State of Green Infrastructure Investment in the Water Sector

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FOREST TRENDS

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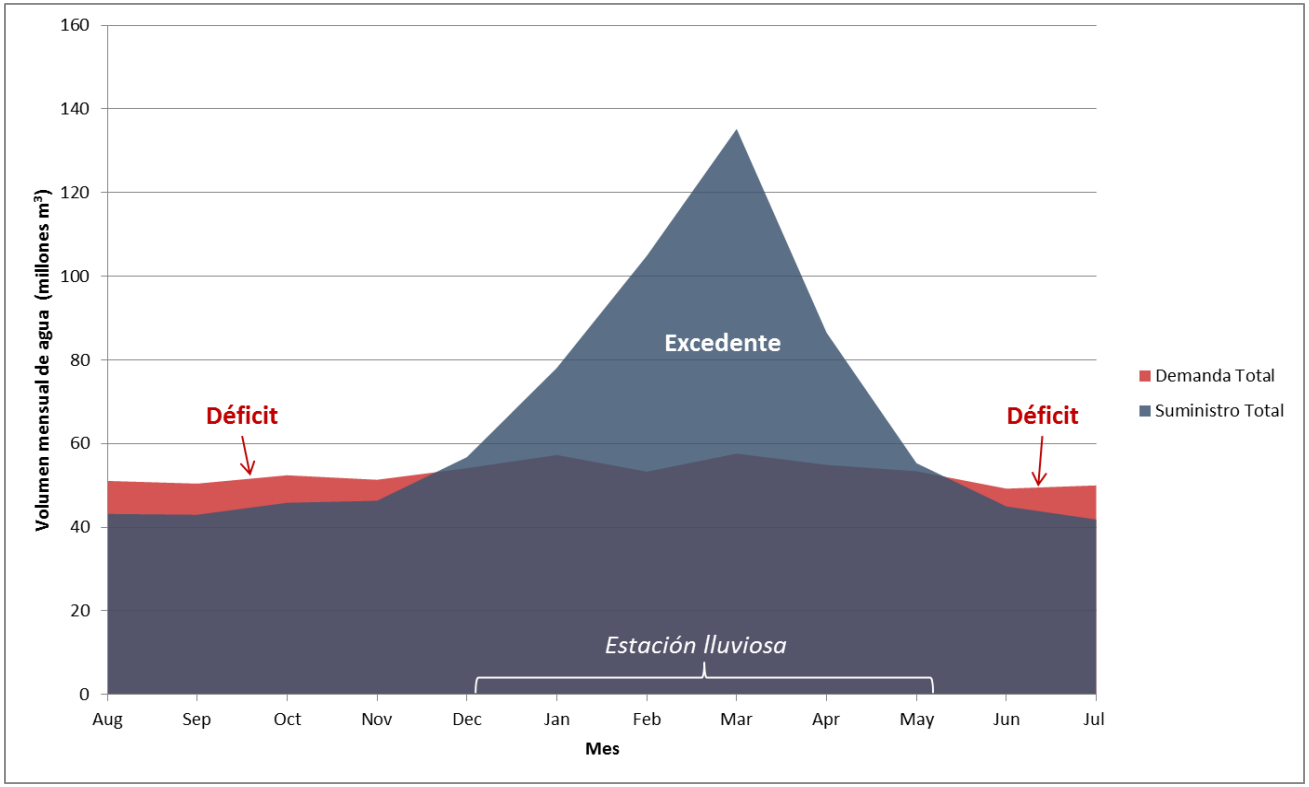
6 CLEAN WATER AND SANITATION

By 2030:

- **6.1:** universal access to **safe & affordable drinking water for all**
- **6.2:** adequate & equitable **sanitation & hygiene for all**
- **6.3: reducing pollution, wise reuse**-recycling
- **6.4:** increase water use efficiency, sustainable withdrawals, **reduce number people suffering water scarcity**
- **6.5: implement IWRM** at all levels
- **6.6: protect & restore water-related ecosystems**, mountains, forests, wetlands, rivers, aquifers….

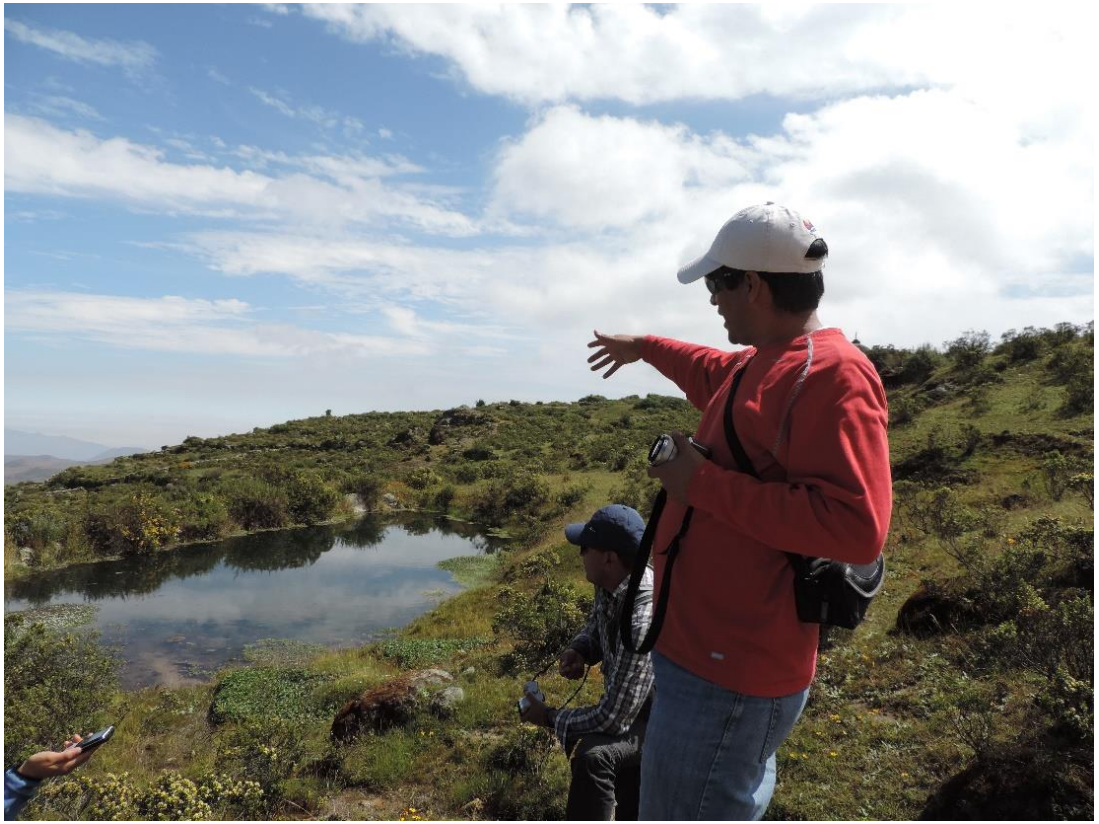
Climate change makes water resources management even more important



Oferta y demanda de agua para la cuenca del Rio Rimac.

Fuente: Gammie y De Bievre (2014); datos del Ministerio de Agricultura de Perú, 2010.

By maintaining and enhancing ecosystem services, **green infrastructure** helps to optimize water resources management



Green Infrastructure for Water

Forests, Wetlands, Grasslands, Rivers, Lakes

Constructed Wetlands (water treatment); Green Roofs, Green Streets; Bio-engineered Shoreline Protection

Natural or nature-based systems that perform the same functions as built or gray infrastructure: regulating supply, storage, filtration & treatment. *Can be an altnernative or complement to gray infrastructure.*

Protected Ecosystem → Restored / Managed Ecosystem → Created (Hybrid) / Green Engineering → Built or Gray Infrastructure

Reforestation; River, Floodplain, Wetland Restoration; Sustainable Forestry or Agroforestry; Ecological Agriculture; Silvopastoral Systems; Sustainable Aquaculture

Water Treatment Plants, Storage Reservoirs, Desalination Plants, Wastewater Treatment Plants, Urban Drainage Systems, Flood Barriers

The benefits of green infrastructure

Table 2 Overview of GI solutions relevant for water resources management. Solutions marked with '*' consist of built ('grey') elements that interact with natural features and seek to enhance their water-related ecosystem services.

Water management issue (Primary service to be provided)		Green Infrastructure solution	Location				Corresponding Grey Infrastructure solution (at the primary service level)
			Watershed	Floodplain	Urban	Coastal	
Water supply regulation (incl. drought mitigation)		Re/afforestation and forest conservation	■				Dams and groundwater pumping Water distribution systems
		Reconnecting rivers to floodplains		■			
		Wetlands restoration/conservation	■	■	■		
		Constructing wetlands	■	■	■		
		Water harvesting*	■	■	■		
		Green spaces (bioretention and infiltration)			■		
		Permeable pavements*			■		
Water quality regulation	Water purification	Re/afforestation and forest conservation	■				Water treatment plant
		Riparian buffers		■			
		Reconnecting rivers to floodplains		■			
		Wetlands restoration/conservation	■	■	■		
		Constructing wetlands	■	■	■		
		Green spaces (bioretention and infiltration)			■		
		Permeable pavements*			■		
	Erosion control	Re/afforestation and forest conservation	■				Reinforcement of slopes
		Riparian buffers		■			
		Reconnecting rivers to floodplains		■			
	Biological control	Re/afforestation and forest conservation	■				Water treatment plant
		Riparian buffers		■			
		Reconnecting rivers to floodplains		■			
		Wetlands restoration/conservation	■	■	■		
		Constructing wetlands	■	■	■		
	Water temperature control	Re/afforestation and forest conservation	■				Dams
		Riparian buffers		■			
		Reconnecting rivers to floodplains		■			
		Wetlands restoration/conservation	■	■	■		
		Constructing wetlands	■	■	■		
		Green spaces (shading of water ways)			■		

Source: UNEP (2014). Green Infrastructure Guide for Water Management

The benefits of green infrastructure

Table 2 Overview of GI solutions relevant for water resources management. Solutions marked with '*' consist of built ('grey') elements that interact with natural features and seek to enhance their water-related ecosystem services.

Water management issue (Primary service to be provided)		Green Infrastructure solution	Location				Corresponding Grey Infrastructure solution (at the primary service level)
			Watershed	Floodplain	Urban	Coastal	
Moderation of extreme events (floods)	Riverine flood control	Re/afforestation and forest conservation	■				Dams and levees
		Riparian buffers		■			
		Reconnecting rivers to floodplains		■			
		Wetlands restoration/conservation	■	■	■		
		Constructing wetlands	■	■	■		
		Establishing flood bypasses		■			
	Urban stormwater runoff	Green roofs			■		Urban stormwater infrastructure
		Green spaces (bioretention and infiltration)			■		
		Water harvesting*	■	■	■		
		Permeable pavements*			■		
	Coastal flood (storm) control	Protecting/restoring mangroves, coastal marshes and dunes				■	Sea walls
		Protecting/restoring reefs (coral/oyster)				■	

Source: UNEP (2014). Green Infrastructure Guide for Water Management

Green Infrastructure Benefits

Water Sector:

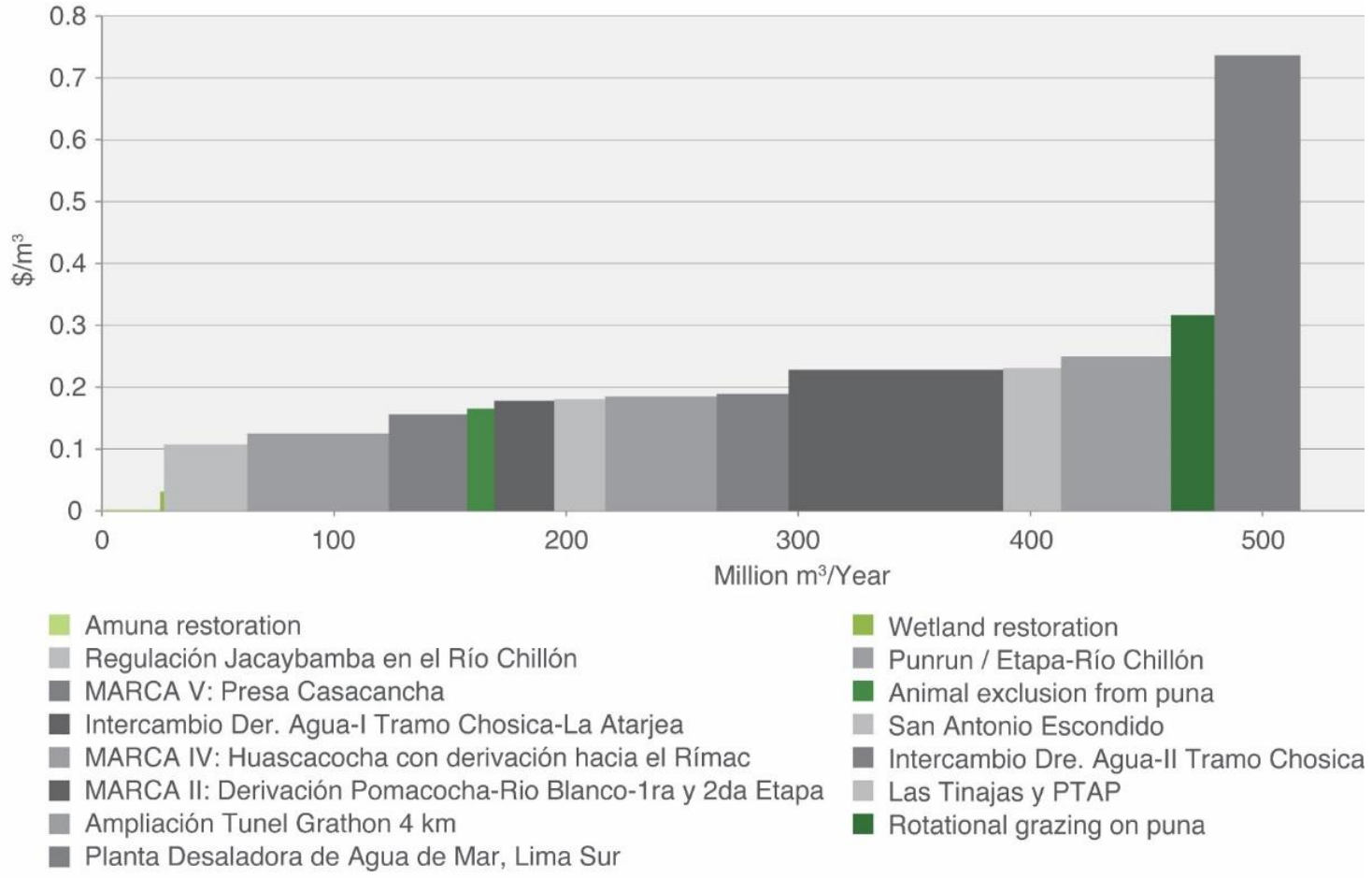
- Avoided capital costs
- Reduced operating costs (e.g., raw water quality)
- 'No regrets' strategies
- More resilient water systems (e.g., reduced flood risks to WTPs)
- More reliable, sustainable supplies (dry season flows, groundwater recharge)

Other Sectors:

- ✓ Reduced flood damages (roads, bridges, energy facilities)
- ✓ Cleaner air (healthier air)
- ✓ GHG reductions, climate adaptation
- ✓ Cleaner water (health water borne diseases)
- ✓ Improved agricultural productivity
- ✓ Rural livelihoods
- ✓ Economic opportunities (eco-tourism, certified agricultural products)

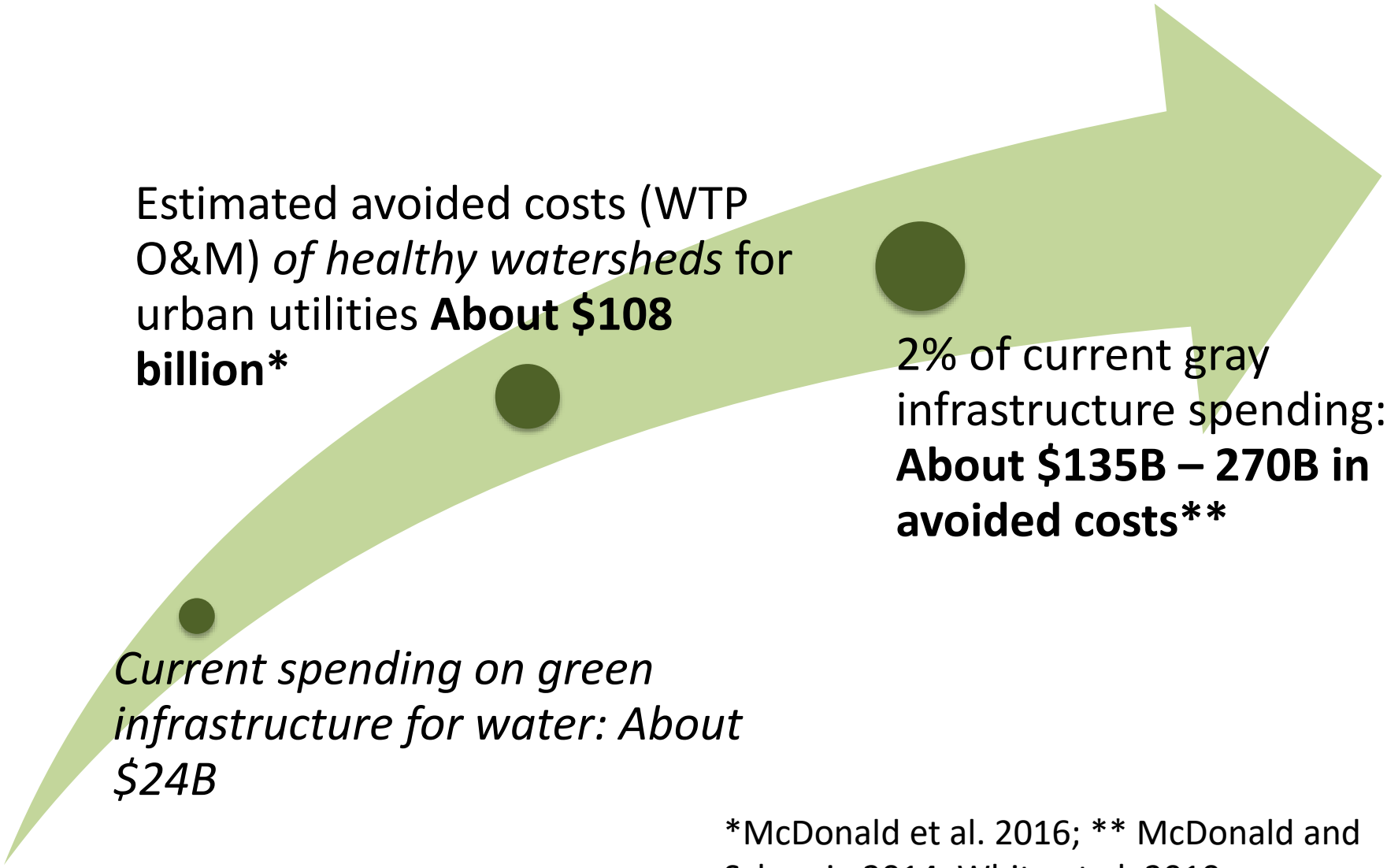
Our ability to quantify the benefits of green infrastructure is improving significantly

Figure: Cost-effectiveness of green and gray strategies for closing the water supply gap for Lima, Peru



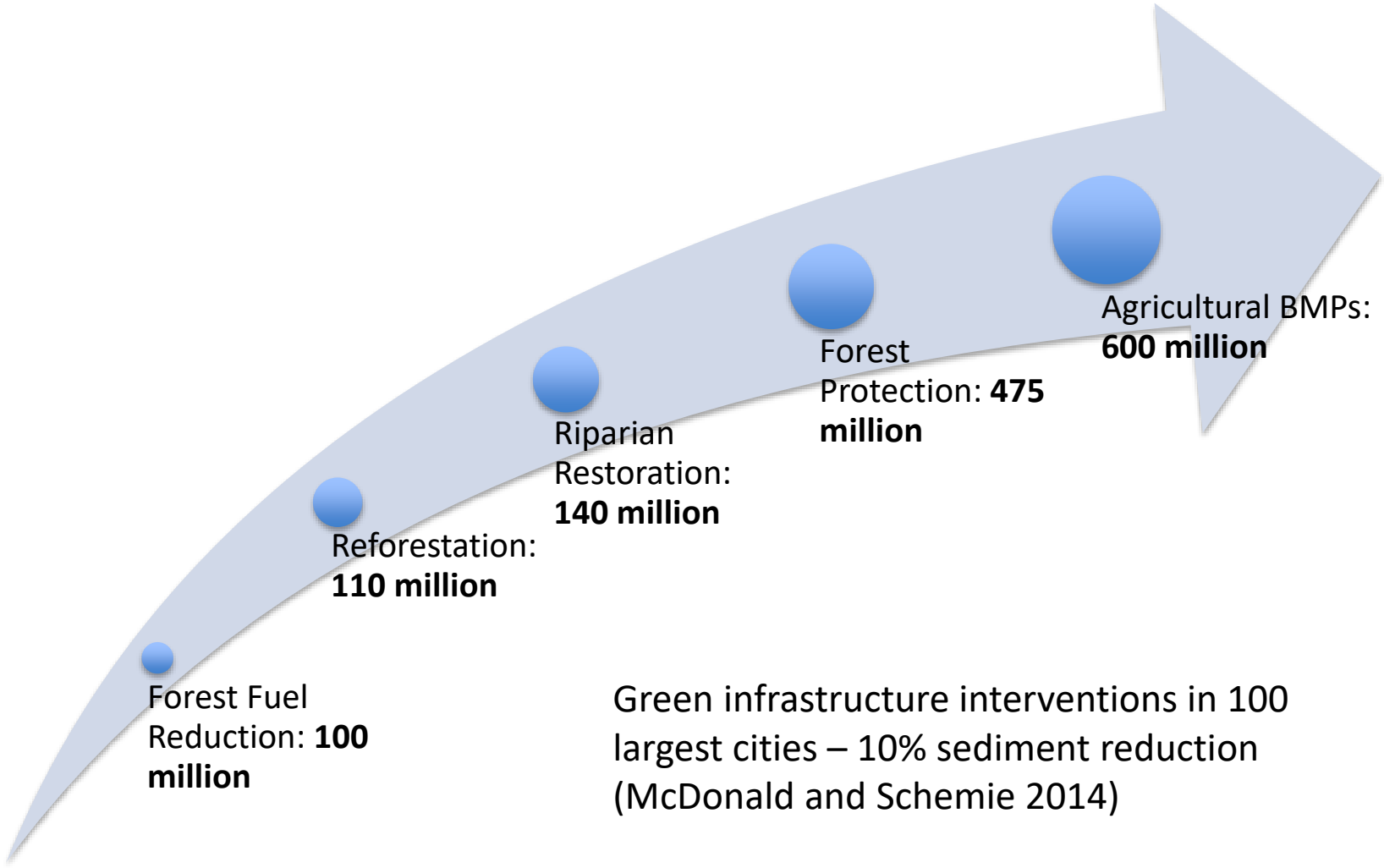
Fuente: Analisis de Forest Trends, CONDESAN, Aquafondo, Kieser & Associates, & SUNASS (2015).

Potential Scale: Cost Savings



*McDonald et al. 2016; ** McDonald and Schemie 2014, White et al. 2010

Number People Benefitting: Water Quality Improvements

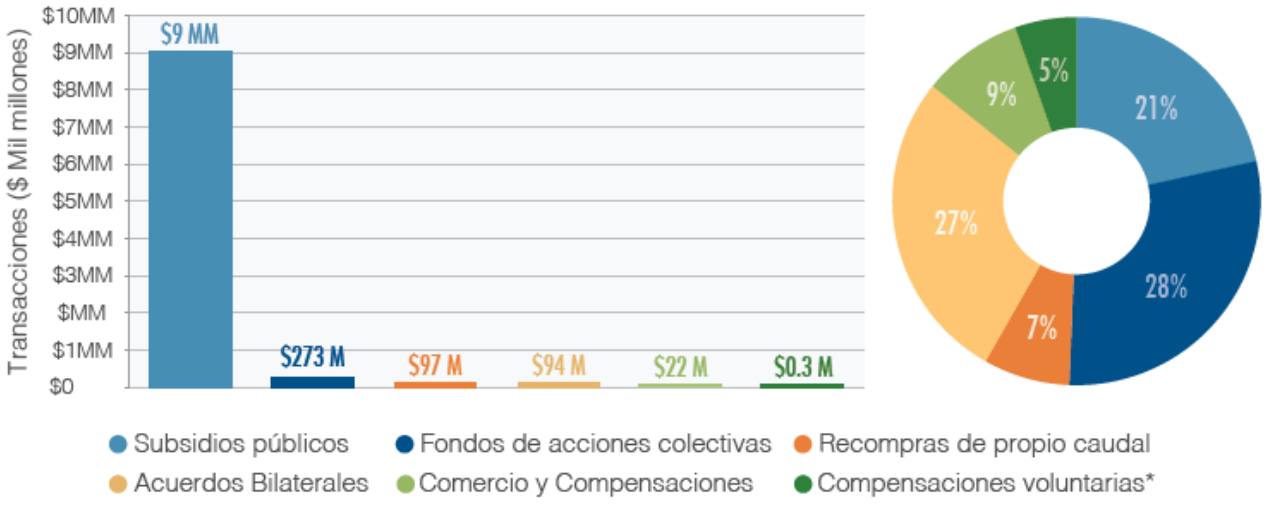


Green infrastructure interventions in 100 largest cities – 10% sediment reduction (McDonald and Schemie 2014)

El subsidio publico ha dominado el valor invertido, pero los otros modelos representan mas de 75% del *numero* de programas

Figura 4: Comparación entre Tipos de Programas por Valor y Prevalencia, 2013

(Valor: $ Transados en 2013, y Prevalencia: # de Programas Activos/Piloto)



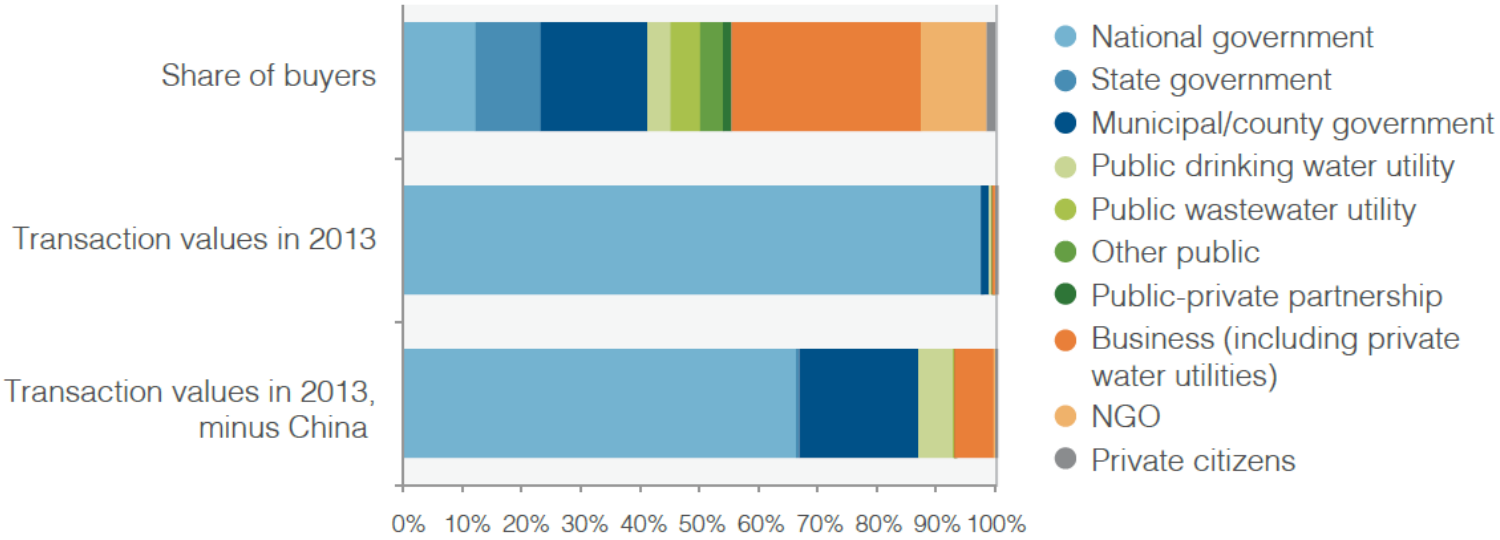
*Nota: 'Compensaciones Voluntarias' se refiere a pagos hechos por compañías para actividades que compensen simbólicamente sus impactos - como el volúmen de agua usado.

Fuente: Forest Trends Ecosystem Marketplace. *El Estado de las Inversiones en Protección Hídrica 2014.*

Los usuarios del agua están entrando cada vez más al entender sus riesgos hidricos

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

(Share of buyers, share of value transacted)

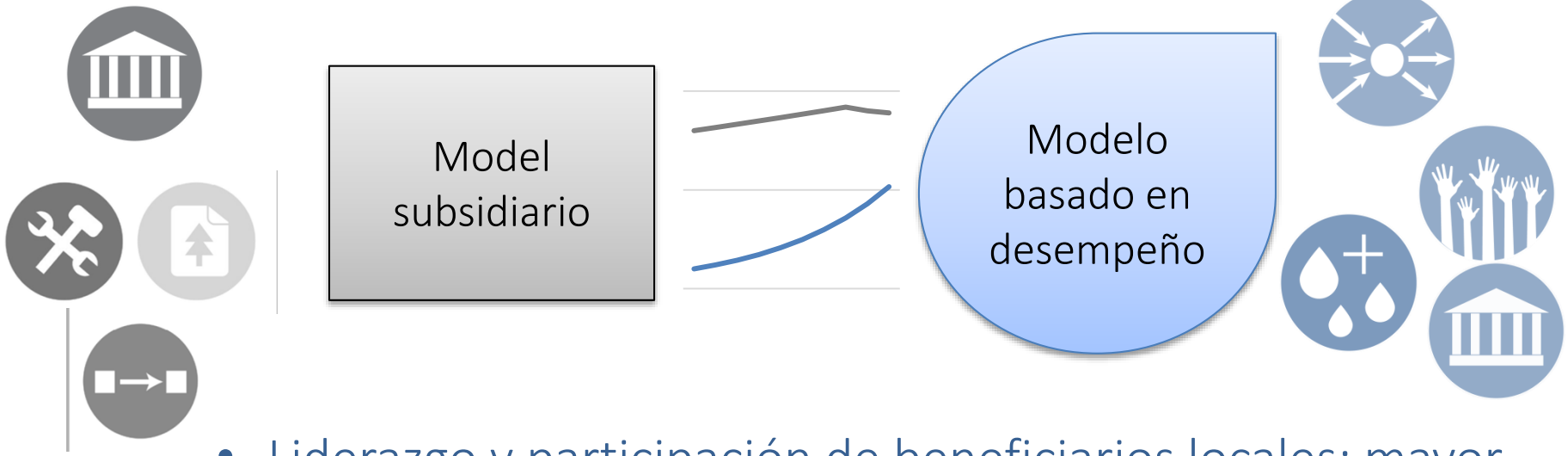


Source: Forest Trends' Ecosystem Marketplace. *State of Watershed Investment 2014*.

Los usuarios del agua están entrando cada vez más al entender sus riesgos hidricos

ASOCIACIÓN DE ENTES REGULADORES DE AGUA Y SANEAMIENTO DE LAS AMERICAS

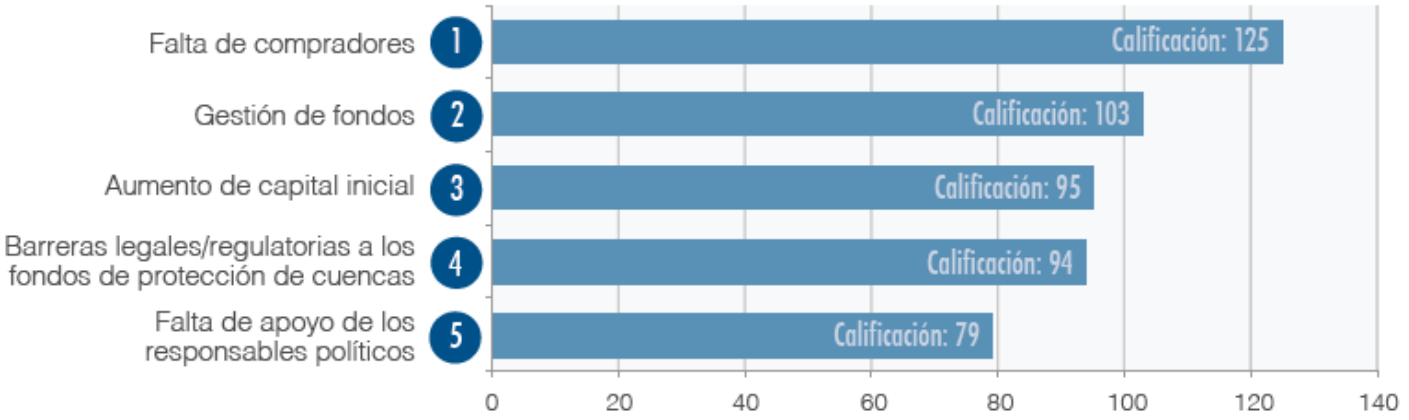
Tendencias en los mecanismos financieros para los servicios ecosistémicos



- Liderazgo y participación de beneficiarios locales; mayor participacion de empresas (públicas y privadas)
- Más enfasis en el desempeño hidrológico en el diseño, priorización y evaluación de proyectos/inversions
- Inversiones más conectados con procesos participativos de planificacion de cuencas

Insumos necesarios y desafíos para el nuevo modelo basado en desempeño y impulso local

Figura 10: Top Cinco Desafíos Reportados por Desarrolladores de los Programas



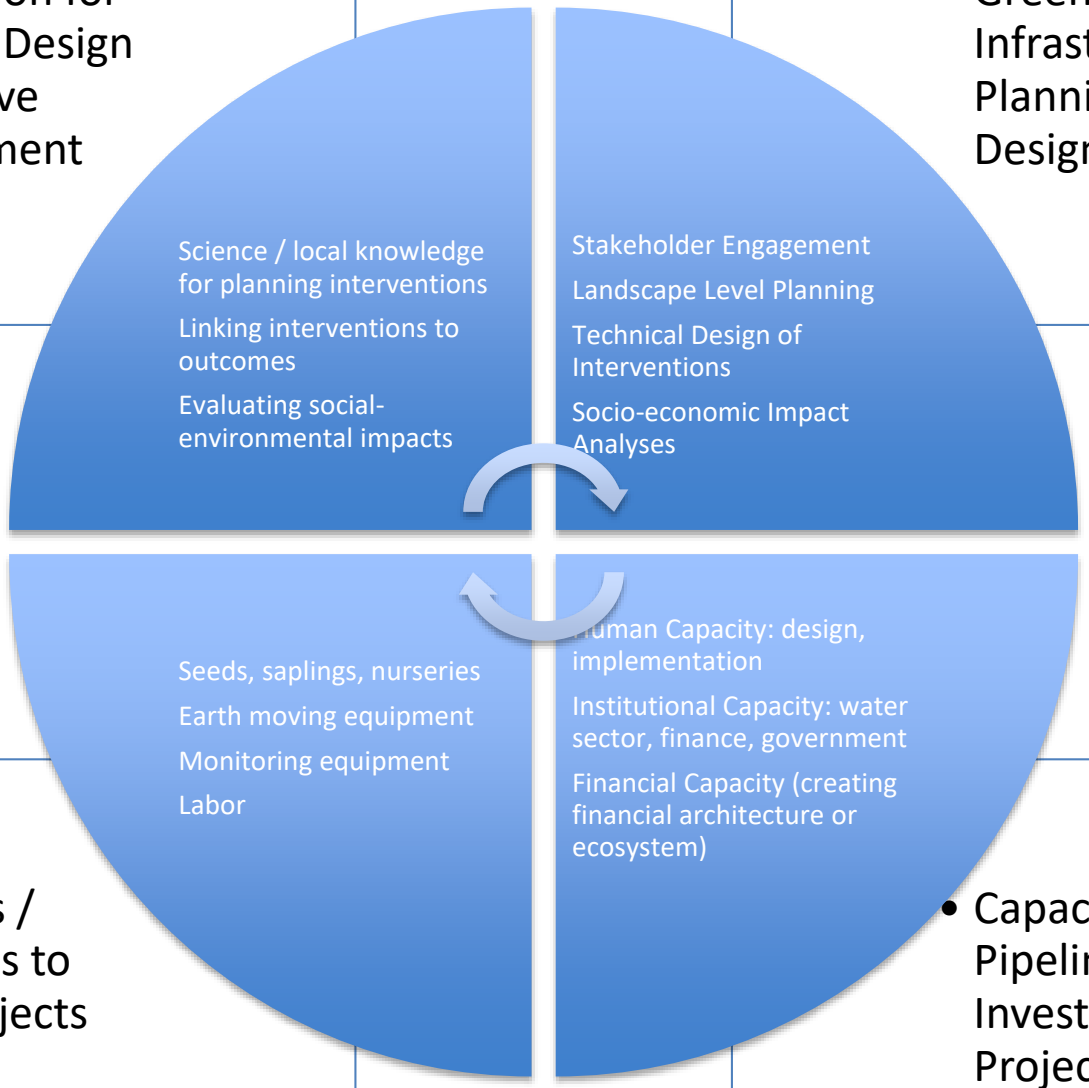
Nota: Los datos sobre los desafíos de los programas fueron calculados en base al numero de programas que reportaron el desafío., multiplicado por el ranking (1-5) asignado por los encuestados. Para este grupo de encuestados, teóricamente el mayor puntaje posible fue 415.

Fuente: Forest Trends Ecosystem Marketplace. *El Estado de las Inversiones en Protección Hídrica 2014.*

Upfront financing needed for green infrastructure projects – matching supply to demand

- Information for Strategic Design & Adaptive Management

- Green Infrastructure Planning & Design

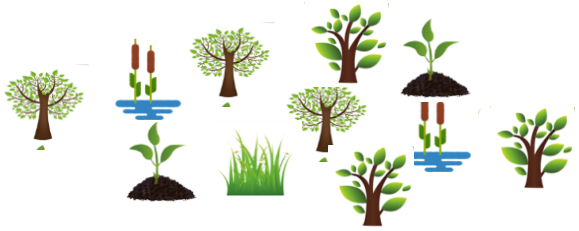


- Materials / Resources to Build Projects

- Capacity to Build Pipelines of Investable Projects

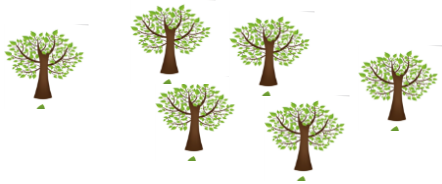
Barriers to Attracting Financial Investments

Watershed A

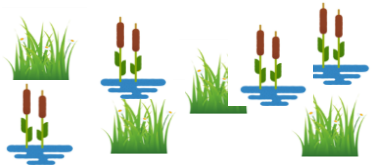


Watershed B

Watershed C



Watershed D



Lack of 'investable' projects:

- Small scale, diversity of project types, many individual 'projects'
- Range of complexity
- Poor understanding of risk/return
  - Uncertainties around performance
  - Time lags to performance
- Uncertain / volatile future revenues
- **Utilities do not own green assets**
- Time to pay-back/ROI

Key Questions for Green Infrastructure Investments – Water Sector

- Moving from small, one-off projects to project pipelines ('green infrastructure factories') at scale
- Diversifying and de-risking revenue streams from green infrastructure
- Financial institutions or consortia that specialize in green infrastructure finance (GI Financing Facilities)
- Developing the human and institutional capacity in the water sector to scale green infrastructure

¡GRACIAS!

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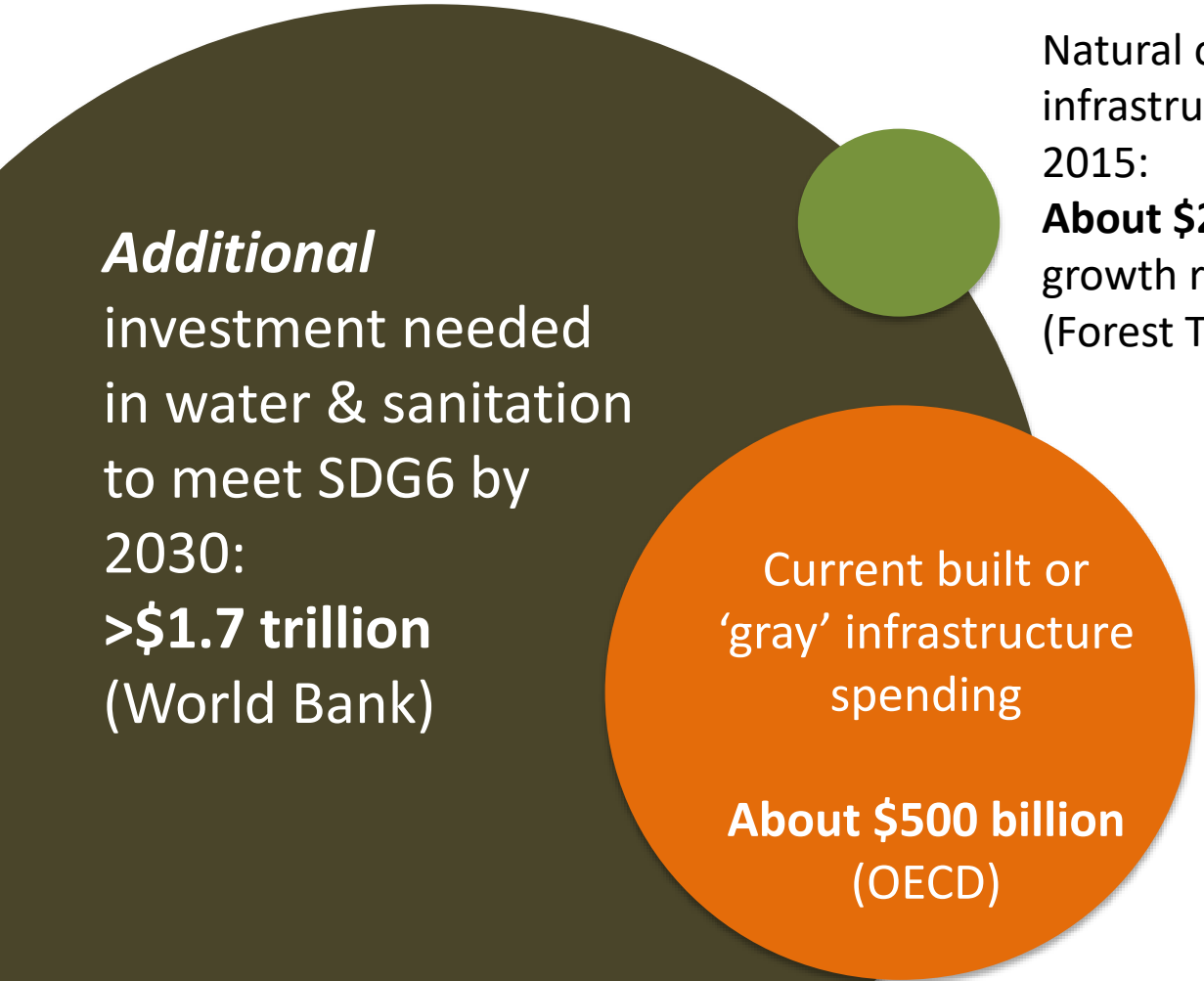
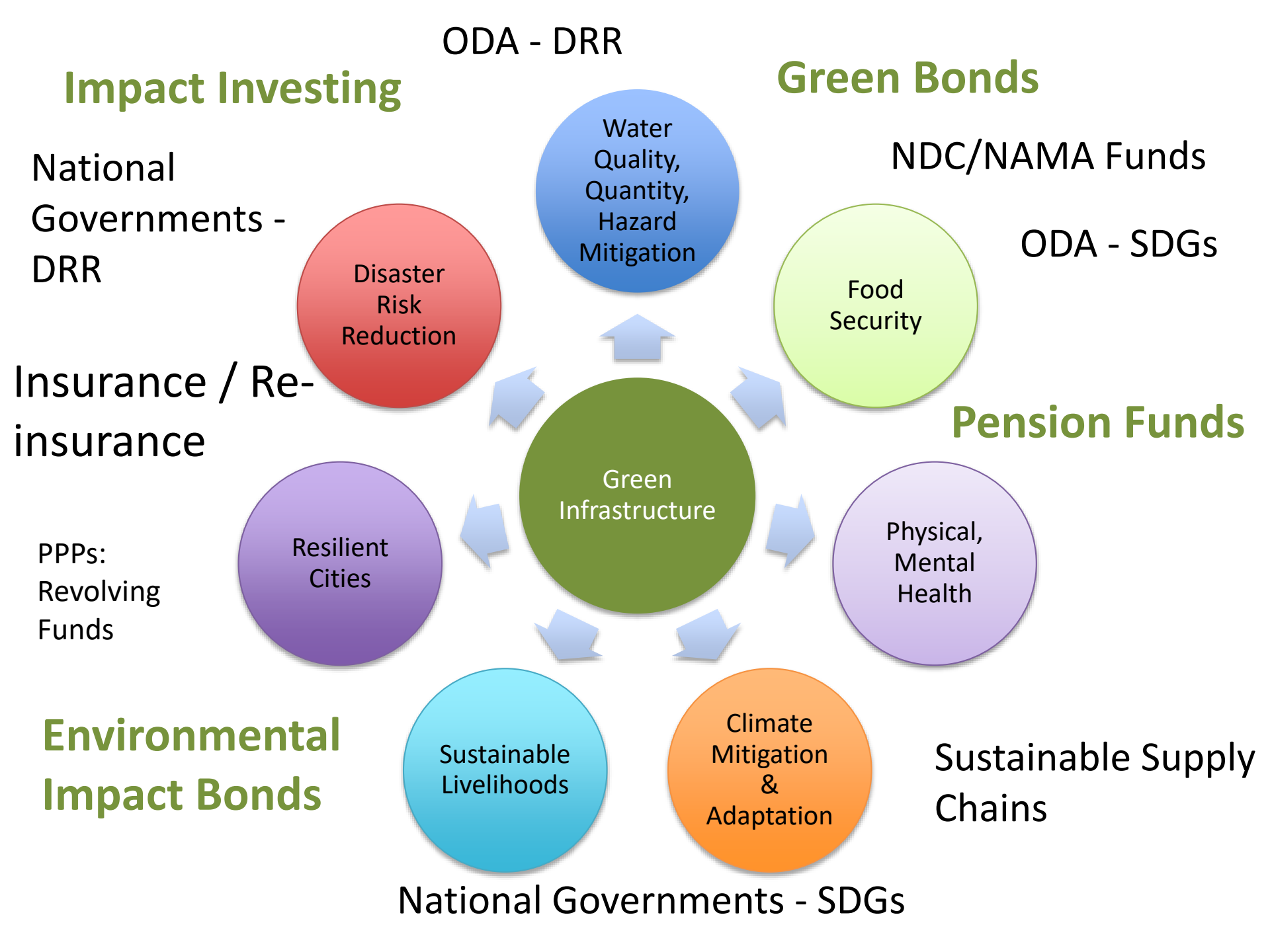
Can ‘green’ investments address the water infrastructure funding gap?



Natural or ‘green’ infrastructure for water in 2015:
About $20+ billion; 11+% growth rate past 10 years (Forest Trends)


ODA - DRR
Impact Investing
Green Bonds
National Governments - DRR
NDC/NAMA Funds
ODA - SDGs
Water Quality, Quantity, Hazard Mitigation
Disaster Risk Reduction
Food Security
Insurance / Re-insurance
Pension Funds
Green Infrastructure
Resilient Cities
Physical, Mental Health
PPPs: Revolving Funds
Environmental Impact Bonds
Sustainable Livelihoods
Climate Mitigation & Adaptation
Sustainable Supply Chains
National Governments - SDGs