

RFEL3082: Course plan spring 2021

- Challenges for sustainability
- Theory and conceptual framework
- Project work
- Excursion
- Lectures
- Literature
- Written Exam at home: 14.05



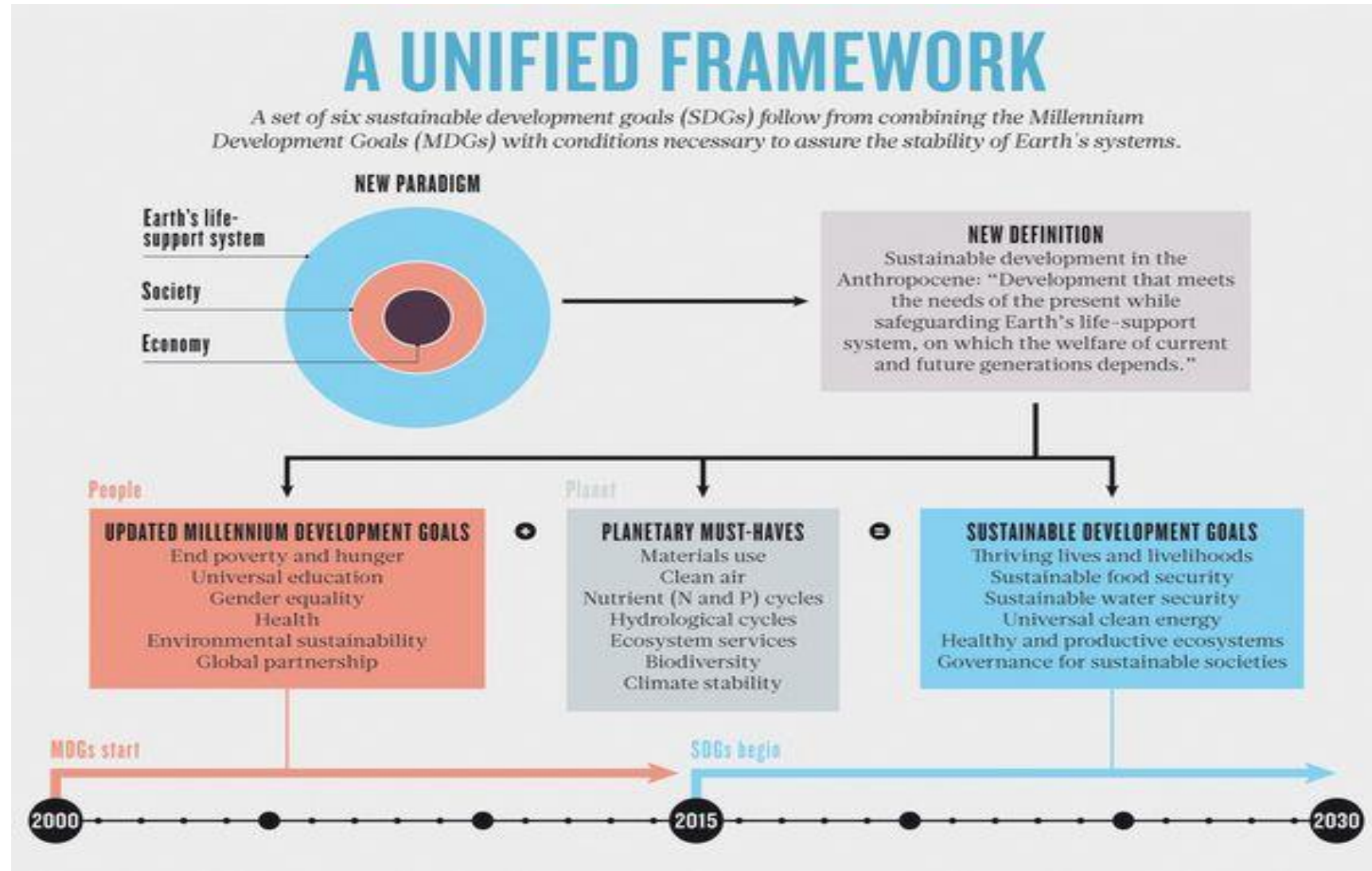
Our focus: sustainable use and management of biodiversity and ecosystem services

Question: what is a sustainable development?

”Meet the needs of the present without compromising the ability of future generations to meet their own needs”

- United Nations General Assembly (1987) [*Report of the World Commission on Environment and Development: Our Common Future*](#). Brundtland report
- Used at the Rio-conference in 1992, United Nations Conference on Environment and Development. Birth of the Convention on Biodiversity.

From Griggs et al. 2013: Rethinking sustainable development in the Anthropocene: **new definition “Development that meets the needs of the present while safeguarding Earth’s life support system on which the welfare of current and future generations depends”**



What are our visions for a sustainable future?

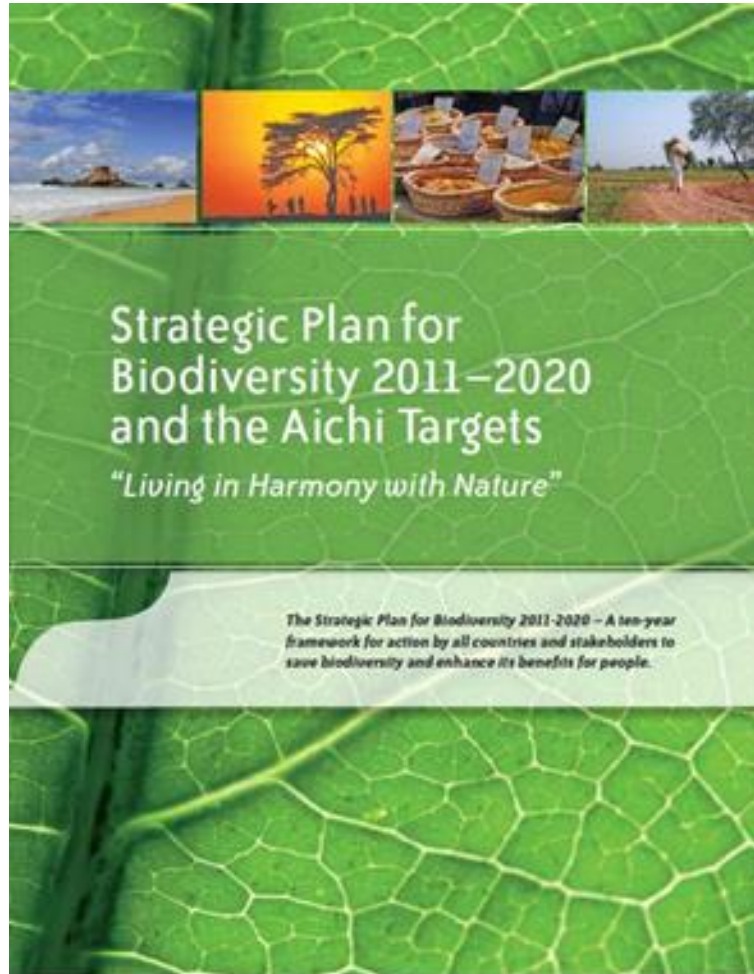
UN agenda for a sustainable development within 2030

<https://sustainabledevelopment.un.org/sdgs>

Sustainable Development Goals



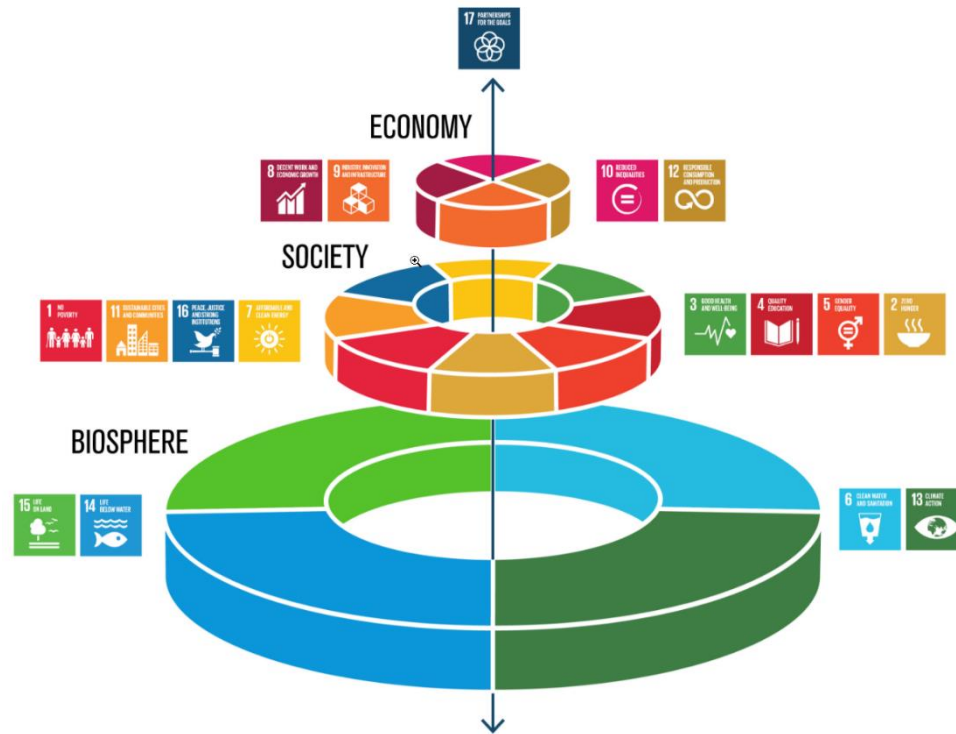
Visions for sustainable use and conservation of biodiversity



Aichi Biodiversity Targets

<https://www.cbd.int/sp/targets/>

Social and economic development is based on a sustainable environment

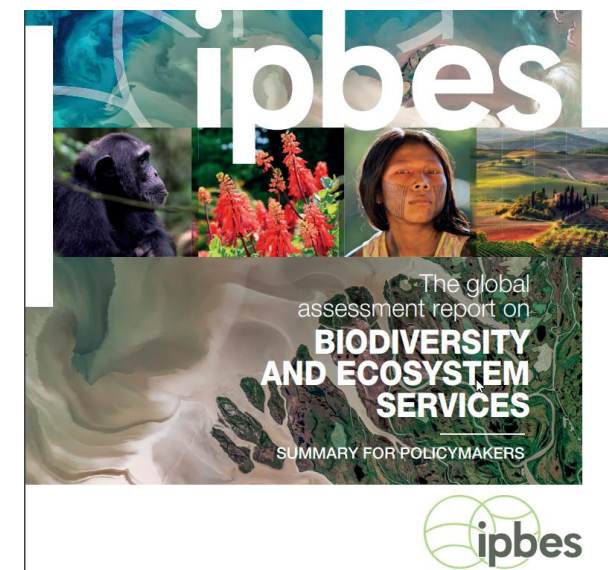
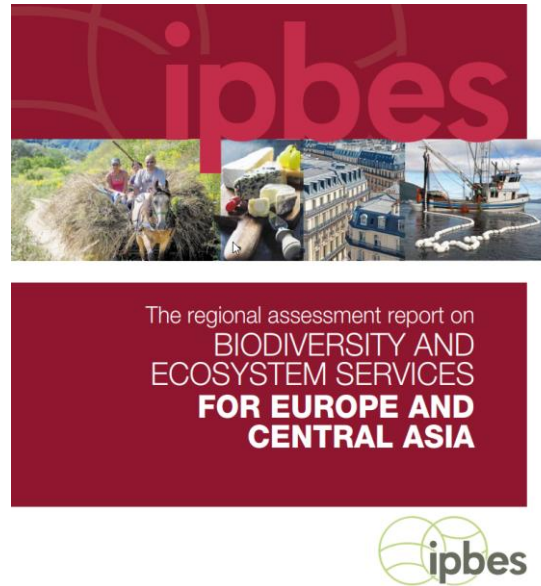
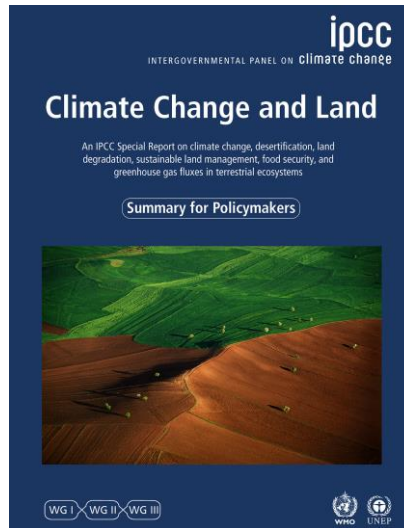


<http://www.stockholmresilience.org/research/research-news/2017-02-28-contributions-to-agenda-2030.html>



Three pillars

Recent expert studies point to challenges for nature and climate



- Demand for comprehensive solutions to reduce greenhouse gas emissions, stop biodiversity loss while producing food and other natural resources.

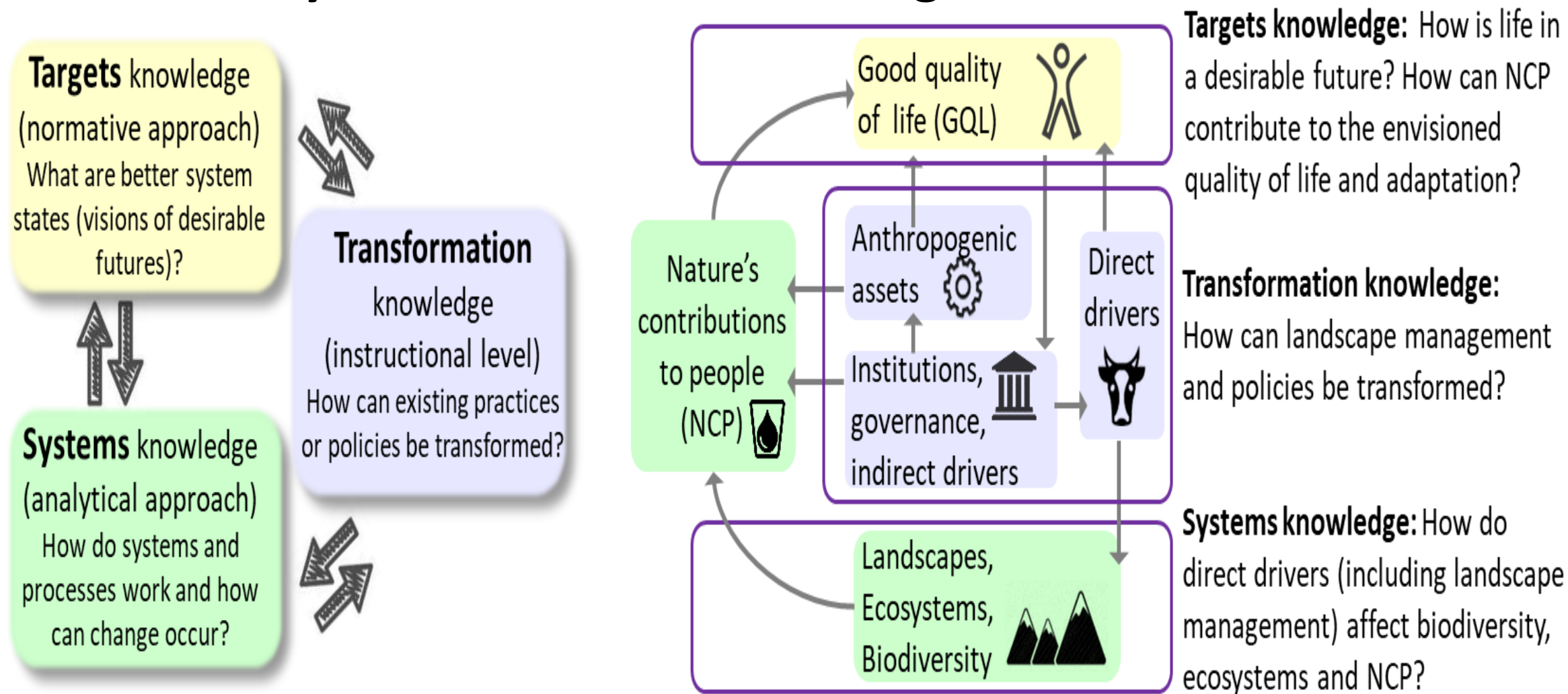
Key question: How can land use change co-produce climate mitigation and multiple ecosystem services whilst preserving biodiversity and meeting social and economic objectives?

Main topics and questions:

1. **Introduction to different socio-ecological systems and current challenge: sustainable use and conservation of biodiversity and ecosystem services.** Status and trends of biodiversity and ecosystem services? Drivers of ecosystem services change at different scales and in different ecosystems? How does this affect ES & human well-being?
2. **Visions for sustainability: Where do we want to be?** SDGs, Aichi-targets, Paris agreement, presentations from stakeholders in forestry, agriculture, aquaculture & fisheries, bioenergy.
3. **Pathways for sustainability: How do we get there? Governance and decision making for sustainable development:** guest lectures from social sciences, humanities: science based knowledge on pathways



Theory and conceptual framework for transdisciplinary sustainability science. Which knowledge is needed?



Hirsch Hadorn et al., *Implications of transdisciplinarity for sustainability research*. Ecological Economics, 2006. **60**(1): p. 119-128. Díaz et al., *The IPBES Conceptual Framework: connecting nature and people*. Current Opinion in Environmental Sustainability, 2015. **14**: p. 1-16

Learning outcomes:

**Knowledge for change
towards a more sustainable
society :**

The student will obtain an overview of alternative visions for sustainable development and how the ecosystem services framework could be used to promote sustainable socio-ecological systems underpinning human well-being.

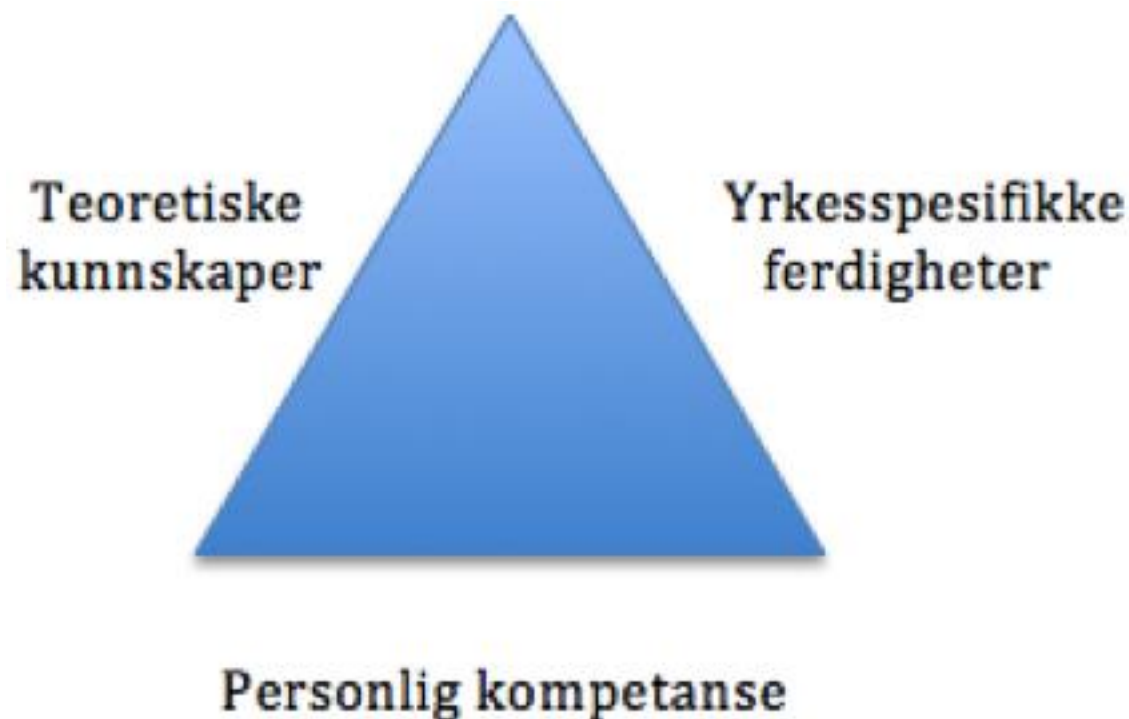


Competence/Skills:

- Can apply knowledge on how changes in socio-ecological systems can promote sustainable development
- understand approaches, methods and techniques needed for sustainable decisions and transitions towards a sustainable.
- be able to integrate her/his discipline and education into a wider interdisciplinary context in order to promote sustainable management of ecosystem services.

The competence triangle:

- Theory,
- Professional skills
- Personal skills

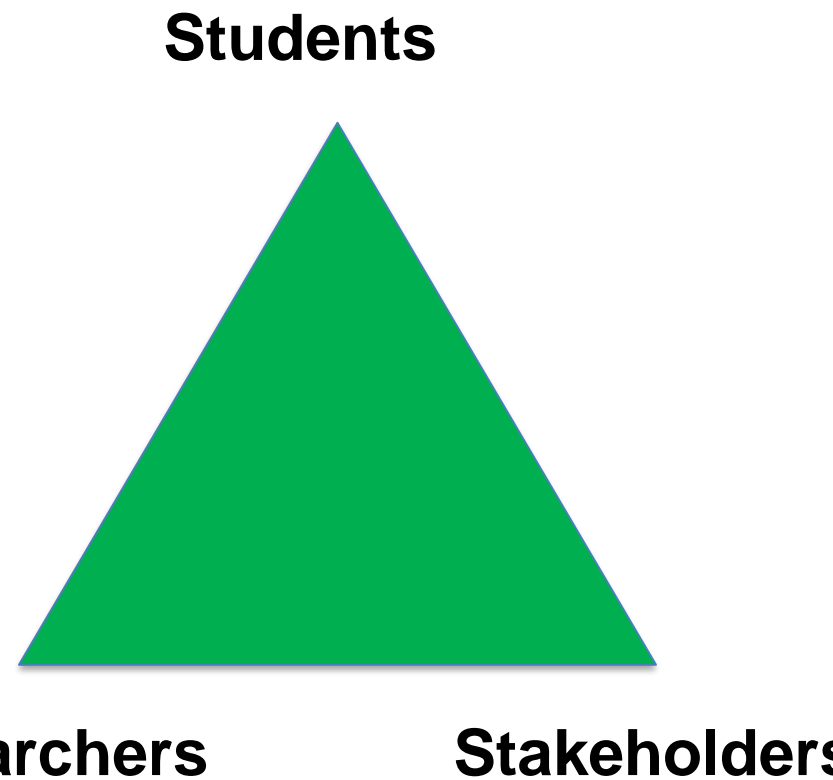


Learning methods and activities

- **Lectures, project work & excursion.**

The teaching is based on **interactive lectures** given by **researchers** and **stakeholders**

Ca. 20 different guest lectures from **science** (different disciplines), **management** (NEA etc.), **business sectors** (aquaculture, forestry, aquaculture, fisheries, bio-energy)



An example of a learning model which aims to integrate science and society

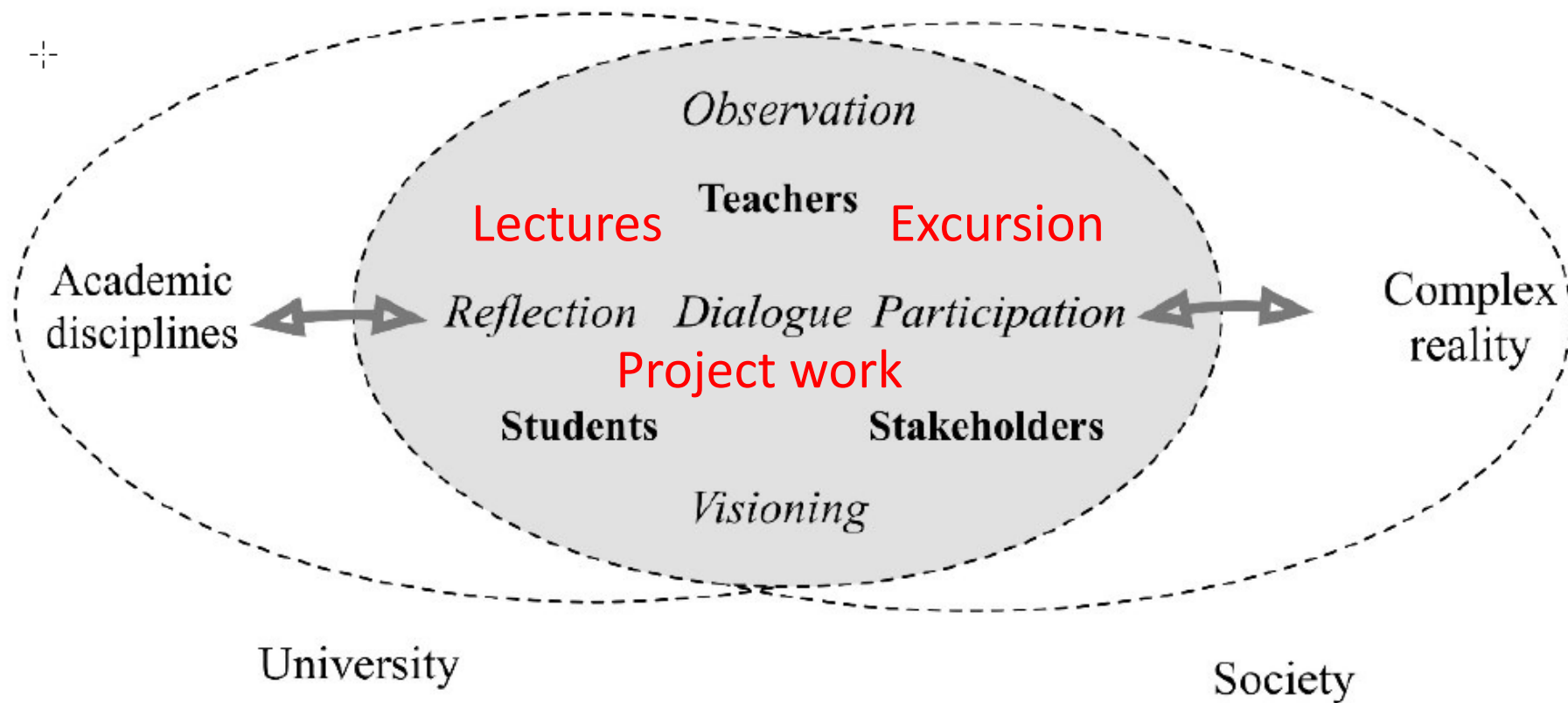


Fig. 1. Students gaining sustainability competencies through action learning (adapted from Lieblein et al. 2012).

Project work

- interdisciplinary groups
- topic closely related to sustainable management of ecosystem services.
- Report for non-academics



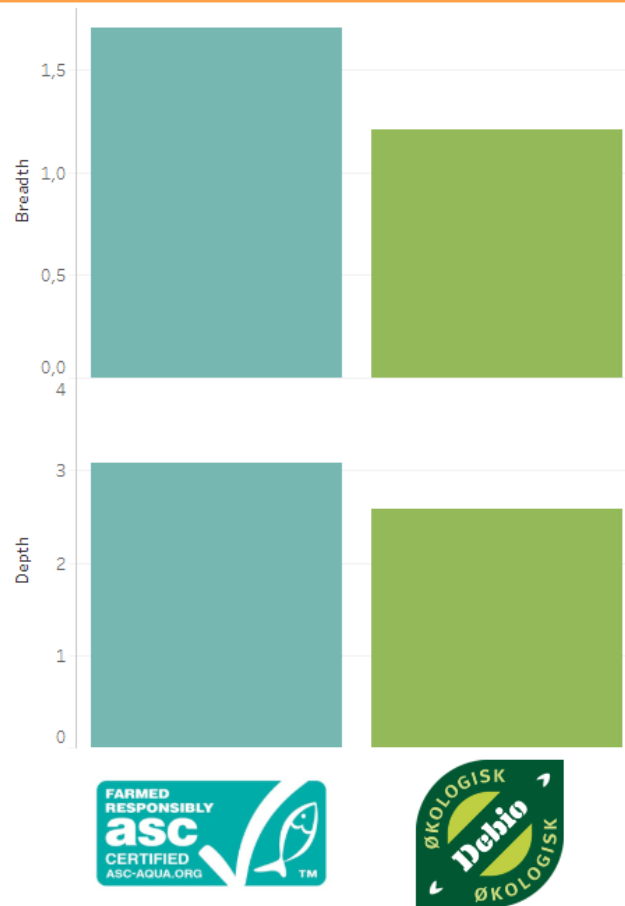
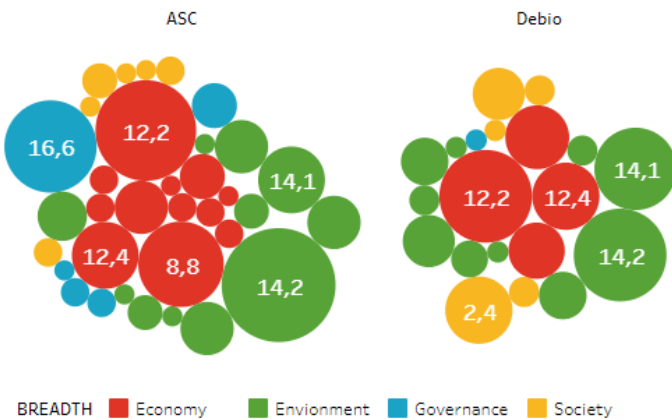
Topics for project work

- **2020: Sustainable production in Forestry, Agriculture, Aquaculture, Fisheries, Bioenergy. What are the main challenges for environmental sustainability? How could these challenges be met?**
- **2019: Certification schemes for products in agriculture, aquaculture, forestry, wild fisheries: How well do they meet (1) SDGs, (2) Aichi-targets for BD (3) Paris Agreement?**
- **2018: Visions and pathways for sustainable development in urban and rural areas**
- **2017: Read and evaluate different reports on visions and pathways for sustainable development for different sectors directly dependent on natural resources**

Work based on scientific reports, stakeholders reports, governmental reports

How do salmon ecolabels address sustainable development?

Filter results by clicking on the sustainability dimension or the SDGs of interest.
To select multiple options, hold the ctrl key.



https://public.tableau.com/profile/mevo#!/vizhome/ecolabel_dashboard/Dashboard1

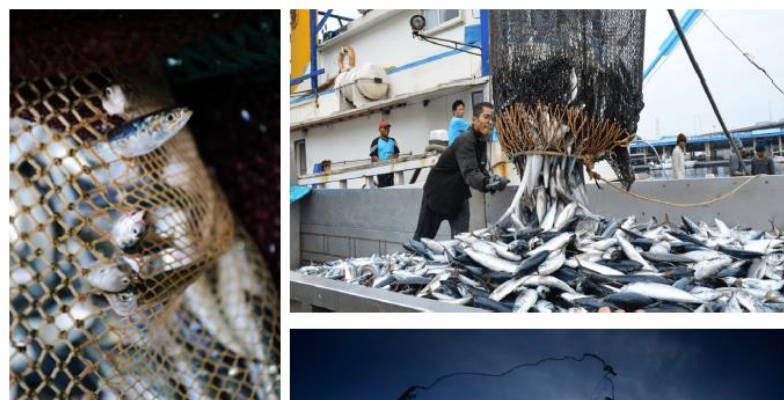
<https://ecologyforthemasses.com/2019/07/15/are-ecolabels-greenwashing-your-farmed-salmon/>

Sustainability Champions or Greenwashing?



Textile Ecolabels

An evaluation of the Nordic Swan, OEKO-TEX Made in Green
and GOTS based on the SDGs and the Aichi targets



Saving the oceans one bite at a time
Evaluating eco-labels in the fishery sector



Project work: New targets for Biodiversity How to stop loss of biodiversity and maintain nature's contribution to people in Forestry, Agriculture, Aquaculture, Fisheries, Bioenergy?

The project work will be introduced at the start of the course and continue throughout the course.

The plan is work in progress before the CBD meeting in China autumn 2021. See also <https://www.cbd.int/conferences/post2020/post2020-prep-01/documents>

Stakeholders representing different sectors will present their view/facts on targets for biodiversity and ecosystem services sustainability

Product: ca. 10 page report for policy-makers. A common presentation in April at the end of the course.

Supervisors: Marte Fandrem <marte.fandrem@ntnu.no>; Damaris Matten damaris.m.matten@ntnu.no; Caitlin Mandeville caitlin.mandeville@ntnu.no; Rune Sørås rune.soras@ntnu.no; Laura Bartra Cabré laura.bartra.cabre@ntnu.no

Interdisciplinary groups

- Project work
- Present a 10-15 min. summary on 1. system knowledge (general and specific), 2. vision knowledge, 3. Transformation knowledge.
- 5-6 students per group

1. System knowledge: Status and trends of biodiversity and ecosystem services (provisioning, support, regulating, social and cultural).

Introduction to the course and to the ecosystem services framework (GA 2 h)

Status and trends for BD (Ivar, 1 h)

Status and trends of ES and ecosystems (GA 1 h)

Drivers of change: direct and indirect (GA 2 h).

Introduction to different case studies: a broad presentation on status and trends of biodiversity and ecosystem services and the main drivers affecting BD and ES in each system.

(a) Serengeti, savanna systems (Bente Graae), (b) pollinating insects (Frode Ødegaard), (c) mires & wetlands (Dag Inge Øien) h), (d) boreal forests (GA), (d) grazing systems (GA) (e) urban ecosystems (Tanja Petersen), (f) limnic ecosystems (Sam Perrin), (g) marine ecosystems (Jan Davidsen), alpine systems (James Speed)

2. Scenarios, visions and pathways for sustainable development

Sustainable development goals SDG, Aichi-targets ,

Norwegian Environment Agency

Aquaculture Jon Arne Grøttum Sjømat Norge ,

Agriculture Norwegian Farmers Association

Forestry Hans C. Brede Skogselskapet ,

Aquaculture and fisheries MSC ASC certificatio schemes ,

Renewable energy ,

3. Transition knowledge: Governance and decision making for sustainable development

This part will give an introduction to governance (private and public decision making) at different levels (international vs. national, regional and local) and within important sectors, and discuss the implications for sustainable development of ecosystem services and biodiversity.

Cases:

Intro to IPBES and conservation: How could we strengthen the science-policy interface? Nina Vik NEA

Multiple dimensions of sustainability and conservation John Linnell, NINA

Sustainable Forestry & Environmental history, Håkon Stokland

Governance for sustainable aquaculture, Jennifer Bailey.

Sustainable agriculture and society, Hilde Bjørkhaug.

Governance for climate, energy and ecosystems services, Espen Moe .

The importance of values Elisabeth Barron

RFEL3082: Sustainable management of ecosystem services Spring 2021

Lectures:	Mondays	10.15 - 12.00	Room: GL-GEL EL1
	Fridays	14.15 - 16.00	Room: GL-RFB R9
Project work:	Thursdays	08.15-10.00	Room: GL-EG A34

Week	Date	Time	Content	Hours	Teacher
2	15.01	12.15 13.15	Introduction to the course Course plan	1 1	GA GA
3	21.01	08.15 09.15	Status and trends for Biodiversity Status and trends of ES and ecosystems. Intro to System knowledge	1 1	IH GA
3	22.01	12.15 13.15	Savannah systems Mires & wetlands	1 1	BG DIØ
4	25.01	10.15 11.15	Boreal forest ecosystems Marine ecosystems	1 1	GA JD
4	29.01	12.15 13.15	Insects and ecosystem services Frode Ødegaard Temperate grassland systems	1 1	FØ GA
5	01.02	10.15 11.15	Urban ecosystems Tanja Kofod Petersen Limnic ecosystems	1 1	TKP ØNK
5	05.02	12.15 13.15	Alpine systems Visions for sustainability: SDGs and biodiversity targets	1 1	JS All, GA
6	08.02	10.15	System knowledge summary. Intro to vision knowledge	1	GA
		11.15	Introduction to project work I	1	GA
6	12.02	12.15	New CBD Targets		MDIR
		13.15	Excursion info		

Literature:

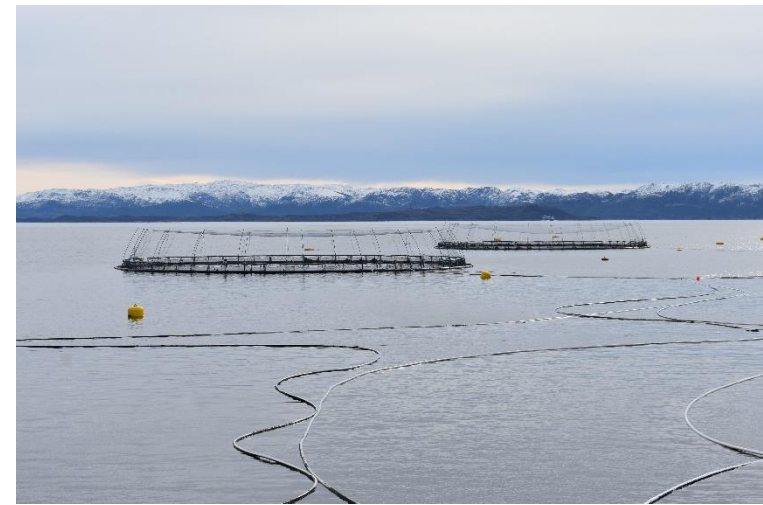
- **Textbook:** Routledge Handbook of Ecosystem Services/Potschin HB.
<https://www.routledge.com/Routledge-Handbook-of-Ecosystem-Services/Potschin-Haines-Young-Fish-Turner/p/book/9781138025080>
- The book will be available as E-book, but is not mandatory. All teachers are asked to recommend one paper for student curriculum based on their lecture.
- The course is based on the ecosystem services framework. To learn more about this framework check IPBES <http://www.ipbes.net/webinars>
- The conceptual framework of IPBES is also presented in this paper:
<http://www.ipbes.net/publication/d%C3%ADaz-et-al-2015-%E2%80%9Cipbes-conceptual-framework-connecting-nature-and-people%E2%80%9D-current>

Excursion: 3 days regional excursion to visit businesses and stakeholders in agriculture, aquaculture, forestry, renewable energy in central Norway in April 2021.

Main objective: We will examine the sustainability of these different business sectors with a special focus on **environmental sustainability**: sustainable use and management of biodiversity and ecosystem services.

The excursion will be part of the project work to evaluate the environmental sustainability within these sectors.

- (1) Aquaculture: several options on the coast of Trøndelag/Møre
- (2) Agriculture: Norwegian Centre for Organic Agriculture at Tingvoll (agriculture, forestry, bioenergy) + conventional farming
- (3) Forestry: several options.
- (4) Bio-energy: Orkla Trebrensel AS Meldal



General competence: ability to disseminate knowledge about central theories and reflect independently around the importance of sustainable management of ecosystem services valuable both for science and management

- *“We are currently not managing biodiversity and ecosystem services in a sustainable way”*. Evaluate this statement by presenting available knowledge on status and trends for biodiversity and ES in general (global level), and for a selected habitat (any nature type could be used as an example).
- *“There is a trade-off between managing for biodiversity and ecosystem services on one side and climate change mitigation”*. Evaluate this statement and give examples of management actions and habitats where such trade-offs could be relevant.

BUILDING A SUSTAINABLE FUTURE TOGETHER

For a sustainable future, we need a world full
of people with sustainability awareness and core literacy.



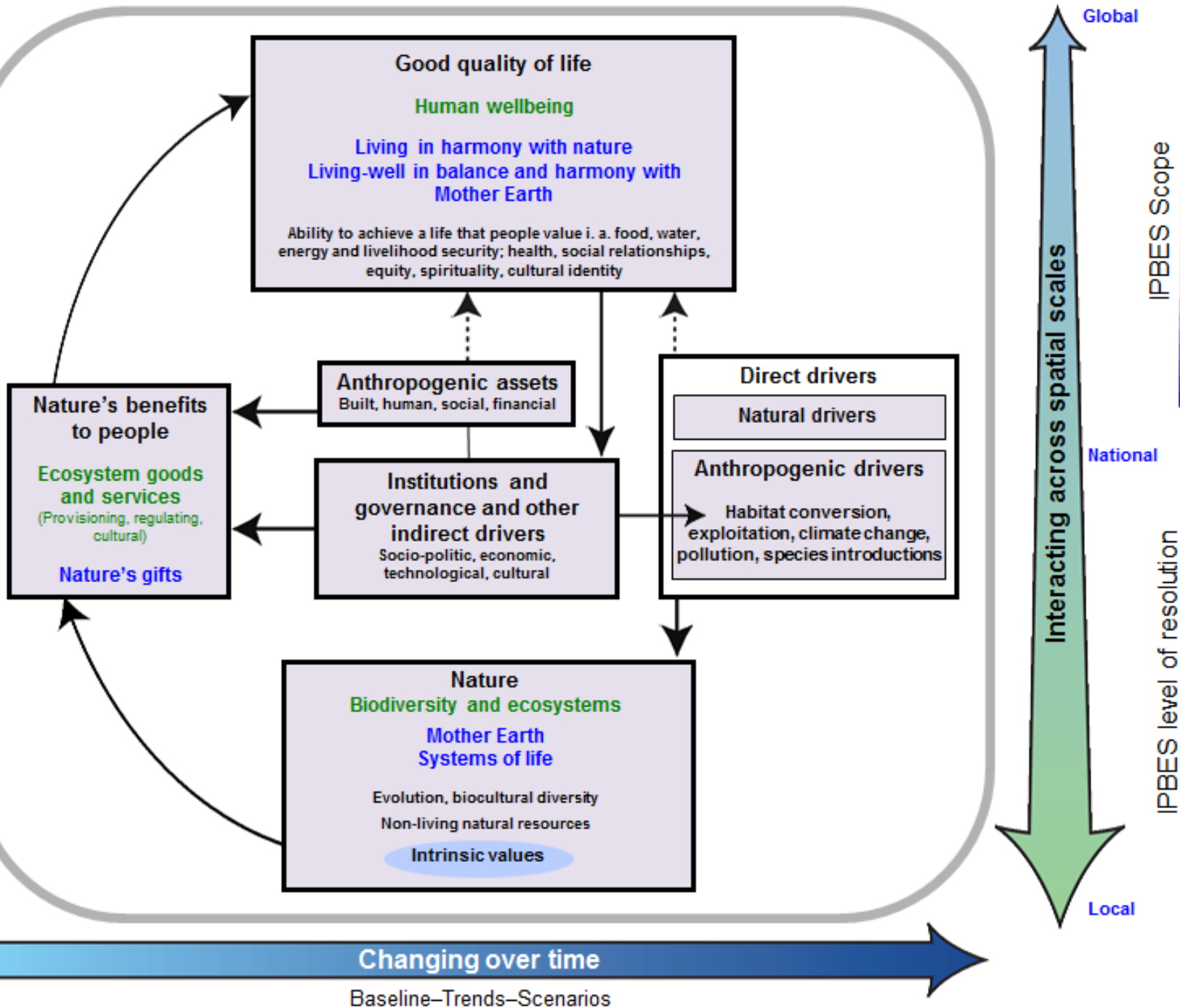
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Tests taken in the world

- <https://www.sulitest.org/en/index.html>

IPBES Analytical Conceptual Framework

A framework for
understanding and
integrating nature and
the society





NTNU – Trondheim
Norwegian University of
Science and Technology

Strategic Research Area 2014–2023
NTNU SUSTAINABILITY



Mission: Create the knowledge needed by society to understand and change unsustainable patterns of behaviour and development.

Research area

Biodiversity and Ecosystem Services

www.ntnu.edu/sustainability



ENERGY



HEALTH



OCEANS



SUSTAINABILITY

To do before next lecture

- Restoration conference (18-19 January)
- Watch youtube on ecosystem services
<https://www.youtube.com/watch?v=BCH1Gre3Mg0>
- Select sectors for project work: agri, aqua, forestry, wild fish, renewable Any preferences?