Good practices for nature and beyond

Nature-based Climate Solutions for urban and rural landscapes (NBS)

Nature for Water
Local solutions. Global impact.

The Nature Conservancy

PEGASYS
CHANGING LIVES CHANGING WORLDS

Plan for this session

1. **Presentation: global NbS practices and lessons**
   20 minutes
2. **Case study: context, overview, and questions**
   10 minutes
3. **Case study: group work and presentations**
   40 minutes
4. **Presentation: summary, examples, and Q&A**
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The Nature Conservancy is a leading global conservation organisation whose mission is to protect the lands and waters on which all life depends

We have more than 6,000 staff and are active in over 70 countries.

Our goals by 2030:

100M
People with improved adaptation to climate change

1M
Km of rivers conserved or improved

4B
Hectares of land conserved or improved

Pop quiz: why is our logo an Oak leaf?

Nature-based Solutions

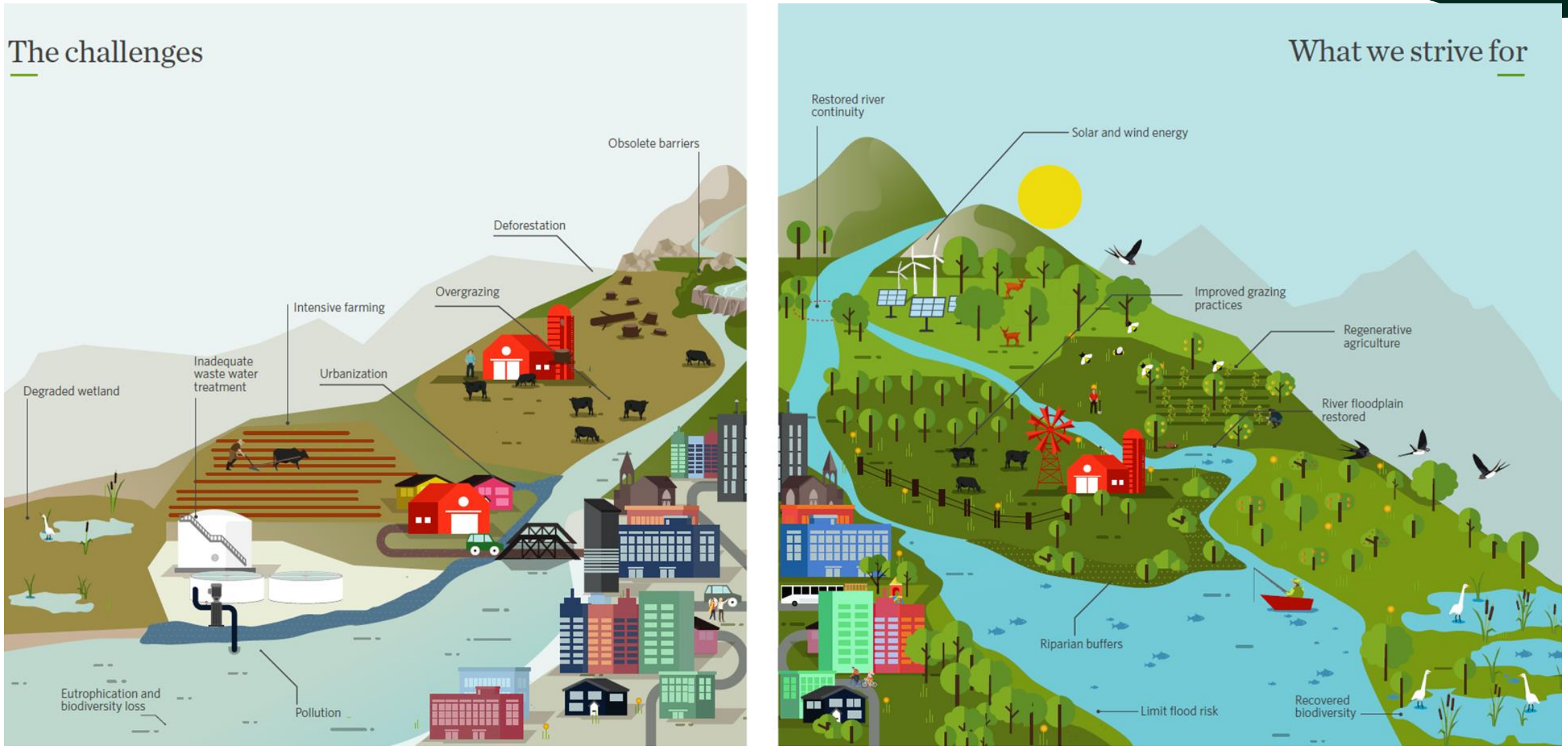
Nature-based Solutions are "actions to protect, sustainably manage and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits" (IUCN, 2016)

Ecosystem services are the benefits provided to people, both directly and indirectly, by ecosystems and biodiversity.

Types of ecosystem services

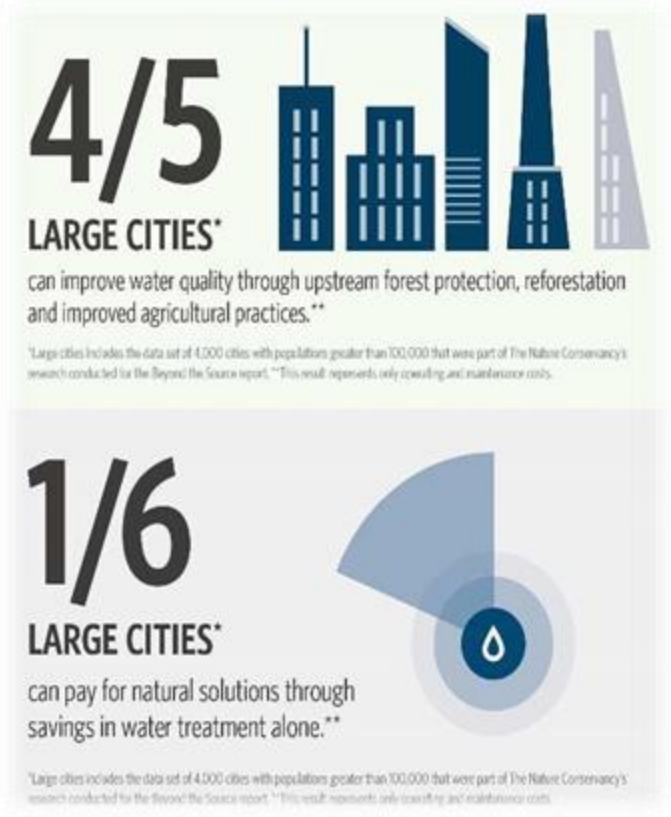
Provisioning	Regulating	Cultural	Supporting
Benefits to people that are **extracted from nature**	Processes that **moderate natural phenomena**	**Non-material** contributions to **development / culture**	**Produce / maintain** all other ecosystem services
• Water (quantity and quality) for consumptive use (e.g. drinking; agric.; industry) • Water for nonconsumptive use (e.g. generating power; transport/navigation) • Aquatic organisms for food and medicines	• Maintenance of water quality (e.g. natural filtration and treatment) • Buffering of flows, erosion control through water/land interactions • Flood and fire control	• Recreation / Tourism • Existence values (e.g. personal satisfaction form free-flowing rivers)	• Nutrient cycling (e.g. soil / floodplain fertility) • Predator/prey relationships • Ecosystem resilience to climate change

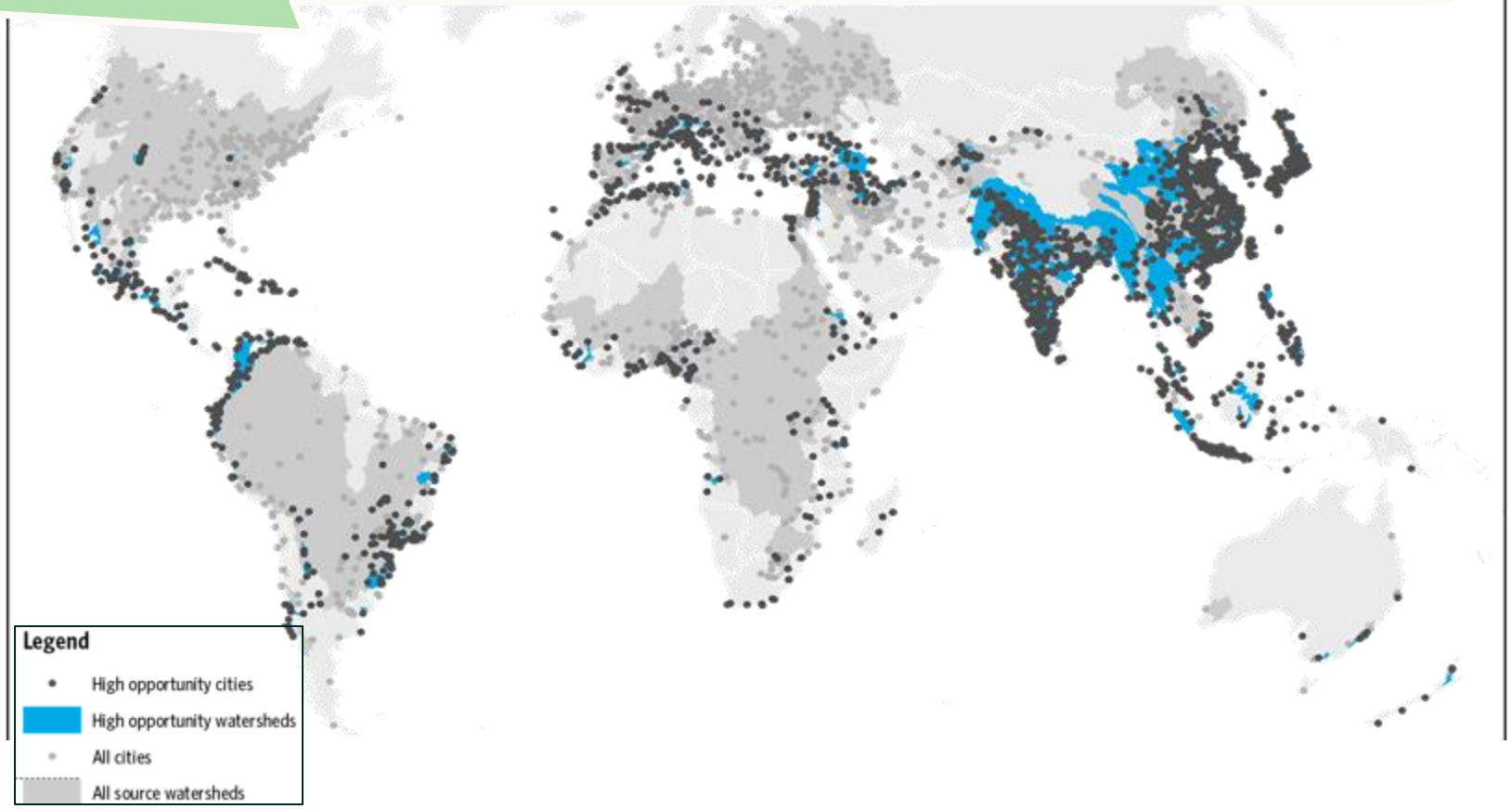
But these services are threatened



The ROI case – water treatment costs

- **2000 cities** could generate a positive ROI if they invested at scale in NBS in their watersheds, just looking at the treatment cost of sediment and nutrients – potentially impacting **664 million people around the world**
- This would be possible for half of all cities for **less than $2/person/year**
- **Asia's short rivers and dense population make this particularly true here!**





New York City example

New York City

- Production and distribution of drinking water to 8m people.
- Need to ensure compliance with the Safe Drinking Water Act.

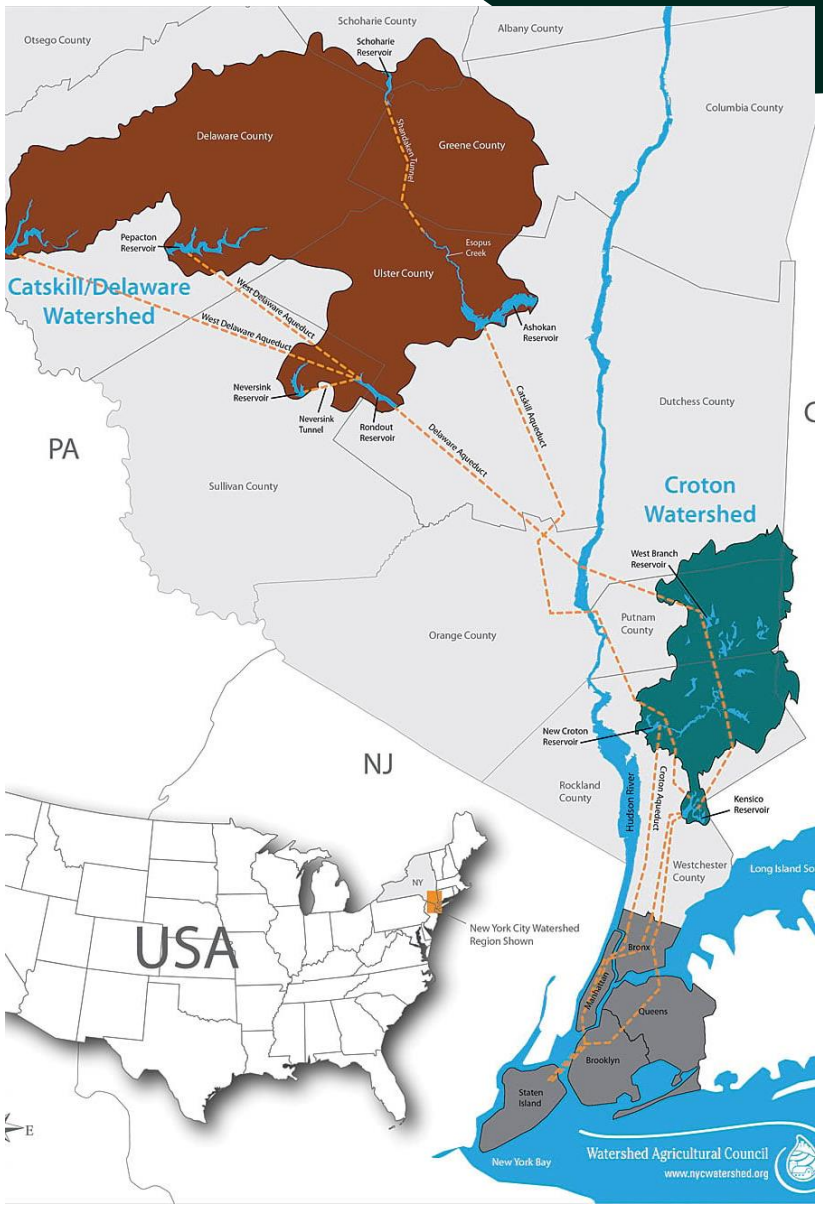
NbS implemented

$1.5 billion for NbS over 10yrs for the NYC Watershed Agreement

- **Improvement of agricultural practices** (nutrient control, manure management)
- **Ecosystem protection**, notably through land acquisition

Results:

- NY's drinking water quality is among the best in the world
- 300 MUSD annual savings compared to the cost of a new treatment plant



And some other examples...

6.7:1 benefit–cost ratio

Norfolk

WRE
WATER RESOURCES EAST

1/10 the cost per m^3 of water vs. alternatives

Cape Town

WaterFunds for Africa

US$2bn saved cost in recovery / damages

Washington

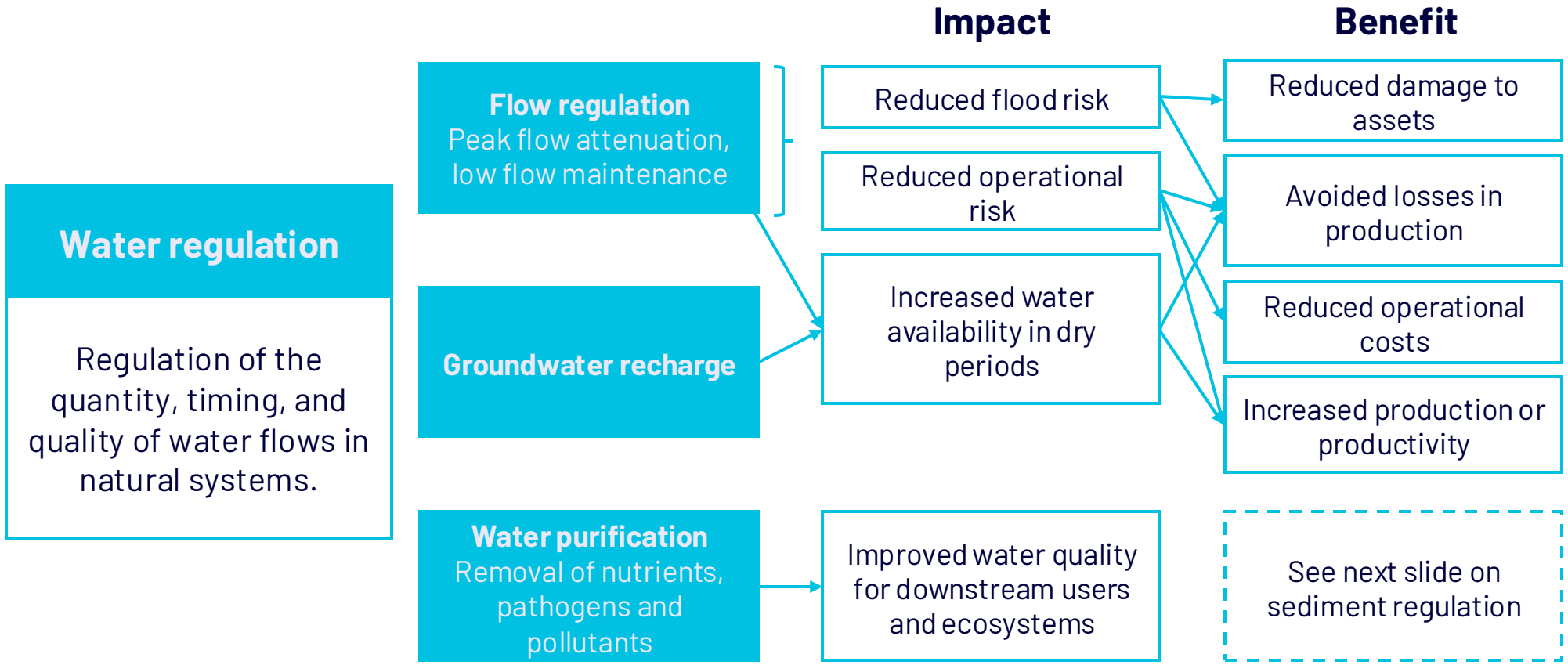
(Floodplains by Design)

NbS combo with & supporting grey infra.

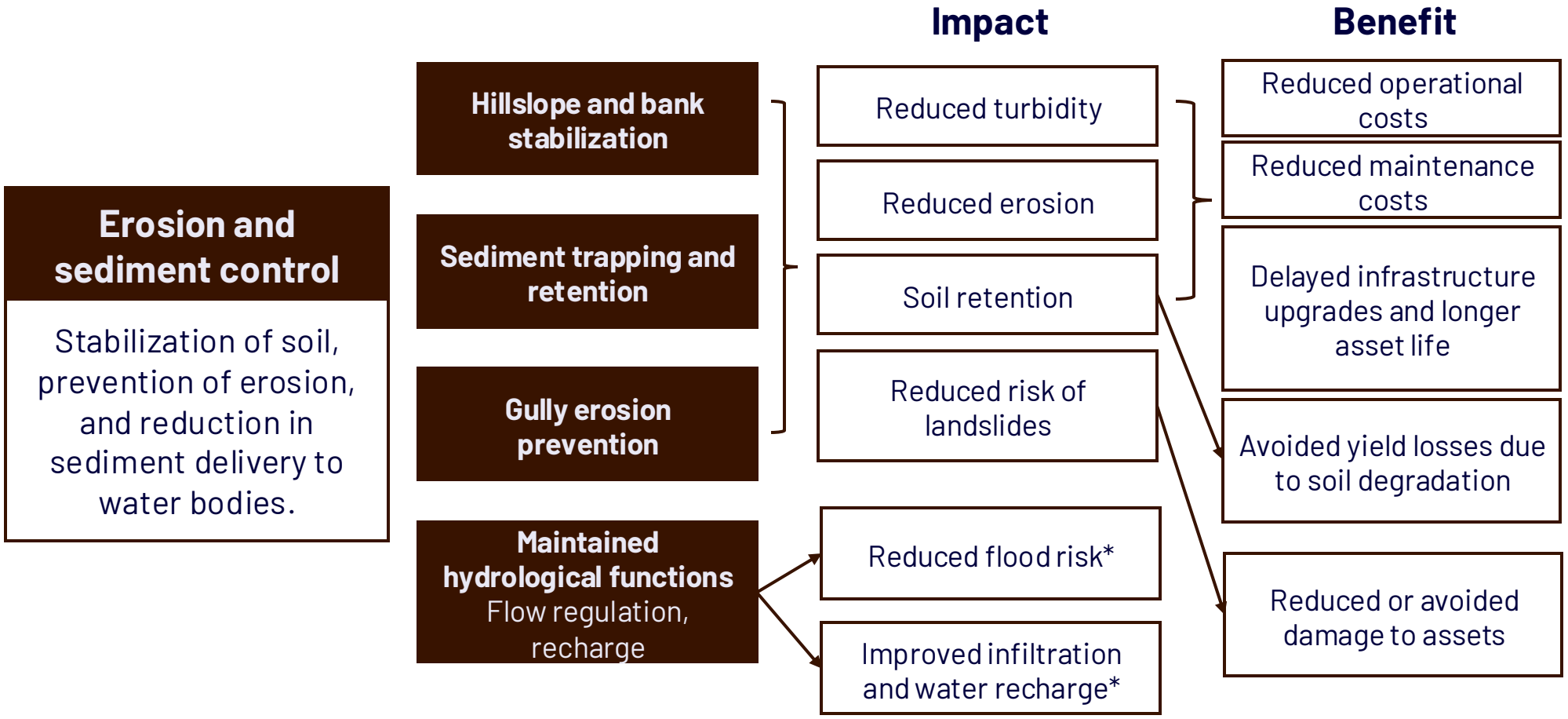
Support *Support*

Example ecosystem-only NbS	Example human/natural NbS	Example grey infrastructure
 Protection of natural areas	 Best agricultural practices	 Water treatment plants
 Restored wetlands	 Riparian buffer zones	 Flood defences
 Removing invasive plants	 Sustainable urban drainage	 Dams and reservoirs

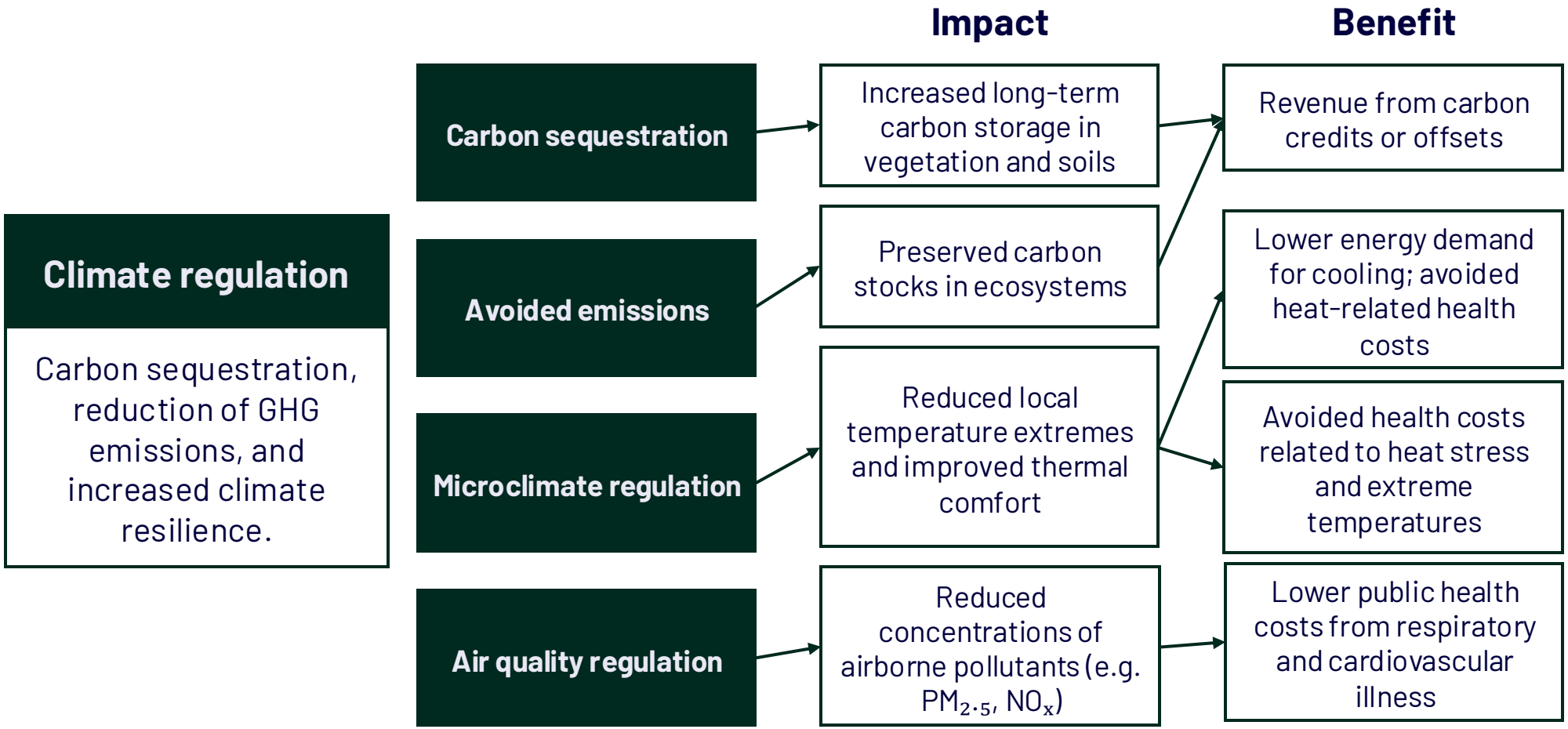
Example: water flow regulation



Example: erosion & sediment



Example: climate



Why do NbS need scale?

Larger land area improves effectiveness & climate resilience
NbS typically require large-area deployment to deliver expected benefits & resiliency.

Cumulative & synergistic multiplier effects
Multiple interventions interact to enhance ecosystem services.

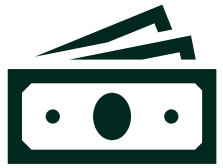
Effective management and maintenance
Programs intentionally built for scale will be more effectively managed in the long-term.

Key considerations for scale

1. **Stakeholders**: Building local engagement and ownership

2. **Governance:** Finding the right vehicle and processes

3. **Operations:** Implementing, maintaining and managing at scale



4. **Funding:** Devising and securing a long-term funding strategy

Stakeholders

Building local engagement and ownership

- ✓ **Identify and involve** key constituents and constituencies.
- ✓ Understand local needs / goals / priorities, and **create a common vision**.
- ✓ Several **technical and social viewpoints** are important to design & implement NbS, especially large-scale behavioral activities.
- ✓ Use best-available science and socio-economic methods and modelling to **quantify benefits, prioritize interventions, and generate trust**.
- ✓ Appraise relevant **non-monetizable co-benefits** (e.g. biodiversity).
- ✓ **Careful balance** between "many hands make light work" and "too many cooks spoil the broth".

Governance

Finding the right vehicle and processes

- ✓ Create a **shared vision for the role of NbS** in the landscape.
- ✓ Develop **transparent and inclusive decision-making** procedures.
- ✓ **Build capacity** to manage funds from diverse public and private sources.
- ✓ Establish **transparent rules** for fund allocation, accountability, and reporting.
- ✓ Promote **scalable and adaptative management**.
- ✓ Structure the **NbS delivery and management "engine"** within the local context.

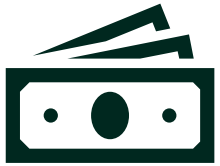
Operations

Developing program management capacity and implementing/maintaining at scale

- ✓ Create a **well-structured system to prioritise, plan, and execute** NbS implementation and maintenance.
- ✓ Ensure that robust **monitoring and evaluation** tools are in place, which respond to funder and stakeholder needs, and contribute to strategic decision-making.
- ✓ **Engage key delivery and governance partners**, including communities.
- ✓ Build sufficient **technical capacity** so that the program can be sustainable.
- ✓ Think through **the entire "NbS supply chain"**.

This rarely exists locally and often requires TA to work with local partners to design and implement the processes and tools that will translate into at-scale NbS outcomes.

Funding



Devise and secure a long-term funding strategy

- ✓ Build a **compelling, at-scale 'project offer'** which offers **meaningful benefits** and can **attract and then deploy large-scale funding**.
- ✓ Ensure funding models account for the **entire lifecycle of NbS**, from design to implementation to ongoing maintenance and monitoring.
- ✓ **Secure and blend a mix** of public, private, and philanthropic funds to create financial stability.
- ✓ **Engage the 'beneficiaries'** identified in your economic and other analyses to explore funding options.
- ✓ Develop structural funding mechanisms to create **recurring, predictable resources**.

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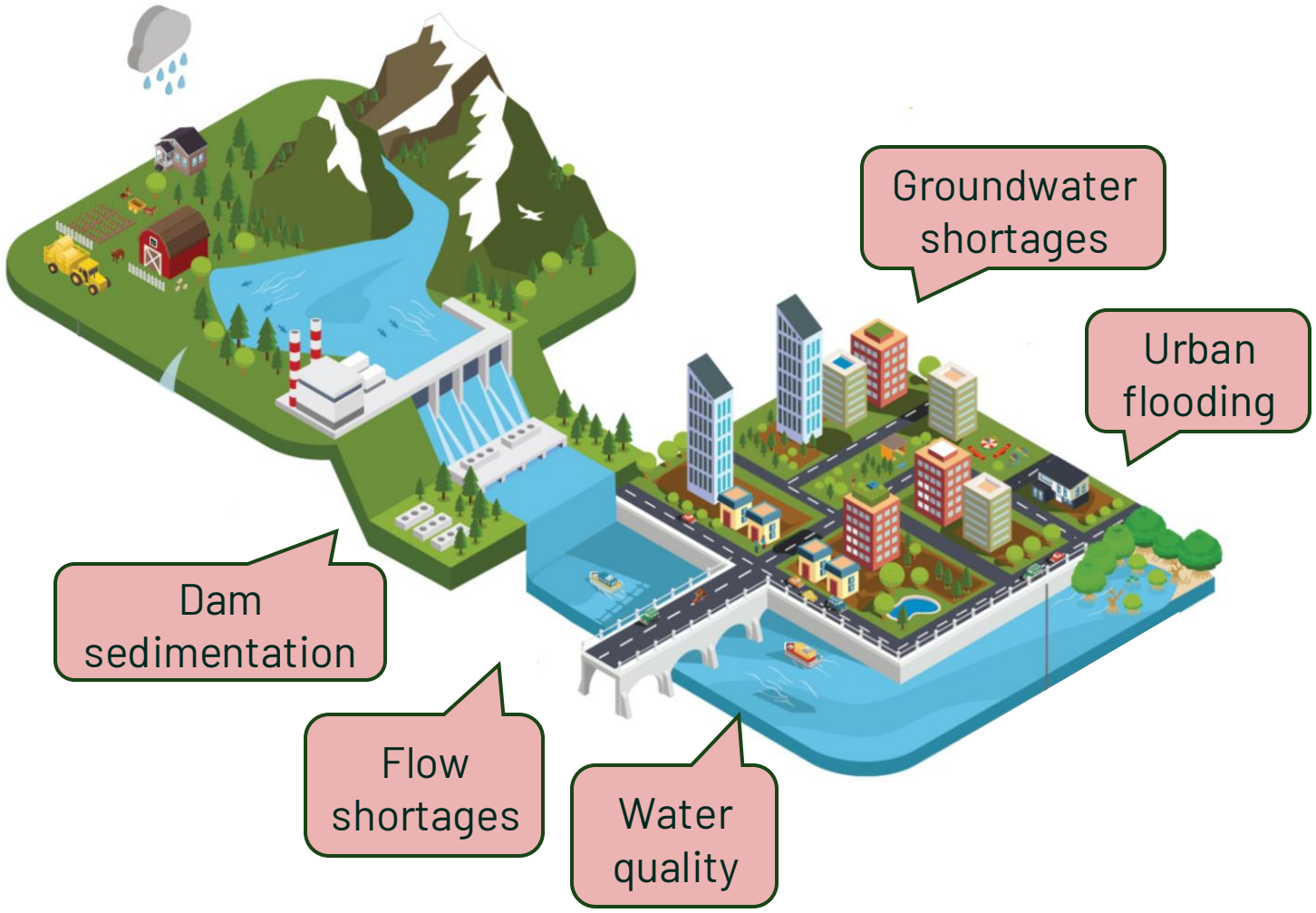
Case study: situation

You have been approached by some city officials who are facing major **challenges**:

1. Surface flow shortages in the dry season.
2. Groundwater shortages.
3. Urban flooding after heavy rainfall.
4. Increasing sedimentation of an old dam.
5. Water quality, particularly pathogens.



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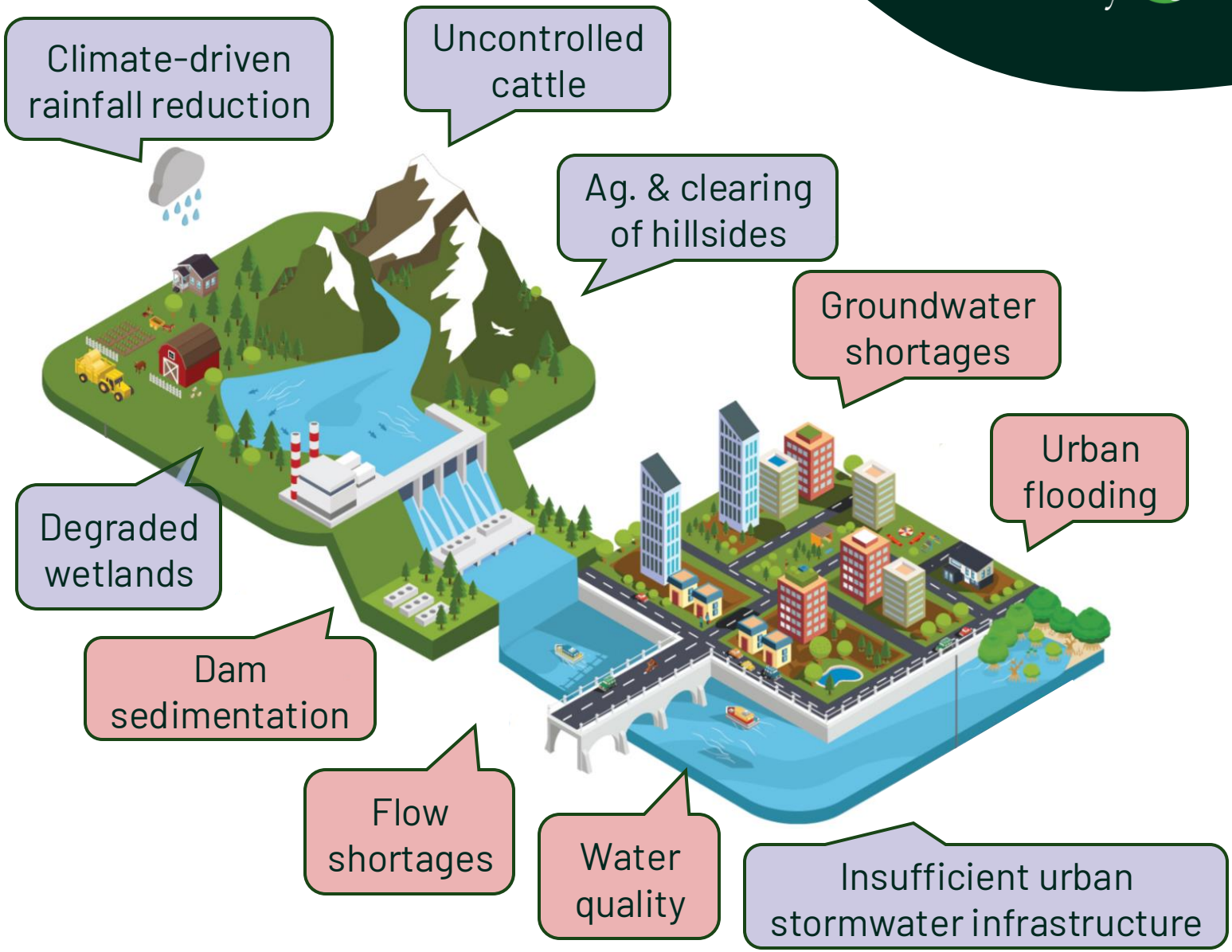
Local natural resource scientists have identified the following **drivers**:

1. Water-hungry invasive plants in wetlands.
2. Agriculture and tree clearing on hillsides.
3. Widespread animal husbandry without management controls such as fencing.
4. Bad urban stormwater infrastructure.
5. Reduced rain & snow due to climate change.



Case study: task

The city officials have requested financing to raise the dam height to increase its capacity, hoping that this will address the challenges that have been identified.

However, you have found a resource from TNC which identifies a series of **potential NbS investments**.

Work together in groups to answer the following questions:

1. What **further studies** or analyses would you want to do?
2. How will you **work with city officials and co-funders** to motivate their support and ensure that NbS investments also benefit grey infrastructure ?
3. How will you **prioritise** among the potential investments?

After twenty minutes we will reconvene to discuss your answers.

WATER SECURITY CHALLENGE	WATER AVAILABILITY		DISASTER RISK	WATER QUALITY	
Ecosystem benefit	Dry season flows	Groundwater recharge	Flood risk	Erosion & sediment	Nutrients & pollutants
Protection					
1. Targeted habitat protection	✓	✓	✓✓	✓✓	✓
Restoration					
2. Revegetation	✓	✓	✓✓	✓✓	✓
3. Riparian restoration	✓	✓	✓	✓✓	✓✓
4. Wetlands restoration	✓	✓	✓✓	✓	✓✓
5. Floodplain restoration	✓	✓	✓✓	✓✓	✓
Management					
6. Agricultural Best Management Practices (BMPs)		✓		✓✓	✓✓
7. Ranching BMPs	✓	✓		✓	✓
8. Forestry BMPs	✓			✓	✓
9. Fire Management			✓✓	✓✓	✓
Created Habitats					
10. Artificial wetlands	✓	✓	✓	✓	✓✓
11. Sustainable Urban Drainage Systems (SuDS)	✓✓	✓	✓✓	✓	✓✓

LEGEND	LOW	MEDIUM	HIGH
Magnitude of benefit			
Depth of evidence		✓	✓✓

Group presentations & discussion

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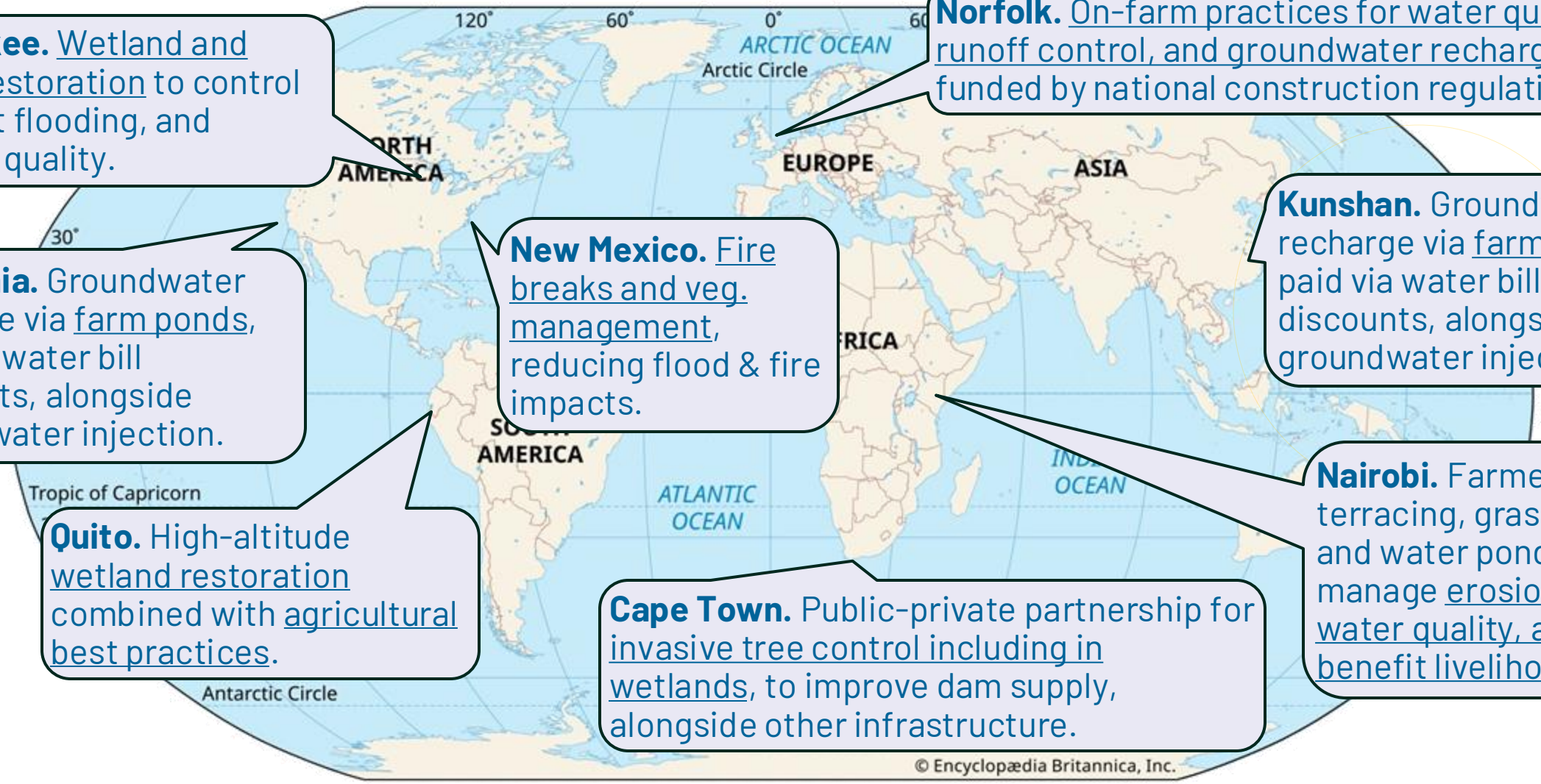
Key points from case study discussion

- **[to be filled out by presenters during group session]**

Real-world examples

We will draw on some more real-world examples of at-scale NbS programs to showcase potential NbS responses to the case study scenario.



Milwaukee. Wetland and forest restoration to control and limit flooding, and manage quality.

Norfolk. On-farm practices for water quality, runoff control, and groundwater recharge, partly funded by national construction regulation.

California. Groundwater recharge via farm ponds, paid via water bill discounts, alongside groundwater injection.

New Mexico. Fire breaks and veg. management, reducing flood & fire impacts.

Kunshan. Groundwater recharge via farm ponds, paid via water bill discounts, alongside groundwater injection.

Quito. High-altitude wetland restoration combined with agricultural best practices.

Cape Town. Public-private partnership for invasive tree control including in wetlands, to improve dam supply, alongside other infrastructure.

Nairobi. Farmer terracing, grass strips, and water ponding to manage erosion and water quality, and benefit livelihoods.

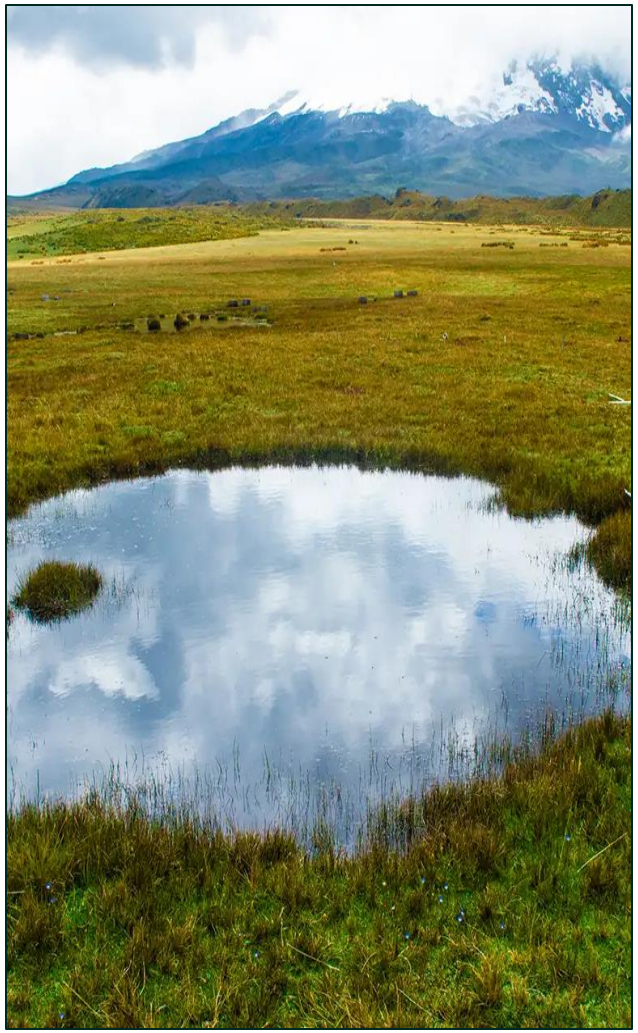
Norfolk

- **Context:** Highly agricultural, flatland area also featuring internationally unique chalk stream ecosystems.
- **Key challenges**: Low surface flows, groundwater shortages, sediment and nutrient pollution, soil degradation.
- **NbS delivered**: Runoff attenuation features, on-farm soil management practices, riparian buffers, land conservation.
- **Integration with grey infrastructure**: Widespread urban and irrigation water assets in the landscape. NbS are partially funded by an offset tax mechanism on new development.
- **Governance structure**: Local water company working with local and national government to design and fund the initiative.

Cape Town

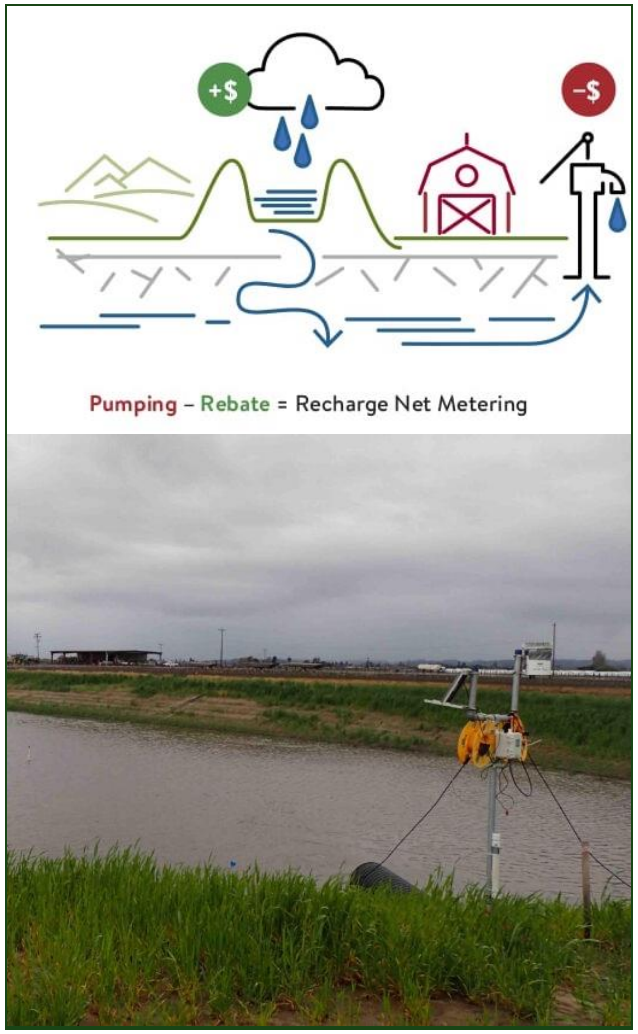
- **Context:** City of ~5m people facing severe water shortages including “day zero” risk event in 2018.
- **Key challenges**: Groundwater and surface water shortages, demand-supply imbalance, invasion of native ecosystem
- **NbS delivered**: Removal of invasive pine and eucalyptus trees from priority water source areas – resulting in new water at 1/10th the unit cost of alternatives.
- **Integration with grey infrastructure**: Priority water source areas feed existing dams. City also invested in alternative ‘grey’ solutions alongside funding the NbS program.
- **Governance structure**: PPP featuring local and regional government, corporate partners, and NGO sector.

Quito



- **Context:** Capital city fed by high-altitude wetland watershed.
- **Key challenges**: Water quality deterioration, reduced flows in dry season, biodiversity loss.
- **NbS delivered**: Wetland restoration and protection, better agricultural and herding practices.
- **Integration with grey infrastructure**: Groundwater infrastructure deterioration led to increased reliance on surface flows, which were under threat.
- **Governance structure**: Multi-stakeholder trust fund that generates returns on an endowment, plus water utility tariffs (2% of water sales revenue goes towards NbS).

California

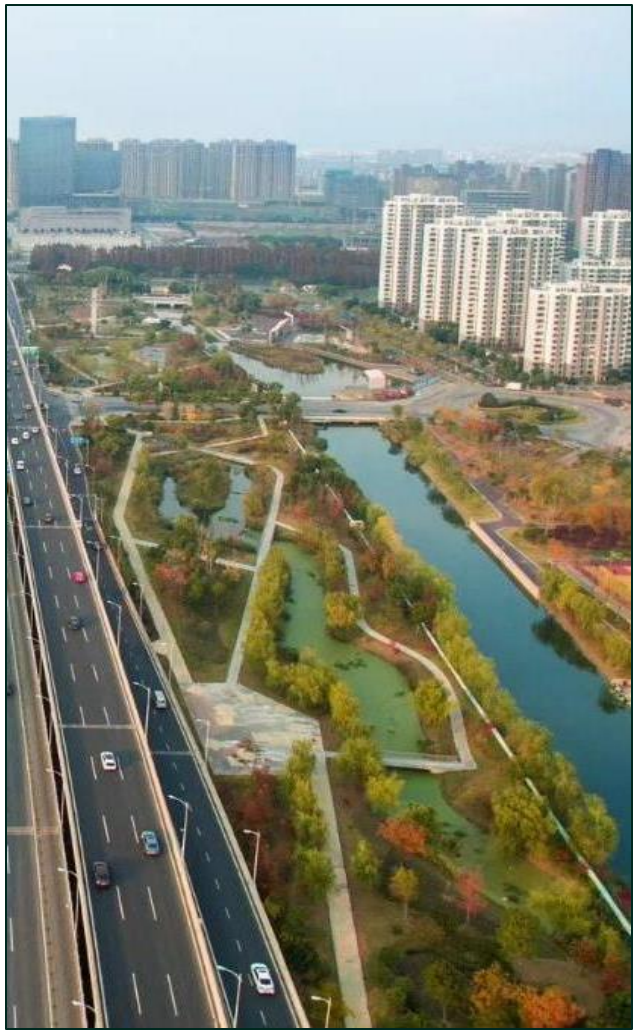


- **Context:** Agricultural region producing high-value crops located nearby to San Francisco.
- **Key challenges**: Over-abstraction of groundwater and sea level rise causing salinisation of groundwater supplies and overall supply shortages.
- **NbS delivered**: Distributed on-farm recharge ponds funded by net water usage tracking and tariff discounts.
- **Integration with grey infrastructure**: Groundwater injection facilities also being implemented nearer to the coast for a more fast-acting response to acute challenges.
- **Governance structure**: Managed by local groundwater utility, conservation district / government, and university.

Milwaukee

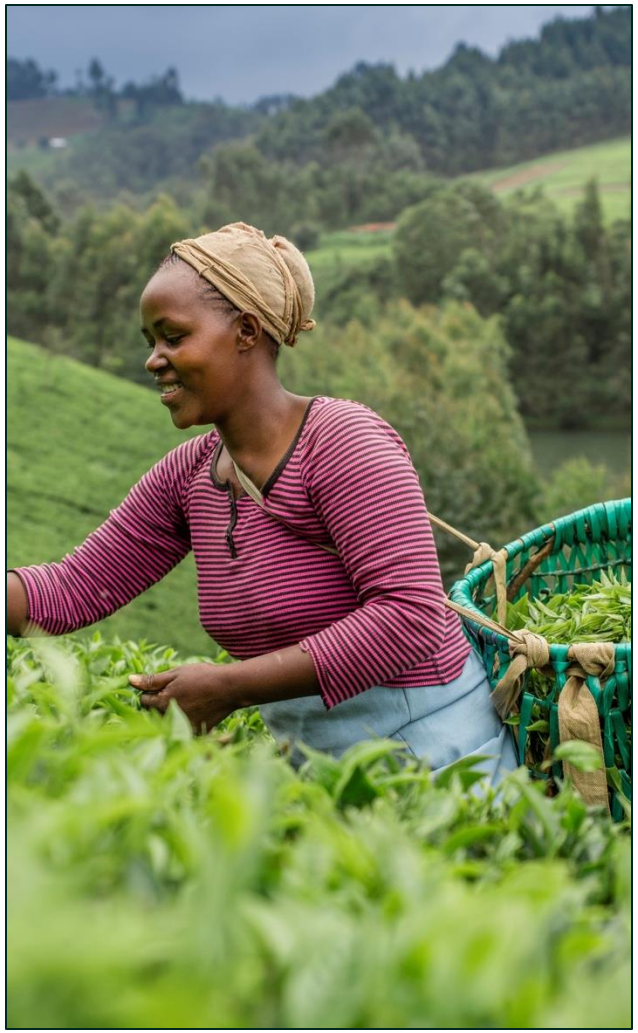
- **Context:** Largest city in its state, on the bank of Lake Michigan.
- **Key challenges**: Flooding, sewer overflows, basement back-ups, urban greening.
- **NbS delivered**: Tree planting and wetland restoration.
- **Integration with grey infrastructure**: NbS program complements existing and future infrastructure delivered by MMSD.
- **Governance structure**: NbS program to plant 6m trees and restore 4k acres of wetlands is being driven my Milwaukee Metro Sewer District, supported by civil society and federal government.

Kunshan



- **Context:** Heritage polder/canal city which has grown rapidly.
- **Key challenges**: Flood control, water quality.
- **NbS delivered**: Reticulation and flood management scheme to manage stormwater through multi-use public space, featuring treatment wetlands and pumping.
- **Integration with grey infrastructure**: 'Sponge city' design working within the urban environment, pumping water to and from existing stormwater infrastructure.
- **Governance structure**: City development and planning officials engaged and driving implementation.

Nairobi



- **Context:** A watershed of 300k smallholder farms that provides 95% of Nairobi's water and 65% of Kenya's hydropower.
- **Key challenges**: Erosion affecting water treatment costs, hydropower generation, and farm productivity. Population growth and climate change putting more strain on resources. Water pathogens.
- **NbS delivered**: Tree planting, terracing, riparian conservation, water pans, rural road buffer zones.
- **Integration with grey infrastructure**: Hydropower dam (Ndakaini) and water treatment plant (Ngethu) supplied by the catchment.
- **Governance structure**: Recently spun out of TNC into an independent public charitable trust, incorporating national and local government, water company, and external funders.

New Mexico

- **Context:** Sparsely-populated, dry and high-altitude landscape prone to wildfires, upstream of major cities.
- **Key challenges**: Fire-caused debris being washed into rivers after rain or flood events causing severe damage and disruption.
- **NbS delivered**: Firebreaks, vegetation management / thinning, and invasive tree control.
- **Integration with grey infrastructure**: Priority area for NbS is immediately upstream of an inter-basin water transfer pipeline. Post-fire challenges have shut down of water infrastructure.
- **Governance structure**: TNC-led PPP initiative, with several sub-implementers including state and federal government.

Any remaining questions?

Thank you

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