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TRAINING & ADVISORY
Energy. Environment. Sustainability
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Natural Ecosystems – Crucial to management of resources in Urban Infrastructure

"Vision 2017"

Gravity2.0 Regional Economic Summit

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Current Trend Worldwide – Rapid Urbanization, Densification

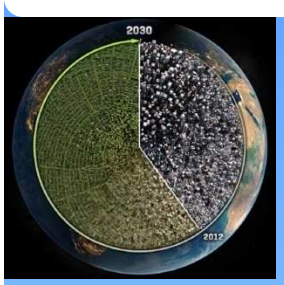
More than 60% of Area Projected to be Urban in 2030

…HAS YET TO BE BUILT

Is this a challenge OR

an **Opportunity?**

Source: Cities and Biodiversity Outlook –
A Global Assessment of the Links between Urbanization, Biodiversity, and Ecosystem Services Action and Policy

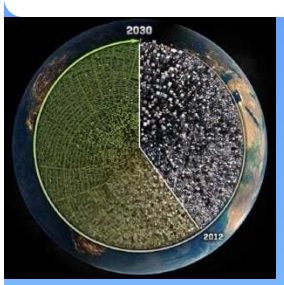


Natural Ecosystems – Service Providers

- All natural bodies – forests, farm lands, mountains, ponds, lakes, wetlands, coastal belts, etc.,
- provide crucial ecological functions of renewal, restoration

- Also known as 'ecosystem services' e.g.

- Resource Conservation
- Capacity Augmentation
- Providing Renewal & Recycling



Natural Ecosystems – Support Biodiversity

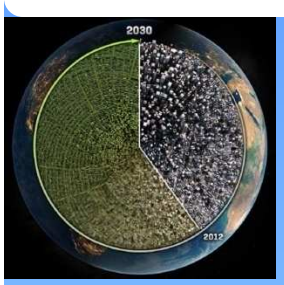
Biodiversity

- Diversity in all life forms – in Flora, Fauna, amongst Ecosystems
- Includes trees, plants, all animals, human beings

  - all life existing on land, in water & in air

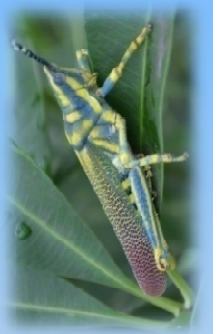
Rich Biodiversity – Serves as an Indicator

- Of better environmental practices
- Of quality of air, water & other resources
- Of health of inhabitants & of Renewal of Resources



Natural Ecosystems – Urban Services

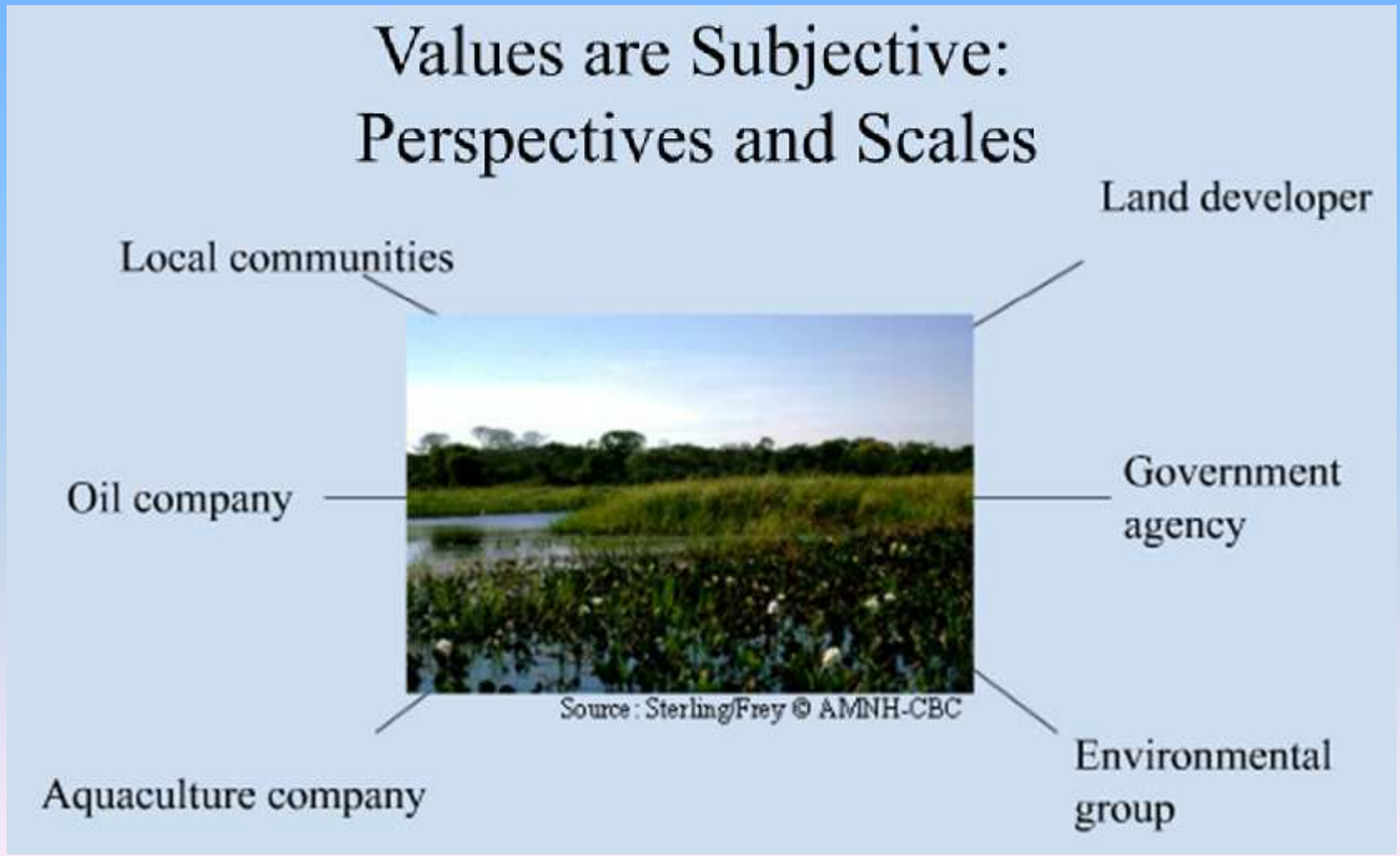
Can Natural Ecosystems play a role



- **in (urban) services provided to the residents?**
- **In (urban) functions of renewal, regeneration, recycling**

Answer – In fact, they can and do!

Understanding Value…



Multiple Services provided by Natural Ecosystems

Understanding Economics of Services by Natural Ecosystems

The Economics of Ecosystems & Biodiversity

Multiple benefits from ecosystems

Provisioning services
- Food, fibre and fuel
- Water provision
- Genetic resources

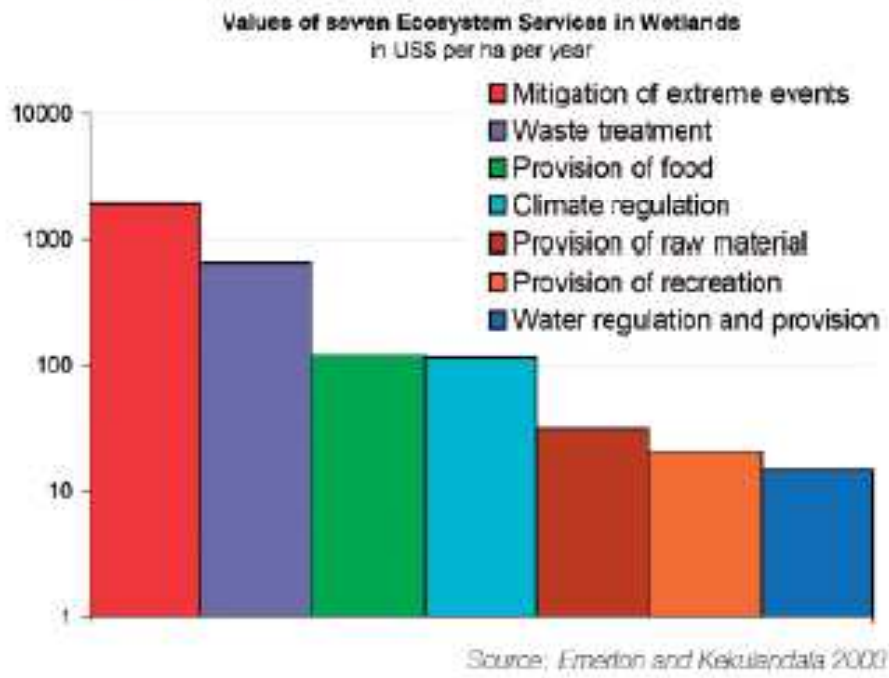
Regulating Services
- Climate /climate change regulation
- Water and waste purification
- Air purification
- Erosion control
- Natural hazards mitigation
- Pollination
- Biological control

Cultural Services
- Aesthetics, Landscape value, recreation and tourism
- Cultural values and inspirational services

Supporting Services
- *Soil formation*

+ Resilience- eg to climate change

Many services from the same resource



Source: Emerton and Kekulandala 2003

Important to appreciate the whole set of eco-system services & take into account in decisions

Not only after they have been lost and oft costly substitutes needed

Economics of Ecosystem Services

Prevalent Scenario:

- Intangibles of better ambience, pollution free land, water bodies and air are easier to appreciate

- **Valuing these services in conventional 'numerics'**

  - have been a challenge to urban bodies &

    those involved in infrastructure decisions.

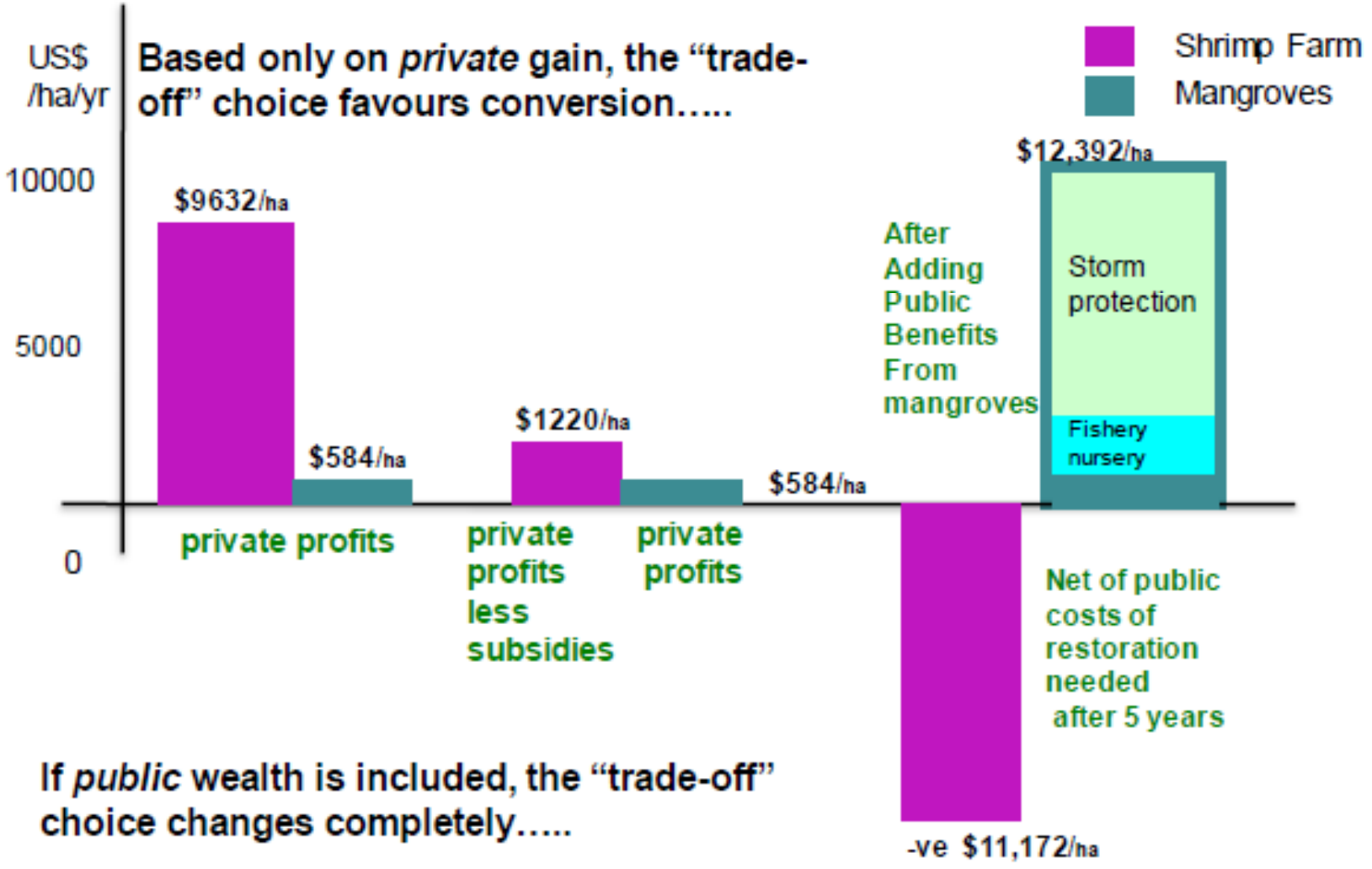
The Economics of Ecosystems & Biodiversity(TEEB)

Tool that attempts to fill these gaps…

- **In valuing fairly ecological services being provided by local ecosystems or natural bodies – in avoided costs**
- **In our knowledge & understanding of the contribution of ecosystem processes & biodiversity to human welfare – recreation & livelihood**
- **The outputs of this tool are parametrics that are more tuned to be being accepted by common perception in figures and numbers.**
- **Here, we see a few examples of application of TEEB approach to understanding role of ecosystems (wetlands) in urban waste management**

Taking account of public goods

...can change what is the "right" decision on land/resource use



If *public* wealth is included, the "trade-off" choice changes completely.....

Source: Barbier et al, 2007

Green infrastructure: opportunities for wetlands

Cost savings: flood management (regional)

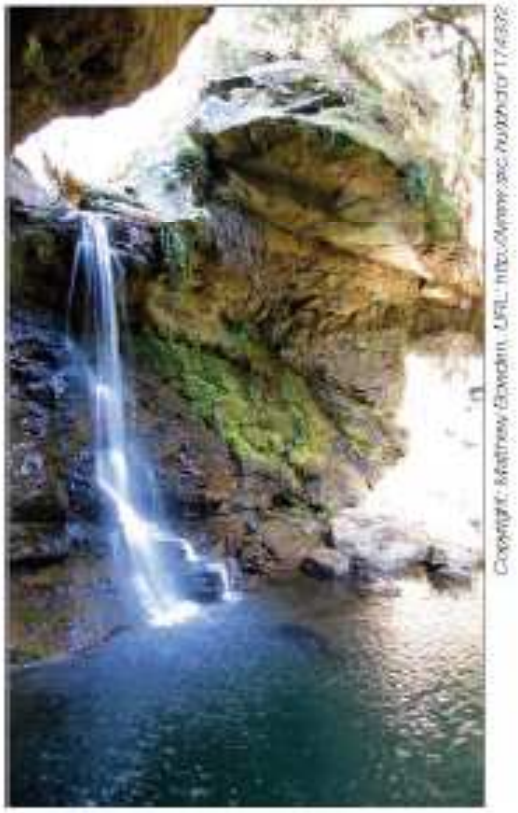
- **Situation**: The Napa River Basin (California) suffers from frequent flooding.
- **Assessment**: Levees & channel modification to prevent flooding were deemed unsustainable by the citizens (eg with several negative impacts to water quality)
- **Outcome**: A comprehensive flood control plan to restore river's original capacity to handle flood waters was adopted. Significant mitigation of damages and over US$ 1.6 billion savings in flood protection.
- **Costs of managing green infra < Costs of damage & manmade infra**

- See TEEB for local & regional policy makers 2010 for references -

Green infrastructure: opportunities for wetlands

Protected areas: benefits for biodiversity & water management

- 1/3 of the world's 100 largest cities draw a large part of their drinking water from PAs.
- PAs & forests purify water for NY city = US$ 6 billion (total) savings in water treatment costs
- 80% of Quito's drinking water originate from two PAs
- Venezuela's national PA system prevents sedimentation that would reduce farm earnings by around US$ 3.5 million/year.
- **Costs of green infra < Costs of manmade infra**



- See TEEB for national & international / local & regional policy makers 2010 for references -

Green infrastructure: opportunities for wetlands

Business opportunities: payments for ecosystem services (PES)

- **Situation:** Vittel natural mineral water (FR) depends on high quality water from Vosges Mountains (no pre-treatment allowed by law).
- **Assessment:** Costs of managing upstream ecosystems in a manner that guarantees continued supply of clean water are lower than the costs of moving the sourcing of water elsewhere.
- **Outcome:** Farmers upstream are paid to adopt best low-impact farming practises.
- **Maintaining green infra → maintaining business opportunities**

- See TEEB for national & international policy makers 2010 for references -

Understanding Economics of Services by Natural Ecosystems

The Economics of Ecosystems & Biodiversity

Investment in ecological infrastructure: multiple benefits

- Afforestation: carbon store+ reduced risk of soil erosion & landslides
- Wetlands and forests and reduced risk of flooding impacts
- Mangroves and coastal erosion and natural hazards
- Restore Forests, lakes and wetlands to address water scarcity
- Coral reefs as fish nurseries for fisheries productivity / food security
- PAs & connectivity to facilitate resilience of ecosystems and species

Potential for lower cost adaption to climate change and policy synergies

Adaptation to climate change will receive hundreds of US$ billions in coming years/decades.

Critically important that this be cost-effective.

Support for identifying where natural capital solutions are appropriate & invest.

Conclusions: wetlands & green economy

Key conclusions

- A 'truly green' green economy rests on sustainably managing natural capital, eg. wetlands.
- Ecosystem services provided by wetlands underpin / provide opportunities for green economy.
- Investing in wetlands (green infrastructure) can lead to cost savings, create business opportunities and - if appropriately planned and implemented – provide win-wins for biodiversity and socio-economic development.

Summary

Urban Ecosystem Services (UES) - Key Messages

1. Biodiversity & Ecosystem Services are critical natural capital
2. Significantly improve human health & well-being
3. Help contribute to climate-change mitigation & adaptation
4. Biodiversity in urban food systems can enhance food & nutrition security
5. Urbanization - a challenge & opportunity to manage ecosystem services globally
6. Urban environments can also support rich biodiversity
7. For this, UES must be integrated in urban policy and planning
8. Managing UES - multi-scale, multi-sectoral & multi-stakeholder involvement
9. UES – Offer learning & education about a resilient & sustainable future
10. Cities have a large potential to generate innovations & governance tools and therefore can - and must - take the lead in sustainable development of infrastructure

Stewardship – Management Concept

- **Stewardship is an ethic that embodies responsible planning and management of resources.**
- **The concept of stewardship has been applied in diverse realms, including with respect to environment, economics, health, property, information, and religion, and is linked to the concept of sustainability.**

THANK YOU!