



# **Necessity of Mapping and Assessment of Ecosystems and Their Services in Planning and Decision Making Process**

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# Presentation questions

- \* *(i) What is the concept and background of ecosystems and ecosystem services and how it relates with economics and human well – being?*
- \* *(ii) How could policy makers, public and private sector representatives can benefit from ecosystem approach?*
- \* *(iii) How could ecosystem approach be integrated in decision making processes?*



# Concepts: Ecosystems and Ecosystem Services I

*«An **ecosystem** is the interactive system established between biocoenosis (a group of living creatures) and their biotope (the environment in which they live)» (Tansley, 1935)*

*«An **ecosystem** is a dynamic functional unit consisting of all plants and animals (biodiversity) in an area, together with the non-living, physical components of the environment (water, soil and air) with which they interact.» (Christopherson 1997).*

- \* In economic terms, ecosystems may be regarded as a **special form of capital assets** with difference that depreciation of natural capital may be irreversible, or the systems may take a long time to recover.





# Concepts: Ecosystems and Ecosystem Services II

- \* **Plato (c. 400 BC)** - realised that deforestation could lead to soil erosion and the drying up of springs
- \* **Marsh (1864)** - suggested that the Earth's natural resources were not unlimited by pointing to changes in soil fertility in the Mediterranean
- \* **Study of Critical Environmental Problems (1970)**, which listed services such as insect pollination, fisheries, climate regulation and flood control.
- \* 1990s - mainstreaming of ecosystem services in the literature and increased interest on methods to estimate their economic value.
- \* **UN Millennium Ecosystem Assessment in 2005** - put ecosystem services firmly on the policy agenda.
- \* **EU Biodiversity Strategy to 2020** - determines that *“Member States, with the assistance of the Commission, will map and assess the state of ecosystems and their services in their national territory by 2014, assess the economic value of such services, and promote the integration of these values into accounting and reporting systems at EU and national level by 2020”* (EU, 2011).



# Ecosystem functions and services

LEAVES, TWIGS, BRANCHES

ABSORB SOUND AND BLOCK  
EROSION-CAUSING RAINFALL

BRANCHES, LEAVES

PROVIDE SHADE AND REDUCE  
WIND SPEED

LEAVES

FILTER DANGEROUS  
POLLUTANTS FROM  
THE AIR

ROOTS, LEAVES, TRUNKS

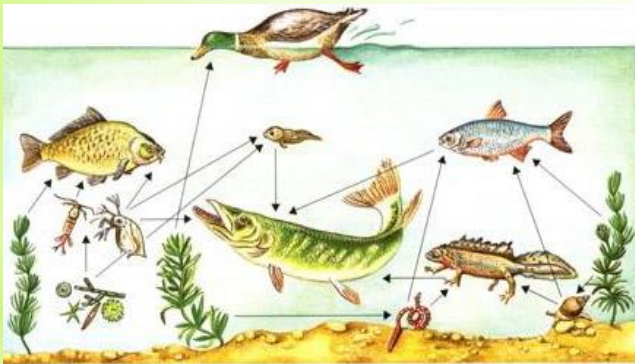
PROVIDE HABITAT FOR  
BIRDS, ANIMALS, AND  
INSECTS

EVAPOTRANSPIRATION

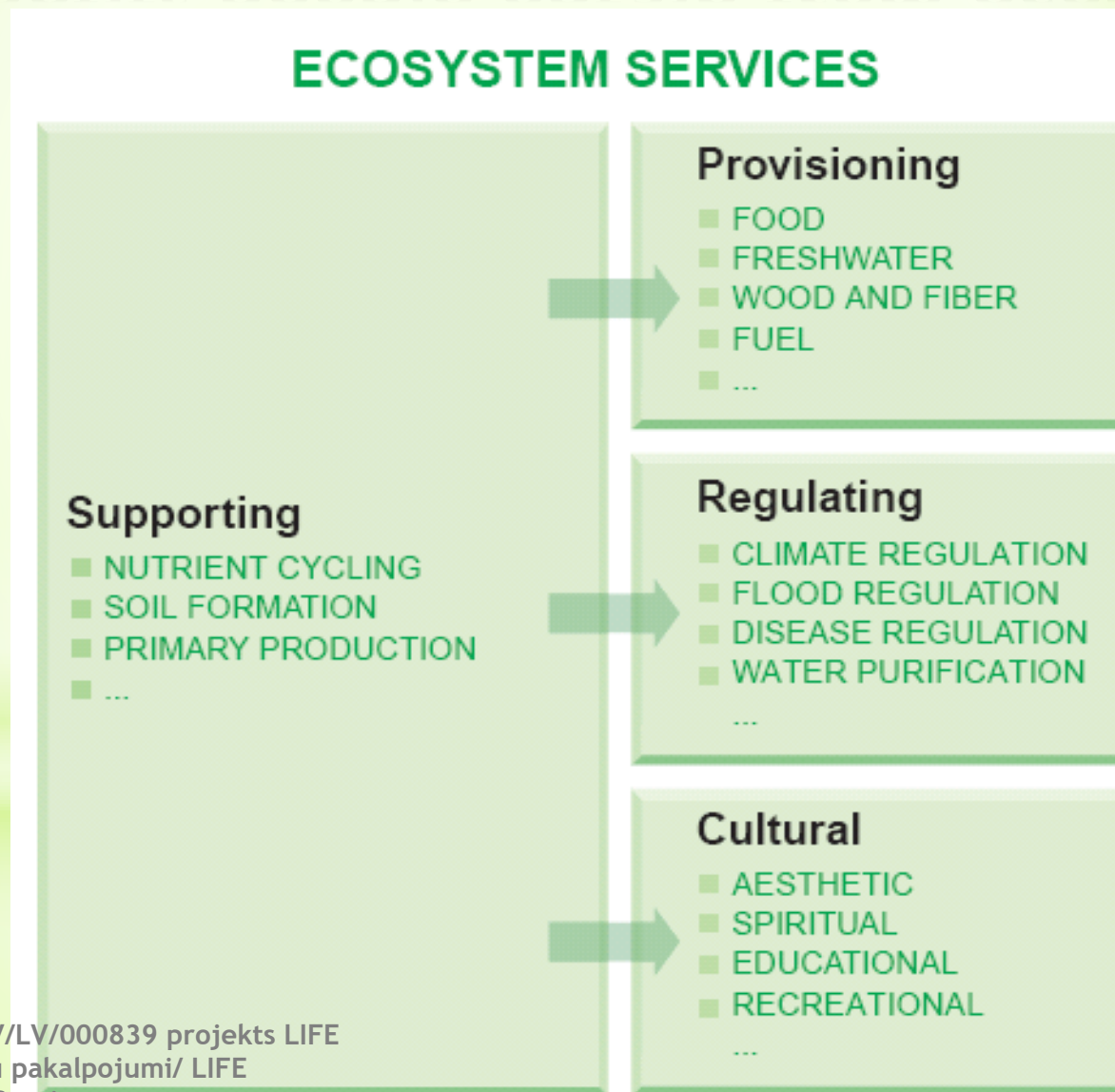
FROM LEAVES COOLS  
SURROUNDING AIR

ROOTS

STABILIZE SOIL, PREVENT EROSION



# Ecosystem Services - The Benefits people obtain from ecosystems



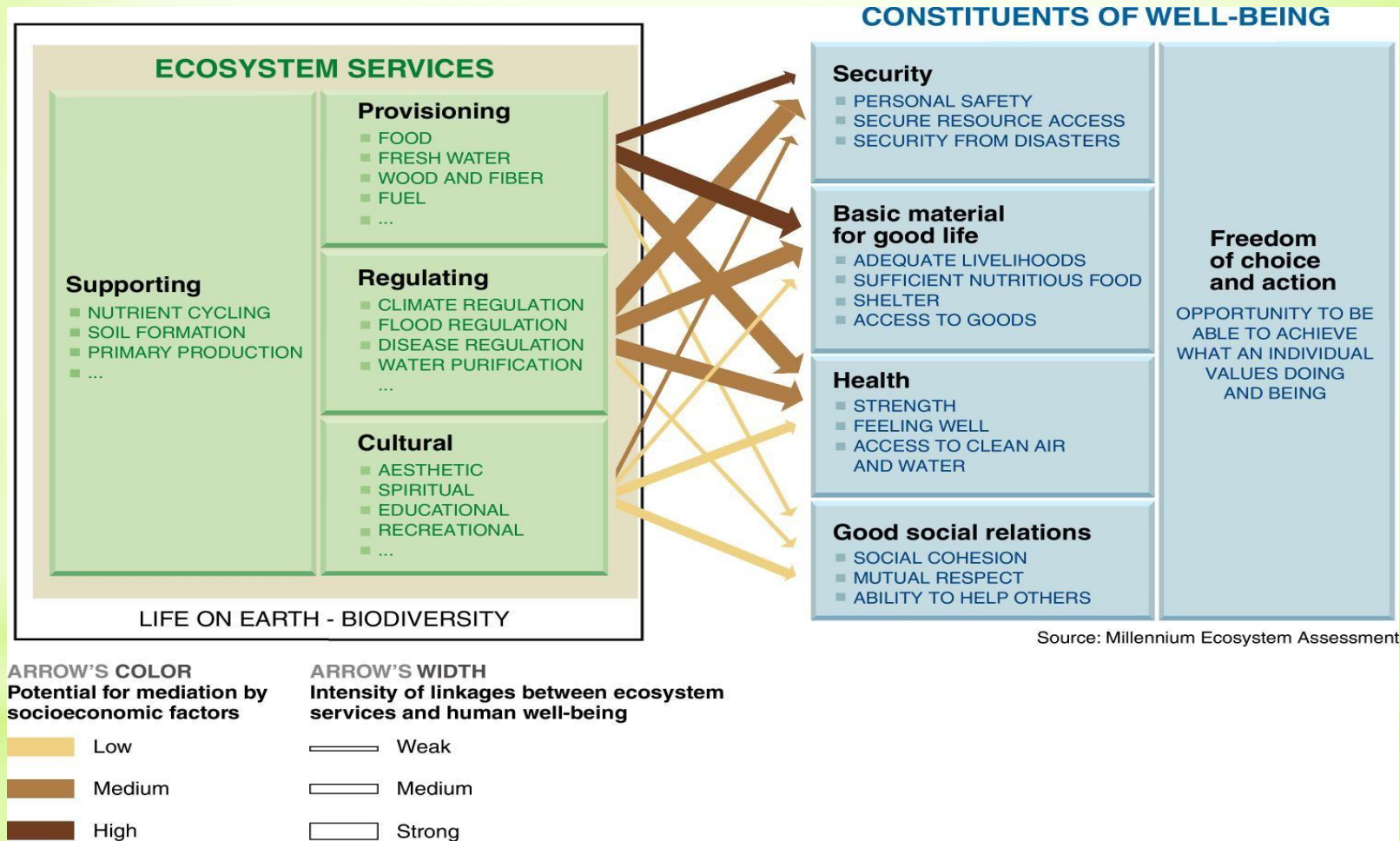


# Problems: Overview of Findings

- \* Over the past 50 years, humans have *changed ecosystems more rapidly and extensively than in any comparable period of time* in human history, largely to meet rapidly growing demands for food, fresh water, timber, fiber and fuel;
- \* The changes that have been made to ecosystems have contributed to substantial net gains in human well-being and economic development, but these gains have been *achieved at growing costs*
- \* The degradation of ecosystem services could *grow significantly worse during the first half of this century and is a barrier to achieving the Millennium Development Goals*
- \* *Climate change impacts on ecosystems* – scientists have concluded over the last three decades, human-induced warming had likely had a discernible influence on many physical and biological systems



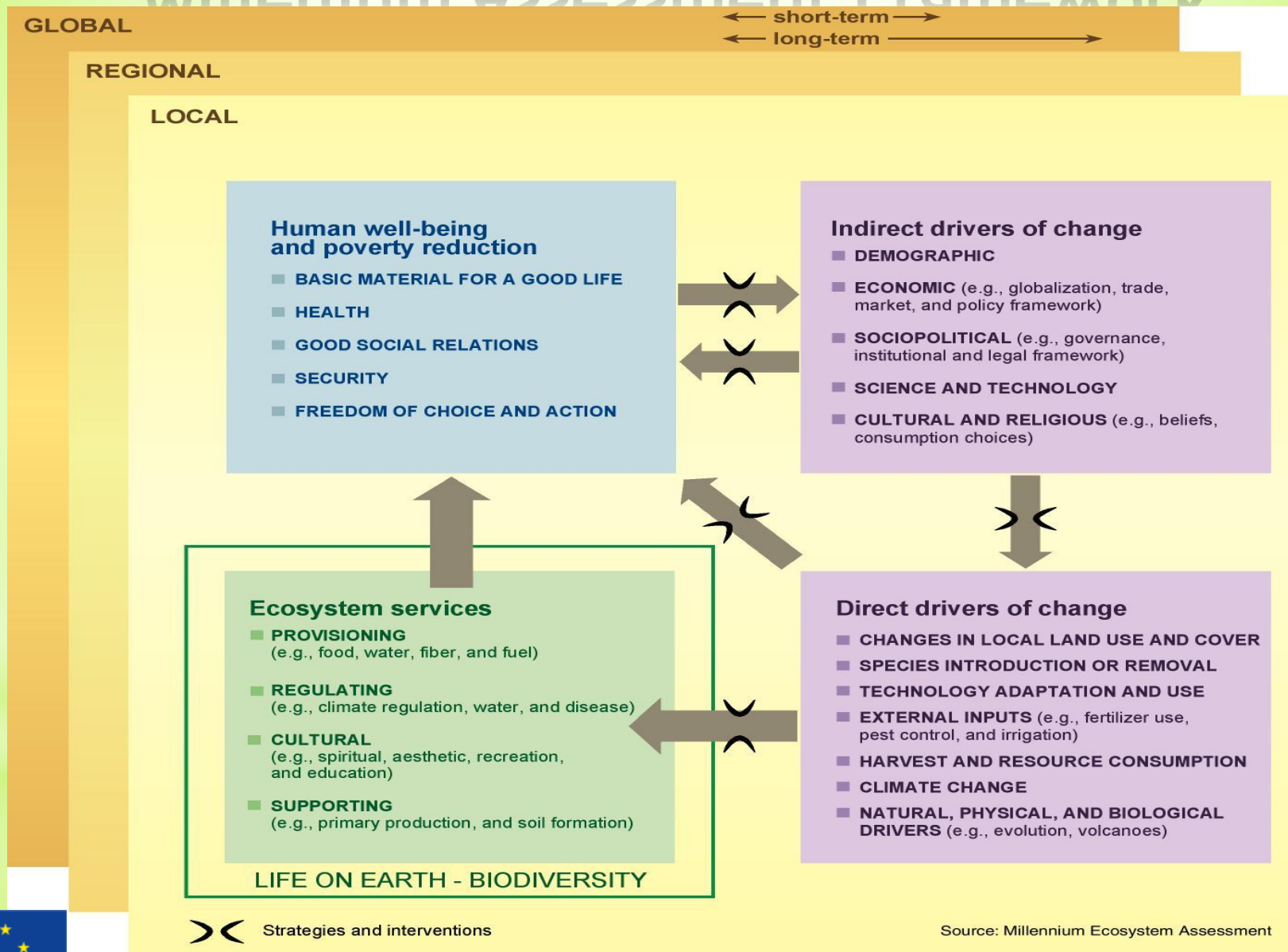
# Consequences of Ecosystem Change for Human Well-being



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# Millenium Assessment Framework



Source: Millennium Ecosystem Assessment

# Economic thinking on natural resources

Period	Economics School	Conceptualization of nature	Value-environment relationship
From the 16th to the 18th century	Pre-classical economics	Land was an important source of wealth, as it allowed feeding a growing population and served as a source of valuable materials.	Economic process could be understood by focusing on a single physical factor: the productivity of agriculture.
19th Century	Classical economics	Land as production factor generating rent (income)	Labour theory of (exchange) value Nature's benefits as use values
First half of 20th Century	Neoclassical economics	Land removed from the production function	Land as substitutable/ producible by capital, and thus monetisable
The second half of 20 <sup>th</sup> century to the 21 <sup>st</sup> century	Modern economics	Land is subject subject to increasing pressures. Economic use of limited materials, energy and food supplies	Interdependency of ecological and economic systems

# A Philosophical View of Natural Capital in Economics

WAREHOUSE Image of Nature	GARDEN Image of Nature
Emphasis on humans as the exploiters of natural resources.	Emphasis on humans as managers or stewards of "natural assets".
Pristine wilderness exists on Earth in the sense that there is "Nature" beyond the realm of human agency.	No pristine wilderness left on Earth in the sense that there is "nature" beyond the realm of human agency.
Emphasis on passive or inert materials.	Emphasis on active materials (ecosystems/biodiversity).
Emphasis on passive or inert materials as inputs to human-directed technological forms of production.	Emphasis on nature's unassisted and assisted productions.
Nature (or "land") is indestructible.	Natural processes are depletable or depreciable.
The ecological conditions required for human economic activity are taken as given.	The ecological conditions required for human economic activity are not taken as given.





# Sustainable use of Natural capital I



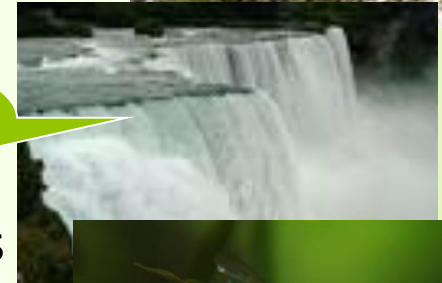
# Sustainable use of Natural capital II

- \* **Environmental Sustainability:** It means that we are living within means of natural resources and we need to ensure that we are consuming our natural resources, such as materials, energy fuels, land, water....etc., at sustainable rate. Environmental sustainability should not be confused with full sustainability, which also need to balance economic and social factor.
- \* **Economic Sustainability:** It means that country or business uses its resources efficiently and responsibly so that it can operate in a sustainable manner to consistently produce an operational profit.
- \* **Social Sustainability:** It's the ability of society or any social system to persistently achieve a good social well being.



# Biodiversity & ecosystem business impacts & dependence

Business impacts on ecosystems and ecosystem services



Ecosystem change creates business **risks** and **opportunities**



Business depends on ecosystems and ecosystem services



# Biodiversity & ecosystem risks & opportunities

- \* **Operational** (e.g. increased scarcity and cost of raw materials)
- \* **Regulatory and legal** (e.g. public policies like taxes and moratoria on extractive activities)
- \* **Reputational** (e.g. relationships and image from media and NGOs)
- \* **Market and product** (e.g. consumer preferences)
- \* **Financing** (e.g. availability of capital)

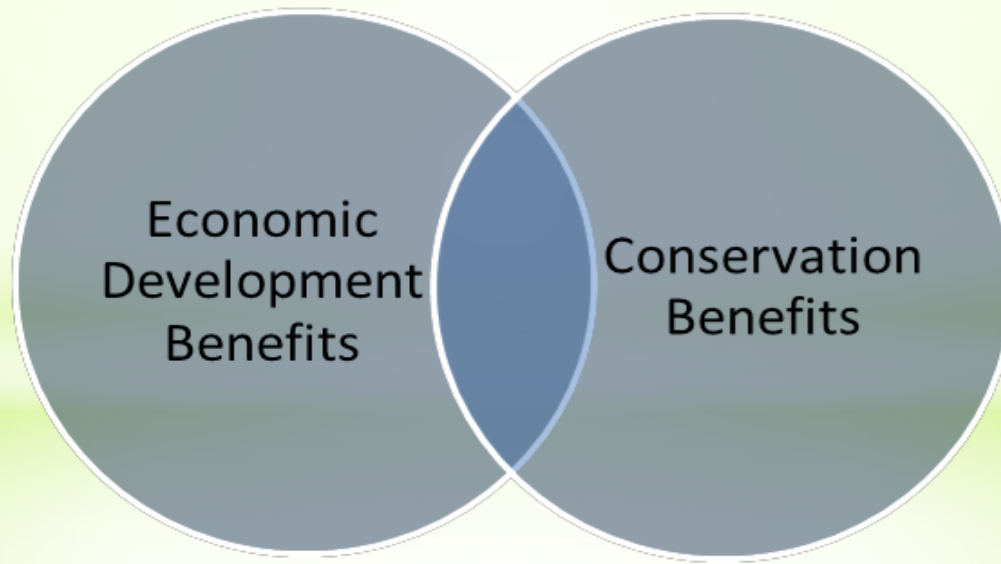


# An Ecosystem Approach I

Linkage between ecosystems and economic development goals (*nature for people's sake*).

Ecosystem services— based approach:

Nature for people's sake



# An Ecosystem Approach II

- \* **Re-connecting** people with the natural environment
- \* **Working together** across boundaries to improve the environment
- \* Reflecting the **value of ecosystem services** in decision-making
- \* Respecting **environmental limits**, in sustainable development, and taking **ecosystem functioning** into account
- \* Making decisions at an **appropriate spatial scale**
- \* Making the case for **investing in ecosystems** to achieve economic development goals
- \* Advancing policies and incentives for **sustaining ecosystems**
- \* Providing a systematic way of managing **ecosystem service trade-offs**





# How thinking in terms of ecosystem services might help

- \* Provide a conceptual shift in the way people think about conservation, increasing public support for conservation efforts;
- \* Improve governments' ability to measure the benefits of particular environmental actions, enabling better goal-setting and program evaluation;
- \* Open up new opportunities for environmental markets
- \* Understanding the full value of the natural environment enables:
  - decisions on the natural environment that do not compromise benefits to society, business and the economy
  - improved delivery of services through better use of the natural environment
  - reduced business risk and increased business opportunity



# Bringing Ecosystem approach into decision making I

- \* The value of ecosystem services needs to be integrated into accounting and - decision making to ensure that we do not erode the natural capital.
- \* The multifunction of ecosystems needs to be maintained when developing land-use methods.
- \* Optimizing the use of only one ecosystem service could negatively affect other services.
- \* Smart development including multiple sustainable use could result in  $1+1=3$  creating prosperity and job opportunities.

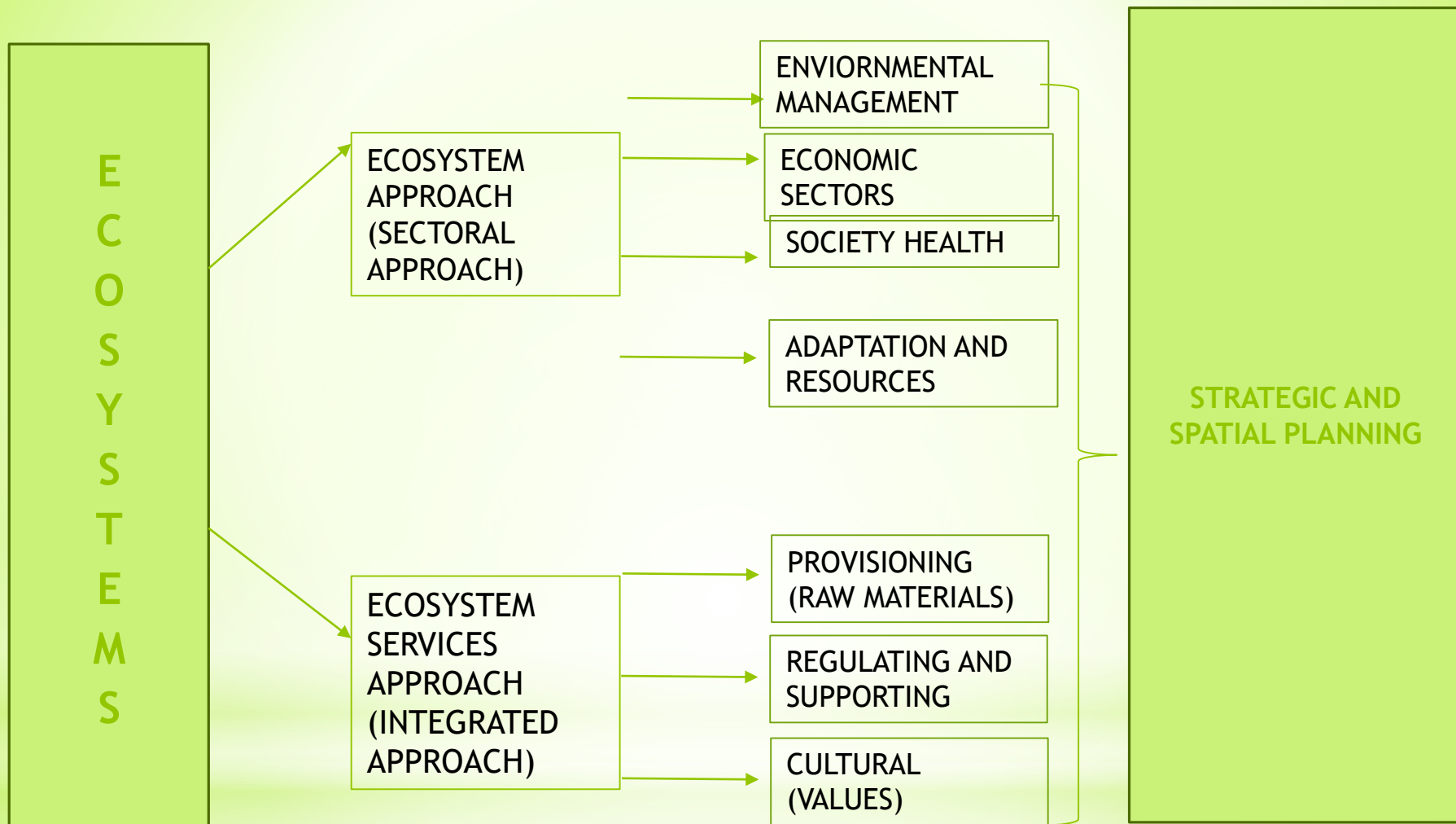


# Bringing Ecosystem approach into decision making II

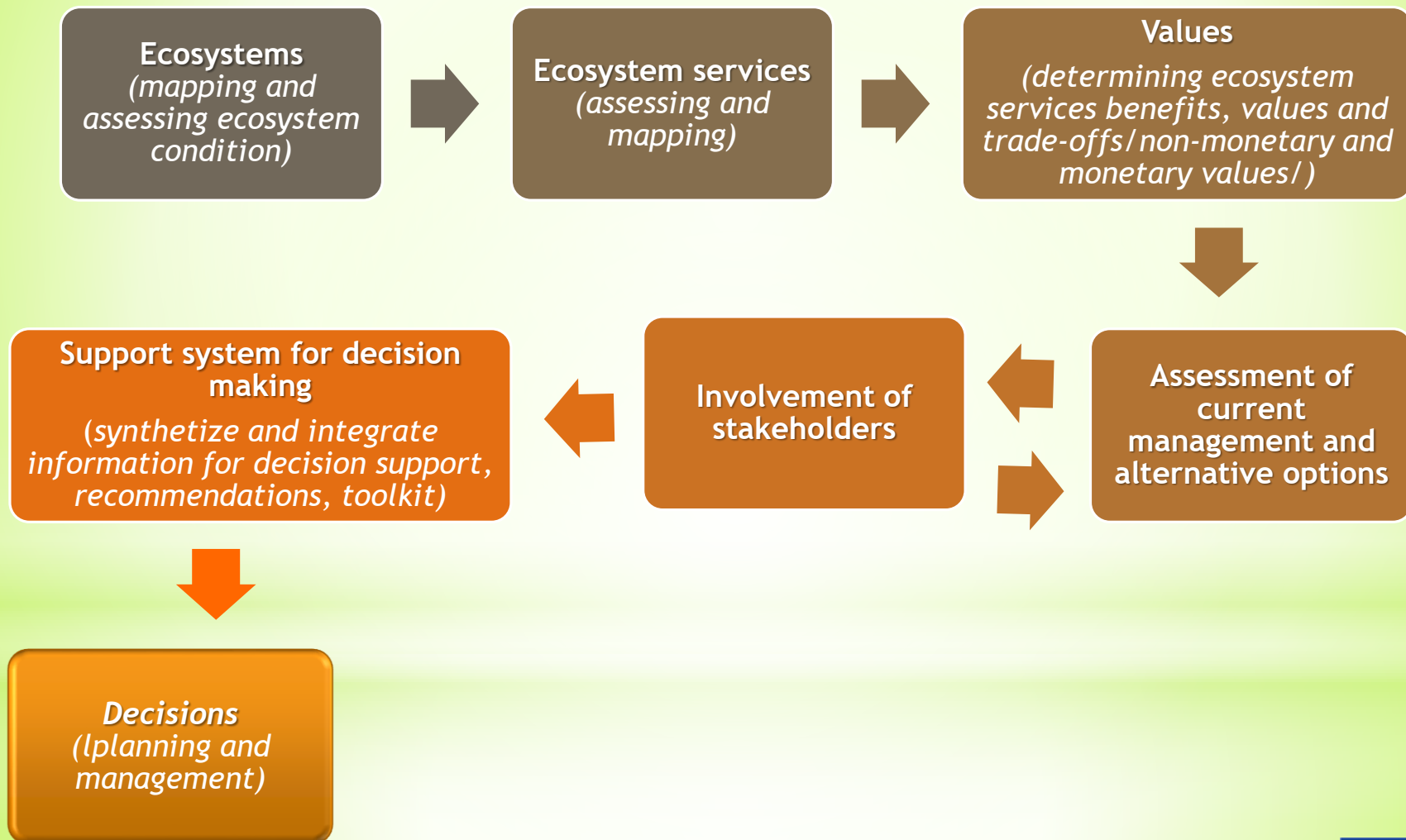
- \* Objective of the ecosystem services assessment is to provide a critical evaluation of the best available information for guiding decisions on complex public issues
- \* EU Biodiversity strategy stress the assessment of ecosystem services and it integration into decision making at EU and national level by 2020”
- \* Provide information to decision makers not only about the state and trends of ecosystem services but also identify spatial dependencies and trade-offs
- \* Involve different interest groups and facilitate communication including those that represent environmental needs and future demands, and integrate their preferences into decision-making
- \* Contribute to choose the economically most advantageous and sustainable options for territorial development and calculate the returns on investments in environmental conservation







# A Framework for Ecosystem Approach Integration into Decision Making



# Main conclusions

- \* Decision makers do not necessarily need an exhaustive understanding of the social-ecological system, but they need sufficient arguments to make a choice between policy and management options.
- \* There is important to provide the framework for improvements for the strategic planning documents (National and Regional Development Plans, Spatial Development Plans and Nature Conservation Plans)
- \* It is important to promote the understanding of the various stakeholder groups on the topics of sustainable planning for the enhancement of common benefits.
- \* It is important the greater focus on decision making basing on relevant ecosystem services assessment values and support system
- \* It is important stronger linkage between the same assessment process and information needs by decision makers from the outset of the assessment process



# EU LIFE supported project “*LIFE EcosystemServices*”

- \* Now in the process - ***Recommendations for decision makers and planners for integration of ecosystem services approach into planning and decision making process – web based toolkit*** (will be available at the end of 2017 at [\*http://ekosistemas.daba.gov.lv/public/eng/\*](http://ekosistemas.daba.gov.lv/public/eng/))
- \* Support for decision makers at different levels (seminars, consultations, etc.)





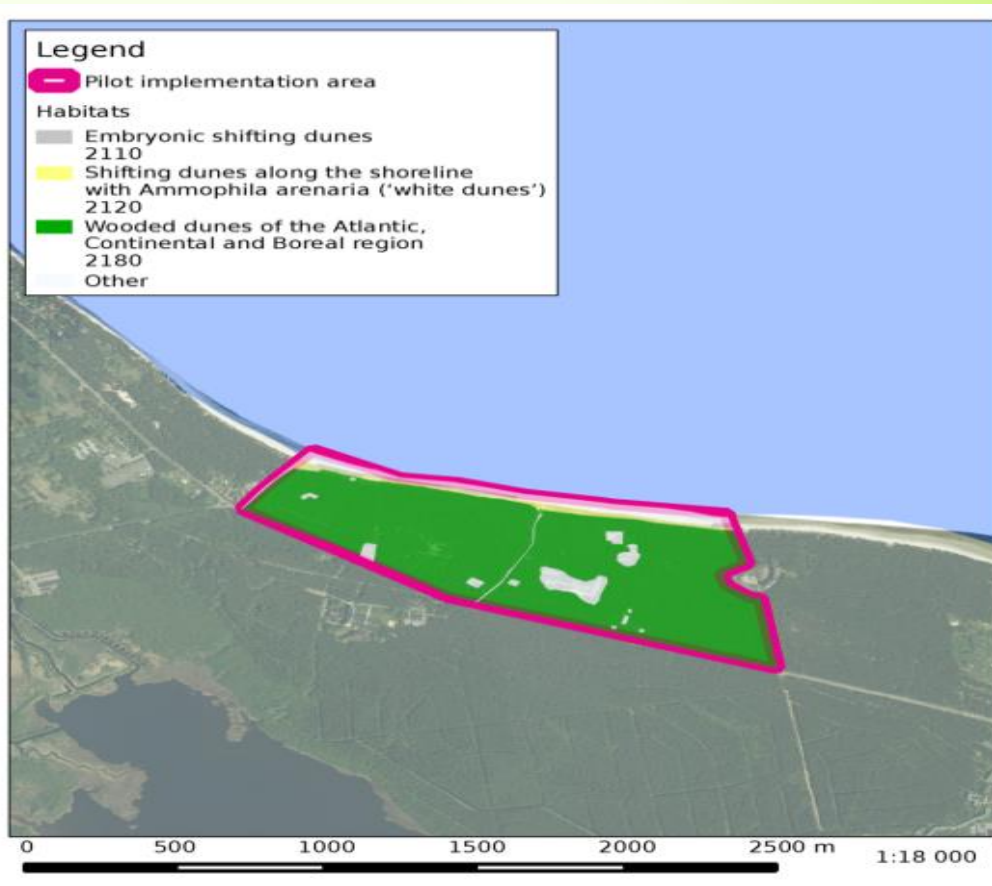
# PRACTICAL WORK



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# Characteristics of the pilot area – Jaunkemeri

Ecosystem	Habitats *	Jaunkemeri
Beach	Sandy beach	5.55
Dunes	Embryonic shifting dunes (2110)	0.82
	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) (2120)	3.85
Forests	Wooded dunes (2180)	3.92
	Wooded dunes (2180) including natural old pine forests (Western Tāiga) (9010)	68.92
Rivers	Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> Vegetation (3260)	n.a
Built-up	Public buildings, residential areas, transport infrastructure, etc.	10.54
	<b>Total area</b>	<b>93.6</b>



# Three development proposals (scenarios for Pilot area)

- \*1<sup>st</sup> - to keep area only for nature conservation purposes, strict regulations on land use and attendance, to apply micro reserve status
- \*2<sup>nd</sup> - to develop the resort area (hotels, sanatoriums, build up promenade along coastline, appropriate tourism infrastructure)
- \*3<sup>rd</sup> - to develop industrial area (fishing harbour, cargo handling)



# Three perspectives

- \* **Environmental Sustainability** (Eco-System Integrity  
Carrying Capacity, biodiversity) - 3-4 students
- \* **Social Sustainability** (Equity, Empowerment,  
Accessibility, Participation, Sharing, Cultural Identity,  
Institutional Stability) - 3 - 4 students
- \* **Economic Sustainability** (Growth, Development,  
Productivity) - 3-4 students





# ASSIGNMENT

You are group of spatial planners/land use planners and you are welcome to provide:

- 1)** *yes or no arguments for each proposal/development scenarios*
- 2)** *together propose one sustainable development proposal/scenario for Pilot area.*



# Which is better? Which is the most sustainable scenario?



# Thank You!

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