershed services, per annum	n/a	35,000 ha

Notes: Given our data collection cycle (which takes place every other year), data on ha protected in 2012 is unavailable, as the survey asks respondents to indicate total ha under management and ha added in the last twelve months.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Key Findings

- The years 2012 and 2013 saw major expansion and consolidation of watershed investment across the EU, with more than $60M transacted in 2013.
- New pilots in the UK were a major source of growth, driven by private water company demand and backed by receptive policy. The island nation accounted for a third of European programs and nearly two-thirds ($24.3M) of all European transactions.
- Overall, program investors committed $45.6M to watershed investment between 2014 and 2020. Thirty-eight percent of buyers pledged future funding, a relatively high proportion compared to other regions around the world. But much of that money is front-loaded in 2014 and 2015. Just one program reported secure funding for three or more years.
- Programs in Europe frequently estimate cost-benefit ratios and cost-effectiveness of watershed interventions. As a result, many programs have been able to conclusively demonstrate the benefits of IWS, compared to alternatives like built water treatment infrastructure. A major driver is the UK Water Services Regulation Authority (known as "Ofwat") requiring a strong evidence base for approval of watershed investment.
- At the EU level, policymakers appear ready to correct a long-standing mismatch between water policy and agricultural, rural development, and energy policy frameworks. More than $167B in Common Agricultural Policy (CAP) funding between 2014 and 2020 has been committed to subsidies for land management practices that safeguard and enhance healthy ecosystems. Common goals shared by new watershed and biodiversity agendas could also open up additional funding for IWS.

7.1 Introduction

UK government throws its weight behind nature-based approaches for water security

IWS grew rapidly in the UK, and particularly in England, in 2012-2013 thanks to supportive policy from Ofwat and the UK Department for Environment, Food and Rural Affairs (Defra). Every five years, Ofwat reviews private water companies' business plans to maintain assets, meet regulations, and ensure secure supplies. Historically, Ofwat hesitated to allow water utilities to invest in watershed management for fear of subverting the "polluter pays" principle. But following positive experiences by the first two utility-led IWS programs (**Sustainable Catchment Management Program** and **Upstream Thinking**), in 2009 Ofwat approved catchment management plans by more than 100 water

[67] This contains information taken from a PhD thesis: Characterizing governance and benefits of Payments for Watershed Services in Europe. Alessandro Leonardi, Department of Land Environment Agriculture and Forestry, University of Padua, and ETIFOR Associate.

Map 6: Active and Developing Programs in Europe, 2013

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

companies representing more than $100M in funding for IWS program development and investment. Roughly 90 initiatives receiving Ofwat approval for catchment management planned to simply "investigate" watershed approaches between 2010 and 2015, meaning that activities initiated during this period may not yet be fully felt on the ground.

Additional policy and financial support was provided by Defra between 2011 and 2013 on several fronts. In 2011 Defra established an Ecosystem Markets Task Force, to be led by stakeholders from the private sector. The Task Force is charged with developing an action plan to expand PES around the country, including a best practice guide on how to design such projects. Defra also funded eleven IWS pilots during this period to demonstrate IWS mechanisms. Finally, the department sponsored the Ecosystem Knowledge Network, which engages practitioners in sharing experiences on projects taking an ecosystem approach.[68]

Water Framework Directive compliance drives interest in watershed health

Policy change has been partly driven by legal challenges brought by conservation organizations. In 2010, the WWF-UK and the Royal Society for Protection of Birds sued the UK government for non-compliance with the Water Framework Directive (WFD). The suit was primarily over the lack of public consultation in river basin management planning.

To account for this gap in watershed management, Defra in 2013 released a Catchment Based Approach policy framework, which requires better coordination between the government and other stakeholders in basin planning. Defra has also allocated more than $2M in start-up funding for catchment partnerships. While not necessarily driving IWS, these partnerships engage with a number of local and national stakeholders at the catchment level, creating relationships and shared knowledge that can underpin watershed investment. Out of the first 20 partnerships that received funding, at least 17 of them today are involved in an active IWS project. As of 2014, partnerships have been funded in about 80 catchments across England.

At the national level, retrofitting regulations for IWS initiatives

Policymakers and NGOs in the last few years focused efforts on crafting IWS-friendly policy at the EU level. Not much national-level policy emerged in 2012-2013, with the exception of strong support at the national level for catchment management in the UK.

Instead, practitioners have made use of existing frameworks to propel nature-based solutions forward, sometimes in creative ways. For instance, many countries offer compensation for legal restrictions on land use due to water source protection.[69] Compensation covers the opportunity cost for farmers facing loss of income from fertilizer use restrictions.

In Italy, where legislation regarding PES doesn't exist, the **Land Stewards** program uses an existing national law as a means to implement and operate PES programs. The law is meant to promote multifunctional agriculture and authorizes public bodies to contract with private and public entities for landscape management.[70] The text of the law doesn't, however, permit compensation for ecosystem services. IWS contracts instead must link payments to activities associated with conservation projects rather than to the delivery of specific ecosystem services.

European Commission looks to ecosystem-based approaches to close the gap on Water Framework Directive implementation

In late 2012 the European Commission (EC) published a "Blueprint" on water, calling for better integration of water goals with agricultural, energy, and development policy.[71] Despite significant improvements on water quality in the last decade, only 53% of EU waters are expected to achieve the WFD goal of good status by 2015.

The Blueprint attributes this implementation gap to poor local governance and limited uptake of economic instruments. The document sets an agenda and timetable for establishing guidance on market-based environmental approaches, including water trading schemes, water catchment accounts, Natural Water Retention Measures (NWRM), and PES.

Linking water and biodiversity policy agendas

In recent years EU-level policy on biodiversity – such as the Birds and Habitats Directives, which collectively cover almost 18% of the EU's territory – has offered IWS

[68] British Ecological Society, January 10, 2012.

[69] Germany: Article 14 Para 2 of the German Basic Law, Lower Saxony (Federal and Provincial States' Water Acts) and in Bavaria (Art. 36 a Para 2 of the Bavarian Nature Protection Act); Italy (Galli's Act indications - art.18 and 24, Law 36/1994); the Netherlands (Groundwater Act 1981); Austria (Austrian Water Rights Act. article 34) and Switzerland (article 62 of the Federal Law on the Protection of Waters).

[70] Decreto Legislativo 228 on agriculutral modernization, May 18, 2001.

[71] http://ec.europa.eu/environment/water/blueprint/index_en.htm

program developers opportunities to couch watershed protection in terms of biodiversity conservation goals. In the UK, for example, watershed areas protected by United Utilities' **Sustainable Catchment Management Program (SCaMP)** in North West England and South West Water's **Upstream Thinking** programs overlap with Habitats Directives land. These areas have had program approval fast-tracked by Ofwat (see Case Studies below). The EC also encourages private-public match funding to meet Directives requirements through a website that provides guidance and financing tools, encouraging member states to employ financing instruments like PES, visitor payback schemes, and trust funds for Natura 2000 sites.[72]

7.2 Impacts

Supply: Funding flows to 1.8M ha in Europe, with a focus on productive landscapes

Buyers of watershed services in 2013 paid for the protection and restoration of more than 1.8M ha of land, with 35,000 ha coming under new management that year. Two-thirds of watershed services suppliers in Europe are private landowners, mainly farmers and forestland owners. Public suppliers (mostly municipal and public utility-owned lands) account for another 27%, with the remainder made up of NGOs and civil society organizations managing high conservation value lands.

There is a very strong emphasis on funding productive landscapes in Europe. Most programs involve payments for either sustainable agricultural methods or sustainable forest management (typically either the conversion of pine to broadleaf forests or hazardous fuel reduction to mitigate wildfire risks). Reforestation in agricultural catchments is a frequently used intervention to enhance groundwater recharge and flow regulation, though these projects are usually small, accounting for around 3% of reported transactions in 2013.[73]

In 2013, 35% of programs reported measuring direct hydrological outcomes. (More often, programs monitor for implementation of management practices or use "hectares under management" as a proxy for impacts.) Where direct performance data is available, programs reported an average of 10%-30% reductions in nitrates pollution and a total of 871.5M tons of avoided sediment loading (equal to 33,500 ships of the size of the "Titanic" full of sediment) and 429 ML of groundwater recharge (roughly the volume of 172 Olympic swimming pools) in 2013.

Monitoring challenges constrain performance evaluation – and regulatory approval

Effective monitoring remains a challenge for programs in Europe. Program developers reported common difficulties for M&E, including inherent uncertainty around measuring outcomes and the fact that monitoring results are highly site- and time-sensitive.

But the implications of these M&E challenges in Europe are important since the WFD is a major driver of programs: regulatory standards rarely accommodate uncertainty related to outcomes, meaning that many water utilities cannot rely on catchment management alone to ensure water quality. For example, in the UK, Ofwat requires water utilities to conduct hydrological baseline and cost-benefit studies before undertaking catchment management schemes. Often these baseline studies are altered by specific annual climate conditions like abnormal rainfall or drought – so demonstrating a program's effectiveness may become a major hurdle in the context of increased climate variability.

Cost-benefit analysis strongly in favor of IWS, especially when co-benefits count

While monitoring IWS projects for hydrological outcomes proves difficult, many programs have been able to measure the cost-effectiveness of their schemes and have found them to be financially viable. One in five programs report using cost-effectiveness or cost-benefit analysis (CBA) to justify implementation.

South West Water, for example, found that reducing pollution at its source instead of investing in treatment equipment offered the company a benefit-cost ratio of some 65:1. Watershed management is also expected to deliver up to 20% savings in operational costs for South West Water's existing treatment plants.[74]

The **Land Stewards** program in Italy (see case study in Box 14) reports four-fold savings in operational costs, as well as reduced monitoring costs thanks to participating farmers taking on decentralized monitoring and management of water channels.

And **Wessex Water** documented a benefit-cost ratio of 6:1 – when compared to the treatment option – for a catchment approach that addresses

[72] http://www.financing-natura2000.eu/

[73] They are also relatively expensive: The Oldenburg and East Frisian Water Association (OOWV) – a water utility in Lower Saxony – reports that compared to other management practices (like grasslands protection or nitrate restrictions), reforestation has a lower cost-benefit ratio in terms of reduction of nitrate concentration in groundwater (though only if other multiple benefits, like carbon storage, are not included in the analysis). The study indicates that a kg of nitrate removed by reforestation costs the water utility around $15, while farm advice and restrictions on fertilizer uses at farm level have a slightly low cost, around $1-2 per kg of removed/avoided. Görlach 2007.

[74] Smith 2013.

Box 11: Matching CAP Payments with Private Watershed Investment

A number of programs tracked in this report use CAP agro-environmental match funding to augment existing financing streams. In the past, agricultural and water policy in the EU have often been at odds, with CAP payments for many years essentially subsidizing agricultural intensification. However, the latest CAP phase (2014-2020) finds clearer support for watershed protection in its two agricultural and rural development funds.

The first pillar, the European Agricultural Guarantee Fund (EAGF), aims to provide ecosystem services to the public through its Green Direct Payment initiative, which becomes operational in 2015. Accounting for 30% of the budget, the Green Direct Payment will fund permanent grassland, "ecological focus areas," and crop diversification. Its total budget from 2014-2020 is $427B. The second pillar, the European Agricultural Fund for Rural Development (EAFRD), includes in its six priorities restoring and conserving ecosystems on agricultural and forested landscapes. It focuses specifically on biodiversity, water, and soils management. These measures account for one-third of the total EAFRD budget, which is $130.6B between 2014 and 2020.

metaldehyde pollution. Metaldehyde, a common pesticide for slugs and snails, is difficult to remove through conventional methods.[75]

Research also found that incorporating co-benefits into programs can make a huge difference in terms of economic appraisal. A CBA of United Utilities' **SCaMP** suggested that operational and capital cost savings would be low.[76] Here, climate and biodiversity co-benefits strongly contributed to the economic case for the program, providing benefit-cost ratios between 2.24-25.38:1 (under different scenarios for greenhouse gas sequestration, biodiversity, and water quality response).

Biodiversity a significant driver, but unclear if effective M&E in place

At present, co-benefits are virtually always "bundled" with watershed protection; that is, all activities are covered under a single funding stream, rather than allocating separate payment levels or investment pools for each ecosystem service. **South West Water** reports, however, that they are considering monetizing multiple benefits. This could mean selling carbon credits generated from wetland restoration projects.

Biodiversity is a big part of the co-benefit and "bundling" aspect of IWS. Forty percent of programs report biodiversity goals, while 21% list carbon sequestration objectives. Yet only 14% provided information on their monitoring of biodiversity. The data provided is uneven in terms of clarity regarding metrics and frequency of monitoring. Around half of reported programs suggested that buyers require monitoring as a condition of payment. But it is not at all clear that proper monitoring and evaluation of biodiversity impacts are in place.

7.3 Investment

Demand: $60.8M transacted in 2013, led by a surge in English investment

Projects reported at least $60.8M in transactions across Europe in 2013, largely thanks to a burst in activity in England.[77] Twenty-two programs were operational in England as of 2013, accounting for a third of the projects in Europe and almost two-thirds of all transactions.[78]

Demand: Beverage industry and water companies a key source of conservation finance in EU

Business was also a major force behind investment in natural infrastructure for water in Europe, delivering at least $8.7M in 2013 (Figure 50). All private-sector buyers tracked in this year's report were either private water utilities (mainly in England) or beverage companies. Beverage companies include Coca-Cola bottling

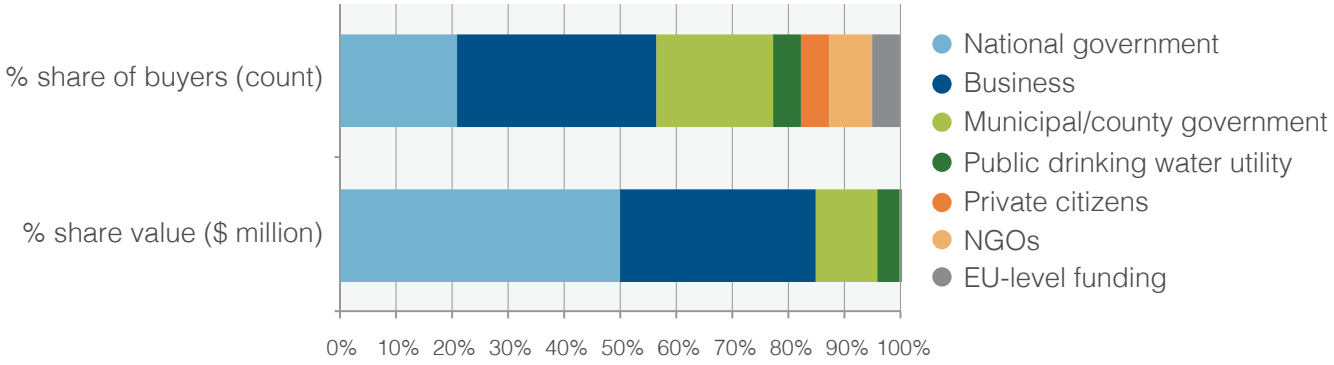
[75] Wessex Water 2013.

[76] Estimates were low in part because the methodology took into account only investments and operational costs directly linked with color removal and waste treatment, and not considering business-as-usual investments in new plant.

[77] The significant increase in transaction value between 2011 and 2013 is also largely a function of improved data collection in Europe.

[78] Actual figures are probably much higher, since accurate transaction data are missing for roughly half of active programs. Many landowners participating in programs also appear to be receiving matching agri-environmental subsidy funds from EU-level bodies, which are not necessarily reported to us by IWS program administrators.

Figure 50: European Buyers by Prevalence and Value of Investment, 2013



Note: Data on NGO and "EU-level" funding is not available for 2013. Private citizen contributions are <1% of total investment.
Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

companies in France and Portugal, Bionade in Germany, Vittel and Danone in France, and Norda in Italy. Contrary to other regions where private-sector contributions make up a relatively small share of programs' total financing, in Europe business delivers at least two-thirds of funding for half of the programs in which it participates.

Demand: WFD is a key driver – but for business, so are reputational concerns

As Defra discovered, non-compliance with the WFD can lead to litigation and other expenses. Buyers appear to understand this: as WFD implementation proceeds, most programs report that a key driver is the risk of non-compliance with increasingly demanding drinking water quality standards. Some utilities surveyed for this report expect pollution problems – especially nitrates and pesticides – to worsen in the next ten to twenty-five years, related to both ongoing diffuse pollution and climate change uncertainties. In the face of all of these regulatory, operational, and capital cost risks, IWS is seen as a potential tool to enhance competitiveness and profitability.

For private water utilities, watershed investment is also often linked to corporate social responsibility strategies. United Utilities in the UK, for example, is listed in the Dow Jones Sustainability Index with the **SCaMP** program one of the core elements in its environmental sustainability performance evaluation. Both **Upstream Thinking** and **SCaMP** have won several awards for sustainability performance and wetlands restoration.[79] Strategies such as these often succeed in generating favorable public opinion for a company. But there can be deeper drivers: Ofwat, for instance, requires businesses to demonstrate customer support when assessing their catchment management plan through surveys and willingness-to-pay analysis.

Mechanisms: A regional shift underway from bilateral to mixed funding models

In France, the bilateral agreement of **Vittel** (now Nestlé) to safeguard mineral water stands as a classic PES arrangement, wherein a downstream water user voluntarily contracts with upstream farmers to practice sustainable agriculture. This model remains popular in Europe. Most city and utility-driven programs – as in **Munich**, **Alborg**, and **Basel** – are bilateral in form. But collective action models combining funding from multiple buyers are on the rise.

At present, collective action mechanisms remain a tiny slice of activity, both in terms of the number of programs and the share of total finance delivered (Figure 51). But half of new programs since 2010 have taken this form.

Many bilateral agreements have also shifted toward a more "mixed model" in recent years, leveraging matching funds from agri-environmental subsidy programs (mainly the CAP) and other watershed stakeholders. IWS payments are typically used to cover the remaining

[79] United Utilities' Upstream Thinking was commended in Defra's Water White Paper last year and won the 2012 Partnership Initiative of the Year award at the Water Industry Achievement Awards. An initiative to improve wildlife habitats and water quality on the gathering grounds of some of the North West's reservoirs has won two national ecology awards.

costs of agricultural practices or capital improvements after CAP subsidies (which typically cover around 50%-80% of project costs). We estimate that nearly two-thirds of programs in this report's dataset directly or indirectly harness CAP payments, though actual payment values are difficult to uncover.

Finance: Program finance through 2020 carried by private sector commitments

Private-sector buyers report significant commitment to watershed investment. In fact, in 2013 the sector provided programs with more certainty on future funding than the public sector did: more than a third of private investors pledged 100% funding to their respective programs in 2014. Meanwhile, uncertainties around the public sector's political will to ramp up environmental protection renders future EU funding support unclear – especially during the transition between the last EU funding period (2007-2013) and the current one (2014-2020).

Overall, program investors committed $45.6M between 2014 and 2020. Thirty-eight percent of buyers pledged future funding, a relatively high proportion compared to other regions around the world. But much of that money is front-loaded in 2014 and 2015. Just one program reported secure funding for three or more years (Figure 52)

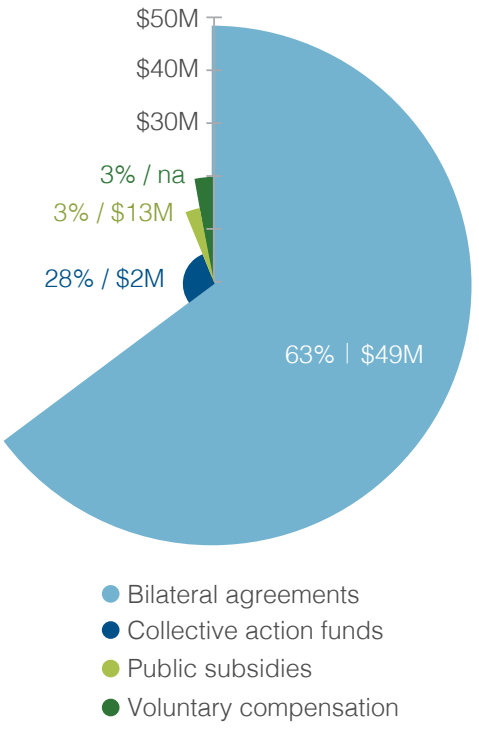
Market infrastructure: Programs turn to commodity certifications for project guidance, verification

Six programs reported the use of commodity certifications (such as FSC or organic agricultural certification) to verify program activities and increase the value of participation for farmers and forest owners. This is an intriguing development, given the lack of widely used project standards or third-party verification options for IWS.

In Germany, the **Lower Saxony** and **Munich** source-water protection programs offer to help to cover costs of organic agriculture certification. For **Munich**, organic certification has been shown to reduce transaction costs.[80] Meanwhile **Monticchio Gaudianello**, a subsidiary of Norda Water in Italy, funds organic certification among farmers in its source areas as

Figure 51: Program Types in Europe by Prevalence and Transaction Values, 2013

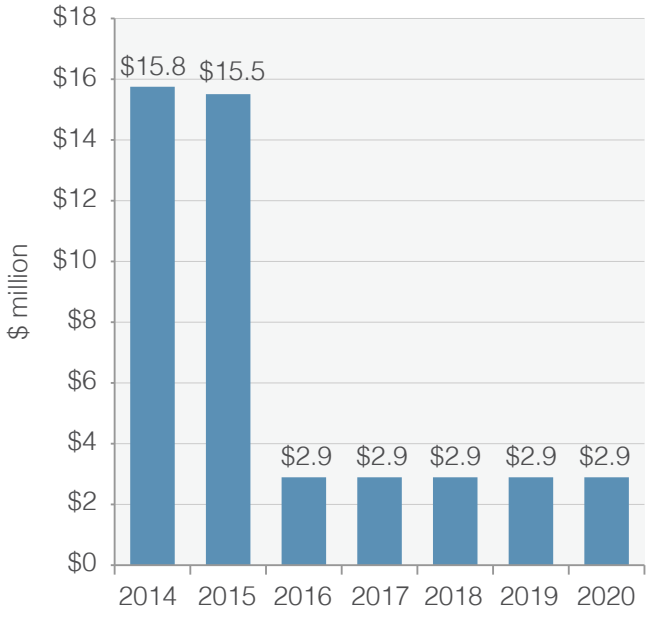
(Interior circle: % share of programs; Exterior radius: $ value invested)



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 52: Funding Commitments by European Buyers, 2014-2020

(Value committed by buyers as of 2013, as reported by program administrators)



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

[80] Grolleau and McCann 2012.

well – and promotes these sustainability efforts on their bottles' labels. In the UK, the **Fowey River** program is also investigating payments for pesticide control via organic agriculture.

United Utilities uses FSC standards for woodlands in catchment lands owned by the company. And in Portugal, The Coca-Cola Company pays the **Forest Producers Association of Coruche (APFC)** for improving cork forest management using FSC certification standards.

7.4 Outlook

The next few years will prove an interesting time for watershed investment in Europe. Continued growth in investment appears likely; the question is whether EU-level policy (and national implementation of that policy) will facilitate nature-based solutions or obstruct them.

At the EU level, better policy integration and deeper pockets

The new European Green Infrastructure Strategy approved by the EC in 2013 will integrate natural infrastructure into funding mechanisms such as the CAP, the Cohesion Fund, the European Regional Development Fund, Horizon 2020, the Connecting Europe Facility, the European Maritime and Fisheries Fund, the Financial Instrument for the Environment (LIFE) and the Program for the Environment and Climate Action (LIFE+). According to the strategy, the EC together with the European Investment Bank will set up an ad hoc EU financing facility by 2014 for publicly and privately led natural infrastructure projects. All of these public funds will look for possible match funding mechanisms on the ground.

Another major source of funding is the new LIFE program. Between 2014 and 2020 the fund is expected to provide $4.6B, mostly directed to Natura 2000 protected areas, with specific preference for activities that will attract innovative governance/financing systems for conservation and climate adaptation.

A new type of EU regional funding vehicle under the LIFE+ umbrella, the Integrated Project, will fund large-scale interventions ($13-26M per project) advancing the Habitats Directive, Birds Directive, and WFD. Such funding is directed at projects able to show a link between biodiversity conservation and the implementation of River Basin Management Plans.

Dozens of new programs anticipated in the UK, France

Program growth is anticipated in 2014 and beyond in France and the UK. In France, **Danone** is extending its PES efforts beyond the Evian catchment to three new watershed areas (Volvic, Badoit, La Salvetat). England in 2014, United Utilities, having recently moved to the second planned phase of **SCaMP** (which doubled the scale of its intervention), plans to activate two new programs (the Catchment Wise and Safeguard Zone projects) to extend the same approach in non utility-owned land in North West England. And in 2015 **Upstream Thinking** will launch 17 catchment-specific projects in South West England, nearly tripling its watershed protection footprint by area.

Defra published a call for four to six new pilots in February 2014, with $25,000-$40,000 available per project. Dozens of other utility-driven programs are expected to emerge in the UK following 2014's Ofwat pricing review and Defra's statement of obligations for utilities.

Also within the UK, the newly formed government body called Natural Resources Wales committed in its 2014-2015 business plan to identifying funding streams for PES and to begin implementing funding mechanisms in 2016.

Compensation law in Spain offers promise of new funds for natural infrastructure

In Spain, a new law for environmental compensation was approved in 2013. The law established ground rules for a habitat banking system, which could deliver additional finance for restoration and protection of natural infrastructure like wetlands and coastal areas.[81] As this report was written in mid-2014, wetland and habitat banks appeared poised to open in the Iberian Peninsula. The emergence of biodiversity offsetting in the EU might provide additional investment for wetlands, though initial pilots in the UK have sparked strong opposition from some environmental organizations.[82]

[81] Environmental Assessment Law 21/2013 December 9.

[82] For example, FERN 2014.

Box 12: Case Study: Upstream Thinking in South West England

South West Water (SWW) is a private company that manages the regulated water and waste water network serving nearly 600.000 customers in South West England. In the past years, intensive mixed livestock farming and degradation of moorlands and peatlands have decreased water quality in regional reservoirs, rivers, and aquifers. In 2008, SWW funded the Exmoor Mires pilot project – a rare move for a water utility at the time – to restore 326 ha of peatlands designated a Site of Special Scientific Interest. SWW partnered with a variety of local delivery groups, such as Exmoor National Park Authority, to deliver the work in coordination with a catchment-based approach facilitated through the NGO Westcountry Rivers Trust, which had experience in sustainable catchment management through the EU-funded WATER project.

Building on that relationship and the pilot experience, SWW launched an umbrella IWS initiative called **Upstream Thinking in 2011.** The project aims to reduce water treatment costs while providing co-benefits like climate change mitigation and biodiversity conservation.

To implement these projects, SWW works in collaboration with a wide range of national and local organizations. South West Water delivers moorlands restorations while the Westcountry Rivers Trust, Devon Wildlife Trust, and the Cornwall Wildlife Trust oversee efforts that target restoration of culm grassland and stem pollution from agriculture in West Penwith, Rivers Taw and Torridge, River Fowey, Tamar, Wimbleball and Roadford catchments, and the Otter Valley. Natural England, the Environment Agency, English Heritage, and the National Farmers Union have all supported the project through match funding with agro-environmental payments, monitoring, and policy advice. Exeter and East Anglia Universities were involved in the monitoring and design of the payments schemes as well.

The project has experimented with two different types of water quality improvement payment mechanisms: i) a system where farmers identified by an advisory group are offered a fixed-price deal in which South West Water pays 50% of the costs of the capital investments; and ii) an auction-based mechanism asking farmers to submit competitive bids for funding.

A comparison between the two systems suggests that the auction-based system delivers 20%-40% better value for money. But the advisory model may be more appropriate for small-scale projects for which site-specific considerations are needed.[83] A 2015-2020 program is currently under development; information about the design, monitoring, and implementation of the 2010-2015 work will be used to improve on-the-ground delivery.

[83] Citation: Day and Couldrick 2013.

Box 13: Case Study: United Utilities Manages for Multiple Benefits

United Utilities (UU) is the UK's largest water company, supplying drinking and waste water services to nearly 7 million people. UU owns 56,385 ha of land surrounding its reservoirs to protect water quality. Around 30% of its land is designated as a Site of Special Scientific Interest (SSSI), constituting a nationally significant habitat for biodiversity conservation. However, fragile moorland and peatland habitats in the upland catchment areas have been damaged by historical industrial air pollution, agricultural activities, and climate change.

Agricultural policies have encouraged farmers to drain the land and increase livestock grazing on the fells at the expense of water quality, landscape values, and wildlife. Over the last 30 years UU has also experienced substantial increase in discoloration of raw water in many upland catchments. The removal of color requires additional processing, chemicals, power, and waste handling to meet drinking water quality standards. As a result, annual operational costs of water treatment have significantly increased.

UU's **Sustainable Catchment Management Program (SCaMP)** primarily aims to address water color and sedimentation issues. Between 2005 and 2010, UU worked with farm tenants, investing $18M in moorland restoration, fencing, woodlands, farm infrastructure, and protecting watercourses across 27,000 ha of catchment areas. Initially, Ofwat expressed concerns that it violated the "polluter pays" principle. But regulators later approved SCaMP on the basis of cost-benefit analysis and UU's demonstrating the multiple services and co-benefits (water quality, biodiversity, and carbon storage) delivered by watershed approaches.[84]

UU's annual monitoring of the management program shows a positive effect on water quality. CBA suggests the main benefit has overwhelmingly been in terms of GHG mitigation and biodiversity benefits – capital and operational expense savings for water treatment are relatively small.[85]

Phase 2 targets in the 2010-2015 period include covering the remaining 30,000 ha owned by United Utilities and extending investment to non utility-owned land. Working with catchment partnerships in the North West England region using the newly created funding schemes, Catchment Wise and Safeguard Zones, is also an objective. Nearly ten years old, the program is used as a model for water utilities across England in designing their own watershed protection programs.

[84] Water utilities in the UK are considered private companies but public bodies under the §28G of Wildlife & Countryside Act. The Natural Environment and Rural Communities (NERC) Act, which came into force on October 1, 2006, requires all public bodies, including United Utilities, to have regard to biodiversity conservation when carrying out their functions. As a result of the SCaMP programme, the company exceeded government Public Service Agreement targets for SSSIs returning 98.6% of its land into a favorable or recovering condition by 2010. In fact, the UU SSSI duty was one of the main legal reasons that allowed OFWAT to first approve SCaMP investments.

[85] United Utilities 2012.

Higginson and Austin 2014.

Box 14: Case Study: A New Role for Farmers and Forest Owners in Tuscany (Italy) – The Land Stewards

In the hilly regions of Tuscany's Media Valle del Serchio, a public authority is tasked with managing more than 115,000 ha of mountain land and 1,500 km of streams. In an attempt to maintain this land effectively, the authority has established agreements with about 40 farmers and forest owners since 2007 to improve flood risk monitoring and control water courses in the mountain basin. These agreements are part of a program called the Land Stewards.

Farmers and forest owners received a fixed payment ($8,000 per year during the initial phase and $5,000 per year in subsequent years) to assess risk and provide an alert-report service to the public authority on instances of slope instability or waterway obstructions. An interactive Information and Communication Technologies (ICT) system (IDRAMAP) manages reports.[86] Landowners also have the option to contract with the public agency for maintenance. This typically involves removing trees and sediments from riverbeds and managing riparian vegetation.

According to the public authority, the Land Stewards program has resulted in 80% annual cost savings for management interventions in the area. The project also provides an alternative source of income for low-income landowners living in remote areas in the Serchio Valley as well as increased community awareness and participation in hydrological landscape management.

Box 15: Case Study: Wessex Waters Finds a Smart, Simple Solution to Combat Metaldehyde

Wessex Water supplies drinking water to 1.3M people in South West England. Most of its water comes from groundwater sources in Wiltshire and Dorset. In recent years, the company has found that increasing levels of treatment were required to maintain and further improve water quality, due to rising levels of nitrates and pesticides including metaldehyde. Extensive monitoring and catchment studies indicated that diffuse pollution from agriculture was actually made up of several concentrated "point sources" of pollution.

Wessex Water already has several treatment plants in the area. But since conventional treatment methods are not very effective at removing metaldehyde from water supplies, the company decided to work at the catchment level. Wessex Waters estimates the catchment program costs six times less than building a new plant, which would have to be specially designed to treat metaldehyde.

The program works by providing in-kind funding for nitrate management practices at twelve sites and pesticide management in three areas. Wessex Water also pays farmers for substituting metaldehyde with a more water-friendly pesticide [87]

[86] Rovai et al. 2013.

[87] Wessex Water 2013.

8. Latin America and the Caribbean

Table 15: Summary Details - Latin America and the Caribbean

	2011	2013
Operational programs	28	68
Programs in development	8	19
Values	$87.1M	$84.9M
Total land area managed for watershed services	3.4M ha	6.1M ha
New land area managed for watershed services, per annum	610,413 ha	311,590 ha

Notes: Given our data collection cycle (which takes place every other year), data on ha protected in 2012 is unavailable, as the survey asks respondents to indicate total ha under management and ha added in the last twelve months.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014*.

Key Findings

- Programs delivered 5% annual growth by area between 2011 and 2013, with more than 300,000 ha of new lands coming under management in 2013. But watershed investment in the region struggles to keep pace with ongoing threats to water supplies, particularly deforestation and urban growth in water-rich forests in Amazonia, and impacts from climate change and mining on Andean landscapes.
- Despite a dip in funding in 2013 in the region's largest initiative, Mexico's National **Program for Hydrological Environmental Services (PSAH)**, 2012 and 2013 saw strong continued growth in mid-sized programs (defined as those transacting between $0.5M-$1M/year), led by ever-multiplying water funds.
- Collective action models saw a surge in growth: The region added a dozen new water funds during the period and incubated approximately twice that number for future launch.
- This report tracked a burst of activity in Brazil, where the **Water Producer program** model has grown in a few short years from a single pilot to 19 mechanisms across the country.
- Andean countries pushed forward several policy initiatives and laws strengthening the legal basis and frameworks for watershed investment in 2012 and 2013, though their effects have yet to be felt.
- Latin America has become an incubator for innovation, with strong collaboration on cross-project learning and fundraising, led by the Latin American Water Funds Partnership (LAWFP) and Brazil's Fundacão Grupo Boticário, and efforts like a new Reciprocal Water Agreements School in Bolivia. These networks look to be accelerating not only new project development but also efforts to deliver more robust monitoring and project appraisal tools.

8.1 Introduction

IWS makes policy headway, mainly in Andean countries

Policy makers in Andean countries showed renewed interest in nature-based solutions to the region's water challenges. This report finds significant developments in 2012 and 2013 in Peru and Colombia in particular.

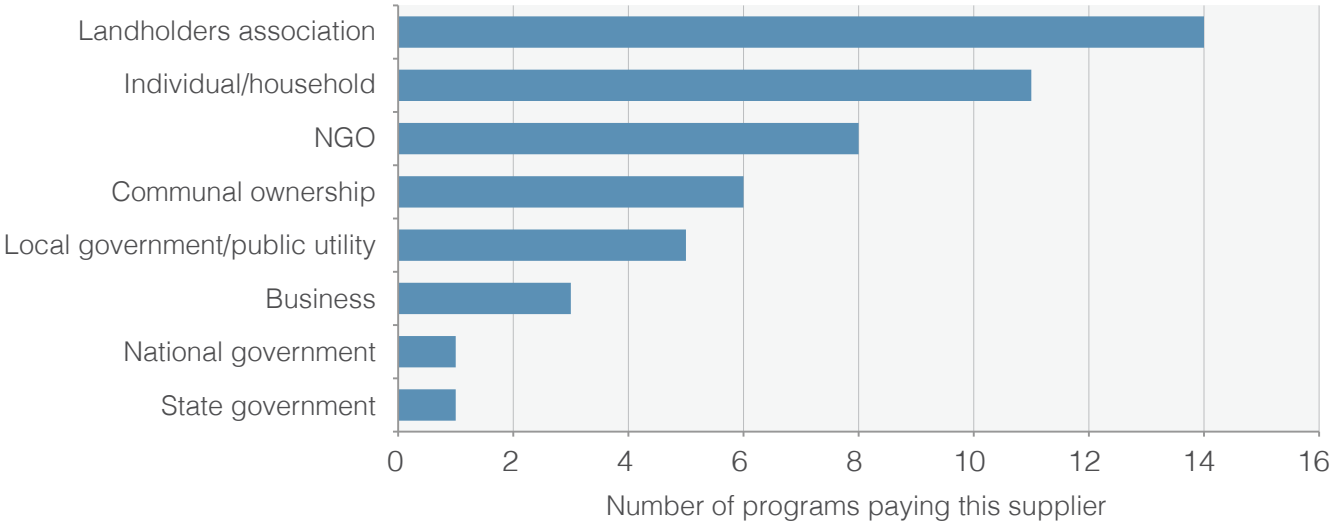
In May 2012, the Peruvian Ministry of Environment (MINAM) together with Forest Trends and the support of the Swiss Agency for Development and Cooperation (SDC) launched a national-level Watershed Services Incubator.[88] The Incubator functions as a platform promoting IWS approaches in the country by advocating

[88] Andina, May 8, 2012.

Map 7: Active and Developing Programs in Latin America and the Caribbean, 2013

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 53: Number of Programs by Supplier Type in Latin America and the Caribbean, 2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

for national policy development and providing technical, financial, and economic expertise to demonstration projects around the country. Four initial demonstration sites in the **Jequetepeque**, **Rimac**, **Alto Mayo**, and **Cañete** watersheds are currently supported, and a total of 17 sites have been identified for developing new pilots.

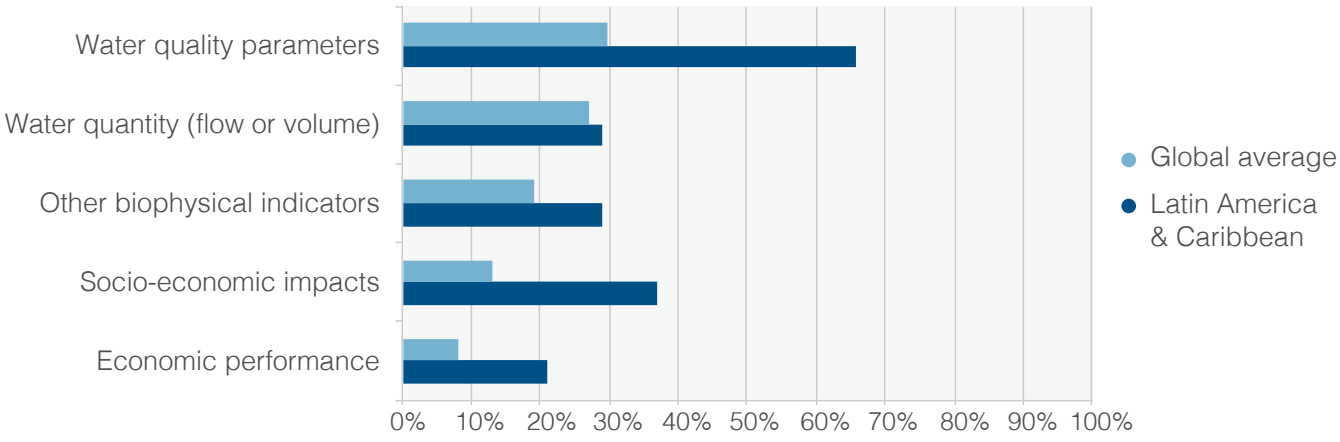
In late 2013, Peru passed a law aiming to modernize its water sector, including provisions that utilities engage in environmental compensation and develop climate change adaptation strategies. The Peruvian national water regulator (SUNASS) is in the process of formulating guidance for utilities on this front in collaboration with the Watershed Services Incubator and the NGO Consortium for Sustainable Development of the Andean Ecoregion (CONDESAN).

Then, in May 2014, Peru's National Congress unanimously passed a Payments for Ecosystem Services Law (*Ley de Mecanismos de Retribución por Servicios Ecosistémicos*). The law provides a legal framework for voluntary PES between land stewards and beneficiaries of ecosystem services.

Colombia's Ministry of Environment and Sustainable Development in May 2013 authorized an even stronger piece of regulation, requiring municipal and departmental entities to comply with an earlier law that

Figure 54: Monitoring Rates by Type in Latin America and the Carribean and Globally, 2013

(% share of programs)



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

directed at least 1% of annual revenues toward either PES to landowners or direct land acquisition in source water areas.[89]

But investment struggles to keep up with regional threats to water supplies

The question remains whether investment in the health of the region's water-rich ecosystems can keep pace with degradation. Unprecedented glacial retreat in the Andes driven by a warming climate poses a massive threat to water supplies. This is a real challenge in glacier-dependent countries like Bolivia: for example, glaciers account for 27% of La Paz's water supply in the dry season.[90]

Meanwhile in the Amazon, deforestation increased by a staggering 28% in 2013.[91] Amazonian deforestation presents an immediate threat to regional water supplies: Watershed services delivered by Amazonia are estimated to be worth tens of billions of dollars annually to countries in the region.[92] One study has found that widespread Amazonian deforestation may lead to a 21% reduction in rainfall in the region by 2050,[93] compounding water insecurity.

The repercussions of forest loss in South America will extend beyond damages to natural infrastructure. Thirty new dam projects in the Brazilian Amazon and 59 in the Andean Amazon will be underway by 2020 – yet a recent study suggests that hydropower is far more reliant on healthy forests than previously understood.[94] At the current pace of deforestation in the Amazon basin, the already controversial Belo Monte Dam will probably only generate about 40% of the electricity projected in its development plans, which had predicted that the facility would be the third-largest in the world in terms of installed capacity.[95]

8.2 Impacts

Supply: Land under management hits 6M ha

Altogether, IWS buyers funded sustainable management, restoration, and conservation of 6.1M ha in 2013. In 2013, 311,590 ha newly came under management, representing 5% annual growth since 2011 by area, but still less than one-tenth of the estimated area of forest cleared each year in Central and South America.[96]

Still, program benefits extend beyond the lands where they have a physical presence. The LAWFP – which was launched in 2011 by TNC, FEMSA Foundation, Inter-American Development Bank, and Global Environment Facility with an estimated $27M in leveraged start-up capital to establish water funds – reported 1.5M ha of actively managed watershed lands in 2013 but nearly 9.3M ha "of influence," e.g., surrounding lands that benefit from neighboring conservation actions.

Supply: Projects focus on productive lands

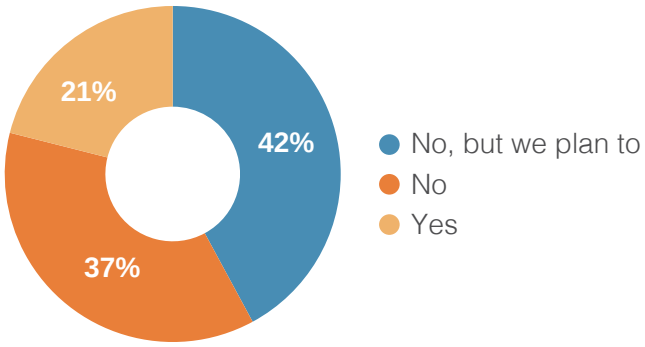
Watershed investment delivered significant finance to landholders managing sustainable productive landscapes in 2013 (Figure 53). Transactions supported an estimated 24 ha of sustainably managed productive lands for every ha of protected "natural" lands.

A renewed focus on monitoring – but different prescriptions

Quality and frequency of monitoring is decidedly mixed. Two-thirds of programs with active water quality monitoring report that monitoring only takes place once or a few times a year, and in some cases may entail only a visual inspection rather than sampling for specific parameters (Figure 54). But it appears that many program administrators are working to strengthen monitoring in 2014 and beyond, including evaluating economic performance, which nearly two-thirds of programs already do or plan to begin (Figure 55).

Figure 55: Proportion of Latin American and Caribbean Programs Measuring Economic Performance

(% share of responses to the question "Does the program measure the value of its outcomes (like reduced pollution or increased supplies) in economic terms?")



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

[89] Republic of Colombia, Ministry of Environment and Sustainable Development 2013.

[90] Rabatel et al. 2013.

[91] Ecowatch, November 18, 2013.

[92] Mardas et al. 2013.
Cranford et al. 2011.

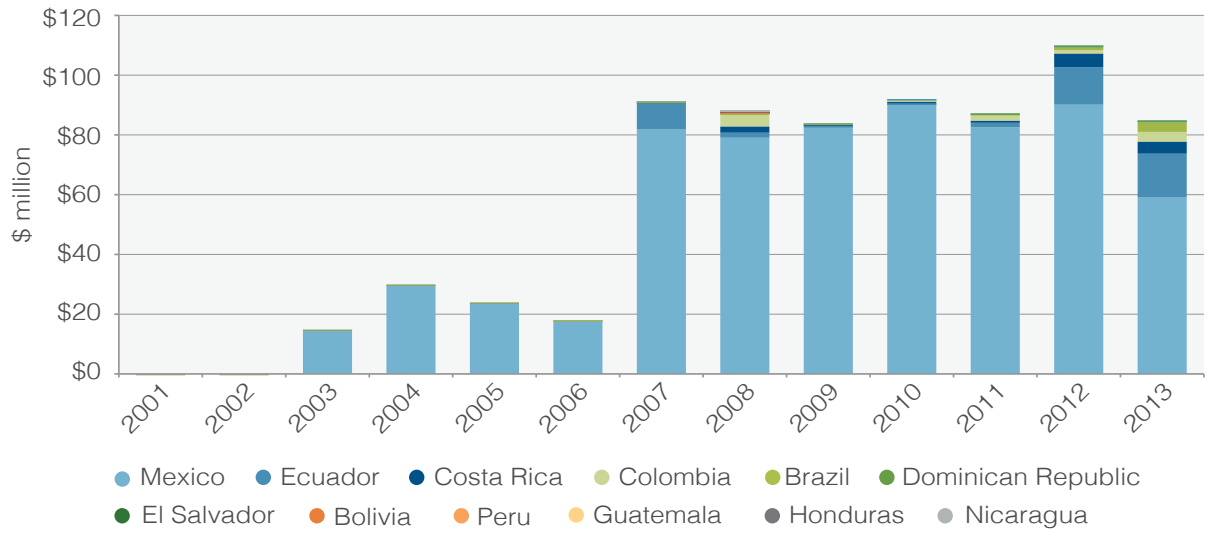
[93] Spracklen et al. 2012.

[94] Ministério de Minas e Energia/Empresa de Pesquisa Energética 2011.
Finer and Jenkins 2012.

[95] Stickler et al. 2013.

[96] Mongabay 2006.

Figure 56: Annual Investments by Year and Country in Latin America and the Caribbean, 2001-2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014*.

Expansion of activity under the LAWFP has come with an emphasis on monitoring. In 2013, TNC released a primer on monitoring water funds[97] and is partnering with the Natural Capital Project, a US-based NGO, to standardize and implement hydrological and social impact monitoring protocols across the LAWFP portfolio.

In Brazil, NGO Fundacão Grupo Boticário is also in the process of developing and implementing monitoring protocols for the nine active and pilot programs it supports based on the **Oásis** model (see Case Study in Box 17).

On the other hand, program administrators attempting to track multiple environmental outcomes (for example habitat values, carbon storage, and hydrologic flow regulation) might face trade-offs in the level of monitoring detail that is feasible. A 2013 review of Costa Rica's national **Payment for Environmental Services (PSA)** program, for example, recommended that instead of attempting to measure specific ecosystem services outcomes, administrators should concentrate resources on monitoring for healthy ecosystems more broadly (which would be assumed to deliver these services). The authors suggest that resources are better spent focusing on a few simple indicators, while using spatial targeting to prioritize lands at risk of conversion or in biodiversity hotspots or corridors.[98] But that calculus may change in the future as the Costa Rican government seeks to link the program with international carbon finance.

Water funds push forward tools for tracking ROI

Latin American water funds also served as test sites for a number of emerging methodologies to estimate the cost-effectiveness of watershed investment. Several funds, including funds in Colombia's **Cauca Valley**, in 2013 tested the Natural Capital Project's RIOS software to model and evaluate ROI in ecological, economic, and socio-economic terms.[99] TNC plans similar work estimating ROI of natural infrastructure in Brazil's **Camboriú** River basin, in Santa Catarina state.

In 2012, water fund **Aquafondo** began collaborating with Forest Trends, the US-based company Kieser & Associates, and CONDESAN on methods to improve the effectiveness of investment. A cost curve study began in 2013 to compare the cost-effectiveness of green and gray investment in Lima's most important watershed, the Rimac. The exercise aims to demonstrate to public- and private-sector actors the benefits of investment in green interventions – such as wetland restoration and improved pasture management – based on their cost-effectiveness compared to gray investment, such as ongoing diversion projects that pump water from the Amazon and over the Andes to the Pacific coast.

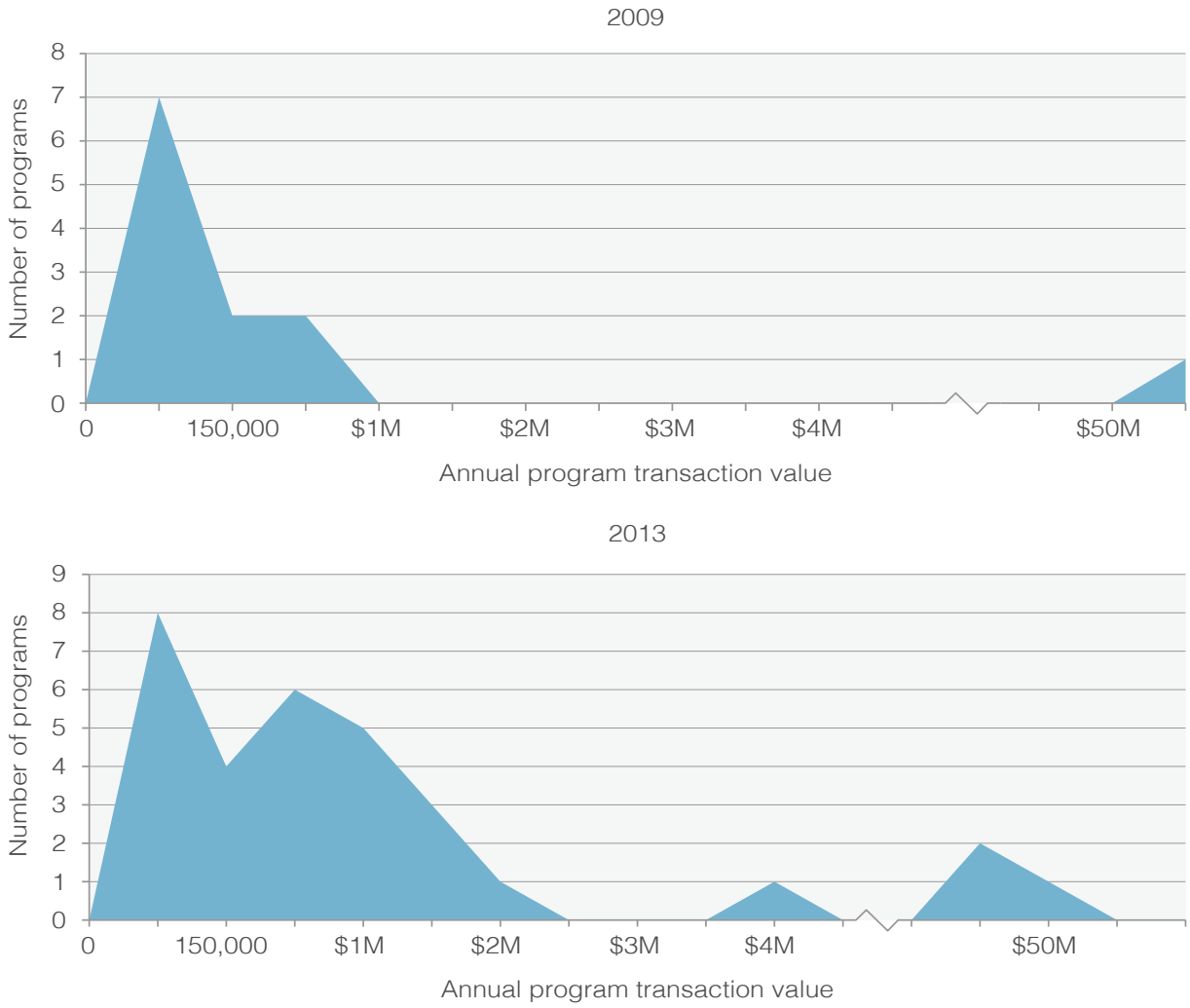
Fundación Natura Bolivia recently carried out an analysis of the distribution of the conservation costs for the reciprocal water agreement schemes (ARA) it implements in **Comarapa**, **Mairana**, **Santa Cruz**, and **Vallegrande**. The results showed that from an average of $5 per ha used in conservation, $3 is delivered

[97] The Nature Conservancy 2013.

[98] Porras et al. 2013.

[99] http://www.naturalcapitalproject.org/RIOS.html

Figure 57: Distribution of Programs by Transaction Values in Latin America and the Caribbean, 2009 and 2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

directly to compensate landowners for conserving their forests, and $2 is spent on administration. The study also found that almost 70% of compensation comes from local water cooperatives and local government – a good sign for long-term sustainability of the programs.

8.3 Investment

Demand: Investment in 2013 falls from 2012 as national program budgets shrink

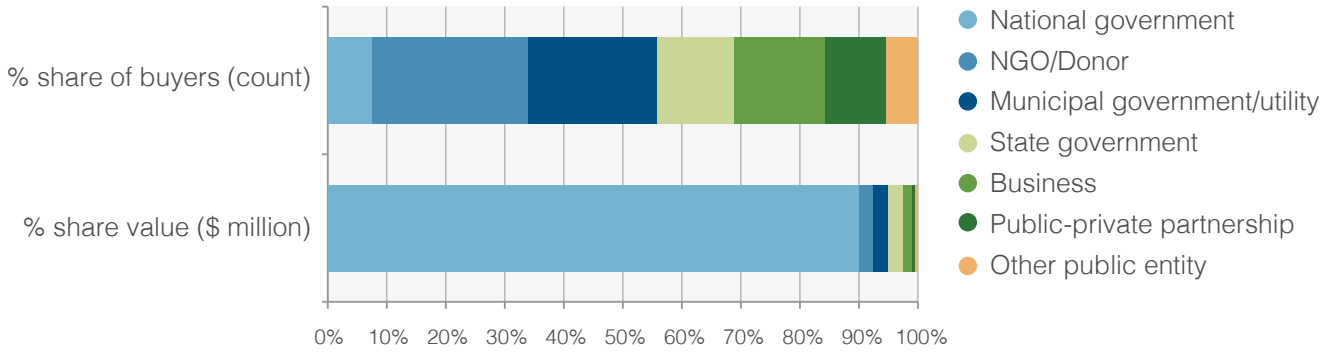
In 2013, Latin American countries saw $84.9M invested on watershed restoration and protection, compared to $109.9M in 2012 (Figure 56).

The center of IWS power in the region is shifting, both from north to south and from national to local scales. Large national programs including Mexico's **PSAH**, its partner program **Local Mechanisms for Payments for Environmental Services** (MLPSA in Spanish), and Costa Rica's **PSA** – all of which pay forest landowners to protect forests – reduced their funding in 2013. These initiatives, which are funded through revenues from water user fees, have a history of fluctuating year to year, but 2013's downturn was steeper than normal. On the other hand, Ecuador's national **Socio Páramo** program, which pays low-income landholders to protect high-altitude grasslands, increased investment in 2013 by 35% from 2012 levels, to $1.3M.

Demand: Growth shifts to South America and mid-sized programs

Leaving aside national programs, growth is striking, from a total of $4.6M transacted by sub-national programs in 2011 to $26M in 2013. Basin-scale water funds in the Andean region and Amazonia dramatically scaled up activity from just a few short years ago, though not quite

Figure 58: Latin American and Caribbean Buyers by Prevalence and Value of Investment, 2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

enough to make up the difference in total transaction values for the region. Thus in the aggregate, 2013 investment was lower than in 2011 and 2012.

Growth among medium-sized programs is mainly attributable to financial and technical backing from the LAWFP. The alliance counted 16 operational water funds in its portfolio at the end of 2013, with another seven in design/negotiation stages and ten sites under evaluation for water fund potential.

This report series tracks a steady movement toward the middle: Historically, the region has been characterized by many very small programs (transacting in the tens of thousands of dollars a year) and two or three very large ones (which post tens of millions in funding annually). But as Figure 57 suggests, virtually all recent growth has taken place in the $0.5M-$1M/year range. Median program transaction values have risen tremendously over the last five years – from $39,000 in 2009 to $415,000 in 2013 – despite little change in the number of programs or average transaction values at the very small and large ends of the spectrum.

Demand: Beverage companies lead private sector activity, though investment remains low

More business interest in IWS appears to exist in the region than did a few years ago, though overall levels of investment are still low. At present, the private sector accounts for 15% of buyers but delivers only a bit more than 1% of transactions (Figure 58). Most activity seems to be driven by international corporations, including The Coca-Cola Company, SABMiller, and Heineken subsidiaries. Virtually all private-sector buyers cite water quality problems and disruptions to supply as their key motives, though around half also say their goals include supporting local livelihoods or biodiversity conservation.

Mechanisms: Funding still dominated by national programs, though collective action brings new players to the field

Collective action funds consolidated their dominance of the region in 2012 and 2013; beyond the 16 LAWFP-backed funds, another 25 active and pilot programs used a collective action model, pooling contributions from stakeholders across a basin.[100]

Still, despite funds' success at leveraging funding from multiple stakeholders – NGOs, donors, business, local government – contributions from these investors are relatively small, and the bulk of finance still comes from national governments (Figure 58). And CONAFOR, Mexico's National Forestry Commission, has been very effective in its own right at leveraging matching funds from local stakeholders: **MLPSA**, for instance, in 2013 secured $8.2M in matching contributions to CONAFOR's $7.7M budget for payments.

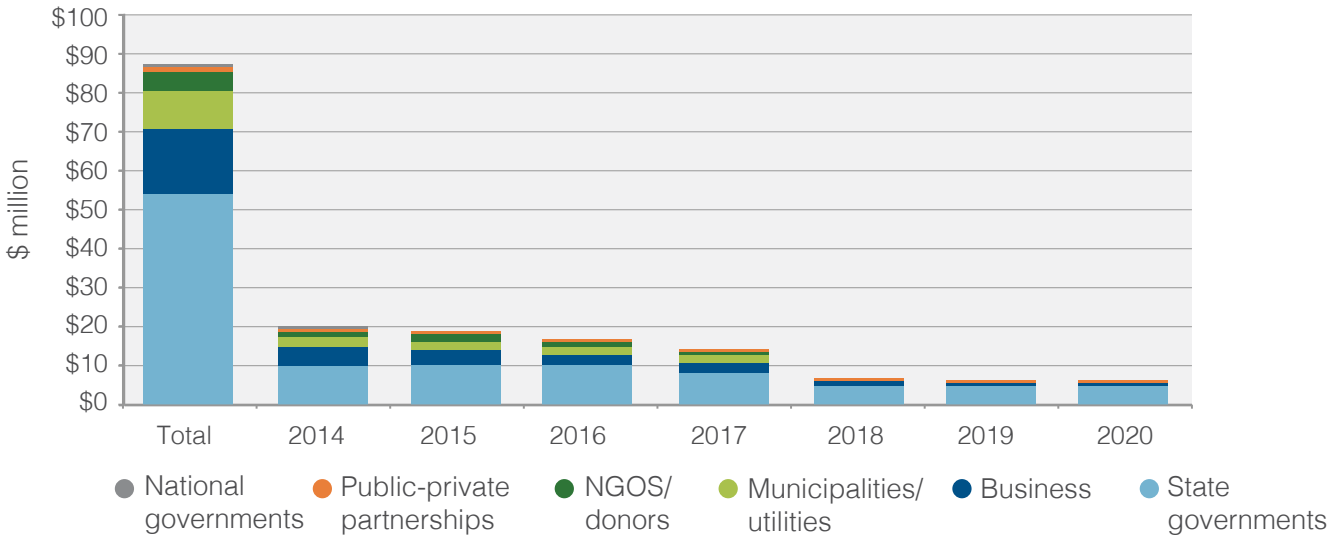
Finance: Through 2020, another $90M already committed

Latin American country programs have been very effective at securing future funding: of current investors, 60% of current investors say that they have already made funding commitments for the coming years. Nearly $20M is secured for each of the next three years (2014-2016) and $90M through 2020 (Figure 59). Funds seeded by LAWFP have leveraged more than $65M in funding from stakeholders to date. (Figure 60).

[100] Please note that not all collective action funds establish an endowment to manage money, as is typically done by LAWFP-supported water funds.

Figure 59: Funding Commitments by Buyers in Latin America and the Caribbean, 2014-2020

(Value committed by buyers as of 2013, as reported by program administrators)



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Seventy-one percent of funding commitments come from investors who report already experiencing water-related risks; another 21% say they anticipate water challenges by 2020. Only 5% of future funding derives from donors and other "public good payers" not directly facing risks themselves. That's an encouraging sign for long-term financing sustainability.

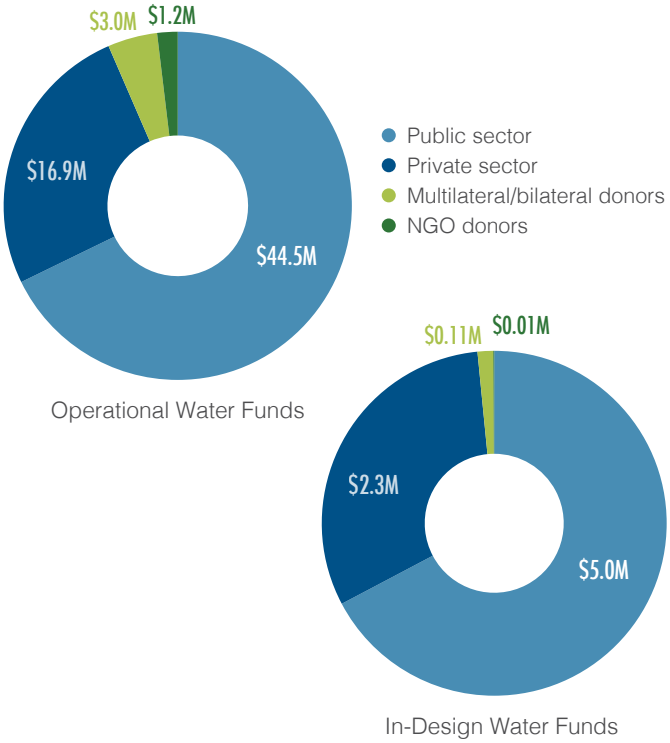
Still, since programs – especially those utilizing an endowment fund mechanism – require significant upfront capital, program administrators are reluctant to say they are on stable ground just yet. Of the 16 funds in the LAWFP portfolio, only Quito's water fund, **FONAG**, launched in 2000 and currently maintaining a $12M endowment, is considered fully mature.

Mechanisms: Restoring the Colorado River Delta, one retired water right at a time

Flow regulation is a priority in the region. One program makes creative use of existing water rights markets to restore the Colorado River Delta in an ambitious transboundary partnership between Mexican and US NGOs. The Colorado River in recent decades has been fully dewatered before ever reaching the Sea of Cortez, with devastating effects for wetlands in the Delta area. NGOs Pronatura Noroeste, the Sonoran Institute, and the Environmental Defense Fund have supported the creation of the **Colorado River Delta Water Trust**, which buys irrigation water rights in the Mexicali Valley from farmers and other rights holders and uses the water

Figure 60: Value of Funds Leveraged by the LAWFP Portfolio as of 2013, Latin America and Caribbean

($ raised by source, for total water funds portfolio and operational water funds only)



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

to inundate riparian zones and irrigate native vegetation plantings. The ultimate goal is to maintain a small base flow to the delta. The buybacks program complements other restoration activities, including using treated wastewater and agricultural drainage to feed marshes and estuaries in the Delta.

Enabling conditions: Voluntary investment leads amidst piecemeal regulations

Effects of Colombia's new municipal compensation requirements and Peru's water sector modernization law have yet to be felt. Instead, amid a patchwork of mostly state- and local-level regulatory frameworks supporting IWS as a compliance option, most Latin American country buyers still act voluntarily.

Several public utilities in Colombia say they engage in watershed protection to meet compliance with a national regulation requiring electricity generators to invest in watershed protection, and both public and private buyers in several Brazilian water funds report their investment as a compliance strategy. A few buyers in Ecuador cite local ordinances requiring financial contributions to watershed protection, often through a fee or levy on water bills.

8.4 Outlook

Latin American and Caribbean region a welcoming nursery for new projects

Our tracking found 19 programs in the design/planning stage, and another ten watersheds being evaluated as a potential site by LAWFP for water funds. LAWFP alone expects to spend $19M by 2016 to kick-start new funds. Though difficult to quantify, there is the expectation that more investment in watershed protection will increase significantly in the coming years.

Fledgling programs in the Andes may also get some help through Fundación Natura Bolivia's new training program. The School for Reciprocal Water Agreements recently opened its doors offering six-day courses teaching participants how to design and implement their own ARA. Fundación Natura Bolivia plans to test its curriculum in 25 municipalities across Bolivia, with a goal of ARAs being established in at least half.

IWS-friendly policy advances, but questions remain

The impacts of Peru's new PES law remain to be seen. The law sets out a framework for compensation for ecosystem services (like clean water or carbon storage) between land stewards and beneficiaries, including civil society, businesses, and municipal governments. Contracts will still be voluntary agreements between these parties, which means that the government's role is limited. According to those familiar with the law, it will oversee the compensation process and provide regulatory certainty for contracts. But how strong a driver the law will be for new PES remains an open question.

Ecuador's Ministry of Environment in July 2014 announced a new National Program of Incentives for Conservation and Sustainable Use of Natural Heritage, building on experience from **Socio Bosque**.[101] The new program concentrates on providing working capital for working forested landscapes. It aims to deepen engagement with forest landowners beyond simply providing incentives and to link conservation finance with landscape-level land use planning, technical support for landholders, and a focus on sustainable forest product value chains.

Proposed "Sustainable Santa Cruz" legislation in Bolivia's Santa Cruz department would levy a fee ($1.45/kg) on agricultural products sold at central collection centers. Proceeds would fund municipal and departmental conservation efforts, including a 15% share allocated to the **FONACRUZ** water fund, which protects forests supplying water to the city of Santa Cruz. The legislation, which could generate millions of dollars annually for environmental protection, has passed the first stage of approval (constitutional review), and is in the consultation process.

In Mexico, a government standard released in September 2012 (NMX-AA-159-SCFI-2012) sets out a process for determining ecological flow minimums in watersheds. Ecological flow minimums could provide the scientific basis for investment mechanisms like the **Colorado River Delta Water Trust** (discussed above). At present, Mexico's National Water Commission and WWF-Mexico, supported by the Inter-American Development Bank, are currently working through the new National Water Reserve Program to identify high-potential watersheds for flow minimums.

In late 2013, a bill was introduced in Costa Rica that would require environmental impact assessment for new infrastructure and development projects to consider natural capital values, beginning in 2016.[102] Costa Rica is already one of the countries piloting natural capital accounting under the World Bank's WAVES program.

In the summer of 2014, the Chilean Parliament was considering a bill to protect the country's glaciers. Mitigation is already required for glacier impacts, but multiple mining projects in Chile have come under fire in

[101] Ecuador Inmediato, July 1, 2014.

[102] Legislative Assembly of Costa Rica 2013.

recent years from environmentalists for violating permit requirements.[103] It is unclear whether the proposed law would apply retroactively to existing mining operations in the vicinity of glaciers. Neighboring Argentina passed a law in 2010 recognizing glaciers as strategic water reserves and the property of the public, but fierce opposition from some policymakers and the mining industry has led to limited enforcement.[104]

Forest protection in Brazil may also have a bumpy road ahead. In May 2014, Brazil's Ministry of Environment unveiled a mechanism for forest landowners to make good on their "forest debt" (land illegally cleared prior to 2008). An estimated six million owners of farms smaller than 440 ha have one year to register on the Rural Environmental Registry System (Cadastro Ambiental Rural, or CAR), a database linked to a satellite monitoring system that tracks land use. Farmers above their legal limit for land clearing can either purchase Forest Reserve Credits (Cotas de Reserva Ambiental, or CRAs) from other landowners or donate land inside recognized Conservation Units to a government environmental agency. CRAs will be traded on the Bolsa Verde do Rio de Janeiro (Environmental Exchange of Rio de Janeiro, also known as BVRio).

A review in the journal *Science* concluded that the new system likely lets farmers off the hook for more than half the forest that had been illegally chopped down prior to 2008 – effectively forgiving somewhere between 22-36 million ha of "forest debt."[105] Proponents of the amnesty said that the previous situation was simply unsalvageable and that CAR creates a mechanism that not only promotes restoration and protection of endangered forest, but also creates a trustworthy database of properties.

COP 20 a chance to link forests, water and people to the global climate agenda

In December 2014, Peru will host the 20th Conference of the Parties (COP 20) to the United Nations Framework Convention on Climate Change (UNFCCC). The meeting is expected to deliver a global agreement on greenhouse gas emissions. The COP will also offer an opportunity for Peru to spotlight linkages between climate change, forests, and water and identify opportunities for climate finance to align with other forms of conservation finance. That theme has already been sounded in Lima, during April 2014's Katoomba XX meeting, convened by Forest Trends, Peru's Ministry of Environment, National Water Authority, and the National Drinking Water Superintendency. For Peru, climate, water, energy, and development challenges are closely related, particularly in the Amazonia region. The COP 20 offers a unique opportunity to advance the country's landscape approach on the global climate agenda.

[103] Associated Press, October 9, 2013.

[104] Columbia Law School Climate Law Blog, May 19, 2011.

[105] Soares-Filho et al. 2014.

Box 16: Case Study: Leveraging Local Resources for IWS in Mexico

Since 2003, CONAFOR has administered the Latin American and Caribbean region's largest IWS mechanism, Mexico's national **PSAH** Program, developed to preserve forest cover in priority areas to enhance hydrological services to communities.[106] In 2008, a newer mechanism, the **Programa de Mecanismos Locales de Pago por Servicios Ambientales a través de Fondos Concurrentes**, or MLPSA-FC, was introduced to strengthen local engagement and leverage local funds for IWS projects.[107] MLPSA-FC represents an intriguing shift of momentum – and responsibility – toward local stakeholders in a historically very large, nationally led IWS effort.

Under MLPSA-FC, users of ecosystem services see their contributions matched by CONAFOR, for up to 50% of financial resources needed to establish or strengthen approved local projects, under five-year contracts.[108] Forest landowners are compensated for sustainable management activities in key watersheds, biological corridors, and areas important for conservation. Local organizations, institutions, and companies may also match resources with CONAFOR for conservation activities, restoration, technical assistance, verification, and monitoring.[109] An annual call for proposals encourages local organizations to apply.[110]

Since 2008, the scheme has signed 94 agreements covering a total area of 348,414 ha. Funding totalled $7.4M, of which 52% ($3.8M) was provided by the users and 48% ($3.6M) was matched by CONAFOR.

[106] Martinez 2009.

[107] CONAFOR [year unknown].

[108] Graf 2012.
CONAFOR 2011.

[109] Graf 2012.

[110] Ibid.

Box 17: Case Study: Rewarding Brazil's "Water Producers"

One of the fastest growing initiatives in Latin America is Brazil's Water Producer Program (*Produtor de Água* in Portuguese), a national-level program created by the Brazilian National Water Agency (Agência Nacional de Águas-ANA) in 2007. Unlike other national-scale programs in the region, the Water Producer program takes a decentralized model. It provides financial and technical support at the local scale for the creation of local water usage fees, used to fund preservation of priority river basins.[111] Fees, which are managed by basin committees rather than the national government, are used to compensate rural farmers and producers who contribute to the conservation of local water resources, prevention of soil erosion, and improvement in water quality.[112] The legal basis for the Water Producer program is the National Water Resources Policy, enacted in 1997, which recognizes water as a public good and enables water usage fees to be used to maintain and improve watersheds.

While most Latin American PES mechanisms set flat payments per hectare, Brazil uses a formula to determine payments proportional to the benefits resulting from reductions in erosion, property size, quality of the environmental services provided, and land-use opportunity costs.[113]

The program was piloted in 2007 in the Piracicaba-Capivari-Jundiai (PCJ) watershed in the state of São Paulo for water users in Extrema and Montes Claros in the State of Minas Gerais.[114] Since the PCJ pilot, ANA has partnered with numerous agencies and organizations, including the State Forest Institute of Minas Gerais and TNC, to establish IWS in numerous other river basins, including the Guandú, Cambiriú, and Pipiripau watersheds. At the end of 2013, the program consisted of 19 projects covering a total area of 306,000 ha.[115]

Box 18: Case Study: A Micro-Finance Mechanism in Costa Rica's Upper Balsa River Basin

In Costa Rica's San Carlos basin, an innovative Revolving Loan Fund (RLF) makes zero-interest loans to groups working to preserve or restore cloud forests. The RLF, operated by the Nectandra Institute, lends to rural water management associations and hydro-electricity co-ops to purchase land in key source water areas in the highlands, where forests act like sponges, trapping precipitation and letting it slowly infiltrate to the aquifer.

In rural communities in Costa Rica, the state-run water company often has little or no presence. The RLF (which was seeded via philanthropic funds) offers a crucial source of finance for local ASANAs for water delivery infrastructure. So far, the RLF has a 100% repayment rate. To date, it has made loans totaling $830,000 in 12 communities, enabling the protection of 220 ha. The typical payback period is 12 years.

Water user or community taxes, or a surcharge on utility bills, are typically levied to cover loan payments and watershed management. In the community of Laguna, the local water association reports 100% community approval for a $4/month surcharge in a place where the average water bill is $12/month. That's a significant increase, but "people here understand that if they own the land around their water source, their water source will be much more protected than in private hands and potential sources of contamination," says Luis Villa, Chief Operations Officer of the Nectandra Institute. "That's the buy-in. They're in control of their water."

[111] Zanella 2012.

[112] Sousa et al. 2013.
Romeiro et al. 2012.
Global Environment Facility 2008.

[113] Pagiola et al. 2013.
Rodrigues et al. 2013.
Cassola 2010.

[114] Buric and Gault 2011.

[115] Andreu 2013.

9. North America

Table 16: Summary Details - North America

	2011	2013
Operational programs	68	98
Programs in development	18	7
Values	$360.5M	$383.2M
Total land area managed for watershed services	0.6M ha	8.7M ha
New land area managed for watershed services, per annum	18,615 ha	0.7M ha

Notes: Given our data collection cycle (which takes place every other year), data on ha protected in 2012 is unavailable, as the survey asks respondents to indicate total ha under management and ha added in the last twelve months.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Key Findings

- Aggregate investment values fell slightly to $383M in 2013 from an all-time high of $393M in 2012 as federal funding in the United States declined. But new areas of growth – including cost-share agreements between federal agencies and western water service providers, activity in water quality markets, plus new funding for instream buybacks programs – that added $14M in value between 2012 and 2013 partly made up the difference.
- Water quality trading markets saw aggregate values hit their highest mark yet: $11.1M in 2013. But behind this number are some tectonic shifts: older markets saw trading volumes fall, leaving newer programs to buoy growth. The private sector also delivered an unprecedented level of activity on the supply side of markets, with revenues from credit development reaching nearly $2.5M in 2013.
- Buyers in the United States committed at least $400M to programs for the 2014-2020 period. But while this number likely underestimates actual commitments – only 20 out of 63 buyers reporting commitments provided specific figures – anticipated funding levels pale in comparison to restoration needs in North America's headwaters areas.
- The center of growth shifted west: two-thirds of new programs in the last three years have emerged in the western part of North America, thanks to new interest in avoiding water supply disruptions through forestland management and receptiveness from federal public land managers. The trend is set to continue, with five out of seven developing programs also based in western US states.

9.1 Introduction

As the previous report in this series went to press in late 2012, the United States was still recovering from Hurricane Sandy, which devastated cities along the Eastern Seaboard and left a $65B bill in damages.[116] That year, Sandy came on the heels of the nation's third-worst fire season on record, burning 3.7M ha, an area larger than the state of Maryland.[117] And all the while, the worst drought the nation had seen in more than 50 years dragged on in the Midwest.[118]

[116] Aon Benfield 2012.

[117] National Interagency Fire Center 2014.

[118] United States Drought Monitor 2014.

Map 8: Active and Developing Programs in North America, 2013

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

These destructive – and very costly – natural disasters loom large over recent trends in natural infrastructure investment in North America. For cities, utilities, and astute businesses facing climate risk and the ballooning costs of water pollution, a bit of preemptive action is starting to look like a very good deal.

Urban areas look to nature for storm resilience

Some of the most significant policy for and investment in natural infrastructure in recent years in North America centers on urban areas. In the aftermath of Sandy, a "storm panel" appointed by New York Governor Andrew Cuomo recommended a range of natural infrastructure elements including wetlands, oyster reefs, and dune systems to buffer populated coastal areas from future storm events. That position was echoed in the "Hurricane Sandy Rebuilding Strategy" document developed by a high-level task force, which recommended that natural infrastructure be considered in all new infrastructure investment decisions.[119] At least $262M has been earmarked in federal grant funding specifically for projects restoring dunes, wetlands, and floodplain areas.[120,]

Infrastructure finance gap drives federal action

Even without a string of high-profile natural disasters, the last few years would have been difficult ones for urban water managers. The American Society of Civil Engineers in 2013 graded drinking water infrastructure with a D+ and wastewater and stormwater systems a D.[121] In the coming decades, the cost of upgrades and new systems installation for these two categories will probably exceed a trillion dollars. Yet, utilities have seen revenues fall in recent years; at present, two-thirds are unable to even cover their costs, according to a recent report, much less pay for new projects.[122]

But costs threaten to keep rising. A forthcoming – though much delayed – rulemaking from the US Environmental Protection Agency (EPA) will probably require new urban development and redevelopment projects to meet stormwater management performance standards.[123] That is an expensive proposition: the Agency has estimated infrastructure needs for stormwater management alone could exceed $42B in the coming decades. To help get cities into compliance, the EPA has since 2011 encouraged lower-cost natural infrastructure strategies with financial and technical assistance to local governments. An EPA green infrastructure strategic agenda released in October 2013 called on the agency to scale up exchange of best practice, regulatory support, and grants and financing even further.[124]

Federal support for water quality trading (WQT) despite industry resistance to stricter standards

The US Department of Agriculture (USDA) also showed high-level federal encouragement of WQT. WQT programs received $7M in targeted USDA Natural Resources Conservation Service (NRCS) Conservation Innovation Grants in 2012. Funding went to projects developing market infrastructure – such as crediting protocols – or fostering scale, for example through credit aggregation mechanisms or multi-state trading guidance. In late 2013, the USDA and EPA also announced a partnership to better coordinate policy and programming that facilitate WQT.[125]

Federal support for WQT comes amid a good deal of pushback against the regulatory mechanisms that drive trading. Agricultural groups, developers, and some cities in the Chesapeake Bay have expressed hostility toward Total Maximum Daily Loads (TMDLs), the regulatory tools that set a cap on pollution in a waterbody. In Maryland, several counties in 2013 refused to implement a stormwater fee driven by the Chesapeake TMDL (known by detractors as the "rain tax"), or set absurdly low rates (one cent per parcel per year in Frederick County) in protest. A major lawsuit by the Pennsylvania Farm Bureau against the EPA on the grounds that the EPA overstepped its authority in setting the Chesapeake TMDL was dismissed by a federal court in the fall of 2013; as this report went to press, the American Farm Bureau Federation and 21 states, concerned about a similar TMDL closer to home, had appealed the decision.

Wildfire risk unites water service providers and public land managers

In the US West, a new partnership announced in July 2013 between the USDA and the US Department of the Interior aims to mitigate wildfire risk in the nation's forests in order to protect water supplies. Major forest fires can cost water utilities tens of millions of dollars to treat contaminated water. The Western Watershed

[119] Hurricane Sandy Rebuilding Task Force 2013.

[120] National Fish and Wildlife Foundation 2014. United States Department of the Interior 2013.

[121] American Society of Civil Engineers 2013.

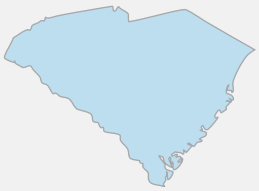
[122] Ironically, declining revenues seem to be linked to the success of water efficiency and conservation programs. (Black and Veatch 2014).

[123] The rulemaking is required as part of the settlement of a 2010 suit against the EPA (Fowler v. EPA, D.D.C., No. 1:09-cv-5, 5/11/10).

[124] United States Environmental Protection Agency 2013.

[125] United States Department of Agriculture 2013.

Table 17: Lands Managed for Watershed Services, North America, 2013

Total area	Restoration & protection of natural areas	Productive lands	Multifunctional landscapes	Urban green infrastructure
8.7M ha	5.9M ha	1.7M ha	992,827 ha	98,800 ha
An area roughly equal to…				
South Carolina	Nova Scotia	Connecticut	Rhode Island	Indianapolis
				

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Enhancement Partnership, part of President Obama's Climate Action Plan, builds on earlier deals between the US Forest Service (USFS) and municipalities to share costs of fuel thinning, controlled burns, and other measures lowering the risk of wildfire.

In Canada, new policy seen only at the regional level

In Canada, there has been relatively little action on the policy front as far as support for IWS. The year 2013 saw Ontario approve its first legally binding source water protection (SWP) in Thunder Bay and the village of Oliver Paipoonge Rosslyn. Previously, authorities were required to develop source protection plans for watersheds in Canada but not to implement them.

There was also a good deal of horse-trading in 2013 over updates to British Columbia (BC)'s water law. A final version of the bill in the spring of 2014 appears to clear the way for ecosystem flow standards – which would set minimum levels of flow needed to maintain the health of streams and other waterbodies – but left their establishment for a later date.

9.2 Impacts

Supply: Buyers focus on restoration in 2013; urban green infrastructure appears on the map

In 2013, buyers paid for management on more than 5.9M ha of natural lands, an area larger than Nova Scotia (Table 17). In contrast to other regions, efforts in North America have mainly focused on restoring and protecting natural areas, rather than payments for sustainable management of productive lands.[126]

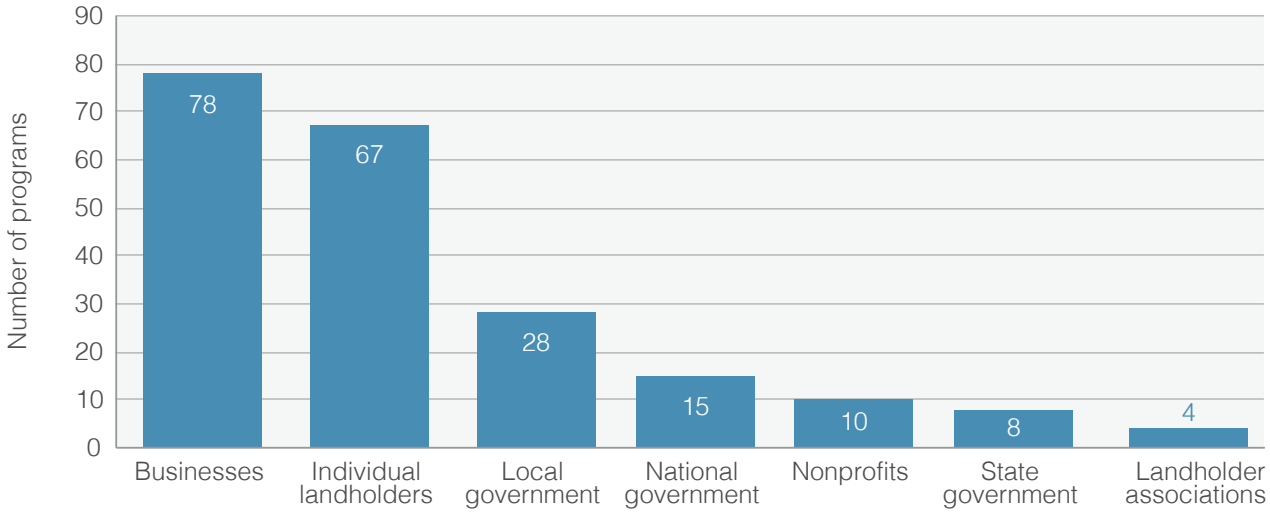
The year 2013 also saw significant new investment in urban green infrastructure: That year, "green" elements for stormwater controls, like bioswales and rain gardens, were installed across an estimated 98,800 ha of urban areas in the United States.

Supply: Private sector pushes past landowners as most frequently cited supplier group

In 2013, business edged out individual landholders as the most commonly reported supplier type, a development driven by the entry of private credit developers in water quality trading markets (Figure 61). While private-sector suppliers in the past have mainly consisted of point-source dischargers selling their pollution reductions "above and beyond regulation" as credits in WQT markets, in 2013 we find a rapidly growing niche industry in developing nonpoint source credits, particularly in Pennsylvania, Virginia, and North Carolina. (This trend is discussed further on page 87.)

[126] Subsidies for sustainable agricultural and working forest management certainly exist and exceeded $4B in the United States in 2013. But these payments do not typically specifically focus on watershed services. Instead, they fund a range of environmentally friendly practices and so are not included in our dataset.

Figure 61: Count of Programs Transacting Payments by Supplier Type, North America, 2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

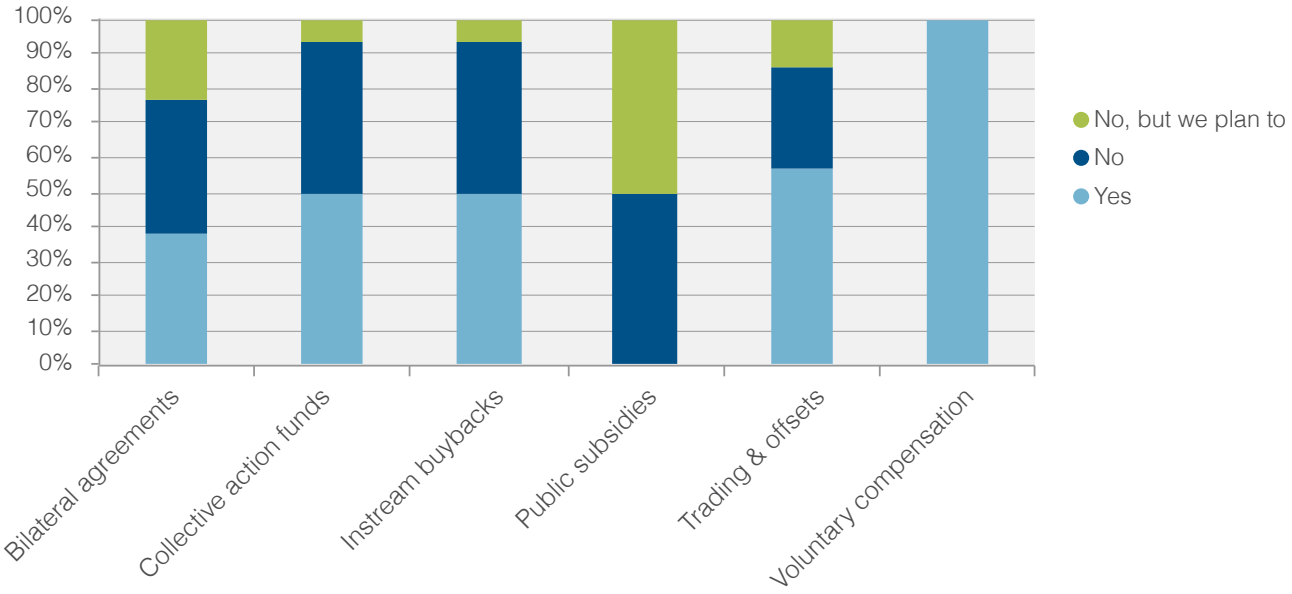
The business case: WQT and voluntary compensation programs most focused on economic outcomes

Altogether 37 programs (or 62% of respondents to the question) say that they already measure or plan to measure their outcomes in economic terms, though interest in economic appraisal varies a bit by program type (Table 19).

Avoided costs appear to be a strong driver for programs seeking to mitigate fire risk, and for water quality and stormwater trading. In the case of wildfire, this represents a major shift in thinking: The high costs of treatment

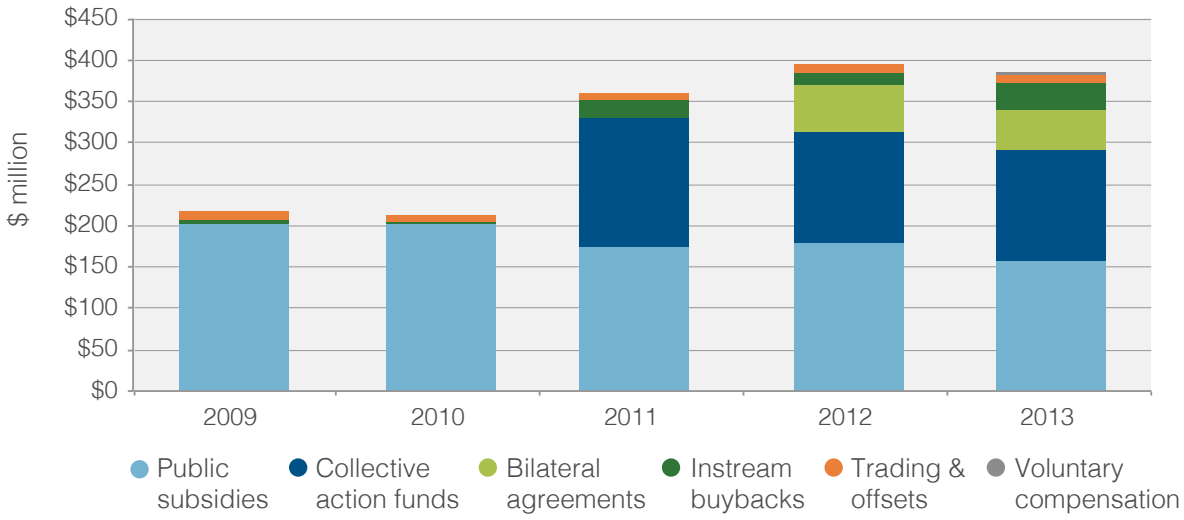
Figure 62: Share of Programs Valuing Outcomes in North America, 2013

(% share of responses by program type to the question "Does the program measure the value of its outcomes (like reduced pollution or increased supplies) in economic terms?")



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 63: Transaction Values in North America by Program Type, 2009-2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

and rehabilitation post-fire are well known, but without hard data on the costs and benefits of hazardous fuels removal and thinning, many water managers have found it difficult to justify spending money to prevent a high-severity wildfire that has not happened yet.[127]

Assessing outcomes/monitoring/ROI

Recent studies are beginning to build the economic case. For example in California's Upper Mokelumne River watershed in the central Sierra Nevada – an important water source for the San Francisco Bay area – a study found that $20-30M in fuel treatment would deliver $35-43M in avoided costs associated with future suppression/post-fire rehabilitation.[128] IWS programs in Arizona, New Mexico, Colorado, and Oregon have been built on similar assumptions, though only half of fire-oriented programs report that they plan to quantify costs and benefits.

Cost savings associated with water quality markets are somewhat better understood. Relatively few respondents in this group (36%) reported doing an ex-ante evaluation, but 57% indicated that they track outcomes in economic terms (and another 14% plan to). This is probably the right approach: Ex-ante evaluation – which typically compares projected costs of installing and operating treatment technology with a least-cost scenario under trading – can underestimate the actual costs of trading, since water quality markets in reality continue to face high transaction costs (especially when nonpoint sources are involved) and low volumes.[129]

Stacking and bundling landscape largely unchanged

The years 2012 and 2013 brought no great changes in stacking and bundling of IWS with other forms of environmental compensation. Fifty-two programs reported biodiversity co-benefits goals (and interestingly, only six said the same for carbon sequestration and storage). But with the exception of programs using the Willamette-Ecosystem Marketplace's protocol, which allows landowners to generate different credit types from spatially distinct areas, and the Conservation Marketplace of the Midwest, which is piloting payments for pollinator habitat, programs have yet to span multiple environmental markets.

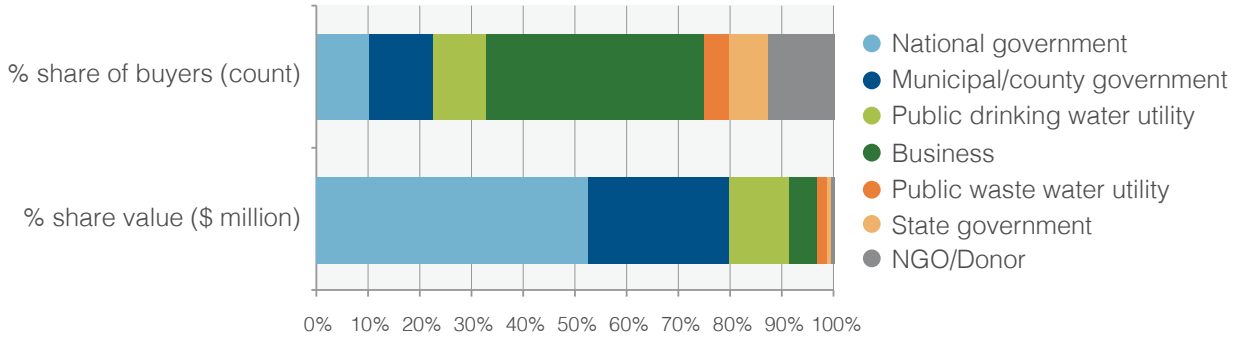
One stacking effort is underway: the Ohio River Basin Water Quality Trading Project will likely estimate carbon credits generated through reduced fertilizer application under its pilot WQT framework. Program administrator, the Electric Power Research Institute (EPRI), has worked with Michigan State University to develop an N20 Offsets Protocol that to date has been validated by three major standards organizations: the American Carbon Registry, the Climate Action Reserve, and the Verified Carbon Standard.

[127] Warziniack and Thompson 2013.

[128] Buckley et al 2014.

[129] Shortle 2013.

Figure 64: North American Buyers by Participation and Transaction Shares, 2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

9.3 Investment

Demand: As federal spending falls, new areas of growth drive $383M in investment

North American buyers spent $383M on watershed investment in 2013. The last three years have been very busy in the United States: even as federal subsidies that compensate landowners for watershed protection steadily fell, other buyers stepped in to (nearly) fill the gap (Figure 63).

Growth came mainly from three quarters: cost-share agreements between federal agencies (including the USFS and the Bureau of Reclamation) and western water service providers, water quality markets gaining scale, and new funding for instream buybacks. Meanwhile, long-standing source water protection programs for major urban areas, such as New York City, Boston, and San Antonio saw spending remain relatively stable, while federal subsidies for watershed management have actually steadily fallen over the last five years.

Demand: Urban water managers and business buyers account for more than a third of spending

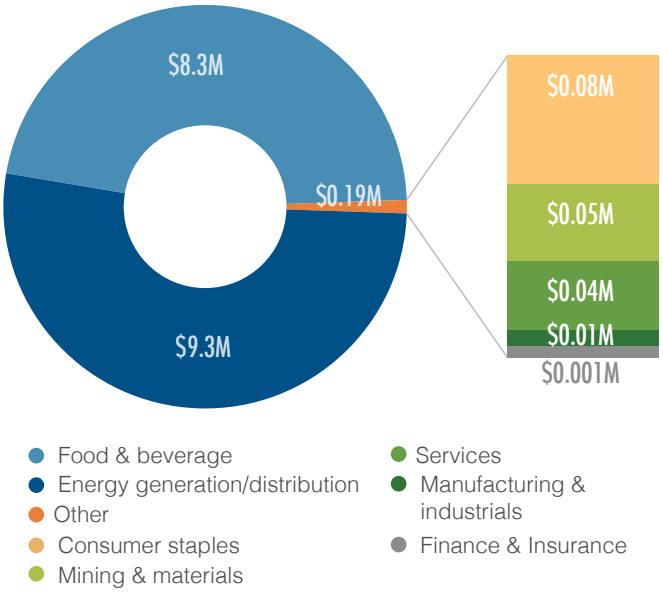
National government remains the majority buyer of watershed services, mainly through EPA grants, the USFS, and the USDA Natural Resources Conservation Service (NRCS). But municipal government and drinking water utilities accounted for nearly 40% of demand in 2013, with $116.7M spent on watershed protection (Figure 64). Business, too, had a strong showing, with nearly $18M spent in 2013.

Private-sector spending, which in 2013 was led by the energy generation and food and beverage sectors (Figure 65), is mainly driven by regulation. Eighty-three percent of business buyers report that watershed investment is a compliance strategy, typically linked to impact mitigation requirements included in permits for wastewater discharge or hydropower. The beverage sector is a bit of an anomaly: it spent nearly $8.3M *voluntarily* in 2013 on watershed protection, driven by corporate commitments to replenishment and concerns about water risk (see Case Study in Box 20). But spending is driven by just a few key buyers supporting a total of nine different programs, led by Nestlé North America and Coca-Cola North America.

Demand: Water service providers in the West take on climate risk through co-funding with USFS

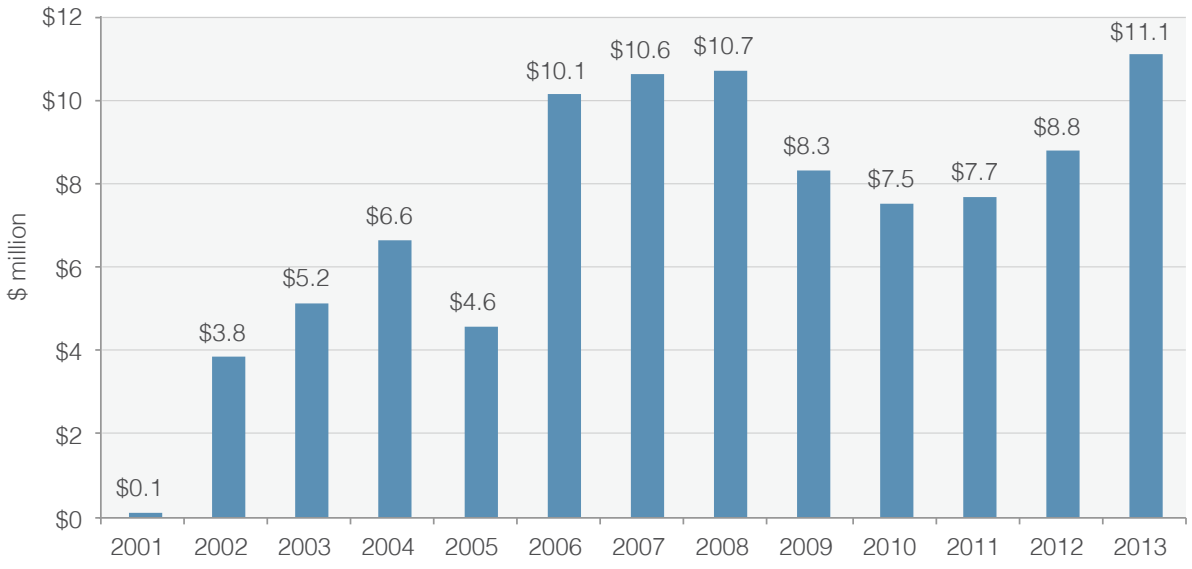
Western utilities, municipalities, and conservation districts in the last five years have invested heavily in

Figure 65: Watershed Investment Values by Business Sector, North America, 2013



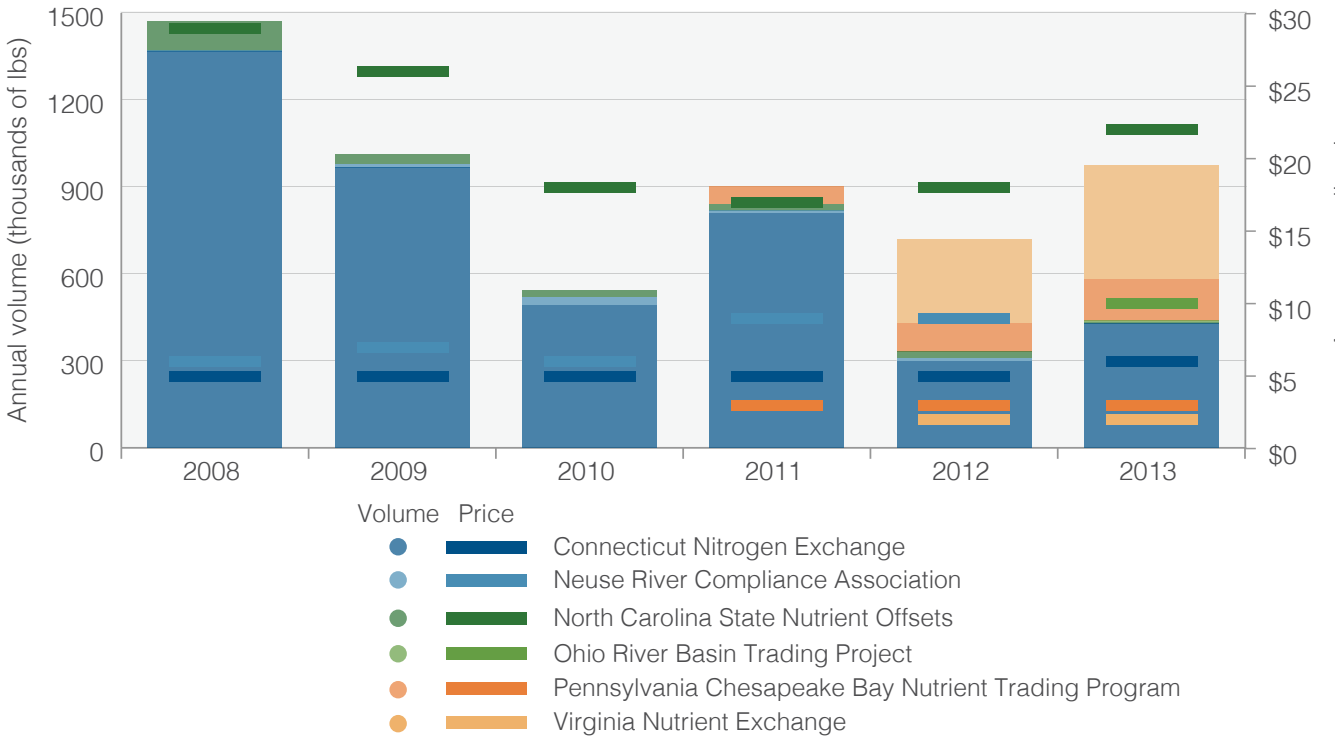
Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 66: North American Water Quality Markets Transaction Values, 2001-2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 67: Price and Volume Data for Major North American Nitrogen Markets, 2008-2013



Note: Volume and price data for the North Carolina State Nutrient Offsets program does not include offsets transacted by private mitigation banks.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

reducing wildfire risk in their watersheds through fire-response planning, thinning dense stands, clearing fuels, and prescribed burning. These efforts were prompted by a history of catastrophic wildfire events in the region. For example, the 2000 Cerro Grande Fire cost the city of Santa Fe $970M in suppression, rehabilitation, and compensation,[130] while Denver Water experienced 40 years' worth of sedimentation (or roughly one million cubic yards) in its Strontia Springs reservoir following two severe fires in 1996 and 2002.[131] Fire is critical for biodiversity and ecological function in many western ecosystems, but decades of suppression in the region, coupled with pine beetle kills and a changing climate, mean that fires now tend to burn hotter and bigger – translating into enormous risk to water supplies and local budgets.

The USFS is frequently a partner in efforts to manage these risks: western headwaters are often located on public lands, and funding from cities and utilities has helped to make some headway on the enormous backlog of impaired watersheds located on National Forest System lands. Seven major urban areas to date have signed cost-share MOUs with the USFS.

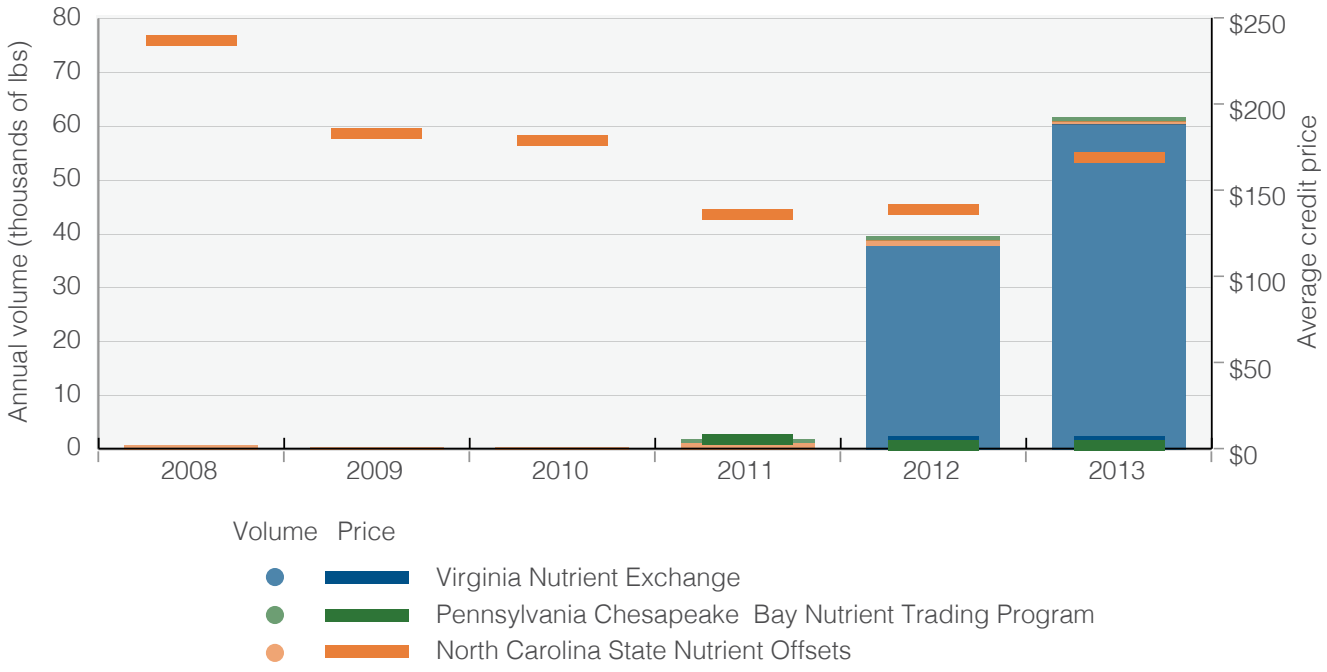
Mechanisms: WQT values reach $11.1M as new markets pick up speed

WQT markets hit $11.1M in 2013, their highest reported value to date, but this growth represents more a recovery to pre-economic crash activity levels than a new peak (Figure 66).

Steadily increasing values also mask a key trend in WQT: some of the longest-running markets are shrinking. For nitrogen markets; which make up 95% of water quality trading values, overall volumes have been falling for years, while credit prices have risen only slightly overall and not nearly enough to maintain trading values in many markets (Figure 67).[132]

Phosphorus volumes have always been very low and were buoyed by the opening of trading in Virginia watersheds subject to the Chesapeake Bay TMDL (Figure 68) (Box 19).

Figure 68: Price and Volume Data for Major North American Phosphorus Markets, 2008-2013



Note: Volume and price data for the North Carolina State Nutrient Offsets program does not include offsets transacted by private mitigation banks.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

[130] Pers. comm., Dale Lyons (former Project Manager, Sangre de Cristo Water Division, City of Santa Fe).

[131] Pers. comm., Claire Harper (United States Forest Service).

[132] Prices in Figures 67 and 68 are for term (annual) credits, not permanent offsets, which typically cost far more.

Box 19: Water Quality Trading: The Regulatory Framework

Water quality markets are usually created 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," or PS) 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 TMDL may be set at the watershed scale, setting out recommended pollution limits.

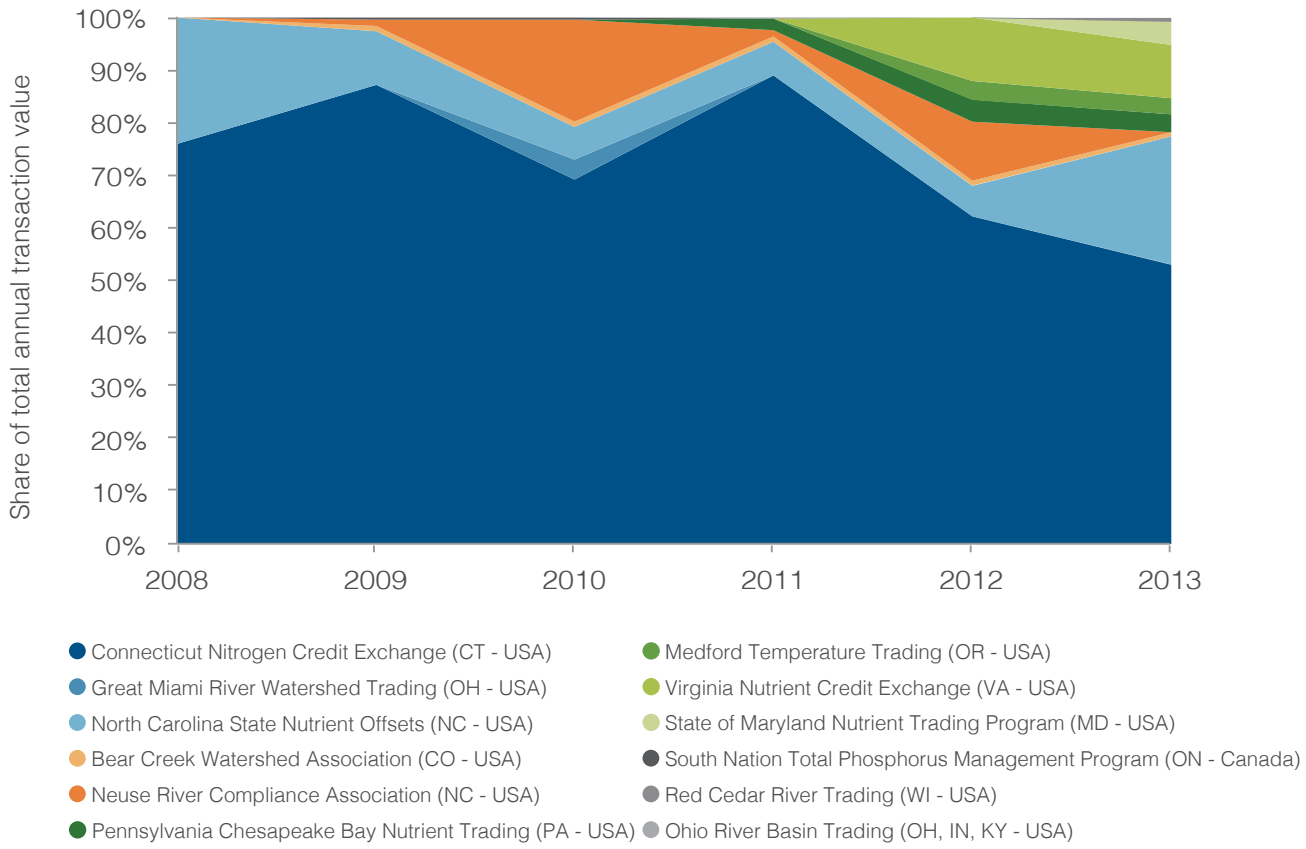
TMDLs are generally implemented by focusing on reducing point source pollution. But in some cases it is more cost-effective to achieve those reductions through an intervention by another party or at another site in the same watershed, such as a sewage treatment paying a nearby factory to reduce their 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 was not 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.

A 2013 study found that trading is probably under-utilized as a compliance option: Facilities whose permits allow trading have not yet purchased credits, or purchased credits but have not applied them to their permit obligations, likely in part because of lingering regulatory uncertainty.[133]

[133] EPRI 2013.

Figure 69: Market Share of Overall WQT Values in North America, 2008-2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

This reflects a broader trend: new market entrants are responsible for keeping overall transaction values high. The Chesapeake TMDL has driven the growth of new markets in Pennsylvania, Virginia, Maryland, and in the District of Columbia, which introduced the nation's first stormwater credit trading system in 2013 (Box 21). The year 2013 also saw the first interstate water quality trading program in the Ohio River Basin, where trades began between farmers and electric utilities in Indiana, Ohio, and Kentucky. In the Pacific Northwest, temperature trading in the Klamath, Rogue, and Willamette Basins (all sharing trading protocols and market infrastructure) are also beginning to move out of the pilot stage.

For overall WQT market values, nearly one-quarter ($2.4M) of current overall trading value comes from markets that began trading in 2011 or later (Figure 69). Meanwhile, at least six markets (out of a total of 21 WQT programs) tracked in earlier Ecosystem Marketplace reports had no trading activity at all in 2013. But as these programs – most of which have always had low trading volumes – slow down, a new wave of WQT programs are making up the difference in activity.

From an environmental perspective, less market activity does not necessarily mean "more pollution." Buyers may simply have less pollution to offset than in previous years. For the Connecticut Nitrogen Exchange, for example, the phase-down was planned as a strategy to give smaller sewage treatment plants more time to upgrade technology. In this sense, trading has allowed facilities to "buy time" to meet compliance with water quality standards.

Newer trading programs also tend to focus on point-source to nonpoint-source (PS-NPS) trading, unlike earlier WQT markets that traded strictly between PS. In the Virginia Nutrient Credit Exchange, for instance, PS-PS trading is permitted for existing facilities, but any new sources of PS pollution must seek NPS offsets.

Broadly, NPS-generated credits tended to be more expensive in our dataset, though comparison of credit prices across basins does not always reveal much about demand or underlying value. Prices are influenced not only by the costs of intervention, but also by transaction costs, presence of subsidies for suppliers, and market trading ratios. They may also be

set by a market administrator or clearinghouse, as is the case with the Connecticut Nitrogen Exchange.

The years 2012 and 2013 saw the private sector appear as a significant supplier of credits in Virginia, North Carolina, and Pennsylvania water quality trading markets. This report tracked a total of 30 nutrient banks active in 2013. Price data reported only reflects transactions made via public exchanges or trading platforms: price and volume data for bilateral private contracts are more difficult to track. But private nutrient mitigation banks transacted at least $449,000 in credit sales in the Pennsylvania Chesapeake markets and nearly $2.5M in North Carolina's nutrient offset program.[134] In the Virginia program, 901 nitrogen and 135 phosphorus bank credits have been retired to date.[135]

In Virginia and Pennsylvania, this is a new market space for entrepreneurs making a business out of restoration. (In contrast to 2013 activity, this report tracked only a single trade with a private-sector supplier in 2011 in Virginia.) Growth in North Carolina has been aided by a new law in 2009 favoring the use of bank credits by the state's Ecosystem Enhancement Program (EEP) to meet nutrient mitigation permit requirements over the design-build process historically used by EEP to develop offsets. This represents a shift in the private sector's role in the state mitigation program rather than a brand-new opportunity; EEP has long contracted out to the private sector design, construction, maintenance, monitoring, and/or full delivery work for restoration projects generating nutrient buffer credits (these contracts totaled $6.9M in 2013).

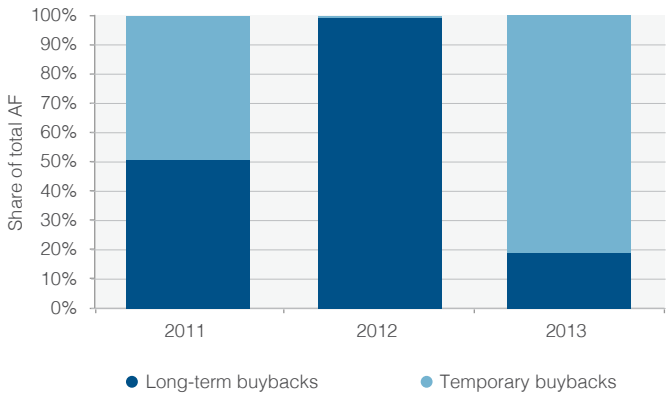
Mechanisms: Buybacks reach $32M in 2013

Instream buybacks data continues to be difficult to track, reflecting the overall opacity of water rights markets in western states. But at least $32M in buybacks was reported in 2013, a surge from the $22M reported in 2011.

Activity was driven by mitigation requirements for wildlife impacts, which accounted for 529,363 acre-feet (AF)[136] of water secured for instream use in 2012 (the latest year for which full data is available), or 66% of total activity that year. Voluntary efforts to protect river systems made up the remainder. Voluntary buybacks still depend mainly on local watershed groups for funding, although 2012 and 2013 saw growth in private-sector enthusiasm for using buybacks to symbolically offset their water use: Silk Soymilk, Ted's Montana Grill, the National Hockey League, and Big Sky Brewery have all bought Water Restoration Certificates (WRCs) in recent years from the Bonneville Environmental Foundation, where each WRC represents 1,000 gallons of water returned to river systems. Still, this segment accounts for less than 1% of buybacks by annual volume.

Figure 70: Share of Temporary versus Long-Term Buybacks in the United States, 2011-2013

(% share of total AF of augmentation)



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014*.

We find little consistency year to year in buyer preference for temporary versus long-term augmentation (Figure 70). "Temporary" is defined here as leases lasting anywhere from part of a season to five years, and "long-term buybacks" as leases of five years or more or permanent transfer of water rights. In 2012, for example, a major water rights purchase by the US Bureau of Reclamation and the US Fish and Wildlife Service in California's Central Valley dominated transactions, while in 2013 the balance shifted back toward temporary transfers of water rights. Short-term leases are often popular with agricultural producers who do not want to permanently part with their water rights and in areas where augmented flow levels are only needed at specific times during the year.

Buybacks transactions were concentrated in the Pacific Northwest in 2013 (Map 9). But interest in the Colorado River watershed is growing: the Bonneville Environmental Foundation transacted WRCs for three sub-basins of the Colorado, totaling 127 AF and including the first

[134] Transaction values for the Virginia trading programs were unavailable for 2013.

[135] Of which, for nitrogen: 322 were retired in the James River Basin, 38 in the York, and 522 in the Potomac. For phosphorus, 91 were retired in the James, 4 in the York, and 40 in the Potomac.

[136] An acre-foot is the volume of water required to flood an acre of land to a depth of one foot, or approximately 1.23 megaliters.

Map 9: Buybacks Activity by Major Watershed Regions in the United States, 2013

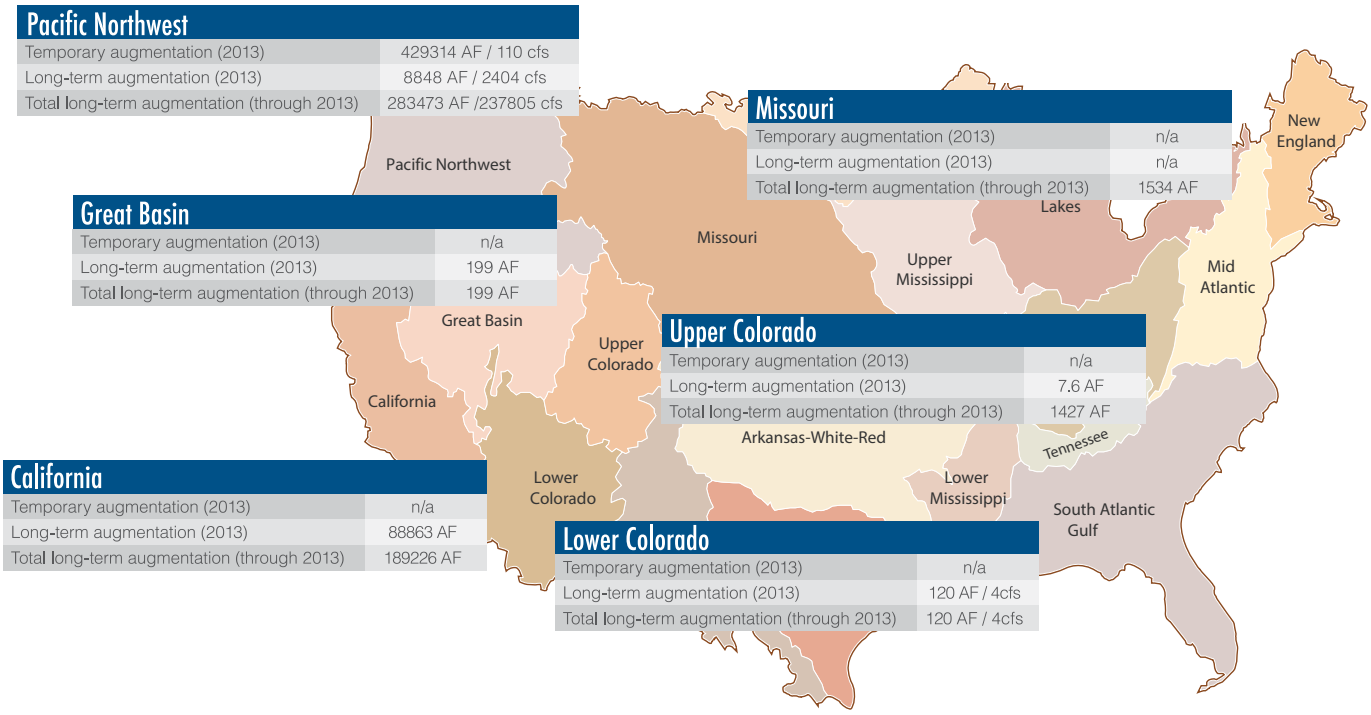


Image credit http://nhd.usgs.gov/images/WatershedBoundaryDataset.jpg
Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

transboundary buyback initiative (see our case study on page 71 for a discussion of the Colorado River Delta Water Trust). California also saw its first NGO-led buybacks effort, the Nature Conservancy-backed **Shasta River Water Trust** open its doors in 2013.

Still, buybacks program administrators report that growth is constrained by red tape, high transaction costs, and uneven community support. Legal frameworks for water rights – set at a state level – have been slow to recognize instream augmentation as a legitimate use of water. Wyoming, for example, still lacks an instream leasing mechanism. Respondents also say that permitting processes and high transaction costs can slow down urgently needed leases to respond to drought conditions. For instance, in Montana, legally changing a water right to instream use takes an average of 18 months to three years.[137] And buybacks are still viewed with suspicion in some places as competing with agricultural use: "It takes time and effort to build relationships to rebut the commonly held belief that water right acquisitions must necessarily come at the expense of farming communities," reported one program administrator.

Enabling conditions: Programs report sluggish demand, regulatory barriers to growth

Cities are lucky to have a cost-sharing partner in the USFS. Our tracking suggests that for non compliance-driven programs focused on forest management on privately owned lands, securing funding has been a slow process (Table 17). Across all North American programs, in fact, finding early-stage capital remains difficult. "Finding investors is a major challenge," one survey respondent said, noting that their program attempts to broaden its funding base by not only engaging water-motivated buyers but also reaching out to potential buyers on the basis of habitat benefits.

Finance: IWS programs draw on a mix of funders for source water protection

More broadly, we find that source water protection programs often fund IWS efforts through a mix of general operating funds, bond issues, and other measures. Ashland, Oregon, even reinvests logging receipts from forest thinning into its watershed program (Table 18).

[137] Ziemer and Yates 2014.

Table 18: Key Challenges for IWS Reported by North American Programs, 2013

1. Lack of buyers
2. Lack of interested suppliers
3. Regulatory uncertainty
4. Lack of support from policymakers
5. Legal/regulatory barriers to funding watershed protection *(tied)*
6. Perceived lack of direct benefits to constituents *(tied)*

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Finance: $400M committed by buyers through 2020

At least $233M has already been committed by buyers for IWS in 2014 and more than $400M between 2014 and 2020 (Figure 71). Those figures likely undershoot actual commitments: Only twenty out of sixty-three buyers reporting commitments provided specific figures. In 2014, Nonpoint Source Implementation Grants under the Clean Water Action Section 319 ("319 Grants") saw budgets inch upward to $159.3M, after a three-year decline. The budget for 319 Grants for 2015 and beyond was unavailable as this report went to press.

Forthcoming watershed spending is also buoyed by ongoing commitments to source water protection from cities like Boston, San Francisco, Providence, and Raleigh-Durham, which collectively will spend $58.5M in 2014 to safeguard their water supplies.

9.4 Outlook

Center of growth shifts west

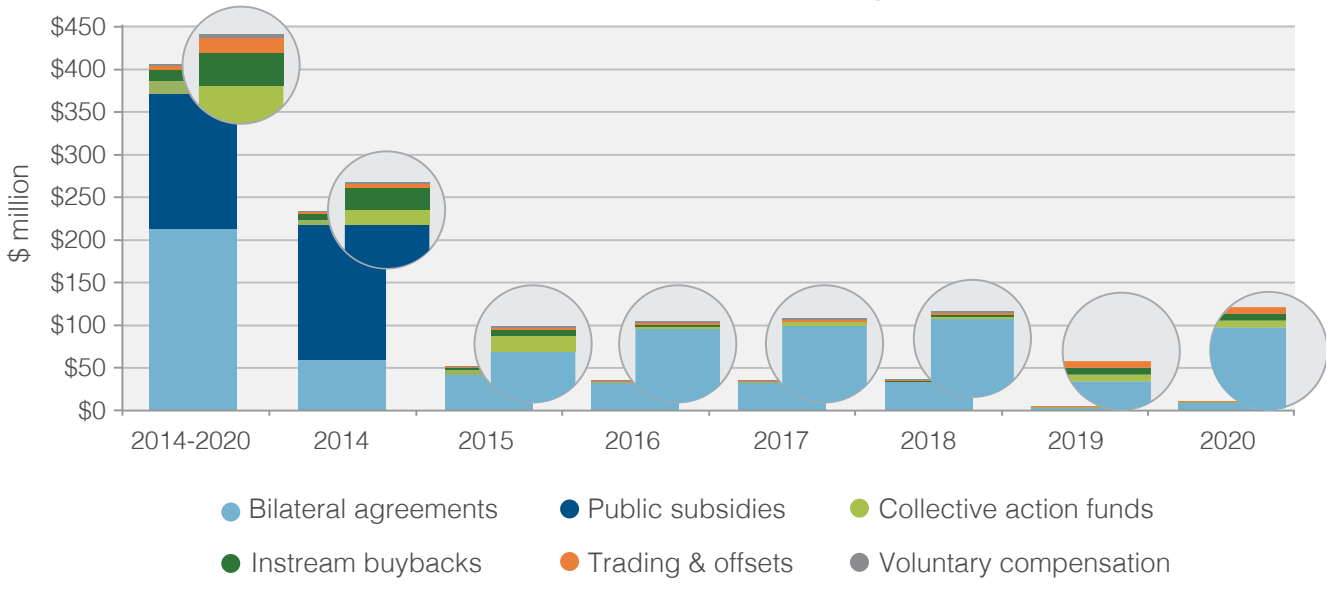
Two-thirds of new programs in the last three years in North America have emerged in the western part of the continent. That trend is continuing: five out of seven developing programs are based in western states, including three initiatives that will use market mechanisms to manage shrinking supplies: two water mitigation banks in the Pacific Northwest and a collective effort by states sharing the Colorado River Basin to pay farmers for conservation in order to address shortages in the Colorado that threaten urban supplies, energy generation, and habitat.

USFS takes watershed approach for National Forest System lands

The USFS continues to integrate watershed health into planning and management on National Forest System lands. In the 2012 revision of its Planning Rule – the first revision of planning guidance since 1982 – the USFS included ecosystem services as one of the multiple

Figure 71: Funding Commitments in North America, 2014-2020

(Value committed by buyers as of 2013, as reported by program administrators)



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Table 19: IWS Funding Sources for Source Water Protection in North America

	Funding Source							
Programs	Municipal/ utility budget	State funds/ grant	Sales tax increase	Bond issue	Ratepayer fee increase	Federal matching funds	User donations	Other
Ashland (OR)						X		X
Aurora (CO)	X					X		
Austin (TX)				X				
Bellingham (WA)					X			
Boston (MA)		X						
Colorado-Big Thompson Headwaters Partnership (CO)	X	X				X		
Colorado Springs (CO)	X							
Denver (CO)					X	X		
Flagstaff (AZ)				X				
New York City (NY)	X							
Patuxent Reservoir (MD)	X							
Providence (RI)				X	X			
Pueblo (CO)	X					X		
Raleigh-Durham (NC)					X			
Salt Lake City (UT)					X			
San Antonio (TX)			X					
San Francisco (CA)	X			X				
Santa Fe (NM)					X	X		
Seattle (WA)	X							
Suffolk County (NY)			X			X		
Tacoma (WA)	X							
Tucson (AZ)							X	
Estimated funding generated to date	**$1,803M**	**$186.3M**	**$372.6M**	**$25.3M**	**$148.2M**	**$221.8M**	**n/a**	**n/a**

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

uses for which planning must account. In early 2014, the USFS also announced $30M in restoration projects in 12 states focused on reducing wildfire risk, improving water quality, and safeguarding wildlife habitat. In addition, the new 2014 Farm Bill may help the USFS increase the pace of restoration work by amending the Health Forest Restoration Act of 2003 to streamline permitting for projects.

Still, compared to the scale of need – the USFS has estimated that its restoration backlog is as much as 33M ha – funding generated through cost-share partnerships for IWS is only a small drop in the bucket.[138] These arrangements are also limited by buyers' specific goals: if lands need restoration but are not good candidates for specific objectives, such as wildfire risk reduction or groundwater replenishment, for example, public agencies may find it difficult to find an interested partner.

Mississippi Gulf the next battleground over nutrient trading?

The spirit of collaboration is not entirely universal. The Mississippi River Basin is shaping up to be the next battleground over water quality cleanup, and thus a potential, if controversial, new setting for WQT.

A September 2013 decision in US District Court gave the EPA six months to set numeric (i.e., quantitative) nutrient standards in the Mississippi or explain why standards are not needed. In March 2014, the EPA was granted a reprieve from setting standards until the District Court appeal was decided. But unless the EPA backs away from its long-held position that pollution in the basin (which thirty-one states share) is severe enough to warrant more serious action, numeric criteria are likely on the horizon – and future lawsuits could press the issue.

So far, attempts to manage nutrient pollution in the Mississippi Basin, which routinely results in a 5,000+ square-mile eutrophic "dead zone" in the Gulf of Mexico, have happened on a voluntary and state-by-state basis. Officials in the state of Louisiana, for example, plan to rely on engineered diversions and voluntary programs encouraging farmers to manage their fertilizer use and control animal wastes. The state has expressed interest in a WQT system with upriver states, but in the absence of federal intervention has no authority to compel its upstream neighbors to control pollution.

Should federal regulation happen – mirroring action in the Chesapeake Bay Basin in 2010 – trading has been promoted as a cost-effective strategy for cleanup. One study estimated that under a regulatory scenario treatment plants could save as much as $900M through trading, while farmers could earn $25-$60 per acre by generating nutrient credits.[139] But lacking that driver, the viability of WQT is far less clear.

In British Columbia, minimum flow standards and mitigation requirements on the table

In British Columbia (BC), NGOs continue to push for instream minimum flow standards for all watersheds in the province and to reform the water allocation system to recognize ecosystem flow standards as a priority use.

A new Water Sustainability Act authorizes the Environment Minister to set flow standards, but leaves their actual establishment for a later date. The act also requires that instream flow needs be considered in decisions on water license applications and gives decision markers the authority to require mitigation for stream impacts affecting quality, quantity, or ecosystem health.

Attracting private finance for urban green infrastructure

Mechanisms to mobilize private capital for urban green infrastructure installation appear set to scale up investment values in the coming years.

In the Chesapeake Bay Basin, where municipalities face tightening stormwater control requirements under the Bay TMDL, public-private partnership (P3) models will likely leverage hundreds of millions of dollars for green infrastructure in the next few decades, according to project developers. P3s for green infrastructure often use an availability payments model, wherein the private sector provides upfront project capital and assumes financial and implementation risks; meanwhile the public sector begins to pay down the project once it is completed, with capital and maintenance amortized over a set period, such as thirty years. P3s allow greater flexibility in siting projects and access to a new source of much needed capital: estimates for implementing necessary stormwater controls in the Chesapeake Bay Basin alone are as high as $15B.[140]

Other regions face similar financing challenges. In January 2013, the Rockefeller Foundation announced that it would provide seed funding for a new initiative that aims to leverage private financing for sustainable urban stormwater and wastewater systems in US cities. The RE.invest initiative will support Community Investment Vehicles (CIVics) in up to eight cities, which will mobilize

[138] United States Forest Service 2012.

[139] Perez 2013.

[140] Chesapeake Bay Watershed Blue Ribbon Finance Panel 2004.

private investment and channel technical support and financial support for projects.

Similar work is being carried out by the Natural Infrastructure Innovative Financing Lab (NatLab), a partnership between EKO Asset Management Partners, the Natural Resources Defense Council, and the Nature Conservancy. In early 2013 NatLab released a green infrastructure financing guide, building on the city of Philadelphia's experience harnessing private capital for green infrastructure development, a strategy that borrows much from energy efficiency financing models.[141] NatLab plans to expand its scope to other US cities in the near future.

Building out the infrastructure for WQT

2014 and beyond are likely to see a concerted effort to build out infrastructure and coordinated frameworks for WQT. In January 2014, two different coalitions were launched to that end. A new National Network on Water Quality Trading aims to distill common principles and best practices, and convene regulators and regulated parties like wastewater treatment plant operators and power plants. And the National Water Quality Trading Alliance – a consortium of business, NGO, and regulated groups – plans to advocate for clear and comprehensive policy on trading and to support the development of new markets.

The USDA Office of Environmental Markets (OEM) also continues to work on coordinating policy across the USDA and encourage tool and protocol development. A recent white paper prepared by the World Resources Institute for OEM looked at a range of potential public strategies for federal support of WQT market growth, including a revolving credit bank to finance credit generation, in-lieu fees for water quality impacts, or acting as a financial clearinghouse.[142]

In September 2014, draft recommendations for achieving consistency across WQT programs in the Pacific Northwest were released in a joint statement from government officials from the EPA Region 10 office and the states of Idaho, Oregon, and Washington, and NGOs Willamette Partnership and the Freshwater Trust. The recommendations will inform planned pilots in Oregon, Idaho, and Washington in 2014-2015.[143]

Federal water investments promote ecosystem approaches

Ecosystem-based approaches are also slowly working their way into high-level decision-making on water infrastructure investment. In 2013, the White House Council on Environmental Quality issued updated Principles and Requirements (P&R) for Federal Investments in Water Resources, which broadens the P&R's scope to cover eight federal agencies, rather than the previous four, and instructs agencies to assess ecosystem services outcomes – rather than just economic ones.[144]

The new P&R may have significant influence on upcoming investment decisions under the 2014 Water Resources Reform and Development Act (WRDDA), authoring $12B in infrastructure projects. WRDDA language itself explicitly prioritizes ecosystem restoration.[145]

A number of federal agencies are also collaborating with the National Ecosystem Services Partnership to produce a *Federal Resource Management and Ecosystem Services Guidebook* to aid in planning decisions, scheduled to be released in December 2014.

[141] Valderrama et al. 2013.

[142] World Resources Institute 2013.

[143] Willamette Partnership and Freshwater Trust 2014.

[144] United States Council on Environmental Quality 2013.

[145] Water Resources Reform and Development Act of 2014.

Box 20: Case Study: The Coca-Cola Company and USDA Partner to Replenish Water on Public Lands

In September 2013, the US Department of Agriculture (USDA) and Coca-Cola North America announced a five-year partnership aiming to return up to 1B gallons of water to streams, rivers, and aquifers in the United States through watershed restoration on National Forest System lands.

The Coca-Cola Company has set a goal of fully "replenishing" by 2020 an amount of water equivalent to the volume it uses in its finished beverages. Through its partnership with the USDA Forest Service and the National Forest Foundation, Coca-Cola funds a range of projects: repairing stream crossings, restoring streams damaged by wildfires, even re-introducing beavers (in the Okanogan-Wenatchee National Forest's Methow River watershed). To date, work has been carried out in the Angeles National Forest (CA), Carson National Forest (NM), the Midewin National Tallgrass Prairie (IL), the Huron-Manistee National Forest (MI), and the Pike National Forest (CO). Coca-Cola North America is matching the National Forest Foundation contributions 2:1. The National Forest Foundation is a Congressionally chartered non-profit of the USDA Forest Service.

Projects are selected based on their potential to replenish water to the landscape, project costs, existing restoration need, and proximity to the operations of Coca-Cola or its bottling partners. At present, four projects take place in watersheds upstream of Coca-Cola facilities; others don't directly benefit the company but were chosen for their strong replenishment potential and existing do not restoration needs. The National Forest Foundation works closely with the USDA Forest Service and local partners to implement these restoration projects, one of several IWS initiatives administered by the NFF tracked in this year's report.

Replenishment values are calculated based on an internal methodology developed by Coca-Cola, Limnotech, and the Nature Conservancy (TNC) to better understand the quantifiable benefits of watershed restoration. Coca-Cola receives replenishment credit proportional to its funding contributions. Current Coca-Cola and National Forest Foundation projects in US National Forests will deliver an estimated 460ML of water. Worldwide, The Coca-Coca Company has replenished 108.5B liters/year to date – equal to 68 percent of the company's annual use.

For the USDA, the partnership is mutually beneficial. Sixty million Americans rely on National Forest lands for drinking water, but the Forest Service faces a serious backlog of restoration work. An estimated 48% of watersheds on National Forest lands are considered impaired or not functioning properly.

"Coca-Cola brings a significant private contribution to the table, allowing important work to occur on national forested watersheds," says Wes Swaffar, Ecosystem Services Program Manager at the National Forest Foundation. As of the end of 2013, the partnership had delivered $983,000 to watershed projects, with another $400,000 committed for 2014.

Swaffar also notes real benefits for wildlife. Project managers in the Huron-Manistee National Forest have reported the biggest run of native anadromous fish in decades, following stream crossing repairs in Brayton Creek. A mink was also sighted in the area – a species rarely seen in the project area.

Three new projects are underway in 2014. Coca-Cola is eager to see other companies take up the model; its methodology is publicly available.[146] Swaffar says the partnership has sparked interest from others in the private sector in funding their own "replenishment" initiatives.

[146] Limnotech 2013.

Box 21: Case Study: Washington, DC, Inaugurates the Country's First Stormwater Trading Market

Washington, D.C., is responsible for an estimated 1% of nitrogen and phosphorus pollution in the Chesapeake Bay, but its bill for reducing pollution in the Bay (as required by the Chesapeake Bay Basin TMDL) may exceed $3.5B, thanks to the high costs of stormwater controls. In response, Washington is experimenting with market mechanisms to encourage private parties to finance green infrastructure in the District.

In the fall of 2014, D.C. saw its first-ever transaction in a new trading program for stormwater retention credits (SRCs), a $25,000 purchase of 11,013 credits. New development is subject to regulatory requirements that set a minimum level of stormwater retention capacity on the site in order to control runoff. SRCs can be generated whenever a property owner exceeds those regulatory requirements, such as through installing bioretention cells or a green roof that retains more stormwater than the law requires. This "above-and-beyond" retention benefit is packaged as a credit – each SRC represents one gallon of retention capacity for a year – and sold to parties who find it too difficult or expensive to install stormwater controls on their own properties. Developers installing stormwater control projects also can qualify for discounts on stormwater fees, doubling up on incentives for green infrastructure.

As the first generation of development projects becomes subject to the new stormwater requirements, the District Department of the Environment (DDOE) expects demand to emerge. The DDOE certified its first credits in April 2014, totaling three years' worth of SRCs at 17,083 gallons of retention per year, currently listed at $2.95 per credit (though this may not be the final sale price). The DDOE also offers an in-lieu fee option at $3.50/gallon/year, which is designed to act as a ceiling on market prices for SRCs.

The DDOE is also developing an option contract, wherein third parties (such as an NGO) would be solicited by a request for applications to recruit certifiable projects, which would be assured of receiving a minimum price for all SRCs generated. Once a project is completed, the developer would have the option of either selling credits to the third party at that preset price or seeking a higher price on the market.

For the DDOE, the system offers several advantages. Trading can result in more retention than requiring 100% compliance on site. Multiple smaller sites can retain more volume than a few large ones (consider either a single 1000-gallon bucket on a roof, versus two 500-gallon buckets: In a storm, the pair of buckets will fill up faster). The DDOE estimates that that the SRC market will increase retention across the district by 57%. Multiple sites can also capture more of the "first flush" volume in a rainfall event, which typically carries the greatest concentration of pollution.

Trading of credits also allows flexibility in siting and thus greater cost savings: projects will most likely be developed in places where costs for green infrastructure are lower. This in turn carries social benefits: "If you look at the District, the opportunity to generate SRCs seems to come from the least affluent parts of the city," explains Evan Branosky, an Environmental Protection Specialist at the DDOE. "Land values there are lower, and the opportunity costs of alternative uses are not as great as downtown. It will be exciting to see if trading helps drive green infrastructure into these places."

10. Oceania

Table 20: Summary Details - Oceania

	2011	2013
Operational programs	6	9
Programs in development	1	1
Values	$174.6M	$103.0M
Total land area managed for watershed services	n/a	107,525 ha
New land area managed for watershed services, per annum	n/a	n/a

Notes: Given our data collection cycle (which takes place every other year), data on ha protected in 2012 is unavailable, as the survey asks respondents to indicate total ha under management and ha added in the last twelve months.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Key Findings

- Spending by the region's largest program, **Restoring the Balance in the Murray-Darling,** was cut roughly in half in 2013 from 2012 levels. That fall pulled down regional values dramatically along with it, from $160.8M in 2012 to $103M in 2013.
- That drop masks growth in other areas. The **Hunter River Salinity Trading** program saw its biggest year to date in 2012, with credit prices roughly tripling since 2010 to an all-time high of $4,989 per credit. Total auction revenues in 2012 reached nearly $1.1M.
- Municipalities and water service providers in **Melbourne, Ispwich**, and **Beaudesert** experimented with new offset mechanisms to manage stormwater and other water quality challenges, transacting a reported $0.9M in 2013.
- Altogether, nearly $1.4B has been committed between 2014 and 2020 for watershed investment programs in Australia, largely by the national government. But given a history of uneven spending patterns and political upheaval in the past two years, it is unclear exactly when this money will be spent or whether commitments might change.

10.1 Introduction

In 2012 and 2013, Oceania saw investment activity begin to rely more on locally driven projects for new energy. The region's largest program – **Restoring the Balance in the Murray-Darling Basin (RtB)**, a nationally driven buybacks effort in Australia – shrank, while at the municipal level several new offset programs were rolled out.

As we noted in our 2012 report, Australia's history of strong government support for market-based mechanisms for conservation is both a strength and a weakness: publicly managed and funded programs have made the region an early leader in watershed investment, but also vulnerable to political shifts. **RtB**, the government's flagship buybacks program, experienced such a shift following elections in 2013, as the incoming Coalition government indicated it would step back somewhat from a buybacks strategy to restore health in the Basin.

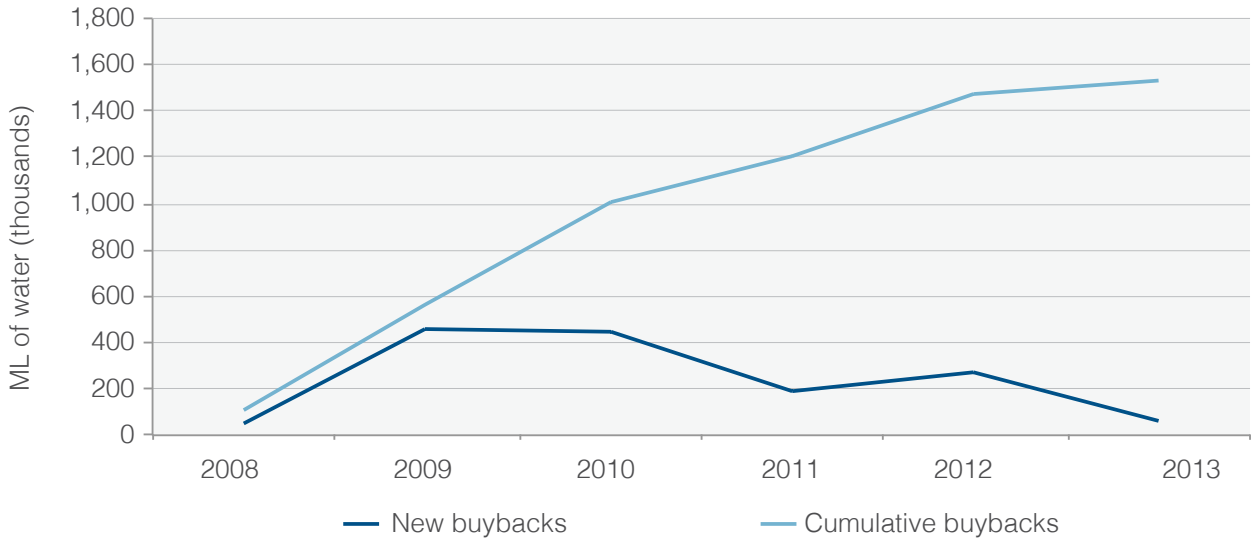
RtB has its basis in the Commonwealth Water Act of 2007, which established the Murray-Darling Basin Authority (MDBA) and instructed it to monitor state and territorial compliance with "the Cap," a policy that limits diversion from the basin to 1993 levels (11,000 GL[147] a year). The MDBA also oversees the Murray-Darling Basin Plan, including the buybacks initiative and programs funding irrigation efficiency improvements. The **RtB** mandate initially was to purchase 2,750 GL worth of water

[147] A gigaliter (GL) is equivalent to one billion liters.

Map 10: Active and Developing Programs in Oceania, 2013

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Figure 72: Volume of Water Returned to the Murray-Darling Basin, 2008-2013



Note: This figure includes volumes of water secured by both the Restoring the Balance in the Murray-Darling Basin program and the New South Wales Water for the Environment program, which ceased buybacks activity in 2011.

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

entitlements on the open market over ten years, with a budget of $3.2B.

In the fall of 2013, the incoming Coalition government said that it would cap buybacks at 1,500 GL rather than the Labor administration's earlier goal of 2,750 GL. The Coalition also plans to spread allocated funds for buybacks over six years instead of the original four. Finally, some water allocations dedicated to instream flows currently managed by the Commonwealth Environmental Water Holder would be sold back to irrigators to help cope with drought – a move that sparked sharp criticism from the Greens Party and environmentalists.[148]

The program has also been plagued by resistance from state and territorial governments: The New South Wales government in 2013 began limiting buybacks by the federal government within its jurisdiction, while the state of South Australia cut its promised contribution to buybacks by $14.6M. Critics of the Basin Plan cite concerns that buybacks will cripple rural economies, arguing in favor of a greater focus on irrigation infrastructure funding.

Long-running WQT experience

Elsewhere, watershed investments have seen smoother sailing. Australia's experience with market-based mechanisms for watershed protection extends back to 1995, when the **Hunter River Salinity Trading** program began. The Australian national and territorial governments also co-funded a Market-Based Instruments Pilots Program in 2003 that provided $10.3M in funds for two successive rounds of pilots programs targeting water quality, carbon sequestration, and biodiversity protection through conservation projects.

Some of these early pilots remain active in some capacity. State and territorial governments have also provided funding for restoration and conservation using tenders, a reverse auction in which landowners submit competitive bids to receive grants for projects. But ultimately Australian programs have tended to focus on bundled ecosystem services; relatively few are exclusively watershed services-focused.

10.2 Impacts

Supply: In the Murray-Darling, more than 1.5M ML returned to the River Since 2008

Even as the purchase of water rights in the Murray-Darling has fallen from a peak in 2009 of nearly 455,000 ML, benefits continue to accumulate to the river system as entitlements are permanently dedicated to instream use (notwithstanding the Coalition government's recent plans to sell some back to farmers). In 2013, total water secured to date through buybacks reached more than 1.5M ML (Figure 72).

Supply: Oceania measures progress in many ways

Most programs in Oceania do not measure outcomes in terms of hectares. In the case of **RtB**, the transaction is based on a water entitlement instead of a land-based

[148] The Guardian, January 20, 2014.

Table 21: Outcomes Reported by Programs in Oceania, 2013

Metric	2013
Ha under management for watershed services	107,525
ML of water	58,000
Tons of sediment	7
Pounds of nitrogen	145,505

Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

intervention. Instead, reflecting the frequent use of trading and offset mechanisms, programs typically report credits or offsets in kg of nitrogen, tons of sediment, or even the right to discharge a certain percentage of a load allocation (in the case of the **Hunter River Salinity Trading** program) (Table 21).

Australian government pursues "Ridges to Reefs" connections

The connection between landscape and marine health is sharply illustrated in Australia, where pollution loads from urban, agricultural, and mining areas are a leading factor in the decline of the Great Barrier Reef. For example, sediment loads to the reef have increased by as much as 500% in the last century in a half largely due to the expansion of agriculture in the Reef's catchment.[149]

In 2008, the Australian government committed $130M over five years for water quality grants to landholders to manage sediment, nutrient, and pesticide runoff to the reef through the **Reef Rescue** program. The program also supported partnerships to build capacity and communication in stakeholder groups and for water quality monitoring and research.

A program launched in 2009 saw the private and NGO sectors throw their hats in the ring to protect the Great Barrier Reef as well. **Project Catalyst**, funded by WWF and the Coca-Cola Foundation, is working with local cane growers and conservation groups to demonstrate farming practices that limit agricultural pollution flowing to the Reef (Box 22).

Monitoring rates reflect program emphasis on outcomes in Oceania

Monitoring rates for the region were high compared to other parts of the world (Figure 73). Strong water quality monitoring rates reflected Oceania's relatively high use of outcome-based programs like trading and offsets. On the other hand, no programs in the region indicated that they either have poverty-related objectives or monitored socio-economic impacts, although a component of the **Reef Rescue** program works to engage Aboriginal and Torres Strait Islander indigenous communities in protection, including "traditional use" management agreements.

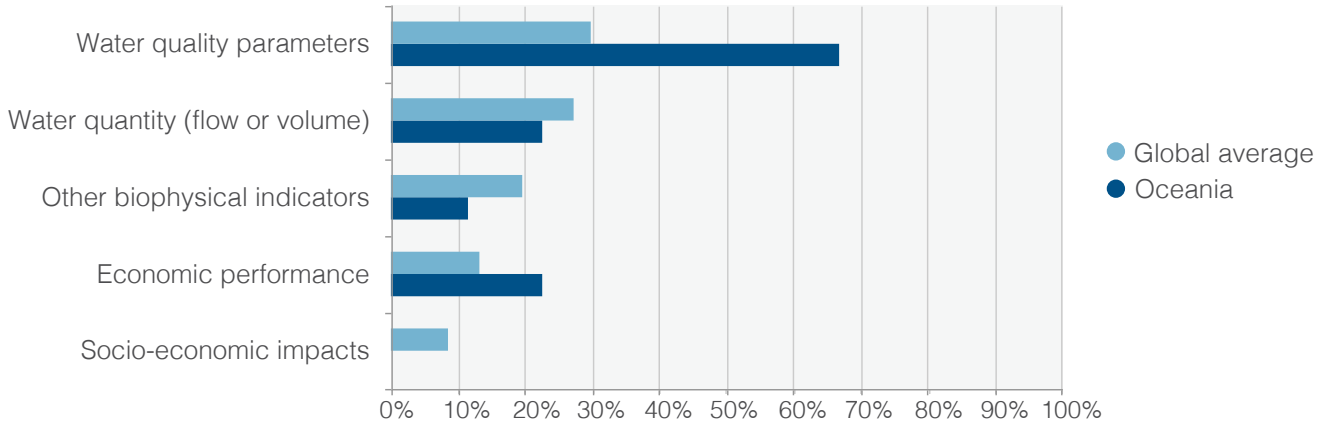
10.3 Investment

Demand: Murray-Darling Basin spending falls sharply in 2013, dragging down regional transaction values with it

Spending by the **RtB** program was cut roughly in half in 2013 from 2012 levels ($66M versus $131M).[150] As by

Figure 73: Monitoring Rates, Oceania and Globally

(% share of programs)

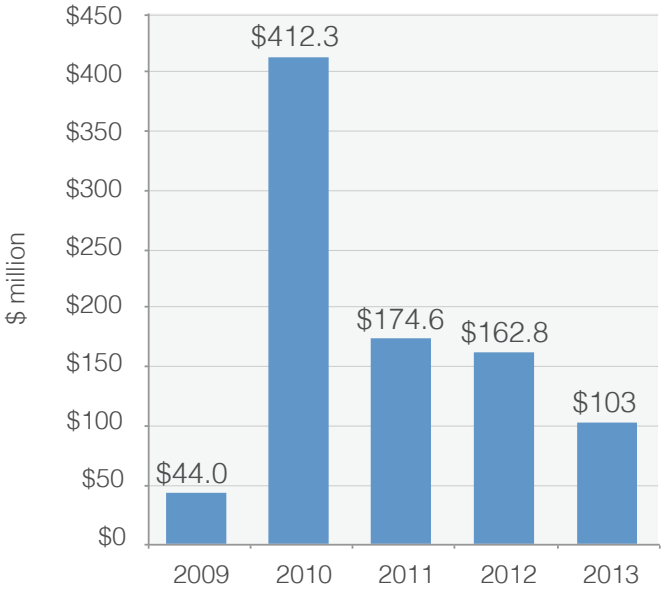


Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

[149] Kroon et al. 2013.

[150] Commonwealth of Australia 2013.

Figure 74: Transactions in Oceania, 2009-2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

far the largest program by spending values in Oceania – the program accounted for 64% of transactions in 2013 – its fall pulled down regional values dramatically along with it (Figure 74). Spending decreases are also linked to the end of the **New South Wales Water for the Environment** program, which had been a major buyer of entitlements for instream augmentation until its funding ended in 2011.

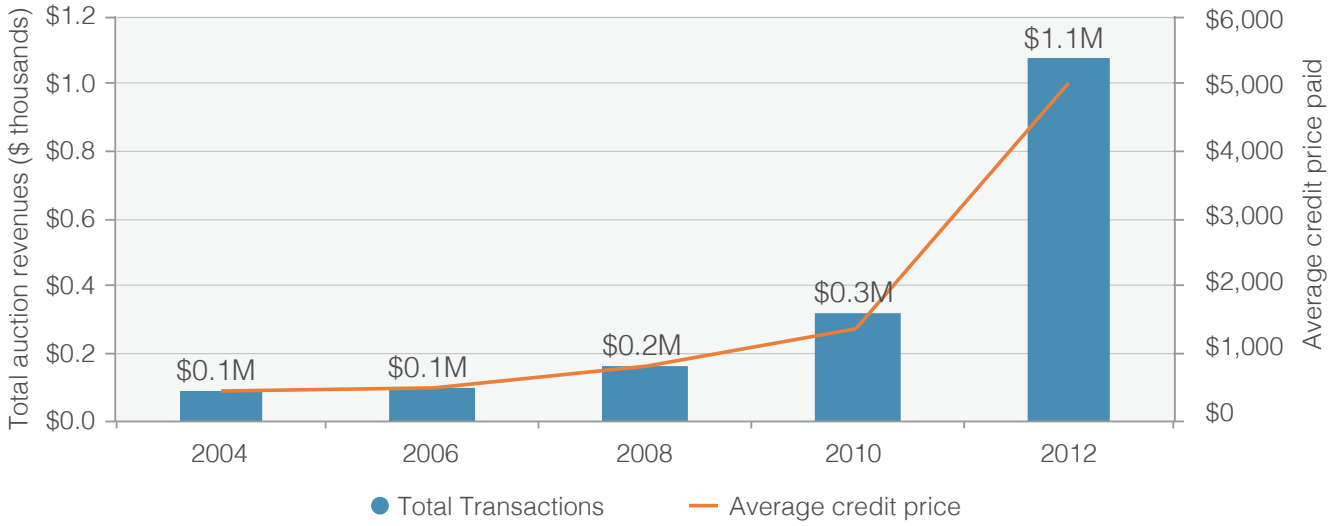
Trading in the Hunter River Basin sees a tripling in value, credit prices since 2010

The drop in MDB masks growth in other areas. The **Hunter River Salinity Trading** program saw its biggest year to date in 2012, with credit prices roughly tripling since 2010 (Figure 75).[151] The Hunter River drains the largest coastal catchment in New South Wales. Salt occurs naturally in many of the rocks and soils of the Hunter Valley, and some of this salt is leached into groundwater and nearby rivers. To address salinity problems, discharge credits (which have a lifespan of ten years) are sold at public auction every two years; these credits entitle their holders to discharge effluent into the Hunter River at times of high flow. A credit allows its holder to discharge 0.1% of a total allowed amount in a river "block," set by monitors based on flow level and ambient salinity. (During high flow conditions, discharge limits are relaxed.) The 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. Two hundred credits, replacing those that expire, are sold at public auction every two years.

Demand: Government largest buyer, but business makes a showing every other year

Buyers in the **Hunter River Salinity Trading** program are all either mining or power generation operations (the latter including both public and private entities). The timing of credit auctions leads to a spike every other year in business spending on watershed protection: in 2012,

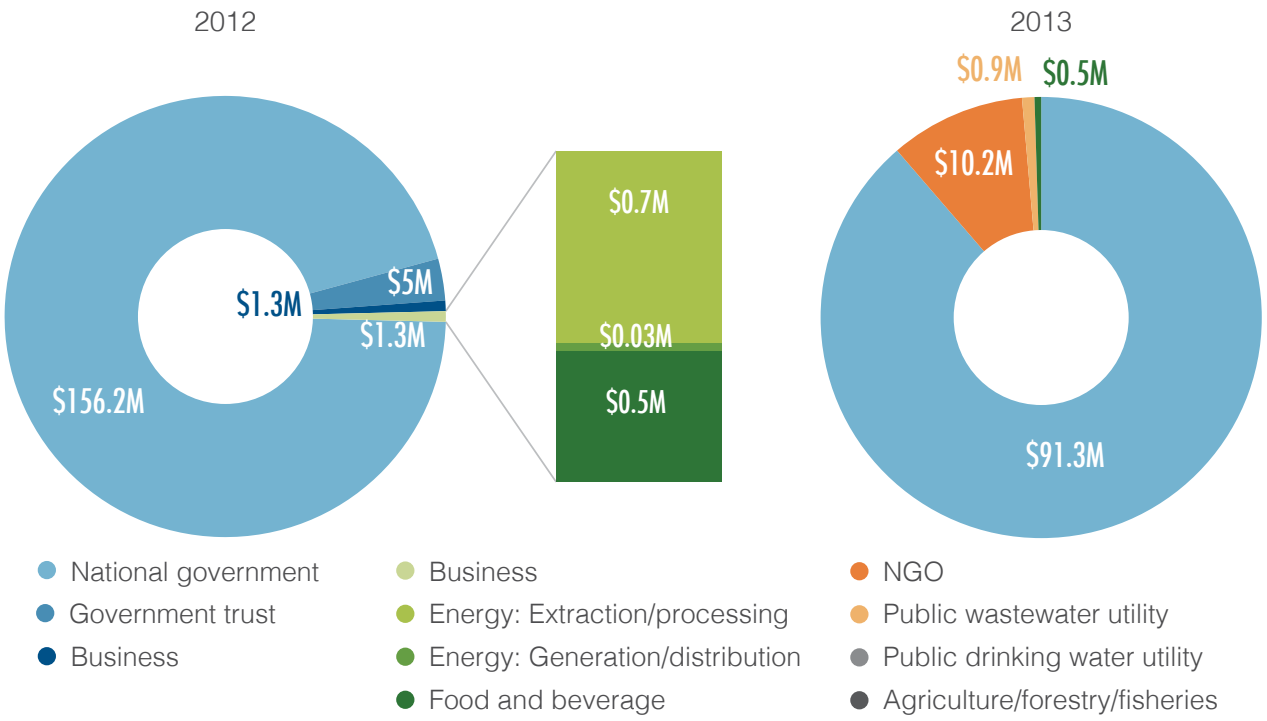
Figure 75: Total Transaction Values and Average Credit Prices in Hunter River Salinity Trading Program Auctions, 2004-2012



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

[151] New South Wales Environmental Protection Authority 2014.

Figure 76: Buyers by Share of 2012 and 2013 Transaction Values, Oceania



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

the private sector, driven by the energy and beverage industries, spent $1.3M, while in 2013 the beverage industry was the only private-sector buyer reporting investment, spending $0.5M (Figure 76).

Another $10.2M in spending in 2013 came from New Zealand's Lake Taupo Protection Trust, which is funded by national, regional, and local governments and is charged with purchasing nitrogen allowances through the Lake Taupo Trading Program and retiring them. However, in June 2013, the Trust withdrew from trading, having made arrangements to fulfill its nitrogen reduction goals via a project purchasing and managing land.

Mechanisms: Cities experiment with stormwater and wastewater offsets

Two recently active programs in **Melbourne** and **Ipswich** focus on stormwater offsets. In Melbourne, industrial and residential developers must pay an in-lieu fee to Melbourne Water if best practice is not met on site for stormwater control; funds go to the public catchment manager to carry out offset activities including urban green infrastructure. A similar mechanism is at work in Ipswich. Queensland Urban Utilities is also experimenting with offset mechanisms, funding riparian restoration work in **Beaudesert** that is expected to save the Beaudesert sewage treatment plant nearly $7M in avoided upgrade costs. Altogether these offset mechanisms transacted a reported $0.9M in 2013.

Enabling conditions: Resistance to buybacks spurs investigation of their economic impacts

A key challenge for the **RtB** program has been agricultural resistance to buybacks out of concerns that the program would encourage farmers to sell off their water rights to the government and leave the agricultural sector, hollowing out rural economies – an issue that has also come up for US-based buybacks programs (see Chapter 9). Critics of buybacks often call for funding to be redirected to irrigation efficiency improvements as a more beneficial way to return water to the Murray-Darling river system.

These concerns have sparked some useful investigations into the cost-effectiveness and economic impacts of buybacks: a recent study in South Australia suggested that the sale of water rights to the government has actually so far been linked to farmers' reducing their debt, modernizing operations, and increasing productivity.[152] However, these benefits appear to take some time to appear. The study found that about one-fifth of farmers

[152] Wheeler et al. 2013.

in the basin have sold surplus water entitlements to the government. Of that group, 60% were still farming, 30% had left the sector, and 10% had replaced the sold entitlement with water from other sources or switched to dryland farming.

Other research suggests, too, that buybacks are likely the most cost-effective mechanism for restoring the river system to health, especially when the economic structure of the basin has become less dependent on agricultural activities over time. A recent comparison between buybacks and irrigation infrastructure upgrades suggested that infrastructure upgrades were at best two to three times more expensive than buybacks for each ML of water delivered to the river system.[153]

10.4 Outlook

Nearly $1.4B committed through 2020, but timing of spending hard to predict

Outlook for the region in the coming years is somewhat unclear. Altogether, nearly $1.4B has been committed through 2020 for watershed investment programs in Australia, largely by the national government. But given a history of uneven spending patterns and political upheaval in the past two years, it is unclear exactly when this money (much of which is through the **RtB** program) will be spent or whether commitments might change.

Box 22: Case Study: WWF and Coca-Cola Sweeten the Deal for Farmers Working to Save the Great Barrier Reef

Along the Mackay-Whitsunday coast, WWF and the Coca-Cola Foundation are partnering with sugarcane growers to demonstrate farming practices that limit agricultural runoff flowing to the Great Barrier Reef, where water pollution originating on-land is a serious threat to the reef. Reef Catchments, NQ Dry Tropics, and Natural Resource Management groups are partners.

Project Catalyst provides financial, technical, and agricultural extension support to farmers proposing new practices that will help them reduce pesticide and fertilizer application without reducing yields, such as precision pesticide application and satellite-controlled equipment. The program estimates that it has reduced nutrient and pesticide loads in more than 100,000 ML of runoff to date; at present it is working with 78 farmers on 101,725 hectares.

Monitoring shows that cane farmers participating in the program have reduced nutrient pollution by 60% and pesticide pollution by 95%. Farmers also report higher profits, since their input costs are lower. A newsletter and website have been created to facilitate sharing of best practice between participants.

For Coca-Cola, the program is a part of its global replenishment commitment (see the case study in Box 20 in the North America chapter) as well as a supply chain issue: sourcing sustainably grown sugar is a key challenge for the beverage company.

Based on WWF 2014 and Moye 2013.

[153] Wittwer and Dixon 2013.

11. Global Outlook

The watershed investment world is rapidly changing in size and composition, making predictions about the future difficult. This report's survey asked program administrators to provide data on developing projects in the pipeline and on future funding commitments, which can serve as proxy indicators for future activity.

But the scale of investment in 2014 and beyond depends heavily on factors affecting demand, including business interest in "water stewardship" strategies and how prominent a role natural infrastructure plays in decisions about infrastructure spending. The emergence of standards and certifications for watershed protection and other project development guidance has promising implications for both project developers and buyers, but remains in very early stages. Similarly, on the supply side, private finance – in particular institutional and high-net-worth individuals – has expressed interest in investing in conservation projects, though given a lack of "investment-ready" projects, funding at significant scale is unlikely in the near future.

Pipeline programs favor collective action funds; growth projected on strength of Chinese investment

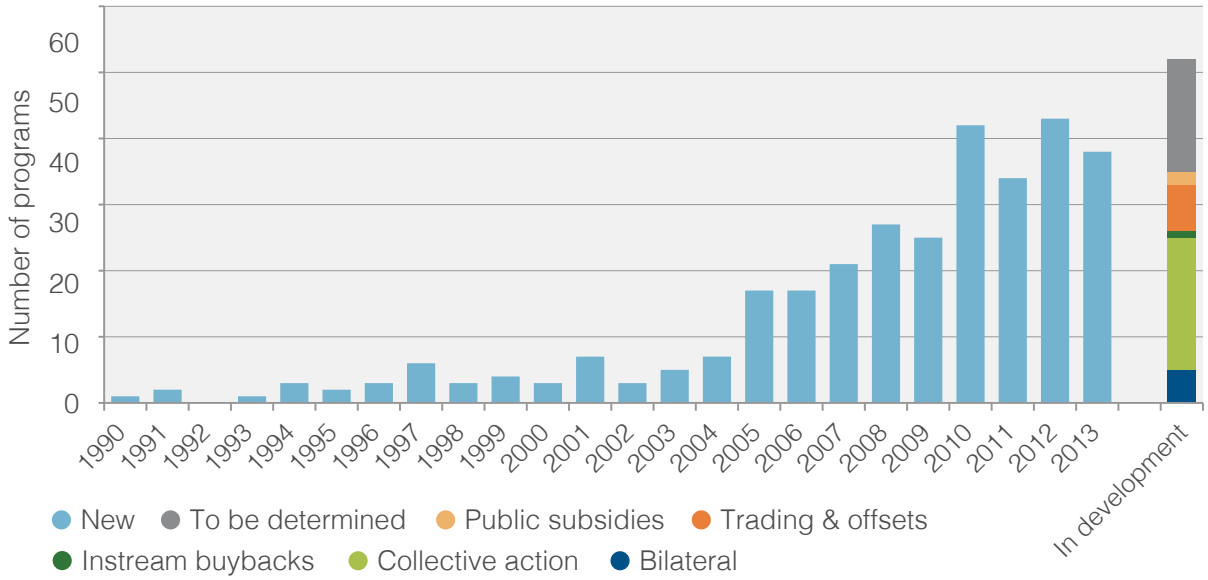
In addition to programs tracked in this report, survey respondents reported another 51 programs in design stage at the end of the 2013. Many of these programs are or will be structured as collective action funds (Figure 77), which, as seen in this report, are already an increasingly popular financing solution. In 2013, the reported average time-to-implementation (from design phase to first transaction) was two years and four months, meaning that these efforts may soon begin bearing results.

In the meantime, outlook for existing programs is cautiously optimistic. National-level spending – the backbone of growth in IWS over the last five years – showed some signs of slowing down in 2013 in Australia, Costa Rica, Mexico, and the United States. However, Chinese leadership appears committed to proceed at full speed with domestic compensation for watershed protection. At the five-year average growth rate, IWS is poised to hit $20B a year somewhere around 2018 (Figure 78), assuming that current investment policies and programs are held constant.

Approximately 42% of buyers have already committed future funding, but finance gap persists

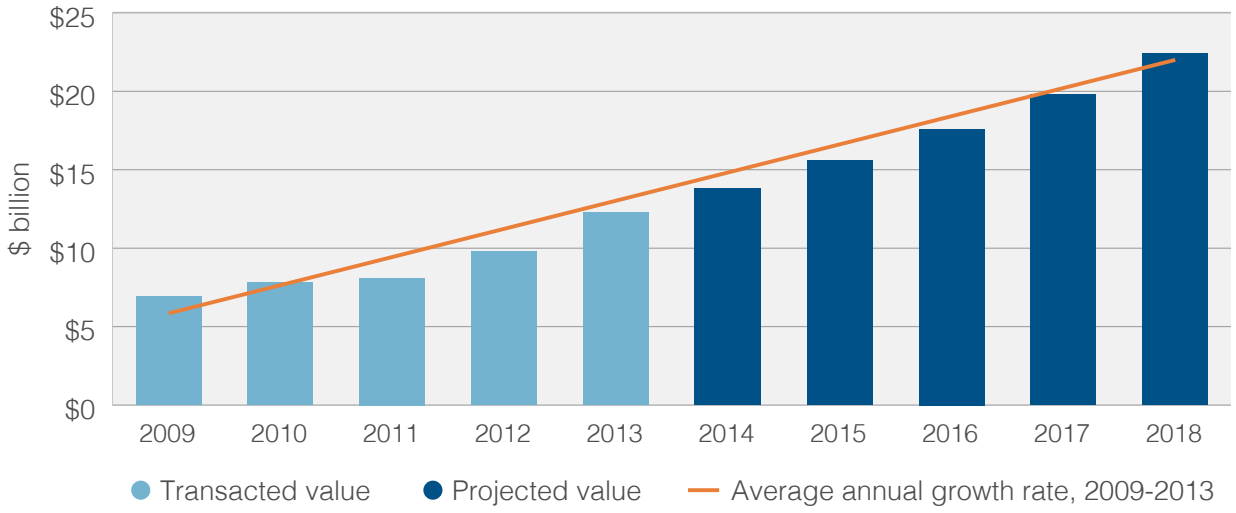
Practitioners report that $904M has already been committed by buyers in 2014, although as a natural extension of long-term investment uncertainty, commitments drop sharply thereafter (Figure 79, Map 11). Total commitments through 2020 equal $6B, mostly via

Figure 77: New Operational Programs Each Year Globally 1990-2013 and Currently in Development



Source: Forest Trends, *State of Watershed Investment 2014.*

Figure 78: Five-Year Projection Based on Current Annual Growth, 2014-2018



Source: Forest Trends, *State of Watershed Investment 2014*.

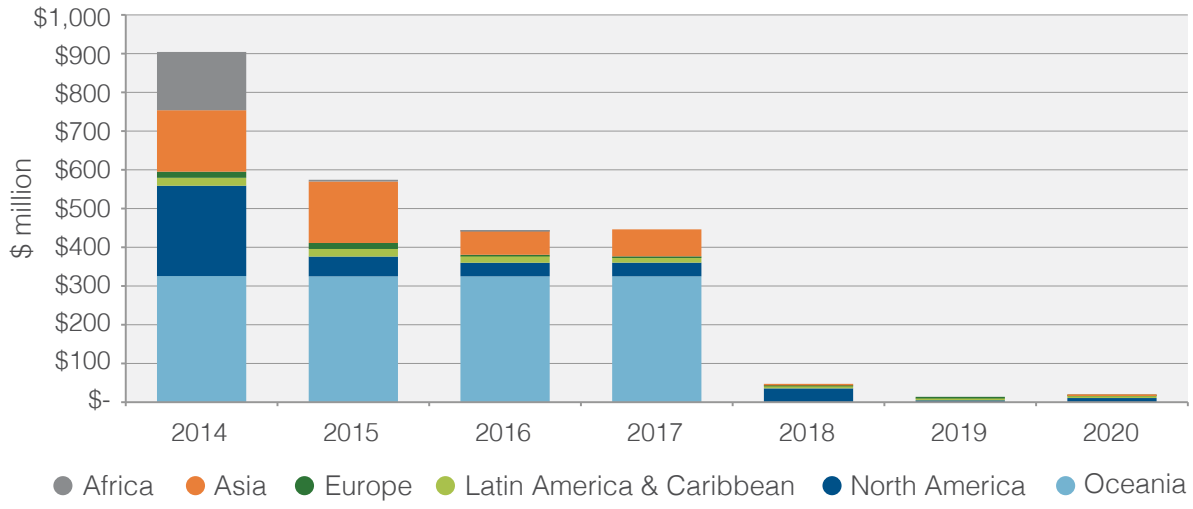
government budgets in China, Australia, and South Africa. This "future finance" figure is likely an underestimation, as 42% of buyers say they have committed to additional transactions, but only 18% reported specific figures.

New tools and guidance seek to smooth the path for business buyers and private finance

On the buyer front, 2013 saw a marked uptick in business interest in water stewardship strategies through which a company manages its water risk at a landscape level and in collaboration with other stakeholders. The launch of the Water Stewardship Standard in the spring of 2014, with backing from Nestlé and General Mills, follows recent guidance and high-level attention from groups like CDP, the CEO Water Mandate, and the World Business Council for Sustainable Development.[154] But here, efforts are only in very early stages. The 2013 CDP Water Disclosure Report found that just 3% of businesses are tackling risk at the watershed level and only 4% within the supply chain.[155]

Figure 79: Funding Commitments 2014-2020 by Region

(Value committed by buyers as of 2013, as reported by program administrators)

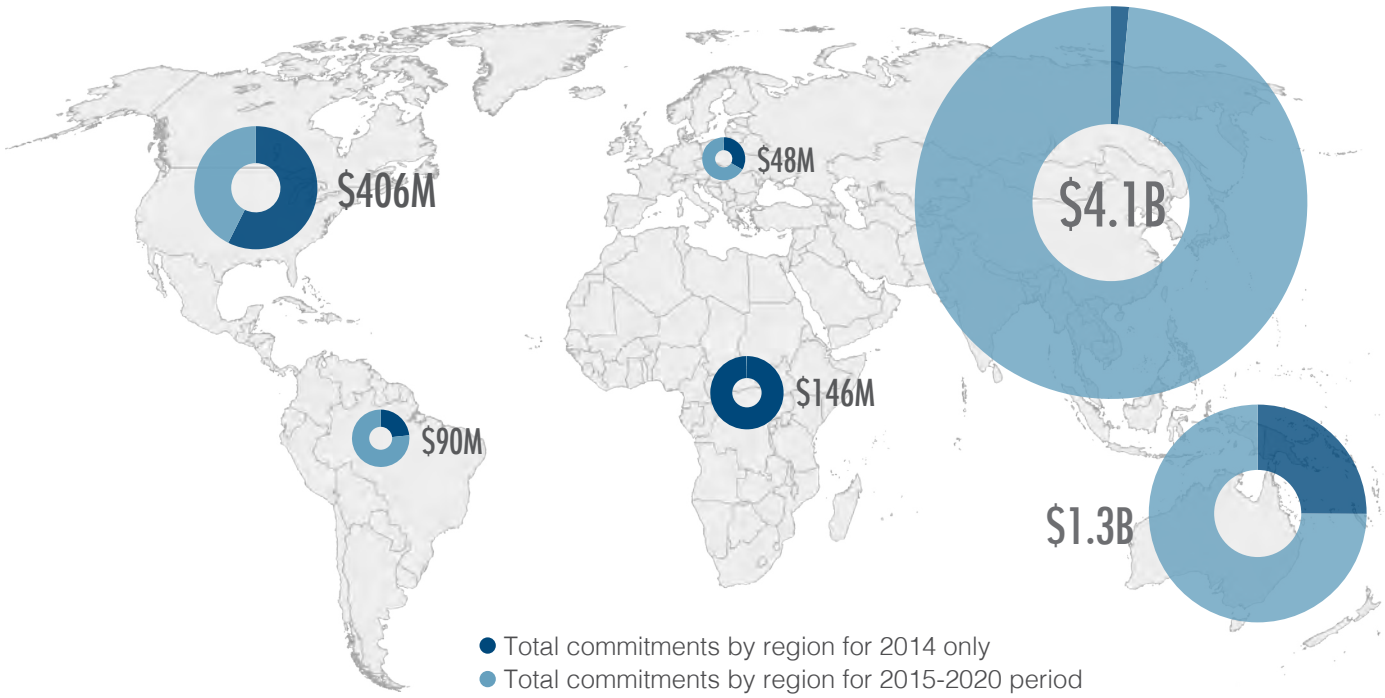


Source: Forest Trends, *State of Watershed Investment 2014*.

[154] See for example CDP 2013, CEO Water Mandate 2014, and World Business Council for Sustainable Development 2013.

[155] CDP 2013.

Map 11: Funding Commitments 2014 and 2014-2020 by Region



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014.*

Scaling up private-sector investment will probably depend on the availability of collective action partnerships and guidance for business, as well as better demonstration of ROI to private buyers. As discussed in earlier chapters, in 2013 this report tracked a number of programs testing new methodologies for quantifying economic and ecological outcomes, particularly in the UK, the US, and Latin America.[156] Cross-fertilization across sectors is also occurring. As an example, a methodology for estimating groundwater replenishment, originally developed for The Coca-Cola Company, is now being harnessed by TNC to estimate performance of a water fund in Monterrey, Mexico, and for restoration work on public forest lands in the United States.

Standards and certifications like the International Water Stewardship Standard, Water Benefit Certificates, and the Forest Stewardship Council's forthcoming ecosystem services certification are another development with promising but still emerging implications.[157] These methodologies could help to improve accountability, establish minimum project standards, and generate more robust information about outcomes. From a financing perspective, standardized approaches and clear metrics for measuring outcomes could mean increased interest from businesses and other major water users. For businesses, there is also appeal in certifications and labels that might enhance their reputations as sustainably minded companies. At the same time, concerns have emerged, too: a resistance to "Kyoto-ization" of water and criticisms that standards and certifications (S&C) – and especially the use of purely volumetric offsets for water-related impacts – oversimplify hydrological complexities and overlook local context.[158]

Private finance – specifically institutional capital and high-net-worth individuals – has recently expressed interest in investing in conservation and restoration, but indicates that the existing portfolio of investment-ready projects is thin. To attract this sector, better quantification of performance (in both ecological and dollar terms), clearer signals related to long-term demand, and demonstrable conservation cash flow potential are needed. Where those conditions exist, however, interest has been substantial, as seen in examples like P3s for "green" stormwater controls in the Chesapeake Bay Basin in the United States (see Chapter 9: North America).

[156] See Chapter 4: Monitoring & Methodologies, and regional chapters (Europe, Latin America and Caribbean and North America).

[157] See Chapter 4: Monitoring & Methodologies.

[158] See for example Henley 2013 and WWF 2013.

Looking ahead: In search of an infrastructure spending shift

The global financing gap for necessary upgrades and installation of drinking water and sanitation infrastructure is tremendous: the OECD estimates that more than $1T a year will be needed in annual investment in water infrastructure by 2025 (Figure 80). Those estimates – and most investments in practice – focus largely on "hard path," or engineered, infrastructure.

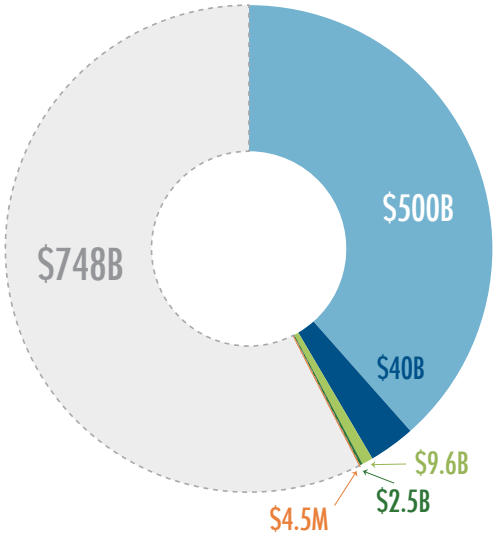
But if just 5% of annual "grey" infrastructure spending (an estimated $37.4B) were channeled to natural infrastructure, a back-of-the-envelope calculation (based on the numbers presented in Figure 80) suggests that these solutions could protect as much as 1.7B ha of land[159] – an area twice the size of Brazil – or secure more than two million metric tons of nitrogen reduction at average 2013 credit prices.[160] That is enough to keep an entire year's worth of nitrogen pollution out of the Gulf of Mexico, where nitrogen and phosphorus runoff contributes to an oxygen-starved "dead zone" the size of Connecticut.[161]

Natural infrastructure also offers flexibility and a "no-regrets" option. Since investments tend to be smaller and less expensive than engineered infrastructure, natural infrastructure investments can often be structured to spread costs over time and require lower initial capital investments than built projects. Also, water managers can adaptively respond to changing conditions, which is helpful in places where climate change effects on water resources are uncertain. Unlike built infrastructure, natural infrastructure also tends to appreciate over time: A forest's ability to filter pollution, trap erosion, or sequester carbon usually increases the older it gets.

In an attempt to capture these benefits, the engineering and conservation fields have established a number of partnerships to develop urban green infrastructure at a large scale and test strategies for green/grey infrastructure hybrid systems. These initiatives include the Rockefeller 100 Resilient Cities program, in which engineering firm AECOM is engaged, TetraTech's and other firms' work on green stormwater infrastructure in Washington DC, and a new partnership between TNC and CH2M Hill.

Practitioners report that continued progress of this kind will depend on recognizing natural infrastructure's value

Figure 80: Annual Water Infrastructure Spending versus Global Need, 2013



Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014*.

as an economic asset. As mentioned throughout this report, natural capital accounting made great strides in 2012 and 2013, but remains an enormous undertaking requiring decision makers to consider the values of assets long implicitly understood as having no value. But NCA has the potential to illuminate clearly the risks natural capital degradation poses to society and put natural infrastructure investment decisions on par with built capital.

A true accounting of natural assets also has important implications for addressing poverty and inequality. As the World Bank's Juergen Voegele pointed out at 2013's Natural Capital Legislation Summit, environmental degradation is felt most acutely by the poorest on this planet: if you live on less than $2 a day, half of your GDP comes directly from natural capital.[162]

As detailed in the pages of this report, watershed investment programs are delivering significant benefits, not only in terms of clean, reliable water supplies but also for cost abatement, local livelihoods, and ecological

[159] Average global per-hectare costs of watershed management in 2013 were $22.43/hectare.

[160] Average price for one term nitrogen credit (representing one pound of pollution reduction) across all markets in 2013 was $8.38.

[161] Estimates of average annual nitrogen load from Goolsby et al. 2001.

[162] Gardiner 2013.

co-benefits like wildlife habitat and carbon storage. The field still depends largely on funding from a handful of public sector leaders, with awareness of natural infrastructure strategies remaining low in other quarters. But 2012 and 2013 were a time of gaining depth, as programs worked to develop a more sophisticated and diverse portfolio of investment projects – experimenting with new models, better demonstrating IWS' benefits, attracting new sources of finance. These efforts are likely to create a wave of investment in the coming years.

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Donors

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

The Swiss Agency for Development and Cooperation (SDC) is Switzerland's international cooperation agency within the Federal Department of Foreign Affairs (FDFA). In operating with other federal offi ces concerned, SDC is responsible for the overall coordination of development activities and cooperation with Eastern Europe, as well as for the humanitarian aid delivered by the Swiss Confederation. The goal of development cooperation is that of reducing poverty. It is meant to foster economic self-reliance and state autonomy, to contribute to the improvement of production conditions, to help in finding solutions to environmental problems, and to provide better access to education and basic healthcare services.

PROFOR

The Program on Forests (PROFOR) (www.profor.info) is a multi-donor partnership managed by a core team at the World Bank. PROFOR finances forest-related analysis and processes that support the following goals: improving people's livelihoods through better management of forests and trees; enhancing forest governance and law enforcement; financing sustainable forest management; and coordinating forest policy across sectors. In 2013, PROFOR's donors included the European Commission, Finland, Germany, Italy, Japan, the Netherlands, Switzerland, the United Kingdom, and the World Bank.

The Grantham Foundation for the Protection of the Environment

The Grantham Foundation for the Protection of the Environment is dedicated to protecting and improving the health of the global environment. The Foundation seeks to raise awareness of urgent environmental issues and supports individuals and organizations working to find solutions. To achieve these goals it supports communication and collaboration in environmental protection, with an emphasis on climate change.

Collaborators

The China Eco-compensation Policy Research Center (CEPRC), established in May 2013, is a joint effort between China Agricultural University and the National Development and Reform Commission, with seed funding provided by the Asian Development Bank. The purpose of the center is to better link ecosystem services providers with beneficiaries via "eco-compensation" policies and programs (a Chinese environmental policy innovation with characteristics similar to Payments for Ecosystem Services), and to promote environmentally sustainable and regionally balanced and inclusive economic development in China. The center is fundamentally a research institute and network, committed both to theoretical research on eco-compensation and the development of case studies and policy research to better capture lessons learned, as well as to help bring together environmental experts, policy makers and practitioners to share knowledge and environmental policy innovations.

The Department of Forest and Rangeland Stewardship at Colorado State University consists of individuals representing a diverse range of expertise and interests in the sustainable management of forests and rangelands and their associated resources. We engage in cutting-edge research and active knowledge exchange with professional managers, stakeholders, and communities. The Department offers comprehensive undergraduate and graduate programs in a wide variety of disciplines within forestry, natural resources management, and rangeland ecology." Participation in the *State of Watershed Investment* data collection research was supported by the Agricultural Experiment Station at Colorado State University.

EcoDecisión, established in 1995, is a socially-oriented company dedicated to developing new ways to finance conservation. EcoDecision is a pioneer in the emerging ecosystem services markets of climate change mitigation, water source protection and biodiversity conservation. By developing creative mechanisms to realize tangible value for stakeholders the company seeks to mobilize investment to conserve invaluable, functioning natural ecosystems in the tropics. These efforts draw on emerging markets for ecosystem services and help put appropriate mechanisms in place to catalyze new finance, providing benefits for nature and its stewards.

ETIFOR is an independent spin-off of Padova University and works to turn scientific knowledge into practical solutions in four areas of intervention: forest certification and supply chain, climate change and ecosystem services, rural development, and international cooperation. We apply ethics and environmental economics to multi-disciplinary natural resource consultancy and project management.

FOREST TRENDS

The Family of Forest Trends Initiatives

Ecosystem Marketplace

A global platform for transparent information on ecosystem service payments and markets

Water Initiative

Protecting watershed services through markets and incentives that complement conventional management

Forest Trade & Finance

Bringing sustainability to trade and financial investments in the global market for forest products

BBOP

Business and Biodiversity Offsets Program, developing, testing and supporting best practice in biodiversity offsets

the katoomba group

Building capacity for local communities and governments to engage in emerging environmental markets

Communities and Markets

Supporting local communities to make informed decisions regarding their participation in environmental markets, strengthening their territorial rights

MARES

Marine Ecosystem Services Program

Using innovative financing to promote the conservation of coastal and marine ecosystem services

Public-Private Co-Finance Initiative

Creating innovative, integrated, and efficient financing to support the transition to low emissions and zero deforestation land use

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