



EKLIPSE

Knowledge & Learning Mechanism
on Biodiversity & Ecosystem Services

Social innovation and nature-based solutions

EKLIPSE/EPBRS/BiodivERsA Joint Foresight Workshop:
Brussels, 6-7 December 2016
Annexes to Workshop Report

A report of the EKLIPSE project



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Social innovation and nature-based solutions

EKLIPSE/EPBRS/BiodivERsA Joint Foresight Workshop: Brussels, 6-7 December 2016 Workshop Report

Report Annexes

These are the annexes for the EKLIPSE/EPBRS/BiodivERsA joint foresight workshop report on social innovation and nature-based solutions, which should be cited as:

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EKLIPSE - Social innovation and nature-based solutions - Report Annexes

1. Workshop agenda

December 6, 2016

Time	Topic
<i>From 11 :30</i>	<i>Registration and welcoming lunch</i>
13:00	Official welcome (organizers) and warm – up. Clarification of agenda and objectives
13:40	Introductory presentation context and key concepts
14 :10	Questions for clarification
<i>14:20</i>	<i>Transition from the plenary into the thematic groups (TG)</i>
14 :25	Thematic Groups: Brainstorming on question 1: “What are important emerging issues/ societal challenges that possibly have big impact 10 or 20 years from now and which nature-based solutions can be a response to these issues/challenges?” (Posters will be displayed and can serve to trigger ideas)
15 :10	Thematic Groups: Prioritizing societal challenges and emerging issues
15:30	Short coffee and short poster session (15’) Departure to the work in smaller teams (triads)
15 :50	Triads work on question 2: “What specific social innovation approaches exist and could be used in order to support the effective implementation of these NBS for tackling these emerging issues?”
<i>16:50</i>	<i>Coming back into the plenary</i>
17:00	Plenary reporting
17:50	Feedback on the day
<i>18:15</i>	<i>End of the workshop program for this day.</i>
<i>19:00</i>	<i>Joint cocktail at the Café de la presse (Avenue Louise, 493)</i>



December 7, 2016

Time	Topic
<i>Start directly in the Thematic Groups</i>	
08:45	Thematic Groups (TGs): Triads present social innovation approaches for implementing NBS as well as research needs developed the last afternoon
09 :30	Brainstorming of further research needs and prioritization. And further work in TG
14 :10	Questions for clarification
10:00	<i>Coffee Break and Transition into the Plenary</i>
10:20	Plenary discussion on issues to be tackled in the dialogue circle
10:30	Plenary dialogue circle: Dialoguing of prioritized research recommendations
11:15	Gradient of agreement on dialogue outputs
11:45	Prioritization of research needs and recommendations in the plenary
12:00	Feedback
12:15	<i>End</i>

2. Participants

2.1. List of participants

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2.2. Participant profile

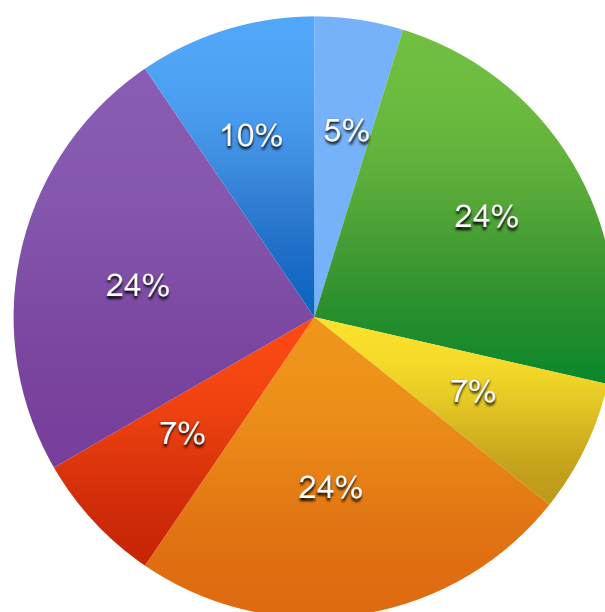
As a warming up activity at this point, the organizers asked participants a number of questions to break the ice and know more about their profile, expertise and expectations. Participants responded using an internet-based electronic application. However, some could not access the online tool and not all participants were already present for the exercise so only about 40 people answered. Here are the questions and the answers:

Q1: Which country/region do you come from?

Answers:

Baltic countries	2
Benelux	10
Central or Eastern Europe	3
France / Iberian peninsula	10
Scandinavia	3
UK / Germany / Austria	10
Other	4
Total	42

■ Baltic countries
 ■ Benelux
■ Central or Eastern Europe
 ■ France / Iberian peninsula
■ Scandinavia
 ■ UK / Germany / Austria
■ Other



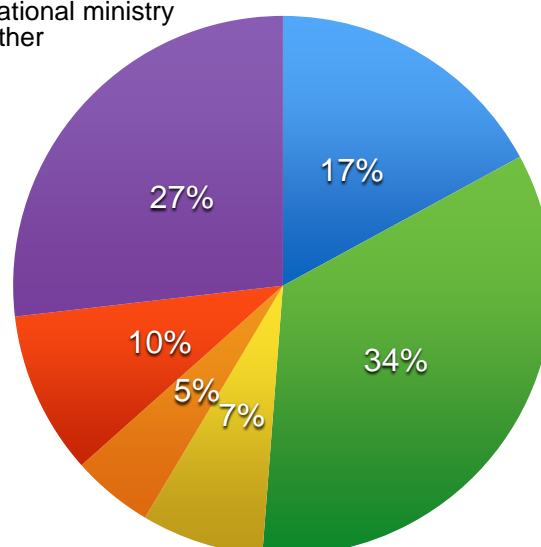
Comment: the results show that country participation was quite balanced, though with relatively lower representation of Central and Eastern Europe.

Q2: In which context do you work?

Answers:

University	7
Research Institute	14
EU Institution	3
European association / working group	2
National ministry	4
Other	11
Total	41

■ University
 ■ Research Institute
■ EU Institution
 ■ European association / working group
■ National ministry
 ■ Other



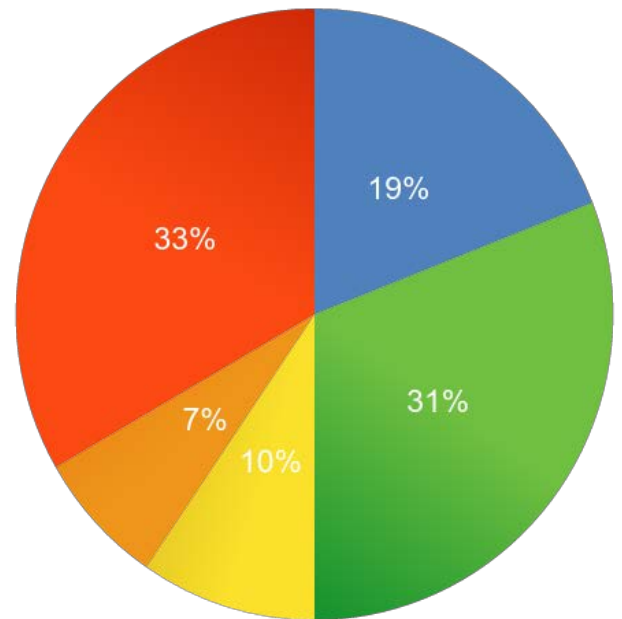
Comment: A little more than half of the participants were from research institutions.

Q3: Which is your main field of work?

Answers:

Land planning & management	8
Governance strategies	13
Human well-being & health	4
Restoration	3
Other	14
Total	42

- Land planning & management
- Governance strategies
- Human well-being & health
- Restoration
- Other



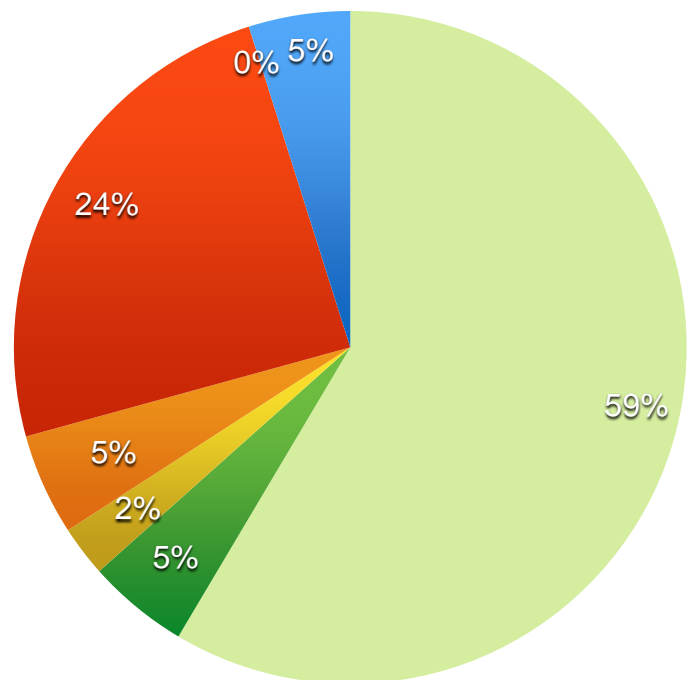
Comment: Governance strategies and land planning and management represented 50 percent.

Last question: Which animal could be a symbol for nature-based solutions?

Answers:

Bee	24
Dolphin	2
Dinosaur	2
Human	10
Panda	0
Tiger	1
Whale	2
Totals	41

- Bee
- Dolphin
- Tiger
- Dinosaur
- Human
- Panda
- Whale



Comment: Although it was just to create a more relaxed atmosphere, it is interesting to see that Bees are the most popular to represent NBS.



3. Results of thematic groups working on Question 1

3.1. Question 1: “What are important emerging issues/societal challenges that possibly have big impact 10 or 20 years from now and which nature-based solutions can be a response to these issues/challenges?”

Here are the results of the brainstorming and prioritization of the societal challenges with their associated potential NBS.

3.1.1. Human well-being and health

Societal Challenge (SC) (Number of votes)	Nature-based solution (NBS) ¹
Air particulate matter pollution (5) ²	Air pollutant removal
Acceleration of everyday life => raise of chronic illnesses	Co-produced spaces – green- with characteristics of “restorativeness” a slowing blown
Mental stress / burn out syndrome (5)	Urban green => more physical activity but also relaxations (urban) gardening / agriculture as material stress release
Migration, losing sense of community / Migration to integration (5)	Urban gardens, social projects => accessible. Green areas at community ownership Implementation NBS => sense of place
Increasing hotspots of conflicts in coastal areas Growing urban populations, resultant density, (4)	Hybrid governance: Transformation of conventional grey infrastructure to green infrastructure; win/win multilateral solution, e.g.: sharing materials, toll, etc....) ³
Climate change, rising temperatures (in particular cities/ at night) => direct health impact (4)	Green corridors (for cool air flows towards city centres) Urban green + blue spaces (including parks, street trees, green walls, roofs, lakes...)
Water scarceness (quality and quantity) (4)	Increased water management. Restoration of retention areas cc mitigation awareness raising
Socioeconomic differences/unhealthy life years (3)	Accessible safe & attractive nearby green spaces
Increasing spread of alien pathogens and vectors (1)	To be explored; pathway management and monitoring
Loneliness (1)	Urban gardens, shared food schemes
Exponential increase in attention deficit, anxiety, depression (1)	Rehabilitation gardens/retreats on every street corner
Antibiotic resistance, poor quality medicines (1)	Bioactive biomolecules/enzymesthis may not be an NBS

¹ Each line in the table give a societal challenge and a NBS that according to the participants could help address this challenge.

² At the end of the brainstorming on emerging issues/societal challenges and associated potential NBS, each participant could distribute three votes to prioritize among all identified societal challenges the ones that were most critical for them in the context of the theme. The numbers behind the individual societal challenges represent the number of votes each one received.

³ The idea is to move from less grey infrastructure to greener infrastructure and to integrate this into the governance.

3.1.2. Governance strategies

Societal Challenge (SC) (Number of votes)	Nature-based solution (NBS)
Loss of social cohesion (5)	Urban farming
Shift of political agenda from growth to sustainability (5)	(promotion of) NBS technologies; jobs; solutions
Disconnection between people and nature (4)	Increase access to green spaces and cities; urban agriculture; education
Energy consumption & production (4)	Alternative energy production; Reduction of energy consumption; Decentralization of the production
Integration of immigrants (3)	Societal activities / work in or for nature
Overpopulation (3)	
Monotone agriculture landscapes, few species, a lot of chemistry (2)	agricultural systems + land use that combines multiples ecosystem pressures + make people want to live in small villages / green areas
Distrust in governments and stalemate politics (2); social differentiation	Many, many participatory budgeting; Do-It-Yourself (DIY) grassroots; NBS grassroots-based
Climate change impacts : Natural disasters ; flooding; sea-level rise (1)	Natural storm-water management e.g. Oyster reefs
More people to feed on same natural resources (1)	Alternative food production systems that are sustainable (e.g. permaculture)
Urbanization - extension of cities and infrastructures (1)	Green infrastructures; green spaces
Health issues: antibiotics, overweight, allergies,... (1)	More outdoors / nature activities
Support research not for policy makers but for understanding and knowledge (1)	
De-faunation (loss of large predators) & reduction in hunting pressure (increasing herbivores: hunting is sometimes necessary to reduce high game stocks and to prevent rejuvenation of tree saplings from browsing.)	Re-faunation & ecosystem management
Agriculture abandonment / urban growth	
Marine debris	Stop or reduce use of plastics; these are not NBS use of new materials that can degrade in seawater
Urban heating	Leisure activities in nature (e.g. hiking, rock climbing,...)

3.1.3. Land planning and management

Societal Challenge (SC) (Number of votes)	Nature-based solution (NBS)
Space to meet different societal needs, balancing development with increasing food demands, ecosystem/ biodiversity conservation; flood management (8)	Integrated system approach, combining different NBS, integration grey with green infrastructure
Alternatives for current unsustainable agriculture production & patterns (e.g., rising water levels, salinization, soil degradation), soil biodiversity loss (8)	Exploring NBS in complex hydrological management; salt tolerant crops
Climate related flooding and associated destruction of property crops (5)	Catchment management
Humans disconnected from nature (5)	Biomimicry (learn from nature), biophilic design ⁴ .
Rural development & suburbanization (4)	New NBS business models (for housing?)
Inclusion of homeless people (2)	Involving homeless in restoration and other NBS activities (as workers)
Increasing disruption causing mental problems (>> human health group) (1)	Urban forest, develop cities as « ecosystems », factories like forests
Ageing Europe (special needs on planning) (1)	Green corridors to facilitate mobility (in healthy environment?)
Literacy for a sustainable future (LS based?) in mixed society	Small scaled initiatives (schools, playgrounds) close to people/learning from nature (practical teaching)
Urbanization needing densification but also green space	Redevelopment of ex-green spaces/commons
Land ownership, land grabbing (international and in Europe) (1)	(New forms of) common goods; legislation to inhibit (not an NBS/SI?)
Conflicting land use interests	<p>Considering and matching the scale-dependency of ecological processes and human decision making</p> <p>Managed water retreats based on participatory processes</p> <p>Process based nature conservation</p> <p>Ecological intensification, multi-functional land management</p> <p>NBS in soil biodiversity restoration</p> <p>Zero C houses, with roof farms etc....</p> <p>Permaculture (collaborate with nature), Urban recreation, gardening, agriculture</p> <p>Innovative protected areas, interacting with land users and local people (to benefit from it)</p>

⁴ These may not be NBS if the outcome does not improve the environment and increase biodiversity.

3.1.4. Restoration

Societal Challenge (SC) (Number of votes)	Nature-based solution (NBS)
Exploitation of renewable resources (10)	Ecosystem approach
Food/Biomass production/distribution (6)	Integrated system of production (e.g. IMTA)
Water availability [and global pandemics?] (5)	Wetland restoration
Increasing urbanization (4)	Developing urban green & blue infrastructures; Restoring polluted/ « wasted » urban soil
Biodiversity loss (3)	
Sea level rise and ocean acidification (3)	Coastal habitat creation and PH regulation
Soil degradation (2)	Agro ecology
Pollution (2)	Biodegradable NBS these may not be NBS
Flooding	Peatland restoration
Use of natural resources for building more and more routes, train paths etc.	Artificial materials, reuse of materials these may not be NBS
Expanding infrastructure e.g. transport	Green bridges
Nature deficit, disorder	Access and contact with nature
Understanding of nature goes down while urban population goes up	Collective gardens
Migration/Crime	Parks, community garden, SUDS,...
Rising temperature	Development of green infrastructure
Lack of trust – disengagement of commons	Recreate natural spaces
People receive only customized info about the world around them	Visualization of NBS – spaces
Inequality	Twin lose (umbrella social/citizen) – lose (vulnerable ecosystem) into win-win through NBS: How?
Ageing of society/demographic situation	Keeping people healthier longer
Obesity	Food/activities

**3.2. Results of the prioritization of the societal challenges following the question:
“How do you assess the importance of nature-based solutions as a way to tackle
identified emerging issues/societal challenges across the different themes?”**

Rank	Societal challenges/emerging issues	Score
1	Biodiversity loss	109
2	Lack of water availability	106
3	Loss of social cohesion	93
4	Geographical and social inequity in food and biomass production and distribution	91
5	Disconnection between people and nature	90
6	Overexploitation of renewable resources such as fisheries	88
7	Shift of political agenda from sustainability to growth	87
8	Energy consumption and production	83
9	Soil degradation	82
10	Climate change impacts: Natural disasters; flooding; sea-level rise	77
11	Increasing spread of alien pathogens and vectors	77
12	Pollution	75
13	Increasing urbanization	73
14	Acceleration of everyday life; increase of chronic illnesses	72
15	Space in urban areas to meet different societal needs and land usage (e.g. food / ecosystem biodiversity / flood management)	70
16	Air particle matter pollution	68
17	Increasing density of population in coastal areas triggers social economic and ecological conflicts	66
18	Rural development and suburbanisation	65
19	Socio-economic differences (rich and poor)	64
20	Overpopulation	60

4. Results of the triads' discussion on question 2

This annex contains the results of all the triads. During the workshop they captured their results on large sheets of brown paper. The structure of the paper was the same for each triad and has been kept in the following.

4.1. Human well-being and health

Increase in air pollution (health damage)⁵

1. Ideas

1. Increasing urbanisation
2. Increasing work distances
3. Increasing density and use of cars
=> Increase in AIR POLLUTION
(health damage)

2. Barriers

- Lack of awareness (impacts and NBS)
- Lack of scientific knowledge (on NBS)
- Lack of space in the cities
- Cars considered as a status symbol, and symbol of freedom
- Local vs global effects

3. Solutions

- Innovative integrate green transportation systems including NBS
- Vegetation as buffer zones near high polluting sources
- Design green areas in a way to maximize removal of pollutants + other ES (e.g. species selection)

4. Research needs

- Better air-circulation modelling
- Empirical studies of pollutants-plants interactions
- Studies on behaviour (e.g. acceptance) of citizen towards innovative solutions that include NBS

Acceleration of everyday life

1. Ideas

- Acceleration of everyday life
- Caused by: over-emphasis on growth/consumption,
- Speed of media/information, wanting to have it all and social expectations, multiple demands & roles
- Consequences; Stress/burnout (physical and mental ill-being, cardiovascular/auto-immune depression, obesity)
- Losing community, identity
- Different effects for different groups
« from footloose to adrift »

2. Barriers

- Social expectations
- Over use communication/information
- Time constraints
- No time for reflection
- Lack of knowledge on real solutions
- Planning (land use/urban)
- Institutional

⁵ It appears that this group treated the question slightly differently than intended. In the ideas sections were supposed to be ideas for answering question 2 with regard to the implementation of a particular NBS identified in the work of question 1.

3. Solutions

- Multifunctional, inviting green spaces
- Neighbourhood promotion of shared sustainable activities
- Green solutions that promote safety
- Co-production of green spaces
- Connectedness- slower space
- “Slow” movement (e.g. slow food) / single-focus activities
- Better use of agricultural areas
- Active transport
- Food growing and sustainable consumption groups

4. Research needs

- More natural experiments and flexibility in structure of projects
- More experimental research
- More evaluation of pilots/studies
- Studies on physiological and psychological effects of acceleration
- Work-leisure combinations - impacts of well-being. Green office to natural office
- Co-production of green solutions, evaluation of who is participating and who is not
- Understanding the effects of NBS in terms of access/use and acceleration of different groups

Declining social cohesion + sense of community/sense of place

1. Ideas

- Declining social cohesion + sense of community/sense of place

2. Barriers

- Long-term security i.e. land-use rights
- Governance/ownership in community
- Different interest when assessing trade-offs in multifunctional NBS
- Integrating migrants (different cultures, social strata, ages, etc.) and locals into single solutions

3. Solutions

- Urban labs to encourage co-development + ownership
- Urban gardens with multi-functional focus
- Development of shared spaces
- Utilise grey urban spaces → transform into green spaces
- Consider multiple activities e.g. food festivals, rehabilitation gardens, food gardens

4. Research needs

- How to design spaces to meet multiple needs, including activity preferences, mobilities and socio-economic challenges
- Identifying initiatives to encourage multi-cultural / multi-demographic use of green spaces
- Explore and examine the changes in 'sense of space' resulting from multi-user involvement in green spaces → improving social cohesion
- Business case demonstrating the co-benefits of multi-functional green spaces
- Exploring potential for co-management of green spaces between recent migrants and long-term residents
- How to design/co-design process to foster balanced involvement of all stakeholders/users

Climate change => rising temperature (in particular in urban areas and at night)

1. Ideas

Climate change => rising temperature (in particular in urban areas and at night)

1. Direct health impacts:

- feeling uncomfortable
- dehydration
- cardiovascular effects

2. Indirect health impacts:

In order to escape hot rooms
→> going outside →

More exposure to UV → skin cancer

2. Barriers

- Financing of activities
- Space is not available
- Legislative barriers
- Blue spaces → increase in pests (rats, mosquitos)
- Lack of information/outreach activities
- Hesitation by house owners (uncertainty about effects)
- Hesitation by higher administrative officials to promote NBS (due to uncertainty of effectiveness, fear of right costs)

3. Solutions

A: Direct solutions to lower the temperature :

- Create more green urban areas (ranging from small to larger scales activities e.g. Green roofs/walls, street trees, ... green corridors for cold air production and flow in city centres)
- Create more blue urban spaces (all sorts of water courses) cooling + air moisture

B: Indirect solutions (to mitigate climate change)

- e.g. planting forests to sequester carbon
- Using bioenergy (but produced in an eco-friendly way)

4. Research needs

- How to best design NBS (green/blue spaces) in order to be most effective on little available space?
- Cost-benefit analysis of long-terms effects of NBS (compared to business as usual with no additional efforts and compared to 'grey/technical solutions). Including all related 'co-benefits' (e.g., recreational or health effects).
- How to design blue spaces in order to reduce the spread of the pests
- Ways for eco-friendly bioenergy production



4.2. Governance strategies

Disconnection between people and nature

1. Ideas

- Education, reintroduce nature in classes for children with practical exercises. Some kids have difficulties to grasp you can't eat all vegetables at all seasons
- Use of space / urban management / green infrastructures e.g. green roofs
- Urban farming
- Use technologies such as the Pokémon game to make people go to nature and rediscover it

2. Barriers

- School curriculum are developed with a strong focus on subjects such as hard science (math, physics, chemistry, biology) and literature but topics such as societal issues, environmental issues, and the link to nature seem to be off the school curriculum
- Lack of funds
- Heavy administrative burden: e.g. to organise a green class is difficult because to take children out of the school can be administratively complicated and expensive
- Urban planning rules are complex and often prevent the implementation of participatory NBS (e.g. ownership of and access to a roof top, practical possibilities for greening and participative management?)

3. Solutions

- Participative management/participatory urban planning
- Incentives
- Introduce society-nature-environment courses in school curricula

4. Research needs

- Comparative studies on urban policies
- Work on social behaviour and incentive responses
- Innovative design and planning
- Evolution of education curricula
- Impacts of nature on well-being and mental/physical health
- Historical studies on health & environment relationships

Shift of political agenda from growth to sustainability

1. Ideas

- Education and awareness can provide results on the long term
- Contribution of social entrepreneurship in such a shift of political agenda from growth to sustainability. Social entrepreneurs get more and more attention and many young people are engaged in such initiatives. They are good for society and good for the economy (but the economy is not so aggressive as under the neo-liberalism concept). Social entrepreneurship aims at creating benefits for the society and for the environment. Promoting such entrepreneurship can help in changing the political priorities in the long term
- Circular economy, which creates businesses that are able to recycle and re-use resources. This results in better living
- More science-based intervention in policy, change in how political priorities are developed. Claim for more attention to environmental matters

3. Solutions

- Promote the above ideas through social media and other social structures
- Develop solutions at local level
- Engage and empower stakeholders in order to educate and exchange ideas and develop understanding; promote the idea that we can change and can ask for a change in the political agenda

4. Research needs

- How to capitalize on the wealth of existing scientific knowledge, how to make this knowledge easily accessible and easy to use
- Develop good indicators that are more appropriate to support decision-making and help decision-makers understand the importance of the social sector
- More investment in trans-disciplinary science

2. Barriers

- Current growth paradigm
- Resistance to change mentality, we want to change but we don't want to change
- Lack of political will
- Lack of understanding of the value of the environment, of how much we depend on it and how much a change in the environment impacts our social and economic life



Loss of social cohesion

1. Ideas

- Include people in design, development and implementation of green spaces and urban farming
- Allow people to develop their own ideas
- Think and plan NBS with social cohesion as a main objective

2. Barriers

- Social and governance issues are not given sufficient attention
- Working across sectors and departments of governments is very challenging in the day to day set-up
- Lack of long-term commitment and financing
- Dealing with very diverse and potentially opposing public opinions

3. Solutions

- Foster work across sectors and departments in governments (e.g. create specific job positions for this)
- Develop more flexible regulations to allow people to develop their own idea (e.g. list of species that you can plant in the public space, making sure that they are non-invasive, non-obstructive, non-allergenic... to easily integrate in urban context)
- Involve the private sector and social entrepreneurs

4. Research needs

- Which NBS help social cohesion? In which circumstances? Which communities can interact with another?
- How to balance differences within communities, within society and between governments and communities? How can governments deal with this?
- What is the potential of social enterprises to increase social cohesion?
- What kind of social cohesion can be better enhanced by NBS and what else is needed?
- How can different governments / departments work together efficiently?

The reduction of energy consumption and production

1. Ideas

Domestic and urban sector:

- Green infrastructures, green roofs, vertical gardens...
- Renewable energy sources at local scale
- Water treatment decentralized (not to use drinkable water for gardens anymore...)

Transport:

- Work on urban planning to reduce citizens movements (e.g. avoid long commuting to go to work...)
- Reduced food and goods transport (local production, urban farms...)

2. Barriers

- Urbanism (regulations...)
- Lobbying by industry and current infrastructures
- Institutional: resistance by existing agencies
- Social economic and technical barriers (re-organizing societies is costly)
- Pollution, property issues, availability of (non-drinking) water
- Existing subsidies and lobbying

Agriculture:

- Reduced energy input in agriculture

3. Solutions

- Changing subsidies and regulations
- Increasing participation and transparency in policy and management - supporting existing social innovations & sharing of good practices
- Enhance the coupling of social innovation & technological design
- Fostering the learning cycle

4. Research needs

- Identification of all the regulatory, social and institutional barriers on what they are and what can be done against them
- Integration of full life-cycle assessment into technological development
- Integration of action research and adaptive governance / management (“learning by doing”)
- Identifying, analysing, and sharing successful examples.

4.3. Land planning and management

Urban densification

1. Ideas

- NBS provided by multifunctional greenspaces in urban areas, esp. densified ones
 - Health and well-being
 - Climate resilience
 - Reduced air pollution
 - Food
 - Education
- Social Innovation: from government to governance local communities managing urban green spaces >> partnership between businesses, government, NGOs and local communities

2. Barriers

- Commercial pressure to develop green spaces and to maximise development footprint on sites
- Declining budgets for public administration and management, declining tax revenues
- Lack of expertise in landscape management in local communities
- Planners/local governments unwilling or unable to hand over control to local communities

3. Solutions

- Capture and communicate economic (incl. non-monetary) values from green spaces such as increased residential and commercial property values and enhanced visitor economy (increased number and longer visits)
- New funding models via sponsorship by businesses and individuals; benefit from increased turnover of adjacent cafés and other businesses
- Participative management by local communities (“moving from government to governance”)



- Training for local governments and community groups to increase capacities of local management
- New IT platforms to tag individual green infrastructure assets, e.g. tagging trees, adopting, sponsoring trees, (make link to species information; “adopt a tree” for citizens and businesses)

4. Research needs

- Socio-economic research to measure, capture values (monetary and non-monetary) of green infrastructure, especially considering multifunctionality
- Research into new funding models and financial products, study current models and explore new ones
- Research into success factors for local governance of green spaces (best practices from examples and how they overcome difficulties)
- Citizen science projects to measure change in green infrastructure and effectiveness of NBS implemented

Storm water/Flooding management

1. Ideas

- Restore upland ecosystem function
- Floodplain and river restoration (including peatlands and forests)
- Restore/maintain traditional agricultural approaches

2. Barriers

- Land ownership
- Conflicting political interests
- Accounting methodologies (“hidden” costs are rarely taken into account, short-term benefits are preferred over long-term ones)

3. Solutions

- Social innovation going beyond “just” community involvement: 1) more inclusion of excluded people in restoration actions, 2) stakeholder involvement in NBS development (e.g., for best practice support by policy makers, certification schemes, rewards for good practice)
- Models where businesses/industry pay for NBS (or: cities and large towns pay) > environment driven taxes, fiscal transfer
- Change of agricultural practices in sustainable ways (e.g., more grassland, less arable land, better integration of nutrient cycling and other natural processes in maintaining sustainability of land)
- Changing insurance policies) e.g., drive change by costs for insurances, based on best practices)

4. Research needs

- Restoration ecology: evidence-based science practised in simple, repeatable, cost-effective, measurable, and long-term best-practice examples
- Holistic view for management/systemic approach in catchment management
- Ecological benefits – biodiversity, ecosystem services, changing unsustainable agriculture practices, linked to multiple benefits for humans, particularly for those living in the catchment area (recreation etc.)
- Social innovation in relation to NBS: engagement of people in thought and action, use of social media can create functional communities who can engage in real social innovation
- Managed retreat: financial and social approaches to deliver NBS to protect people and economy and achieve natural gains, especially in terms of long-term gains over short-term interests

NBS to reconnect humans with nature

1. Ideas

- Participatory design and development of projects
- Participatory budgeting
- Participatory democracy (renewing democratic processes)
- Create community ownership of projects
- Develop new business models for the Commons

3. Solutions

- Regenerative development and design
- Innovating education (from school onwards)
- Community learning
- Biomimicry for social innovation (inspirations from natural processes, e.g. in conflict cooperation)

4. Research needs

- General:
 - more investment in post-normal science
 - more risk-taking in funding to support innovative projects
 - foster co-creative research and implementation approaches
- research on better addressing inequalities and environmental justice approaches
- research promoting collective and interdisciplinary “deep” learning

2. Barriers

- Illiteracy of people on environmental issues
- Ownership conflicts on land and other resources
- Sectoral/silo thinking & organisation
- Inappropriate institutional settings (“old-fashioned”, normative) often linked to mismatches in scales and responsibilities
- Current economic logic and organisation hinders innovations
- Underlying: unsuitable value regimes (exploitation rather than sustainability led)

Sustainable agricultural intensification

1. Ideas

Sustainable agricultural intensification faces several challenges related to soil degradation: soil biodiversity loss, erosion, and contamination (including salinization). These issues need to be addressed in an integrated and systematic manner.

NBS could be used to:

- Prevent soil erosion by creating erosion barriers and/or soil traps, and other innovative erosion pathway interventions
- Prevent, remediate and/or assimilate soil contamination

2. Barriers

- Current unsustainable societal consumption patterns (e.g. unnecessary over production of crops, exacerbated by food wastage, that leads to [in some instances] soil degradation)
- Current agricultural production systems do not favour innovative integrated soil management approaches
- Lack of public perception and valuation of soil as a vital natural resource
- Responsibility for implementing and maintaining NBS are often not well defined



3. Solutions

- Improved awareness of consumption impacts beyond consumers own ‘bubble’ – highlighting extended impacts of consumer choice
- Understanding soil degradation drivers in agricultural systems (societal as well as ecological ones) and the potential solutions to prevent these drivers that could simultaneously drive potential innovation and economic growth
- Increased education and awareness of the importance of soil resources to society, environment, and the economy
- Further development of governance frameworks that enable stakeholders to understand and appropriately address the issue (e.g. via policies like Payment for Ecosystem Service (PES))

4. Research needs

- Transdisciplinary approaches to evaluate NBS potential in the context of implementing sustainable agricultural intensification and simultaneously delivering multiple-benefits that facilitate economic opportunities whilst providing effective intervention to further soil degradation
- Effective awareness raising on the topic of soil: soil as an important good, rather than only “dirt”
- Change of personal consumption patterns
- Stakeholder engagement with implementation of NBS. Need to consider how can this be achieved and consumer motivated to reduce negative impacts on soils

4.4. Restoration

Integration of ecological principles in daily life

1. Ideas

- It’s a closed system
- There’s a balance to find between growth and decay

This applies to :

1. Agriculture (respect of soil biodiversity)
2. Forestry (sustainable forest management)
3. Fisheries (marine protected areas)

2. Barriers

- Uptake of already available knowledge
- Short-term based economic arguments are a problem

3. Solutions

Change the consumption behaviours:

- Decrease material consumption (increase of immaterial consumption)
- Stop over-production

4. Research needs

- Social research: how to induce change in people’s behaviours?

A local economy of water

1. Ideas

All aspects should be connected and linked through the cycle of production and consumption:

- sectors such as industry, construction, education, tourism, IT and agriculture, and their construction or use of new “bio” materials
- water management approaches including wetland management, aquifers, catchment management and rainwater harvesting
- certification and training
- involvement of volunteers, working with time banks, involvement of civil society, active retirement

3. Solutions

- Change mind-sets (see the bigger picture)
- More success stories and proof that alternative production and consumption cycles work
- Innovative public procurement
- Reverse roles: “the bad” [\[EB1\]](#) become part of the solutions
- Social innovation: Make “old ideas” work with new facts and technologies
- “Own the space; own the idea”

4. Research needs

Research should be orientated towards creating a local economy of water. This will require, fundamentally, the building of trust in science, which may be achieved through participative modelling, sensors and apps that allow transparent data collection and trust in scientists.

2. Barriers

- Social conflicts
- Political cycles
- Who pays?
- Tendering processes
- Inertia
- Evidence lacking on other options

Increasing urbanisation

1. Ideas

- Multiple restoration “opportunities”:
 - Increase ecological value of urban green space
 - Connect green spaces
 - Create new sites (e.g. brownfields, rural-urban fringe areas)
 - Remove concrete in rivers
 - Diversify native species, provide them with a better structure
- Peri-urban areas should be included in the urban planning and made accessible for transport

2. Barriers

- Funding
- Regulations
- Silo thinking / sectoral approach
- Awareness and understanding of :
 - Policy
 - Public
 - Business



- There's a need for outdoor education since primary education: children must learn about trees, types of fruits, nuts, making safe fires ...
- Wilderness should be "rewilded"

3. Solutions

- Connecting people, ideas and best practices in a new Community of Practice?
- Place-making, participatory visioning, storytelling...
- New financing mechanisms
- Greater green requirements in building regulations

4. Research needs

- How to achieve systemic change and true social innovation?
- Develop operational models for place-making, societal participatory visioning and story telling
- Evidence base for linkages between NBS and biodiversity

Type 2+ NBS for managed aquaculture

1. Ideas

There are inputs, impacts and outputs regarding an aquatic ecosystem.

For a managed aquaculture, you need to:

- Reduce inputs
- Reduce impacts
- Increase outputs

2. Barriers

- Regulatory
- Cultural
- Economic
- Knowledge gap
- Funding gap for research

3. Solutions

- Cost benefit / feasibility: need to make the case for funding
- Training and knowledge exchange
- Communications / behavioural change
- Commercial partners

4. Research needs

- Varietal development
- Understanding cultural barriers / identifying ways to address these barriers
- Proof of concept at farm scale
- Management systems

4.5. Prioritization of research needs across themes

Here are the results after calculating the scores for each research need that was submitted from the thematic groups:

Rank	Research is needed on :
1	How can NBS provide social co-benefits: what are the conditions/requirements?
2	More experimental research and evaluation of pilot studies of using NBS and social innovation together
3	Multiple values (monetary and non-monetary) of green infrastructure development and investments especially in context where you have multi-functionalities
4	Understanding how to achieve systemic change in urban planning to embody NBS
5	Effectiveness of NBS on social cohesion / temperature decrease / health increase / co-benefits etc.
6	Storm water/flood management: research how to develop holistic systematic approaches for watershed management from upstream to downstream with engagement of local actors throughout the process
7	Research into success factors of local governance of green space
8	An evidence base of understanding linkages between biodiversity and NBS (in urban areas)
9	How can transdisciplinary research help overcome institutional barriers within governments (sector-thinking)?
10	How to design (or re-think) spaces to include different and multiple needs from different communities? (Physical / mental / physiological / environmental)
11	How can the involvement of people in NBS be fostered to ensure social co-benefits?
12	Awareness of perception and acceptance/understanding of NBS in populations
13	How can regulations support the social co-benefits of NBS?
14	Explore funding models to support active lifestyles and de-acceleration in green spaces (e.g. from health organizations: social securities / insurance companies etc.)
15	Under what circumstances social entrepreneurship could deliver social co-benefits of NBS?
16	Innovative governance for integrated water catchment management (and learning from best examples)
17	The effective use of citizen science to measure change in green infrastructure and effectiveness of NBS
18	Investigate human barriers to consumptions of more ecological food items (sea weeds / insects etc.)
19	Identify economic and social case for developing managed aquaculture (to increase food production)
20	How to ensure that technological development does not run ahead of social innovation?



5. Live notes of the dialogue sessions

5.1. Sustainability of NBS

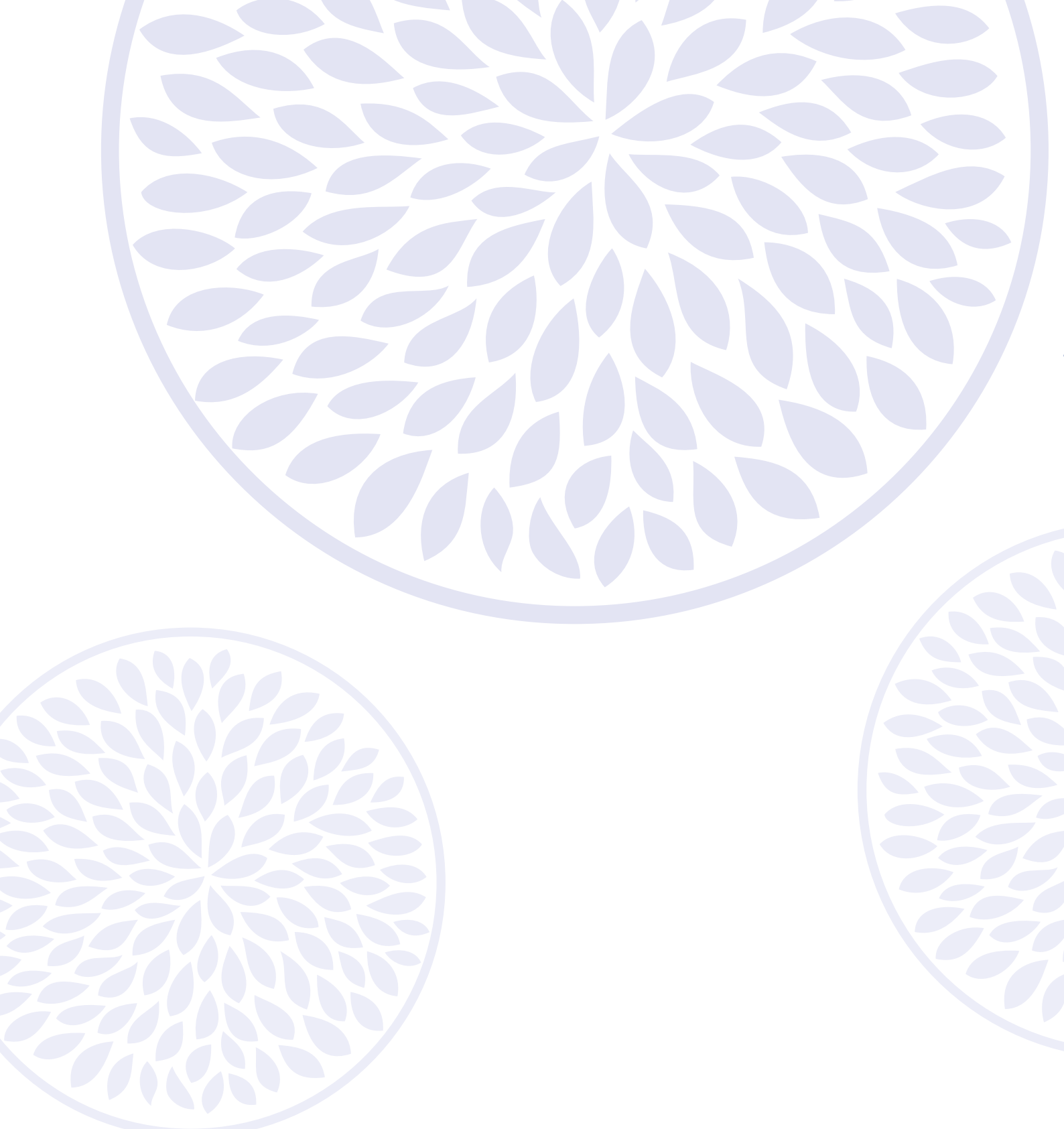
- It has to do with the ownership of a concept that has been created to represent a reality in the past years. We had to explain to them the definition of NBS for things they had done. The multi-functionality of what they had done was not evident. Planning in city councils is often a barrier for NBS as they work in silos. Excitement for them because they see the opportunity of their actions to bring more systemic effects and to re-organise themselves.
- We did not look at social innovation (SI) much. The connection with SI is difficult and the discussion on what SI could mean. We worked on SI definition in relation to changing relationships especially in institutions. It has a lot to do with spontaneous solutions generated, difficult to discuss on specific social innovation.
- What is sustainability of NBS: Are the NBS sustainable themselves; is sustainability about their effectiveness which relates to monitoring. Or is it the sustainability of NBS as a tool to reach the objectives, will policy makers keep using these...
- We have to take into account that there are alternatives and we need to have tools to assess sustainability of implemented NBS or for the ones we are going to implement.
- We need to assess NBS effectiveness, no framework exists, and this is difficult as they are multifunctional/multiple benefits.
- There are many different forms of NBS. Sustainability is a process by which we try to realise a solution with multiple actors and to satisfy multiple goals. The process is more important and can be the part that is sustainable.
- Research should highlight criteria to assess sustainability. There is a lot of room for researching the term of NBS and the criteria for sustainability. We need to make sure we use all the criteria to ensure branding and long-term use.
- Adaptive management is about participatory decision process based on monitoring and including a participatory framework to deal with conflicts. This framework for participatory adaptive management is designed for sustainability.
- The way we define NBS should include sustainability: if sustainability is not in the process/NBS it is not an NBS. We need to be clear on this aspect.
- We need to clarify as we mean 2 different things: environmental sustainability is indeed a condition of NBS, but the other aspect is durability of the NBS in the face of change in needs and conditions. Durability aspect has a lot to do with economic models. What is included in NBS is to also propose new models for our society and economy, what they deliver in terms of new economic models is very important.
- Let's not forget the end word "solutions" which means it is a solution of a problem and should not be overcomplicated. Social and economic change can be triggered by NBS.

5.2. How do we make space for research on NBS as much research is currently on artificial solutions

- A main trend is to work on artificial life/synthetic biology and how do we see that in relation to NBS/How far should we go in terms of artificialisation of NBS (e.g., producing medicine with modifying of organisms).
- A clarification on NBS: mimicking nature is not an NBS. NBS need to improve the ecosystems/biodiversity. NBS introduces/increases nature.
- If you look at NBS it should be in an integrated way.
- The term natural does not mean much anymore, an artificial species can "increase" biodiversity for some people.
- Example: if we create new bacteria to deal with an oil spill, is it an NBS. This may not be an NBS.
- No in the sense that it is not directly improving biodiversity/natural systems.
- Majority of our habitats in Europe are semi-natural and require human intervention to maintain systems. In many management strategies to restore flooding areas means restoring traditional human practices. It is very much about re-engaging people into management for which they should get benefits and this relates much to social innovation.
- This conversation shows the dilemma around NBS. Same issue as climate change as a scientific objective item and also as a social/cultural topic. Same thing with "nature" as this is understood differently by various people. There also is an ethical element that should be included in the debate.
- NBS at the beginning was much more on the natural ecosystems, the typology show now the diversity: type 2 shows the need for management in some NBS (e.g. forest management, agricultural landscape...), 3 is more engineering NBS. The big difference is whether the engineering is aiming at higher ecological resilience as well as economic and social benefits. A difficulty with NBS is also how a durable solution could decrease the level of management.
- If we move on the practice of NBS, we see that we need to move to co-benefit management also for benefits coming from the NBS. Importance to better understand the trade-offs and synergies between solutions.
- The key to secure sufficient funding is to show the clear social benefits of NBS. Also need to assess the risk of other solutions.
- Open space for research means also funding. EC is financing large demonstration projects with the systemic approach. As a community working on NBS we need to push on research needs as these projects are demonstration projects less than research ones. These demo test solutions and don't provide space to research on sustainability and effectiveness.
- Grey solutions are still dominant. The people in environment ministries are fighting for NBS and need the evidence to support this shift and avoid short-term grey solutions.
- There are methodologies in which you can use demo to test and evaluate long-term sustainability. The problem is timing, we need to move to have already practical solutions and building learning processes within the implementation. NBS have another added value, they are also a way to address conflict resolution on the contrary of grey solutions.
- Need to keep in mind that if national level is not very motivated for NBS, some local politicians/mayors can be very pro-active.



- Deconstruction of what the GDP represent and see how NBS can fit in new GDP models.
- BiodivERsA will not go to demonstration projects but will be tacking more the "fundamental questions" we are discussing.



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