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NBS & URBAN ECOSYSTEM SERVICES



**European
Commission**

**Horizon 2020
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- Ecosystem regulation
- Biodiversity
- Regeneration of derelict areas & brownfield sites
- Ecosystem disservices

- Integrated governance
- Long-term viability of activity/projects & monitoring duration
- City budget
- Transfer of actions

Integrated environmental performance

Health and well-being

Indicators of NBS effectiveness

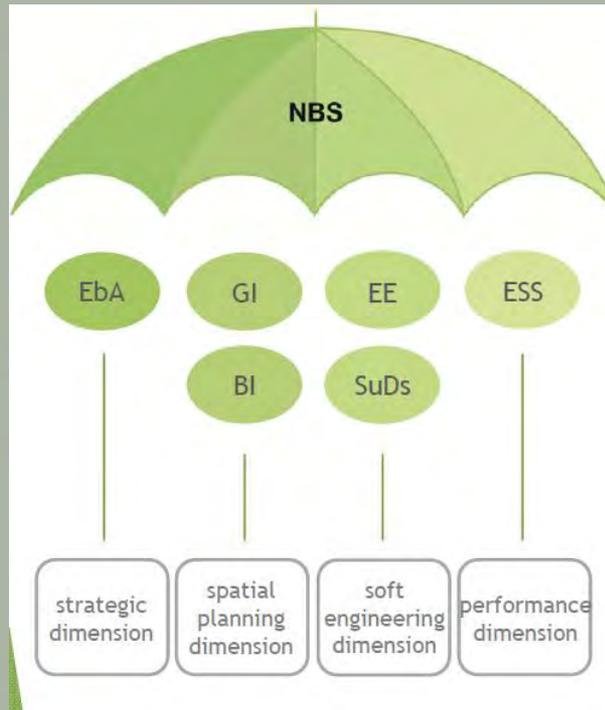
Transferability and monitoring

Citizen's involvement

- Physical & mental health
- Access
- Impact on quality of life, happiness & employment

- Involvement in implementation projects
- Ownership & responsibility
- Sharing & adopting NBS in community

Image reproduced from Kabisch et al. 2016, Ecology and Society 21(2):39



NBS as a concept

EbA → Ecosystem-based adaptation

GI → Green infrastructure

BI → Blue infrastructure

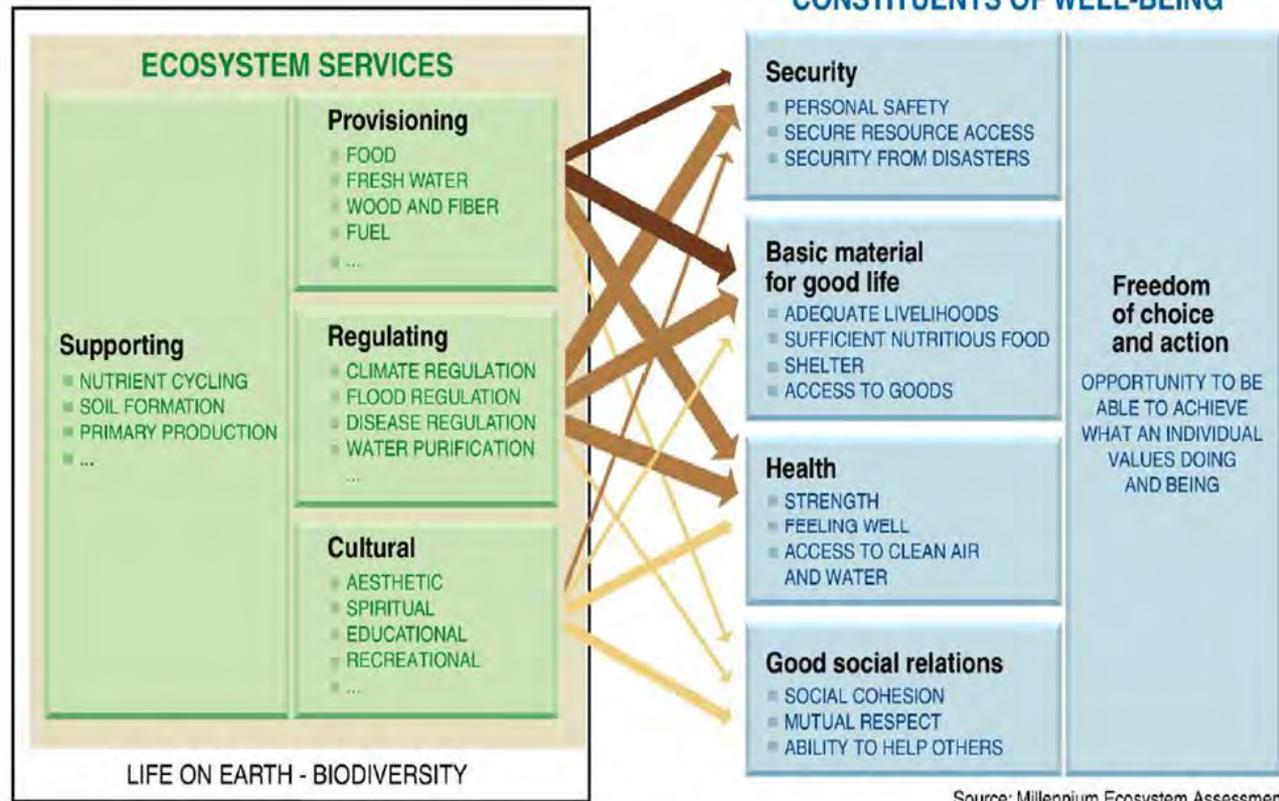
EE → Ecological engineering

SuDs → Sustainable urban drainage systems

ESS → Ecosystem services

- Provide **solutions to climate change related challenges**: more/less rain, (storm)water quality/quantity, biodiversity, well-being
- **Multifunctional** infrastructure: water management + recreation + biodiversity
- **Replace/complement grey infrastructure** + food production
- **Mimic nature**: biofilter, green roof/wall etc.

CONSTITUENTS OF WELL-BEING



Source: Millennium Ecosystem Assessment

ARROW'S COLOR
Potential for mediation by socioeconomic factors

- Low
- Medium
- High

ARROW'S WIDTH
Intensity of linkages between ecosystem services and human well-being

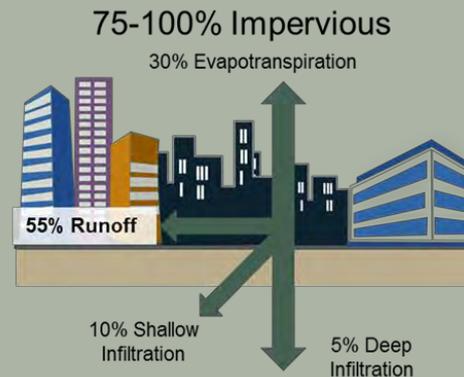
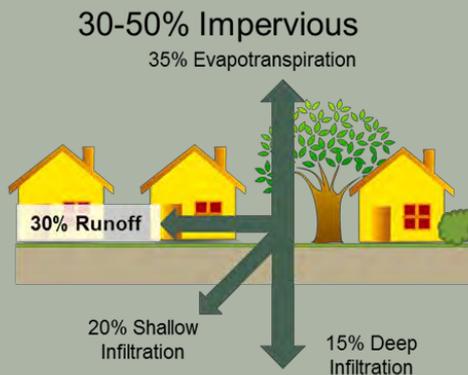
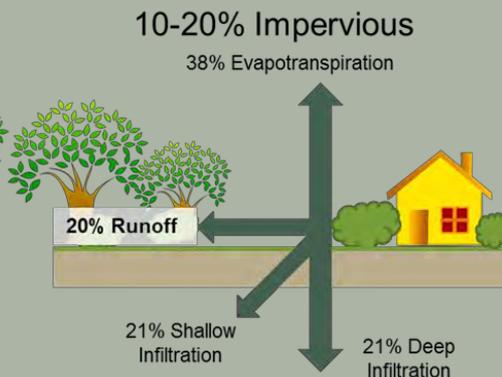
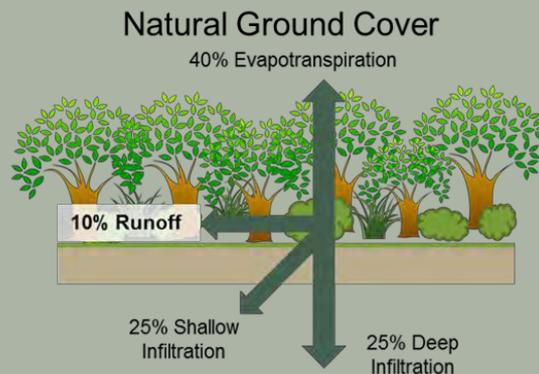
- Weak
- Medium
- Strong

Cities rely on local ES + services from ecosystems beyond city limits

Ecosystem service providing unit = NBS?

SECTION	CLASS	SERVICE UNIT	DEMAND
PROVISIONING	Cultivated crops	Fields, orchards, gardens	Consumption
	Surface water for drinking	Watershed	
	Groundwater for drinking		
	Surface water / non-drinking use		
	Groundwater / non-drinking use		
REGULATING	Air filtration/pollutant sequestration	Trees, shrubs	Risk of exposure to pollutants
	Reduced GHG concentration	Vegetation, soil	Risk of climate change
	Micro/regional climate regulation	Vegetation, water bodies	
	Smell/noise/visual impact buffer	Vegetation	Risk of exposure to noise etc.
	Hydrologic cycle maintenance	Vegetated & permeable surfaces	Risk of flood
	Flood control	Wetlands	Exposure to flooding
CULTURAL	Physical use of landscape/waterscape	Green and blue spaces	Potential & direct use
	Scientific/educational		
	Heritage, cultural		

Exemplar water-related ES from Maes et al. 2016

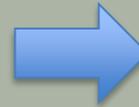




NBS in Practice: Genova

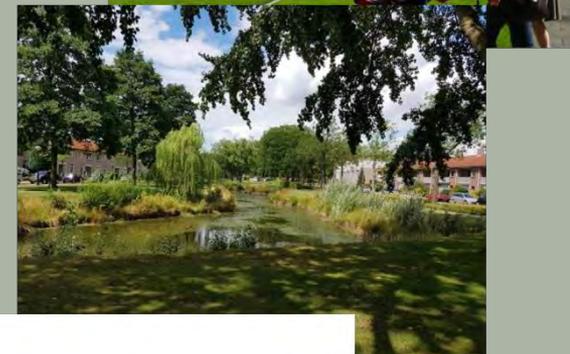
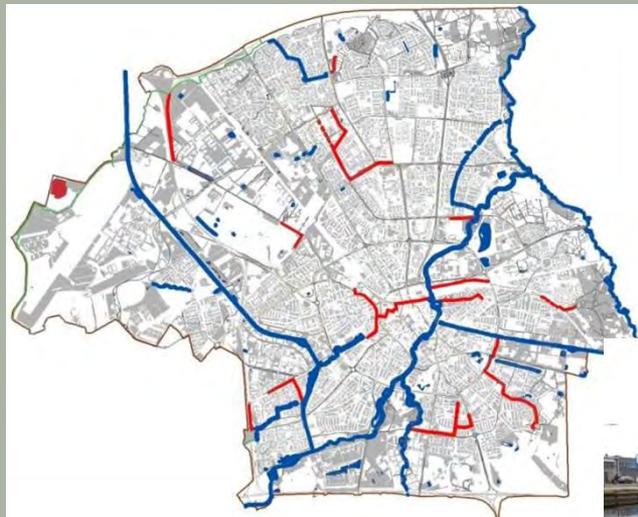
Brownfield regeneration at Gavoglio Barracks

- Multifunctional green space with recreational areas, community gardens & orchards, stormwater ponds, forested areas, playgrounds, green wall(s)



NBS in Practice: Eindhoven

Watercourse reconstruction, green roofs/walls & increased vegetation

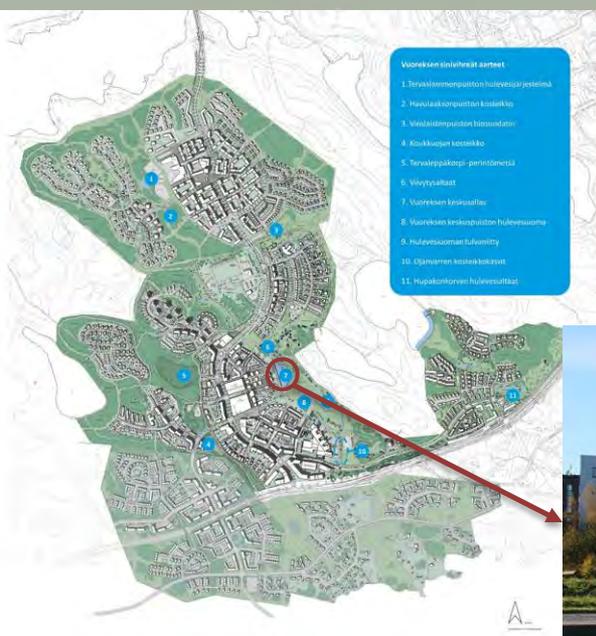


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NBS in Practice: Tampere

Vuores stormwater management system

- Multifunctional green space with stormwater ponds, surface & subsurface water filtration (wetlands, biofilters)



Quantifying ES provision by NBS

- Most policy goals now 'structure oriented' rather than 'supply oriented'
- ...but ecosystem services (provided by NBS) may be specifically targeted in policy
- Evidence for NBS (co-)benefits facilitates systemic approach to ecosystem services provision in cities
- NBS implementation should involve explicit consideration of ecosystem services (supply oriented) as well as form (structure oriented)



THANK YOU!



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