Connecting Nature

ReNature

NATURE-BASED SOLUTIONS NOT JUST A CITY THING

MCAST, MALTA, 2020

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NATURE-BASED SOLUTIONS - ISSUES

LACK OF IMPACT MEASUREMENT / EFFICACY / MONITORING PROGRESS

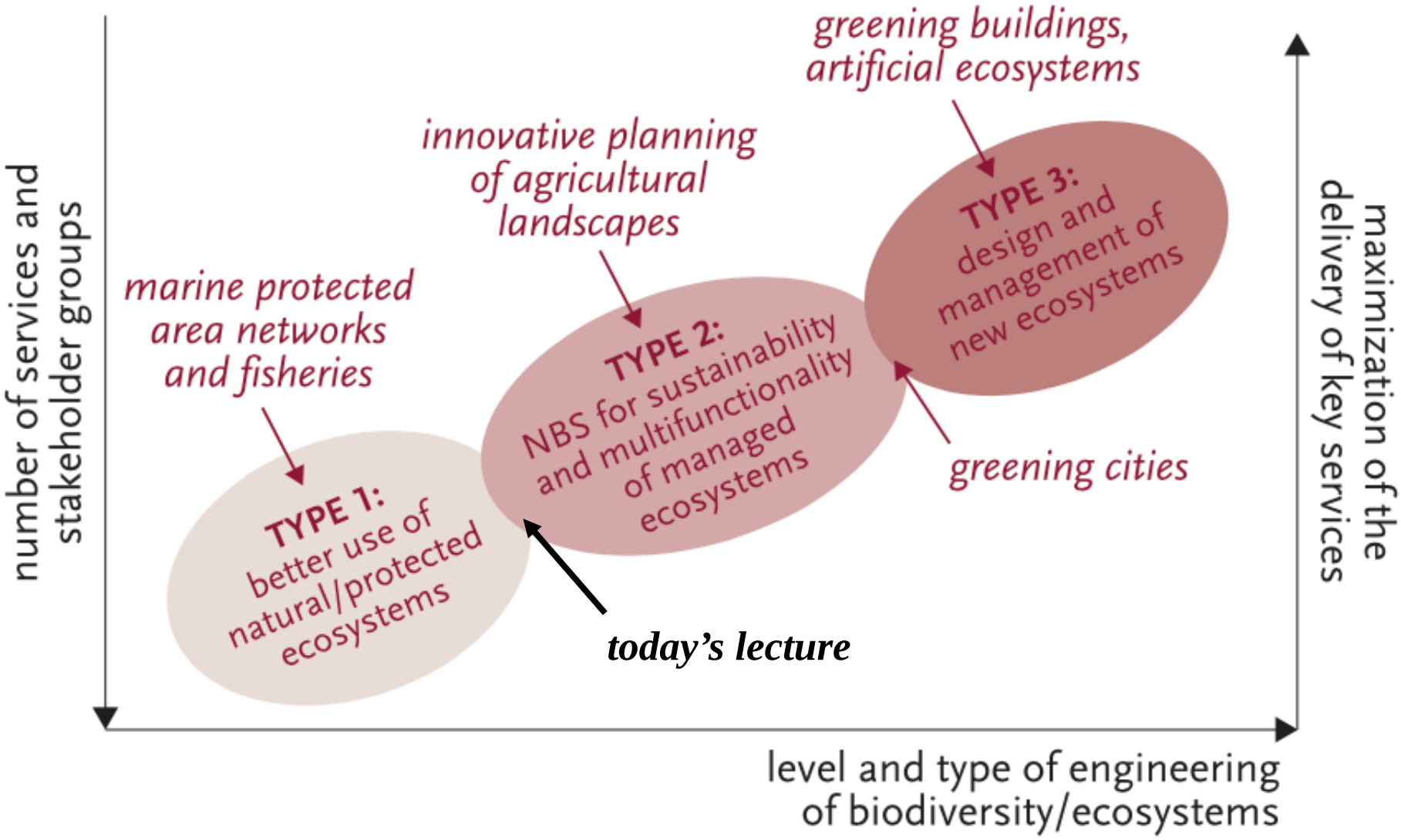
NO CONSIDERATION GIVEN FOR **CO-DETRIMENTS** (THE OPPOSITE OF CO-BENEFITS)

SDGS ARE NOT FULLY INTEGRATED INTO NATURE-BASED SOLUTION THINKING

THERE ARE FEW INDUSTRIAL **STANDARDS** AND THEREFORE FEW DESIGN SPECIFICATIONS

WHERE IS 'NATURE' IN NATURE-BASED SOLUTIONS? THERE IS NO AGREEMENT ON HOW **BIODIVERSITY** IS INCORPORATED INTO NATURE-BASED SOLUTION THINKING

FOCUS ON **URBAN** LANDSCAPES AND NOT ON **PERI-URBAN** OR **RURAL** LANDSCAPES



Source: Eggermont, H., Balian, E., Azevedo, J. M. N., Beumer, V., Brodin, T., Claudet, J., Fady, B., Grube, M., Keune, H., Lamarque, P., Reuter, K., Smith, M., van Ham, C., Weisser, W. W., Le Roux, X., 2015, Nature-based solutions: new influence for environmental management and research in Europe, GAIA - Ecological Perspectives for Science and Society 24(4):243-248.

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EC DEFINITION OF NATURE-BASED SOLUTIONS

"Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions."

- "multiple benefits for biodiversity"
- "approaches that do not improve biodiversity, or not based or delivering on a range of ecosystem services, are not nature-based solutions!"

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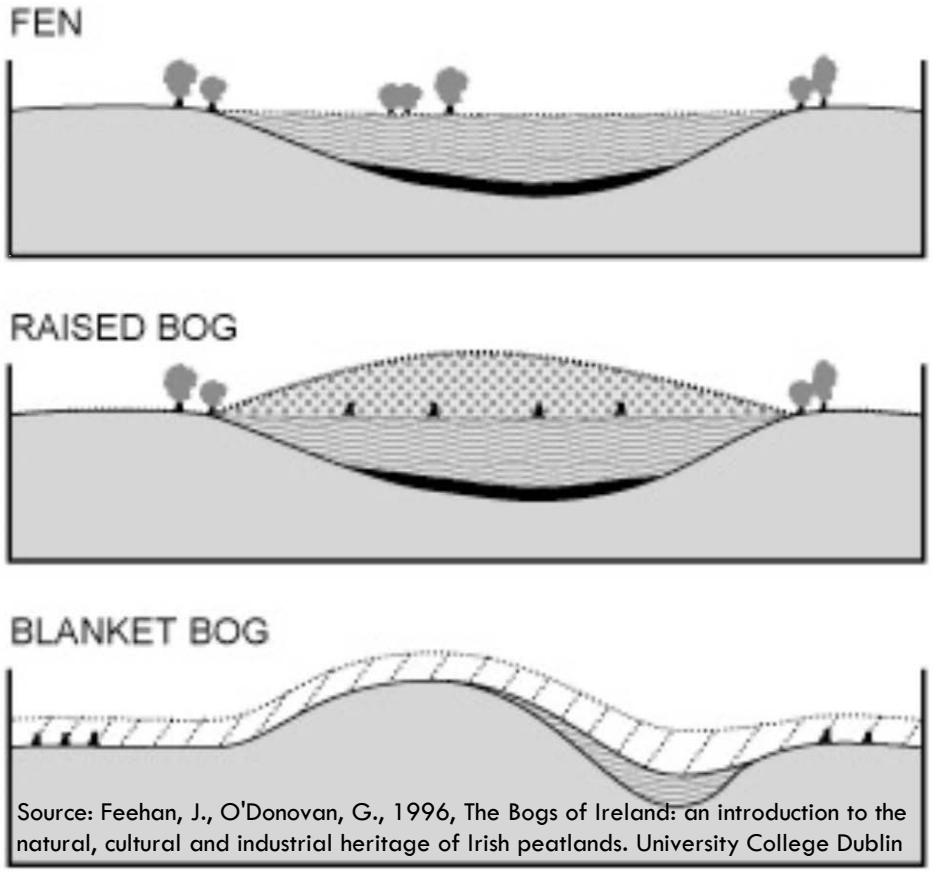
OPPORTUNITIES FOR BIODIVERSITY

- Nature-based solutions challenge: improve biodiversity
- Not much of a baseline in urban areas
- Peri-urban and rural areas may fare much better
- Nature-based solutions (biodiversity focus) for:
  1. Rehabilitating 'natural' landscapes (watersheds / forests) for the ecosystem service provision: e.g. peatlands for carbon storage, etc.
  2. Retaining anthropogenic landscape elements (semi-natural habitats) for cultural services / biodiversity: e.g. hedgerows, etc.
  3. Rewilding

REHABILITATION

PEATLANDS – NATURES BEST SOLUTION!



Source: Feehan, J., O'Donovan, G., 1996, The Bogs of Ireland: an introduction to the natural, cultural and industrial heritage of Irish peatlands. University College Dublin

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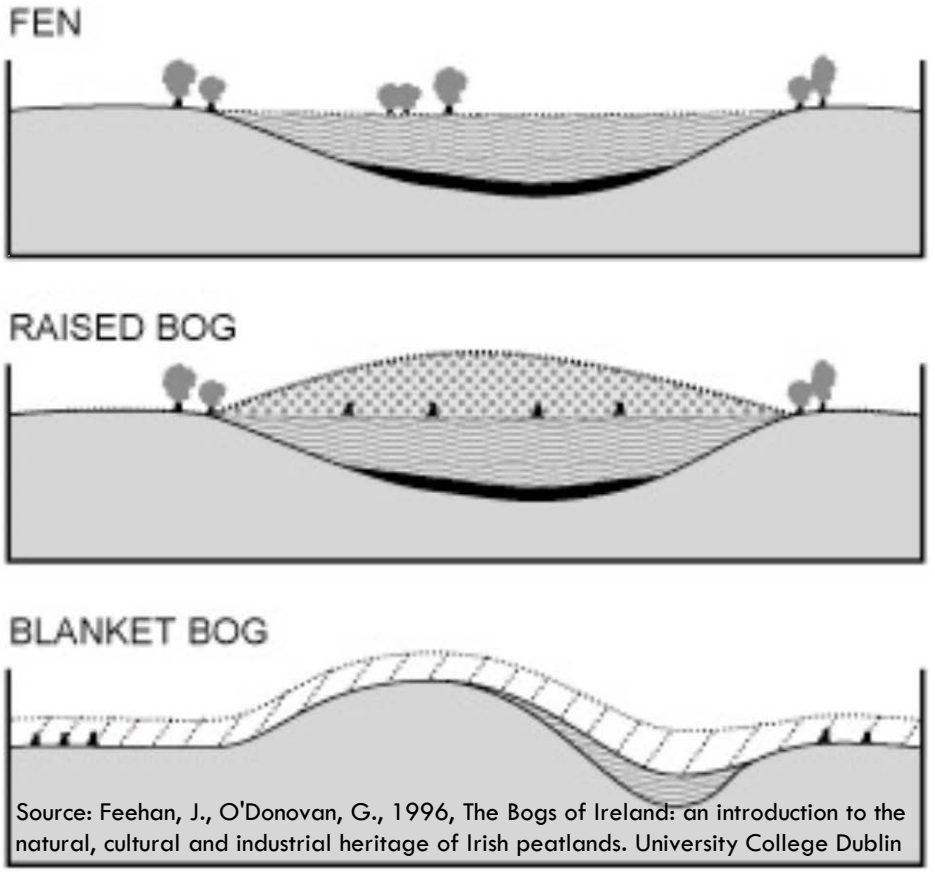
PEATLANDS – NATURES BEST SOLUTION!



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PEATLANDS – NATURES BEST SOLUTION!

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- 3% of land and freshwater on Earth
- 30% of global soil carbon
- 10% of global freshwater

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REHABILITATION

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PEATLANDS – NATURES BEST SOLUTION!

Nature-based solutions / ecosystem services:

- Highest values for carbon sequestration / water attenuation
  - Vital for long term climate mitigation
  - Extremely valuable for mitigating downstream impacts / adaptation
- Biodiversity?
- Co-benefits to communities?

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RETAINING HEDGEROWS – HISTORICAL NATURE-BASED SOLUTIONS

HEDGEROWS – HISTORICAL NATURE-BASED SOLUTIONS

- Pervasive in many agricultural landscapes
- Enclosure / Bocage period from 15th to 20th centuries
- Original solutions:
  - Keep animals in/out; shelter/shade
- New values have emerged:
  - Biodiversity & ecosystem services (pollination, nutrients, water, drift, etc.); noise; dust; genetics; etc.
  - Nature-based tourism; foraging; cultural memory; etc.

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HEDGEROWS – HISTORICAL NATURE-BASED SOLUTIONS

Early history & Enclosure era	Modern era		
Hedgerows as engineered solutions for…	Hedgerows providing ecological solutions, such as…	Hedgerows providing co-benefits, such as…	Hedgerows providing engineered solutions, such as…
Enclosing agricultural fields and preventing livestock from wandering / intermingling / theft (Aalen et al., 1997; D., 1598; Feehan, 2003; Kelly, 1997; Marshall and Moonen, 2002; Morgan Evans, 1994; Nairn and O'Sullivan, 1977; Pollard et al., 1974)	Providing general wildlife corridors and habitat linkages (Davies and Pullin, 2007; Dawson, 1994; Dondina et al., 2016; Forman and Baudry, 1984; Fry, 1994a; Krewenka et al., 2011; Marshall and Moonen, 2002; Maudsley, 2000; Smart et al., 2001)	Amenity, foraging and hunting (Aebischer et al., 1994; Bunce et al., 1994; Burel and Baudry, 1990; Nozedar, 2012; Rands and Sotherton, 1987)	Preventing snowdrift (Iversen, 1981; Walter et al., 2004)
Providing shelter and shade to livestock from sun and exposure (An Taisce, 2000; D., 1598; Greaves and Marshall, 1987b; Marshall and Moonen, 2002; Pollard et al., 1974; Staley et al., 2012)	Biodiversity repositories / wildlife habitat provision (Burel, 1992; Graham et al., 2018; Greaves and Marshall, 1987b; Lecq et al., 2017; Petrides, 1942; Smart et al., 2001; Staley et al., 2015; Vickery et al., 2002)	Food and fuel for human use (An Taisce, 2000; Baudry et al., 2000a; Biber, 1988; Nozedar, 2012; Reif and Schmutz, 2001)	Improving microclimate (Gardiner and Dover, 2008; Guyot and Verbrugghe, 1976; Harvey, 1976; Sánchez et al., 2009; Sánchez and McCollin, 2015)
Providing shelter and shade to livestock from wind and rain (Brown et al., 2004; Burel and Baudry, 1990; Carborn, 1976; D., 1598; Helps, 1994; Pollard et al., 1974)	Habitats for reptiles and amphibians (Edgar et al., 2010; Lecq et al., 2017; Saint-Girons and Duguy, 1976; Vos et al., 2007)	Screening buildings (An Taisce, 2000; BASC, 1996; Biber, 1988; Millsopp, 2001)	Screening buildings (BASC, 1996; Biber, 1988)
Delineating between agronomic activities (Baudry et al., 2000b; D., 1598; Feehan, 2003; Greaves and Marshall, 1987b)	Habitats for mammals (Boughey et al., 2011; Gelling et al., 2007; Koyzageorgis and Mason, 1997; Lacoeuilhe et al., 2016; Michel et al., 2007; Peña et al., 2003; Poulton, 1994; Tew, 1994)	Generating a cultural link to past and folk memory (Dowdeswell, 1987; Morgan Evans, 1994; Nairn and O'Sullivan, 1977; Oreszczyn, 2000; Oreszczyn and Lane, 2000; Oreszczyn et al., 2010; Sánchez and McCollin, 2015)	Improving soil drainage (An Taisce, 2000; Ghazavi et al., 2008; Harvey, 1976; Millsopp, 2001; Miñarro and Prida, 2013)

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HEDGEROWS – HISTORICAL NATURE-BASED SOLUTIONS

Early history & Enclosure era	Modern era	
Habitats for birds / migratory birds (Arnold, 1983; Batáry et al., 2010; Besnard and Secondi, 2014; Gottschalk et al., 2010; Green et al., 1994; Heath et al., 2017; Hinsley and Bellamy, 2000; Lack, 1992; Lysaght, 1990; O'Connor and Shrubb, 1986; Osborne, 1984; Pain and Pienkowski, 1997; Vickery et al., 2002; Vickery et al., 2009)	Marking political and social boundaries in the landscape (An Taisce, 2000; Angus and Woods, 1987; Garratt et al., 2017; Moxham, 2001)	Intercepting agricultural spray drift (Brown et al., 2004; Burel and Baudry, 1990; Lazzaro et al., 2008; Longley et al., 1997; Longley and Sotherton, 1997; Marshall and Moonen, 2002; Moonen and Marshall, 2001)
Repositories for vascular plants (Bunce et al., 1994; Fritz and Merriam, 1993; Fry, 1994a; Helliwell, 1975; McCollin et al., 2000a; Wehling and Diekmann, 2009; Wilson, 1994)	Producing healing plants (Angus and Woods, 1987; Dowdeswell, 1987; Nozedar, 2012; Podlech, 1996)	Reducing soil blow (Fry, 1994b; Greaves and Marshall, 1987a; Pollard et al., 1974)
Seed reserves and genetic heritage (Favre-Bac et al., 2014; McCollin et al., 2000b; Smart et al., 2001; Staley et al., 2013; Wilkerson, 2014) Bunce et al., 1993 Cummins & French, 1994	Creating cultural distinctiveness (Barr and Petit, 2001; Baudry et al., 2000a; Baudry et al., 2000b; Burel and Baudry, 1995; Feehan, 2003; Nairn and O'Sullivan, 1977)	Buffering flood and soil erosion (Ghazavi et al., 2008; Greaves and Marshall, 1987a; Merot, 1999; Montégut, 1986; Vickery et al., 2009)
Supporting pollinating invertebrates (Dover and Sparks, 2000; Dover et al., 2000; Dover, 1997; Garratt et al., 2017; Hannon and Sisk, 2009; Lebeau et al., 2018; Lewis, 1969; Miñarro and Prida, 2013; Morandin and Kremen, 2012, 2013; Mwangi et al., 2012)	Screening covert activities* (An Taisce, 2000; Dowdeswell, 1987; Nairn and O'Sullivan, 1977)	Prevention of wetland pollution from runoff (Borin and Bigon, 2002; Caubel et al., 2003; Moxham, 2001; Viaud et al., 2005; Viaud et al., 2004; Vought et al., 1995)
Shelter for overwintering and predator invertebrates (Holland et al., 2001; Miñarro and Prida, 2013)	Dividing soil types / cropping patterns (Dowdeswell, 1987; Nairn and O'Sullivan, 1977)	Limiting evapotranspiration (An Taisce, 2000; Biber, 1988; Greaves and Marshall, 1987a; Longley et al., 1997; Merot, 1999; Pollard et al., 1974)
Supporting other invertebrates (Amy et al., 2015; Lacoeuilhe et al., 2016; Le Viol et al., 2008; Lebeau et al., 2018; Ricci et al., 2011)	Providing craft materials (Baudry and Bunce, 2001; Baudry et al., 2000a; Koyzageorgis and Mason, 1997)	Intercepting particulates (Tiwary et al., 2006; 2008)
Fungi reserves (Dowdeswell, 1987; Montégut, 1986)	Symbolizing the theft of commonage and imperialism* (Aalen et al., 1997; Feehan, 2003; Kelly, 1997; Morgan Evans, 1994; Moxham, 2001)	

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RETAINING HEDGEROWS – HISTORICAL NATURE-BASED SOLUTIONS

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Emergent nature-based solutions / ecosystem services:

- Highest values for biodiversity / cultural services
  - Vital for habitat connectivity / rural green infrastructure
  - Extremely valuable as genetic reserves / nature-based museums!
- Co-benefits are significantly higher than originally planned
  - E.g.: rural heat island; soil attenuation
- Examples for current nature-based solution planning and design?
- Culture-based solutions?



HEDGEROWS — CULTURE-BASED SOLUTIONS?

REWILDING – ACTUAL 'NATURE'-BASED SOLUTION!

Autogenic Engineers

Animals / plants that modify / transform ecosystems by their presence

- e.g. trees: habitats for plants and animals in their living / dead tissues
- e.g. corals / kelp forests etc.

Allogenic Engineers

Animals / plants that modify / transform ecosystems deliberately

- e.g. termites / ants / elephants / etc.
- Rewilding with allogenic engineers specifically for provision of nature-based solutions

REWILDING – ACTUAL 'NATURE'-BASED SOLUTION!

Beaver rewilding - ecologically important as an ecosystem **driver**

- Reduce river flow - trap sediment, attenuate water and alleviate flooding
- Create diverse ponds – other species / ecosystem benefits
- Alter vegetation (mesic meadows) / landscape alteration
- Fish stock nurseries / shelter areas
- Change predator / prey behaviour in surrounding landscape

Experiments proving extremely positive – but controversial

REWILDING – *PROPER* 'NATURE'-BASED SOLUTION!

Only recently been viewed as nature-based solutions:

- Highest values for biodiversity / water and sediment attenuation
- Socially appealing (but not for everybody)
- Ethically appealing – proper nature-based solution but use of species in the past has yielded longer term negative effects!
- Species specific – beavers are not wolves (but not cane toads)!

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Thank you

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