Institute for European Environmental Policy

Ecosystem services and natural capital – the foundation of a green economy

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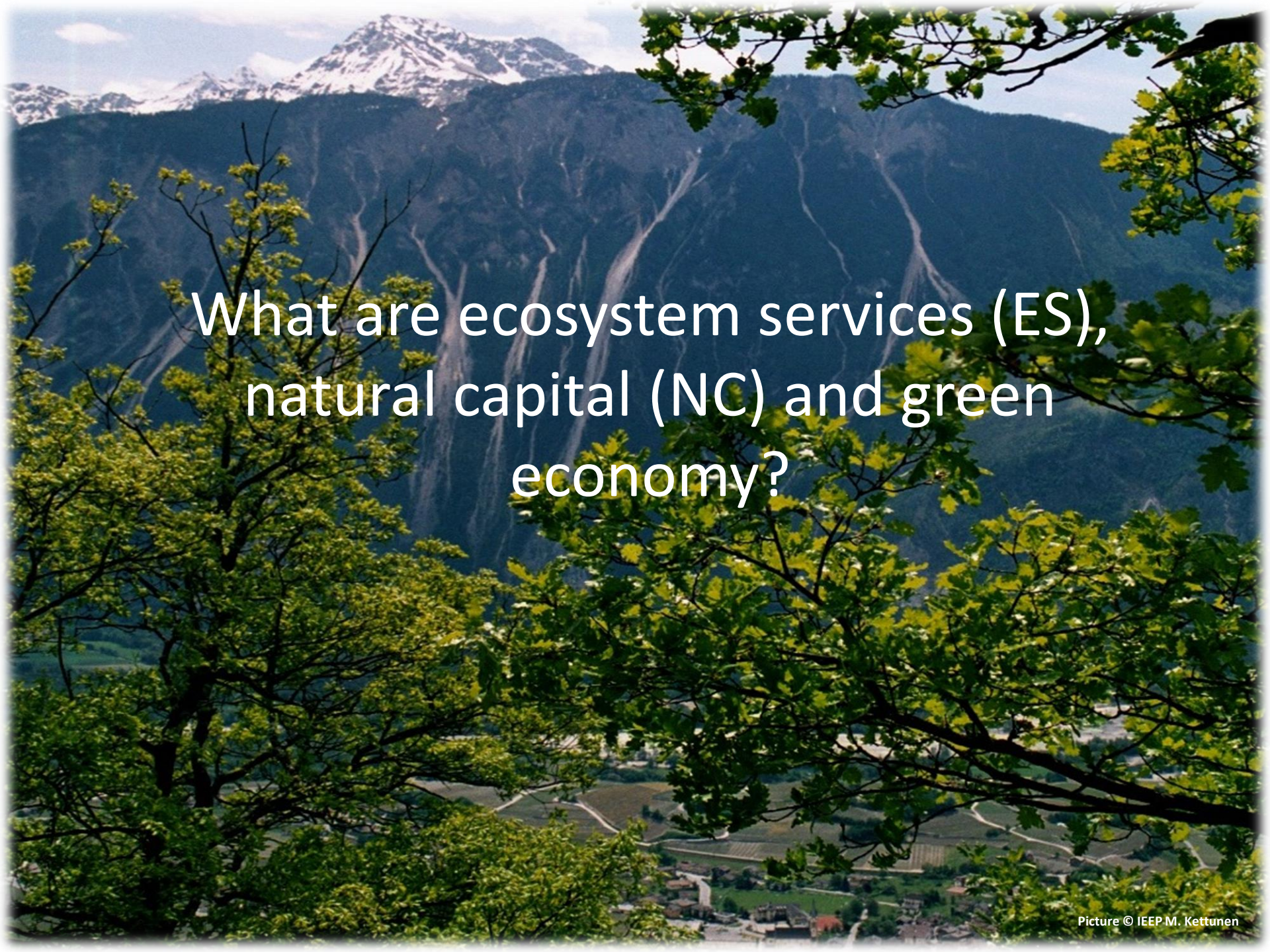
Content

- Ecosystem services (ES), natural capital (NC) and green economy
- Why are ecosystem services and natural capital integral to green economy ?
- Towards a truly green economy - integrating ES and NC to policies and decision-making


What are ecosystem services (ES), natural capital (NC) and green economy?
Picture © IEEP M. Kettunen

Ecosystem services

Provisioning Services
(i.e. ecosystems' ability to provide resources)

E.g. Food provisioning - Water provisioning - Raw material - Medicinal resources / biochemicals - Ornamental resources - Genetic resources

Regulating Services
(i.e. ecosystems' beneficial regulatory processes)

Climate regulation - Natural hazards regulation - Purification and detoxification of water, air and soil - Water / water flow - Erosion and soil fertility – Pollination - Pest and disease regulation

Cultural Services
(i.e. ecosystems' non-material benefits)

Opportunities for recreation and tourism - Aesthetic values- Inspiration for the arts - Information for education and research - Spiritual and religious experience - Cultural identify and heritage - Mental well-being and health

Supporting Services
(i.e. services necessary for the production of all other ecosystem services)

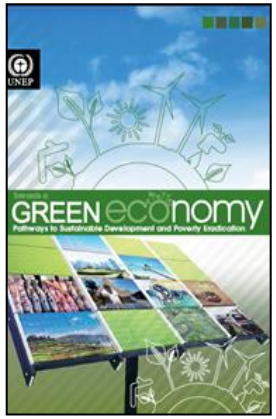
Ecosystem process maintenance - Lifecycle maintenance - Biodiversity maintenance and protection

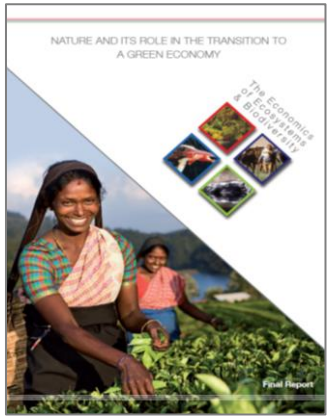
Natural capital and green economy

Picture © IEEP Web

What is natural capital?

'Natural capital' is an 'economic metaphor for the limited stocks of physical and biological resources found on earth' (MA, 2005).





What is green economy?

UNEP defines a green economy as "***one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.***

In its simplest expression, a green economy can be thought of as one which is ***low carbon, resource efficient*** *and* ***socially inclusive***"

Protection and restoration of natural capital a key component.

Source:: UNEP Green Ecobomy report (2011)


Why are ES and NC integral to a green economy?
Picture © IEEP M. Kettunen

Problem: the invisible value of ES and NC

Provisioning Services
(i.e. ecosystems' ability to provide resources)

Only services with market value recognised

- Ornamental re… - Genetic resources

Regulating Services
(i.e. ecosystems' beneficial regulatory

Not integrated / no price signals

regulation - Purifi…
detoxification … soil -
Water / wa…
soil fert… and
diseas…

Cultural Services
(i.e. ecosystems' non-material benefits)

Only services with market value recognised

Inspiration for …
Information fo… d
research - Sc…
experience…
heritage - M…
health

Supporting Services
(i.e. services necessary for the production of all othe… services)

Not considered

Example: berries, mushrooms and game

Table 3: Quantities and values of berries and mushrooms picked for markets in 2005 in Finland, Norway and Sweden. Source: Turtiainen and Nuutinen (2011).

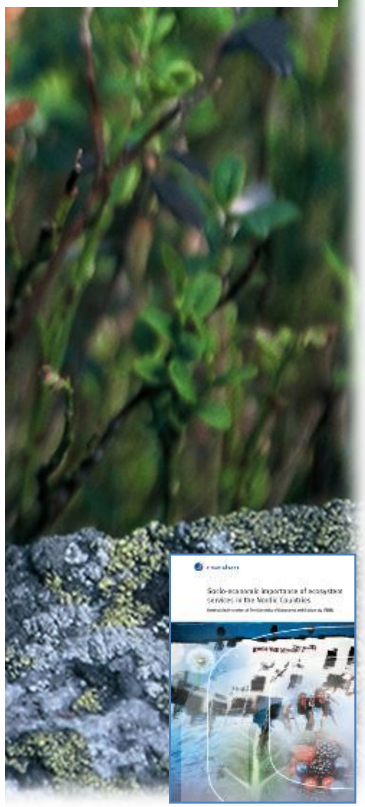
Country	Berries		Mushrooms	
	Quantity (tonnes / year)	Value (mil EUR)[2]	Quantity (tonnes / year)	Value (mil EUR)[2]
Finland	12,027	11.862	426	1.019
Sweden	13,790	32.435[1]	Not available	Not available
Norway	350	0.524	500	1.873

[1]Value for mushrooms and berries together

price whereas in Swedish

Table 4: Socio-economic significance of hunting in the Nordic countries

Country	Finland	Sweden	Norway	Denmark	Iceland	Greenland
Hunters (with licence)	311,000	263,000	195,500	171,119	12,227	6,539
Large mammals	Eurasian elk 68,423	Eurasian elk 80,974	Eurasian elk 36,400	Roe deer 128,200	Reindeer 1,229	Reindeer 15,092
Bears	179	181	3	NA	NA	Polarbear 124
Other species	Mallard 265,400 Wood pigeon 232,100 Black grouse 170,000	Roe deer 119,000 Mallard 91,500 Wood pigeon 71,000	Willow grouse 127,850 Wood pigeon 56,900 Red deer 39,100	Pheasant 721,400 Mallard 485,400 Wood pigeon 299,500	Rock ptarrigan 68,831 Greylag goose 45,828 Puffin 33,074	Guillemot 84,412 Harp seal 84,223 Ringed seal 71,260
Ref. year	2010	2007-2008	2010-2011	2010-2011	2010	2007-2009
Source	RKTL 2012	Naturvårdverket 2012, Statistics Sweden 2009	Statistics Norway 2012	Asferg (2011)	Heiðarsson et al. 2010, Statistics Iceland 2012	Statistics Greenland 2012
Value of game meat	83 mil EUR	1,119 mil SEK (~125 mil EUR)	44 mil EUR	NA	NA	NA
Ref. year	2010	2005-2006	2001			
Source	RKTL 2012	Mattsson et al. 2008	Lunnan et al 2005			



Data source: TEEB Nordic report

See TEEB Nordic for references

Example: recreation and tourism

- **Denmark:** ~70 % of Danes visit green areas several times a week
- **Norway:** hiking in nature is practised more than twice a month by almost half of the population (i.e. around 2.4 million people)
- **Finland**: 1 EUR financial support for the management of national parks provides 10 EUR return for the region

Name of national park in Finland *Some examples of total 37*	**Local, accumulative economic impacts of visits (EUR mil / year)**	**Person-years of employment**
Nuuksio	2.1	16
Pallas-Yllastunturi	34.3	450
Oulanka	15.5	200
Etc.		

See Kettunen et al. (2012) TEEB Nordic , Kettunen and ten Brink (2013) and Metsahallitus for references

Example: pollination

- **Finland:** the value of honeybee pollination service of selected crops would be around 18 million EUR and of wild berries (bilberry and lingonberry) 3.9 million EUR
- **Finland** : estimated value of pollination (by honeybees) in home gardens was 39 million EUR in Finland
- **Denmark**: the value of the general insect pollination service was calculated to be worth ~56 to ~93million EUR) a year
- **Sweden**: the value of honeybee pollination service was calculated to be ~21.5 - ~37 million EUR


Towards a truly green economy:
integrating ES and NC to
policies and decision-making
Picture © IEEP M. Kettunen

A truly green economy

Building green economy on ecosystem services:

1. Understanding the value of ecosystem services & natural capital
2. Integrating the value of nature & natural capital into the foundations of decision-making
3. Providing the right economic signals – removing harmful subsidies and creating incentives to sustainable use of natural capital
4. Investing green (eg. green infrastructure) & creating green jobs

Understading & integrating the value:
systematic framework for ES and NC information

Indicators:
ES Stock – Flow – Value
Biodiversity

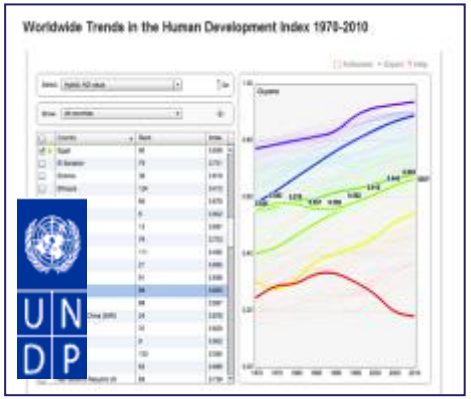
European Environment Agency

UNEP

OECD

Natural Capital Accounting (NCA):
Ecosystem accounts (EA) & System of Integrated Environmental and Economic Accounting (SEEA)

Beyond GDP



A bundle of greener macroeconomic & societal indicators

Example: from ES indicators to natural capital accounting in Finland

BETA Biodiversity.fi
ECOSYSTEM SERVICES

Search here... Go!

HOME | INTRODUCTION | ECOSYSTEM SERVICES | HABITATS | CICES | CASCADE | PARTNERS | FEEDBACK

Home > Ecosystem services > Regulating services

Services by category

- Provisioning services
- Regulating services
  - Water retention
  - Water filtration
  - Climate regulation
  - Nitrogen fixation
  - Erosion control
  - Soil quality
  - Nutrient retention
  - Mediation of waste and toxins
  - Nursery habitats
  - Pollination
  - Air quality
  - Noise reduction
- Cultural services

BIODIVERSITY.F

Regulating services

Regulating services consist of ecosystem processes that maintai

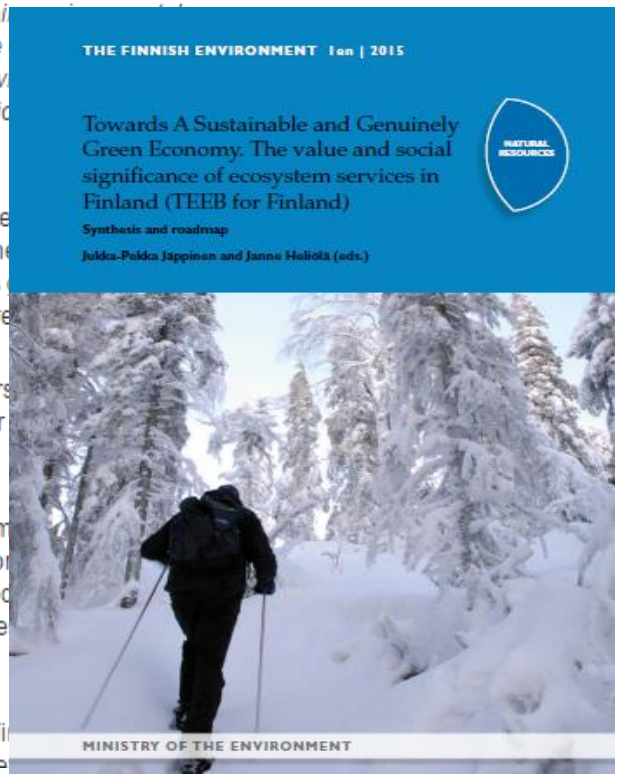
t important of these are the
isms. Some regulating serv
tement of noise and pollutio

nd rather invisible processe
thing wrong with them: Wh
s dirty; when the climate is
ops fail because there were

g services. Even the unders
that we could monitor their

ting services. In the econom
es that do not enter equatio
often subject to what has been famously described as the Tragedy of the Commons, where individuals depleting a shared resource out of rational self-interest, without any mechanism to regulate its use.

The most important regulating services are mostly the same in Fi
countries. Possibly the most important is the cycling of carbon be



Example: recommendations for natural capital accounting in Finland

Forest accounts: complement info on timber with info on carbon, quality of forest ecosystems (e.g. soil quality), wild berries, tourism and food resources for reindeer herding (lichen)

Water accounts: combine existing info on water resources and quality, add info on water retention and infiltration capacity → dedicated water accounts

Fisheries accounts: complement existing information on fisheries catch with information on status of fisheries resources, include information both on commercial and recreational fisheries capacity → dedicated fisheries accounts

Tourism accounts: existing Tourism Satellite Accounts (TSA) could be expanded to include a dedicated element focusing on nature-based tourism

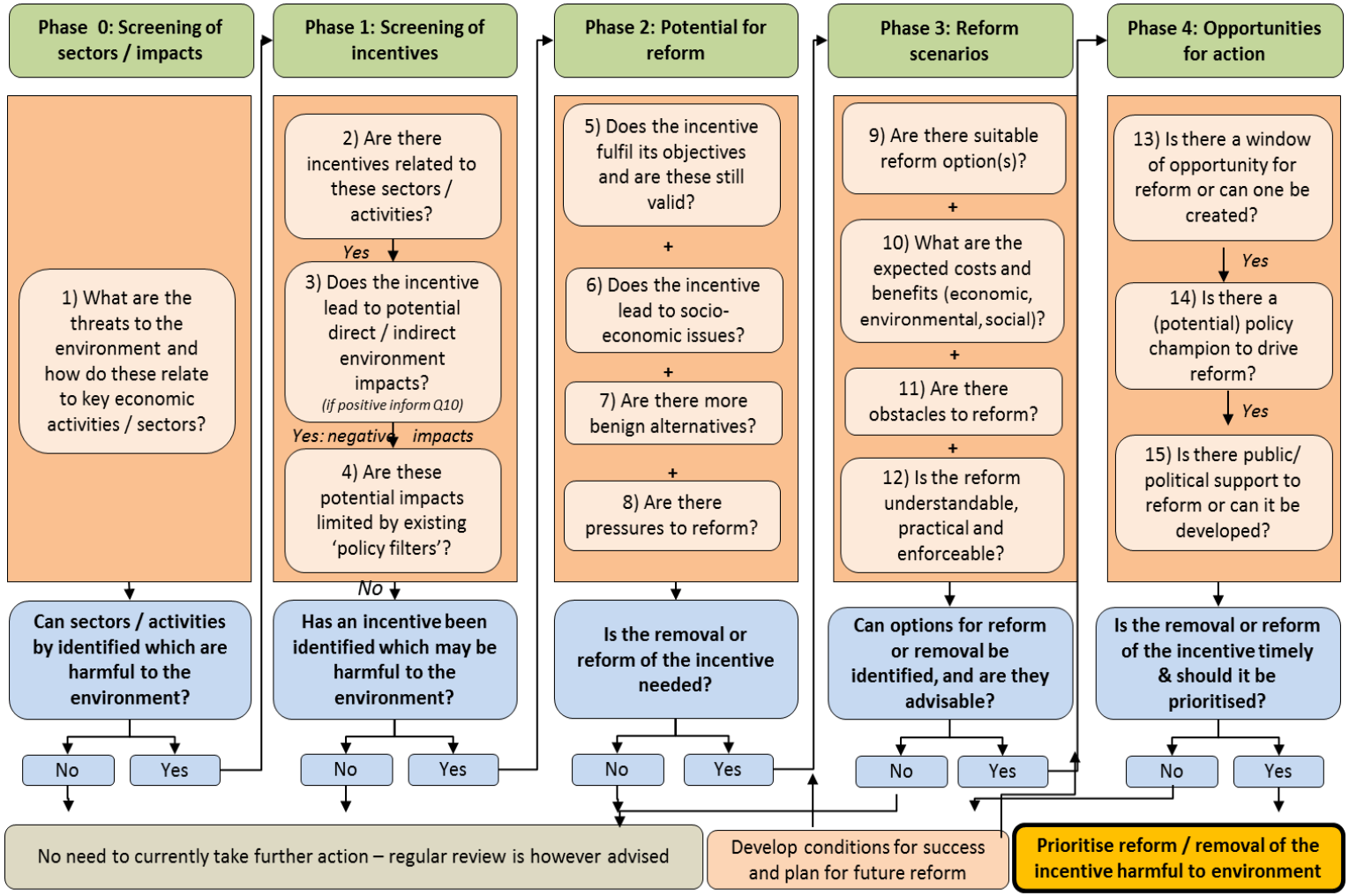
Kettunen et al. 2015 TEEB for Finland

Providing right signals:
mainstraming ES / NC into sectoral policies

Policy sector	Conceptual integration	Operational integration
Air	[Name relevant policy]	[Name relevant policy instruments]
Soil		
Water		
Agriculture & rural development		
Forestry		
Marine & coastal (incl. fisheries)		
Regional development / Cohesion Policy		
Climate Mitigation & Adaptation		
Bio-energy		
Transport & grey infrastructure		

Level of integration	Conceptual integration	Operational integration
Comprehensive and explicit	**All ecosystem services** & recognition of contribution to human wellbeing	**Dedicated instruments** enabling comprehensive integration.
Explicit but not comprehensive	**Some ecosystem services** & recognition of contribution to human wellbeing	**Some instruments that proactively address / build on ESS/NC** within the policy area.
Implicit and incomprehensive	Generally **focus on preventing negative impacts** of a policy sector to ecosystem services and natural capital	**Some aspects - mainly avoid negative impacts on (some) ecosystem services - integrated** into sectoral instruments.
No specific integration	**No recognition** (direct / indirect) of ecosystem services and natural capital	**No instruments** exist that would in any way address ESS/NC.

Providing right signals:
removing subsidies harmful for ES / NC



© Withana et al. (2012) *Study supporting the phasing out of environmental harmful subsidies* , being further developed by Withana & ten Brink under EU FP7 OPERAs project

Providing right signals:

assessing and addressing interlinkages between ES & economic sectors

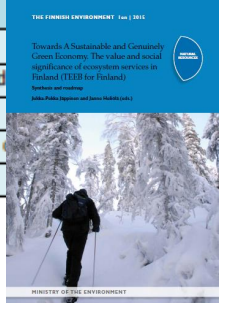
Strong interdependency
Moderate/low interdependency
Indirect interdependency

depends on / benefits from

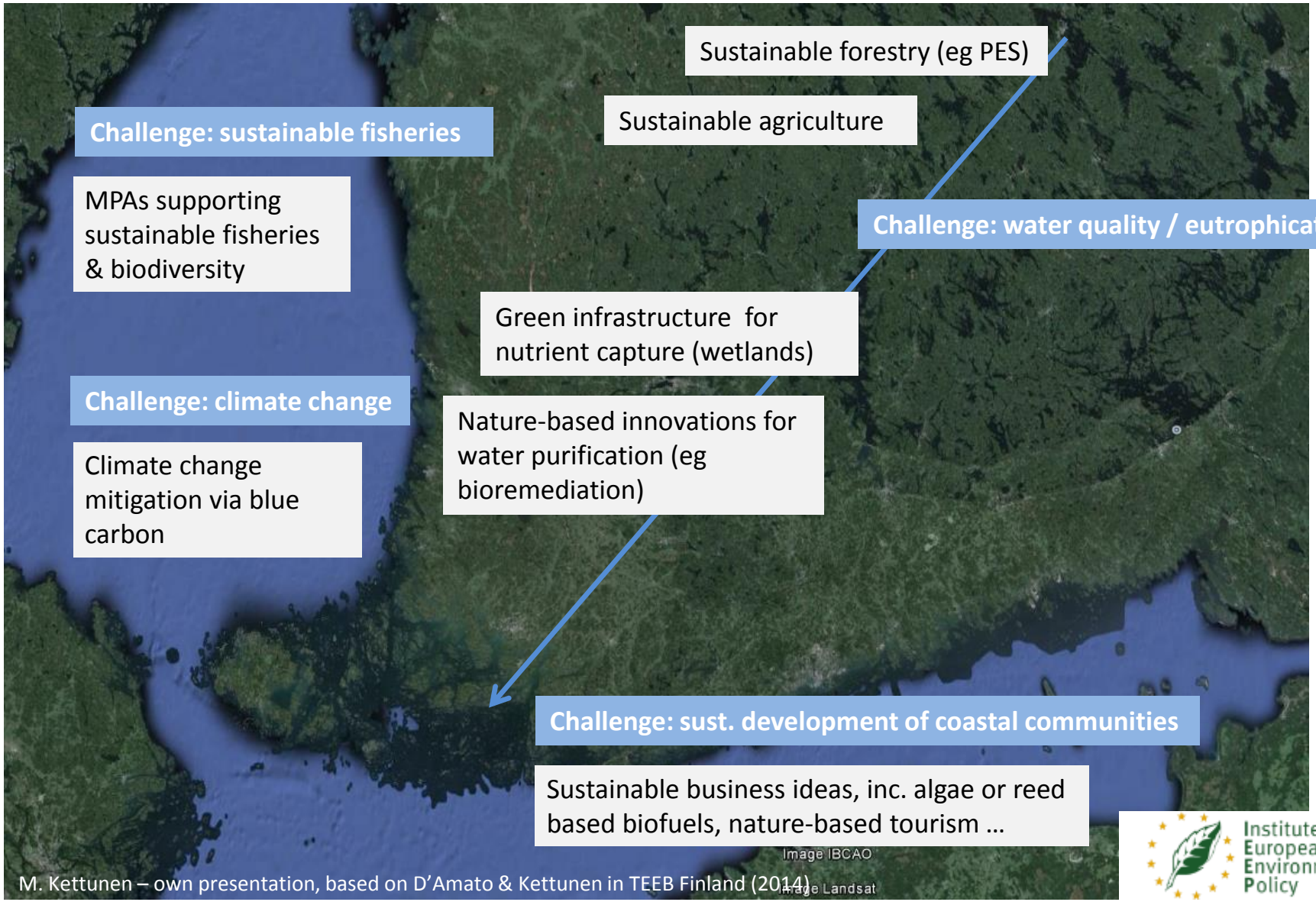
affects to

Strong impact
Moderate / low impact
Indirect impact

Forest ecosystem	Forestry and forest industry	Forest ecosystem
Provisioning services		**Provisioning services**
Agricultural and aquacultural products		Agricultural and aquacultural products
Wild plants, animals and their outputs		Wild plants, animals and their outputs
Surface and ground water for drinking		Surface and ground water for drinking
Surface and ground water for non-drinking purposes		Surface and ground water for non-drinking purposes
Materials from plants, algae and animals and genetic materials from all biota		Materials from plants, algae and animals and genetic materials from all biota
Biomass-based energy sources (and animal-based mechanical energy)		Biomass-based energy sources (and animal-based mechanical energy)
Regulating and maintenance services		**Regulating and maintenance services**
Mediation of waste and toxics		Mediation of waste and toxics
Mediation of smell/noise/visual impacts		Mediation of smell/noise/visual impacts
Mass stabilisation and control of erosion rates, buffering and attenuation of mass flows		Mass stabilisation and control of erosion rates, buffering and attenuation of mass flows
Hydrological cycle and flood protection		Hydrological cycle and flood protection
Mediation of air flows		Mediation of air flows
Pollination and seed dispersal		Pollination and seed dispersal
Maintenance of nursery populations and habitats, gene pool protection		Maintenance of nursery populations and habitats, gene pool protection
Pest and disease control		Pest and disease control
Soil formation and composition		Soil formation and composition
Maintenance of chemical condition of waters		Maintenance of chemical condition of waters
Global climate regulation		Global climate regulation
Micro and regional climate regulation		Micro and regional climate regulation
Cultural ecosystem services		**Cultural ecosystem services**
Recreational use of nature		Recreational use of nature
Nature as a site and subject matter for research and of education		Nature as a site and subject matter for research and
Aesthetics and cultural heritage		Aesthetics and cultural heritage
Spiritual, sacred, symbolic or emblematic meanings of nature		Spiritual, sacred, symbolic or emblematic meanings
Existence and bequest values of nature		Existence and bequest values of nature



→ Investing in nature-based solutions for sustainable development



M. Kettunen – own presentation, based on D'Amato & Kettunen in TEEB Finland (2014)

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A truly green economy

Building green economy on ecosystem services:

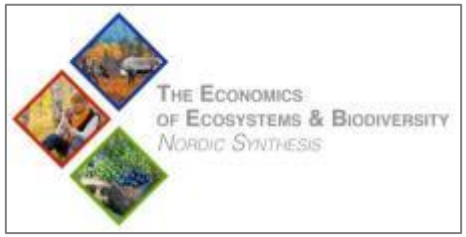
1. **Understanding the value** of nature & natural capital – even where the values are not market based.
2. **Integrating the value** of nature & natural capital into the foundations of decision-making (strategies, plans & regulations, accounting systems, indicators, impacts assessments, tools for landuse planning …).
3. **Providing the right signals** – removing harmful subsidies and creating incentives to sustainable use of natural capital within policies
4. → **Investing green** (eg. green infrastructure) & creating green jobs

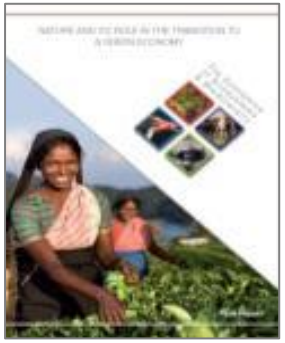
Can be established at different levels: national – regional – local

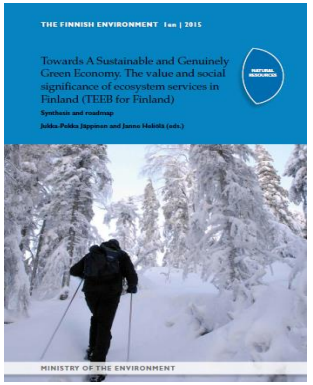
Further information

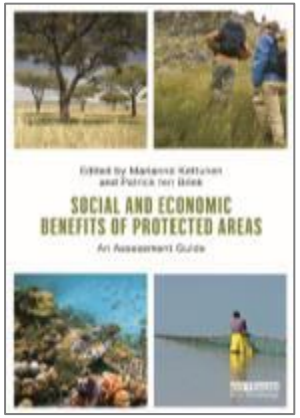
Picture © IEEP Web

- Kettunen et al. (2012) TEEB Nordic
- Jappinen et al. (2015) TEEB for Finland
- The Economics of Ecosystems and Biodiversity (TEEB) (2008 -)
- TEEB Green Economy (2012)
- Kettunen & ten Brink (2013) Social and Economic Benefits of Protected Areas - An Assessment Guide
- Withana, S. et al (2012). Study supporting the phasing out of environmentally harmful subsidies
- EU FP7 OPERAs project for operationalising ecosystem services and natural capital









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Thank you – Merci !

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