Stockholm University Date: 17 Dec, 2020
Department of Biology Education ***Please check Athena for most updated schedule***

Master's Programme: Social-Ecological Resilience for Sustainable Development

Course 3: Governance and management of social-ecological systems (15hp)

Course leader: Thomas Hahn

Brief Description

This course explores alternative approaches for analysing how people make choices, engage in learning, collaborate in networks, adapt to and change institutions (rules), and manage and govern social-ecological systems. The course analyses how institutions can be designed and how governance can emerge at different organisational levels to adapt to social-ecological change and to transform governance and management. The course analyses economic and interdisciplinary theories and methods for decision-making under uncertainty and how collaboration for common-pool resources can overcome narrow strategic behaviour and instead result in decisions which improves the outcome for all. The student is introduced to adaptive approaches based on learning and re-evaluation.

The student studies how actors can collaborate in networks to promote learning and trust-building and thereby alter power structures and facilitate transformations. The student learns how to apply cost-benefit analysis, game theory (strategic behaviour) and other theories and methods and conduct group and individual research projects that utilize these concepts and methods.

The course consists of the following parts:
Module 7. Transformative strategies for governance (4 hp) (18 Jan – 2 Feb),
Module 8. Economic perspectives (4 hp) (3 – 18 Feb),
Module 9. Theories and methods for governance of common-pool resources (3 hp) (19 Feb – 4Mar),
Module 10. Adaptive processes in social-ecological systems (4 hp) (5 – 22 March).

Course Learning Outcomes

After taking this course the student is expected to be able to:

- Explain the challenges and opportunities of adaptive governance and transformative governance (Mod. 7-10).
- Understand how human behaviour relates to the creation of and solution to ecological problems (Mod. 7-10).
- Analyse the interplay at different scales between actor networks, social learning and institutional change (Mod. 7-10).
- Explain the difference between conventional, adaptive, and transformative governance of social-ecological systems (Mod. 7).
- Understand decision analysis under uncertainty in simple real world situations (Mod. 8).
- Problematize rational choice in relation to the Tragedy of open access collaborative processes (Mod. 9).
- Explain the conceptual foundations of adaptive processes, apply this on social and biological phenomena and understand the interplay between local adaptive processes and large-scale structures (Mod. 10).

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Module 7: Transformative strategies for governance (4 hp) 2021

Module leader: Thomas Hahn <thomas.hahn@su.se>

Instructors (in order of appearance): *Thomas Hahn (TH), Wijnand Boonstra (WB), Henrik Österblom (HÖ), Robert Blasiak (RB),Per Olsson (PO), Victor Galaz (VG), Alice Dauriach (AD), Laura Pereira (LP).*

Brief description

This module focuses on the complexity of social coordination, how actors try to change governance by engaging with other actors to influence or even transform policies and institutions. You learn different theoretical approaches related to the governance of dynamic and non-linear social-ecological systems. You study how actors (change agents) come together, engage in social learning and trust-building, develop social networks and bridging organizations to change power relations and institutions, with the goal to transform the social-ecological system. Social learning is important to increase awareness about uncertainty and potential tipping points, to innovate and to adapt or transform the present management and governance. We explore these topics across a diverse set of real-world challenges, ranging from ocean governance to local social-ecological systems. All cases include multiple stakeholders and multilevel governance.

Schedule - All lectures are on Zoom unless otherwise noted

	Lectures and seminars		**Preparation**
Week 1:			
JANUARY Mon 18	**9.00-12:00.** Adaptive and transformative strategies for governance [TH]		
Tue 19	**9:00-11.00.** Adaptive and transformative strategies for governance of different scales of SES. Various cases [TH] **11.00-12:00.** Seminar [TH]		Reading Guide I
Wed 20	**9:00-12:00.** Power in social-ecological interactions [WB]		
Thur 21	**9:00-12:00.** Theories of change in Ocean fishery governance [RB and HÖ]		
Fri 22	**9:00-10:30.** Normativity and power in resilience and CAS research [TH] **10.45-12:00.** Valuation without commodification [TH]		Reading Guide II
Week 2:			
Mon 25	**10:00.** Submit Reading Assignment **10:00-12:00.** Parallel peer review seminars on Assignment		
Tue 26	**10:00-12:00.** Innovation and transformations in social-ecological systems [PO].		
Wed 27	**10:00-12:00.** Finance and Earth System Governance. [VG and AD] **13:00-15:00.** Exercise on analytical frameworks [AD]		

Thur 28	**10.00-12:00.** Transformative participatory processes [LP] **13:00-15:00.** Exercise on Transformation Labs [LP] **15:00.** Home assignment uploaded Athena		
Fri 29	**9:00-11:00.** Transformation strategies in The Green Economy, IPBES, and ecological economics [TH] **11:00-12:00.** Seminar and brief course evaluation [TH]		Reading Guide III
Week 3:			
Tue 2 Feb	**18.00.** Submit Home Assignment		

Learning outcomes

After completing the course, course participants are expected to be able to:

1. explain the difference between conventional, adaptive, and transformative governance of social-ecological systems

2. define and describe key concepts related to transformative and adaptive governance and ecological economics, such as adaptive co-management, social learning, social networks, bridging organization, polycentric and multilevel governance, sustainability transformations, green growth, decoupling and rebound effects.

3. understand and analyse the role of power structures, legitimacy and innovation in adaptive governance and transformative strategies for governance.

4. apply concepts related to adaptive and transformative governance at multiple levels, on real-world cases including green economy and green growth.

Assessment and Grading

Component	Weighting (%)	Learning Outcomes
Final Exam (Home assignment)	100%	1-4
Reading Assignment	Compulsory	1-4

Lectures are a very important part of the course and we expect you - and have put aside time for (except for the first day) - to read the assigned literature before the lecture. All lectures will provide an overview of an existing research field, and explore how they relate to the governance of dynamic social-ecological systems. Exercises focuses on methods. The cases will give you an opportunity to elaborate how some of these concepts can be used to analyse real-world challenges.

The reading guides I and III will help you to read the literature more efficiently and reflect on how different concepts presented in the literature relate to each other and to the lectures. You need not submit any answers to these questions but you may use the questions for group work if you like. The reading guide II will be submitted as an assignment for internal peer review. You will be divided in groups of three and give feedback to each other′s answers.

Criteria for assessment

The following grades are issued, the lower limits for each grade is expressed as the percentage of total points that must be obtained to reach that grade:

A 95% Excellent
B 85% Very good
C 75% Good
D 65% Satisfactory
E 60% Sufficient (pass)
Fx 50% Insufficient (fail)
F Below 50% Poor or insufficient conduct (fail)

The final exam is a home assignment consisting of around 4 questions which together cover major parts of the course content. The participant must achieve passing grades for all questions, which will graded according to a letter and then translated to a percentage. If one or two questions result in Fx or F but the total percentage is >60%, then the participant will have the option of a re-take of only those parts which did not get a pass (at least E). If so, the highest grade possible is E for those questions. For a full re-examination, a new home assignment with new questions will be provided by the module leader.

Questions for a partial re-take or a full re-examination will be sent out on 22 March 2021 and submitted by 29 March.

The following criteria are used for grading assignments:

A	The text has no faults with formalia. Concepts are well-defined, correctly applied and integrated in a clear way to illustrate theoretical challenges, and real-world problems or opportunities in the context of transformative and adaptive governance, at multiple levels of social organization. The text clearly demonstrates independent thinking, an ability to connect key concepts presented during the course, and to make connections beyond the immediate subject area.
B	The text has minor faults with formalia. Concepts are defined and correctly used, and applied in a way that illustrates both theoretical challenges, or real-world problems or opportunities in the context of transformative and adaptive governance, at multiple levels of social organization. The text demonstrates a clear ability to connect key concepts presented during the course.

C	The text has smaller faults with formalia. Concepts are defined and correctly used, and applied to illustrate both theoretical challenges, or real-world problems and opportunities in the context of transformative and adaptive governance, at multiple levels of social organization. The text demonstrates an ability to connect key concepts presented during the course.
D	The text has faults with formalia. Concepts are defined and in general correctly used, and applied to illustrate both theoretical challenges, or real-world problems and opportunities in the context of transformative and adaptive governance, at multiple levels of social organization. The text demonstrates an ability to connect key concepts presented during the course.
E	The text has faults with formalia. Concepts are defined and in general correctly used, and loosely applied to illustrate both theoretical challenges, or real-world problems and opportunities in the context of transformative and adaptive governance, at multiple levels of social organization. The text indicates an ability to connect key concepts presented during the course.

Preliminary Reading List – readings should if possible be done prior to lectures.

Lecture 18 January: Adaptive and transformative strategies for governance

Folke, C., T. Hahn, P. Olsson and J. Norberg. 2005. "Adaptive Governance of Social-Ecological Systems", *Annu. Rev. Environ. Resour*. **30**:441–73.

Chaffin, B.C., Garmestani, A.S., Gunderson, L.H., Benson, M.H., Angeler, D.G., Arnold, C.A., Cosens, B., Craig, R.K., Ruhl, J., Allen, C.R., 2016. Transformative environmental governance. Annual Review of Environment and Resources **41**, 399-423.

Lecture 19 January: Adaptive and transformative strategies for governance of different scales of SES

Olsson, P., Folke, C., **Hahn, T**., 2004. Social-ecological transformation for ecosystem management: the development of adaptive co-management of a wetland landscape in southern Sweden. *Ecology and Society* 9(4):2. [online] URL: http://www.ecologyandsociety.org/vol9/iss4/art2/print.pdf

Schultz, L., Folke, C., Österblom, H. and P. Olsson. 2015. Adaptive governance, ecosystem management, and natural capital. *PNAS* **112** (24) 7369-7374.

Lecture 20 January: Power in social-ecological interactions

Boonstra, W. J. (2016) Conceptualizing power to study social-ecological interactions. Ecology and Society, 21(1):21

Olsson, P., V. Galaz & W. J. Boonstra. 2014. Sustainability transformations: a resilience perspective. Ecology and Society, 19**.**

Lecture 21 January: Theories of change in Ocean fishery governance

Österblom, H., J.-B. Jouffray, C. Folke & J. Rockström (2017) Emergence of a global science–business initiative for ocean stewardship. Proceedings of the National Academy of Sciences, 114, 9038-9043.

Österblom, H. 2017. Reimagining ocean governance using the keystone species concept. NATURE ECOLOGY & EVOLUTION 1, 0133

Lecture 22 January: Normativity in resilience and CAS research + Valuation without commodification

Hahn, T., McDermott, C., Ituarte-Lima, C., Schultz, M., Green, T., Tuvendal, M., 2015. Purposes and degrees of commodification: economic instruments for biodiversity and ecosystem services need not rely on markets or monetary valuation. Ecosystem Services 16: 74–82.

Hahn, T., Nykvist, B., 2017. Are adaptations self-organized, autonomous, and harmonious? Assessing the social–ecological resilience literature. Ecology and Society **22**(1):12.

Seminar 25 January: See instructions.

Lecture 26 January: Innovation and transformations in social-ecological systems

Loorbach, D., Frantzeskaki, N., Avelino, F., 2017. Sustainability transitions research: Transforming science and practice for societal change. Annual Review of Environment and Resources **42**:599–626

Olsson, P., M.-L. Moore, F. R. Westley, and D. D. P. McCarthy. 2017. The concept of the Anthropocene as a game-changer: a new context for social innovation and transformations to sustainability. Ecology and Society **22**(2):31.

Westley, F. R., K. A. McGowan, N. Antadze, J. Blacklock, and O. Tjornbo. 2016. How game changers catalyzed, disrupted, and incentivized social innovation: three historical cases of nature conservation, assimilation, and women′s rights. Ecology and Society **21**(4):13.

Lecture 27 January: Finance and Earth System Governance.

Galaz, V., B. Crona, A. Dauriach, J.-B. Jouffray, H. Österblom & J. Fichtner (2018). Tax havens and global environmental degradation. Nature ecology & evolution, 1.

Galaz, V., B. Crona, A. Dauriach, B. Scholtens & W. Steffen (2018) Finance and the Earth system–Exploring the links between financial actors and non-linear changes in the climate system. *Global Environmental Change,* 53**,** 296-302.

Lecture 28 January: Transformative participatory processes

Pereira, L., Drimie, S., Zgambo, O. et al. Planning for change: Transformation labs for an alternative food system in Cape Town, South Africa. Urban Transform 2, 13 (2020). https://doi.org/10.1186/s42854-020-00016-8

Additional reading:

(Pereira, L., N. Frantzeskaki, A. Hebinck, L. Charli, J. Scott, M. Dyer, H. Eakin, D. Galafassi, T. Karpouzoglou, F. Marshall, M.-L. Moore, P. Olsson, J. M. Siqueiros-García, P. van Zwanenberg, and J. M. Vervoort. 2019. Transformative spaces in the making: key lessons from nine cases in the Global South. Sustainability Science:1–18.)

Lecture 29 January: Governance approaches from The Green Economy, IPBES, and ecological economics

Hickel, J. & G. Kallis. 2020. Is Green Growth Possible? New Political Economy, 25(4): 469-486. https://doi.org/10.1080/13563467.2019.1598964

Raworth, K., 2017. Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist. Chelsea Green Publishing. (only Chapter 2; download from Athena)

Van den Bergh, J. C. & G. Kallis. 2012. Growth, a-growth or degrowth to stay within planetary boundaries? Journal of Economic Issues, 46, 909-920.

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Module 8: Economic perspectives (4 hp)

Module leader: Gustav Engström

Instructors: Anne-Sophie Crépin (ASC), Therese Lindahl (TL), Gustav Engström (GE), Johan Gars (JG)

Period: February 3-18

Brief description

The objective of this module is to help the students understand the whole width of challenges associated with decision making coupled to environmental issues. The module will explore alternative approaches for analysing how people make choices individually and collectively to manage social-ecological systems and what consequences these choices have. The students will learn economic approaches to decision-making that incorporate uncertainty and complex dynamics including regime shifts, behavioural biases, climate change and international trade.

Module content

Concepts	***Methods***	**Applications**
Section 1: Policy instruments for environmental decision making		
Market failures, Incentives, Taxes, Subsidies, Regulations, Rights, Selection criteria	Market analysis using diagrams and examples, Policy instruments design and choice	Multidisciplinary case studies and examples
Section 2: Basis for environmental decisions – empirical applications		
Empirical methods for policy, Economics of climate change, Integrated assessment models	Randomized and Quasi experiments and valuation, Integrated assessment modelling	Multidisciplinary case studies and examples
Section 3: Decision analysis framework for SES		
Risk, Knightian uncertainty, complexity, regime shifts, behavioural biases, trade	Multidisciplinary approaches to solving problems, environmental decision- making, Individual and collective decision-making, Trade theory	Multidisciplinary case studies and examples

Schedule - All lectures are on zoom unless otherwise noted

	Lectures	***Class exercises***	**Home work**
Week 1:			
Wed 3 **9:00-12:00** **13:00-14:00**	**AM:** Module Intro (GE, ½ hr) **AM:** Economics and the environment (GE&TL 2 hr)	**PM:** Discussion economics and the environment (GE&TL, 1 hr)	
Thu 4	**READING DAY**		
Fri 5 **9.00-12.00**	**AM:** Check-In **AM:** Policy Instruments for the environment (GE 2 hr)	**AM:** Discussion policy instruments (GE, 1 hr)	

Week 2:		
Mon 8 **10:00-12:00** **13:00-15:00**	**AM:** Check-In **AM:** Empirical methods for Environmental Decision-making (GE, 3 hr)	**PM:** Discussion empirical methods (GE, 1 hr)
Tue 9 **9.00-12.00** **13.00-14.00**	**AM:** Check-In **AM:** Behavioural biases in decisions (TL, 2 hr)	**AM:** Group exercise on behavioural biases in decisions (TL, 1hr) **PM:** Class discussion on behavioural biases in decisions (TL, 1 hr)
Wed 10 **13:00-16:00**	**AM:** Check-In **PM:** Climate and economics (JG 2hr)	**PM:** : Discussion on climate and economics (JG 1hr)
Thu 11	**READING DAY**	
Fri 12 **10.00-12.00** **13.00-15.00**	**AM:** Check-In **AM:** Decision-making under uncertainty. (ASC, 2 hr) **PM:** Decision-making with regime shifts. (ASC, 2hr)	
Week 3:		
Mon 15 **11.00-12.00** **13.00-15.00**	**AM:** Check-In **AM:** Decision-making with regime shifts. (ASC, 1hr)	**PM:** Group Discussions (ASC, 2 hr)
Tues 16 **10:00-11:00**	**AM:** Panel discussion	
Wed 17	**AM:** Exam handout	
Thu 18 **9.00-12.00**	**AM:** Exam handin	
Fri 19		

Learning outcomes

It is expected that the student, after taking the module, will be able to:

1. Apply and discuss essential elements of decision analysis in real world situations
2. Be familiar with economic and institutional aspects of social-ecological management that can lead to successful and unsuccessful management

3. Grasp the challenges of decision making for social ecological systems related to uncertainties, climate change, trade, behavioural biases and regime shifts

4. Be able to discuss relevant issues related to decision making using economic thinking.

Component	Weighting (%)	Learning Outcomes
Final exam	100%	1-5
Attendance in class and discussion	Compulsory	1-5
Module Review	Compulsory	

Attendance of lectures is compulsory. Attendance means active participation. The student should be prepared for and take an active role in class discussions. The individual course evaluation at the end of the course is compulsory.

Assessment and Grading

Examination will be conducted through one final individual exam (lecture material allowed). The exam will be based primarily on lecture slides and notes and can give at most 100 points. The exam will include technical questions, multiple choice questions and short essay style questions (max 0.5 page). Technical questions and multiple choice questions can be either right or wrong. The number of points you can get for each question will be specified in the exam. For the essay style questions question, the grading will be as following:

100%	is issued to participants who can recapitulate and explain all of the arguments and concepts discussed in the module that are relevant to discuss the question and show outstanding insight and understanding of how the module concepts are related to the problem.
75%	is issued to participants who can recapitulate and explain at least 75% of the arguments and concepts discussed in the different module components that are relevant to answer the question and show independent sound judgements and analytical skills in discussing them. The exact grade is issued in proportion to the extent of the content they are able to present.
50%	is issued to participants who can recapitulate and explain at least 50% of the arguments and concepts discussed in the different module components that are relevant to answer the question. The exact grade is issued in proportion to the extent of the content they are able to present.

25%	is issued to participants who can recapitulate and explain less than half of the arguments and concepts discussed in the different module components that are relevant to answer the question. The grade is issued in proportion to the extent of the content they are able to present.

Re-examination will be sent out on 22 March 2021 and submitted by 29 March.

Criteria for assessment
The participant must achieve passing grades for all parts of the course in order to pass the course as a whole. Failure to submit on time will result in a maximum grade C. The maximum grade for Fx grade is an E.

The following grades are issued, the lower limits for each grade is expressed as the percentage of total points that must be obtained to reach that grade:
A 95% Excellent
B 85% Very good
C 75% Good
D 65% Satisfactory
E 60% Sufficient (pass)
Fx 50% Insufficient (fail)
F Below 50% Poor or insufficient conduct (fail)

Reading list– readings should be done prior to lectures!
All readings are available at SU online library, online or will be distributed during class.

Lecture 0: Economics and the environment.
Lecture material available on Mondo.

Lecture 1: Policy instruments and tools for decision-making
Lecture notes available on Mondo.

Lecture 2: Empirical methods for environmental decision making
Lecture slides & notes.

Recommended reading:
http://www.ecosystemvaluation.org/

- The big picture
- Essentials of ecosystem valuation
- Dollar-based ecosystem valuation methods

Greenstone, M., & Gayer, T. (2009). *Quasi-experimental and experimental approaches to environmental economics.* www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-07-22.pdf

Angrist, J., & Pischke, J.-S. (2010). *The Credibility Revolution in Empirical Economics: How Better Research Design is Taking the Con out of Econometrics* (NBER WORKING PAPER SERIES No. 15794). http://www.nber.org/papers/w15794

Lecture 3: Climate and economics

Krugman, P. 2010, Building a Green Economy, The New York Times, April 7. Available online http://www.nytimes.com/2010/04/11/magazine/11Economy-t.html?page-wanted=all&_r=0

Pindyck, Robert S., 2017, The use and misuse of models for climate policy. *Review of Environmental Economics and Policy*, 11**,** 100-114. https://academic.oup.com/reep/article/11/1/100/3066301

Lecture 4: Behavioural biases in decisions:

Lindahl, T. 2018, *Behaviour, Economics and the Environment*, draft lecture notes. Will be posted on Athena.

Chapter 8 in Janssen, M.A. and Anderies, J.M. 2013. *Sustaining the Commons*. Published by: Center for the Study of Institutional Diversity, Arizona State University, Tempe. Available as open access e-book: https://csid.asu.edu/publications/sustaining-commons

Schill, C., Anderies, J.M., Lindahl T., Folke C., Polasky, S., Cardeas J-C., Crépin, A.S., Janssen, M., Norberg J., and Schlüter M., 2019 A more dynamic understanding of human behaviour in the Anthropocene, *Nature Sustainability*, November, DOI: 10.1038/s41893-019-0419-7.

Lecture 5: Decision making under uncertainty

Crépin, A.-S. 2014, Decision making for social ecological systems, lecture notes. Sections 1-2.

Polasky, S. et al. (2011) Decision-making under great uncertainty: environmental management in an era of global change. *Trends in ecology & evolution* 26.8: 398-404. (https://www.cedarcreek.umn.edu/biblio/fulltext/Trends_in_Ecology_and_Evolution_2011_Polasky.pdf)

Polasky, S., Crépin, A. S., Biggs, R. O., Carpenter, S. R., Folke, C., Peterson, G., ... & Howarth, R. B. (2020). Corridors of Clarity: Four Principles to Overcome Uncertainty Paralysis in the Anthropocene. *BioScience*. (https://academic.oup.com/bioscience/advance-article/doi/10.1093/biosci/biaa115/5936130)

Lecture 6: Decision making with regime shifts

Crépin, A.-S. 2014, Decision making for social ecological systems, lecture notes. Sections 3-5.

Sterner T., E. B. Barbier, I. Bateman, I. van den Bijgaart, A.-S. Crépin, O. Edenhofer, C. Fischer, W. Habla, J. Hassler, O. Johansson-Stenman, A. Lange, S. Polasky, J. Rockström, H. G. Smith, W. Steffen, G. Wagner, J. E. Wilen, F. Alpízar, C. Azar, D. Carless, C. Chávez, J. Coria, G. Engström, S. C. Jagers, G. Köhlin, Å. Löfgren, H. Pleijel, A. Robinson (2019) Policy design for the Anthropocene, *Nature sustainability, 2:14-21*. (https://ore.exeter.ac.uk/repository/bitstream/handle/10871/35473/Policies%20for%20the%20Anthropocene%201812final%20w%20figures.pdf?sequence=1&isAllowed=y)

Li C.-Z., A.-S. Crépin and C. Folke (2018), "The Economics of Resilience", International Review of Environmental and Resource Economics: Vol. 11: No. 4, pp 309-353. http://dx.doi.org/10.1561/101.00000096. (available through https://www.su.se/biblioteket/)

This last paper is a bit more technical than the others but provides an overview of the literature. You should focus primarily on sections 3.1 and 5 and don′t need to understand the math. The Intro and section 2 provide an overview of the types of problems we are dealing with and can be useful to understand the rest of the paper. Section 4 is about valuation and not obligatory reading.

Module 9: Theories and methods for governance of the commons (3 hp)

Module Leaders: Caroline Schill & Nanda Wijermans

Instructors: Caroline Schill (CS), Nanda Wijermans (NW)

Brief description

During this module you will be introduced to different theoretical and applied approaches related to understanding and analysing the nature and use of common resources and property and in particular common pool resources in the context of social-ecological systems. This will include: social dilemmas (e.g. prisoner′s dilemma), collective action, human behaviour, institutions, and institutional analysis. We explore this field using exercises, group work and case studies – both to illustrate and apply the course′s theoretical content.

Module content

Concepts	***Methods***	**Applications**
Week 1: Tragedy and Drama of the Commons: Institutions (Theories focus)		
Tragedy of the Commons Common Pool Resources Rational Choice Social Dilemmas Institutions – norms, rules and rights Property rights	Institutional Analysis Coding	Roles of institutions in governing and managing the commons
Week 2: Behavioural and Simulation Experiments (Methods focus)		
Tragedy of the Commons Common Pool Resources Rational Choice	Behavioural laboratory and field experiments and simulation experiments	Understanding individual and collective behaviour

Schedule

	Lectures	*Class exercises*	Home work
Week 1: Tragedy and Drama of the Commons: Institutions (Theories focus) [All Online]			
Fri 19 FEB 10:00-11:30	**AM:** Module intro [CS & NW, ½ hr]	**AM**: Class activity (Game) [CS & NW, 1hr] [**Onsite option** possible (not mandatory) **–** decided jointly with class beforehand]	**AM/PM:** Reading + Homework 1 - Submit in Athena before 17:00
Mon 22 FEB 10:00-12:00 13:00-14:00	**AM:** Check-in **AM: Tragedy to Drama of the Commons** [CS, 2hrs]	**PM:** Class exercise [CS, 1hr]	**PM:** Reading + Homework 2 - Submit in Athena before 17:00
Tue 23 FEB 10:00-12:00	**AM:** Check-in **AM: Institutions to govern the Commons** [NW, 2hrs]	**AM:** Introduction seminar [NW, ½ hr]	**PM:** Reading + Homework 3 (individual coding exercise) - Submit in Athena and share in Athena with the Madagascar seminar group before 09:00 on Wed (24 Feb)
Wed 24 FEB 9:30-10:00	**AM**: *Optional* check-in at 9.30	**AM/PM** Groups prepare for their seminar (self-organised)	**AM:** Reading + Preparation for seminar
Thu 25 FEB 9:00-12:00 13:00-14:00		**AM:** Seminar [students, 3hrs] **PM:** Seminar coding exercise [CS & NW]	**PM:** Prepare for Week 2: Reading + Homework 4
Week 2: Behavioural and Simulation Experiments (Methods focus) [All Online]			
Fri 26 FEB 9:30-10:00	**AM**: *Optional* check-in at 9.30	**READING DAY**	**AM/PM:** Prepare for Week 2: Reading + Homework 4 - Submit in Athena before 17:00
Mon 1 MAR 10:00-12:00 13:00-16:00	**AM:** Check-in **AM: The Value-Added of Using Behavioural and Simulation Experiments to Study the Commons** [CS & NW, 4hrs]		
Tue 2 MAR 9:00-10:00 10:00-14:30 15:00-16:00	**AM:** Check-in **AM:** Recap of previous day [CS & NW, 1hr]	**AM/PM:** Experiments exercise [CS, 3.5hrs] **PM:** Presentations, peer-review & feedback [CS & NW, 1½ hrs] **PM:** Class module evaluation workshop [class, CS & NW, 1hr]	**16:00** Final Assignment available on Athena
Wed 3 MAR 9:00-10:00		**AM:** Q&A and/or module reflection – *optional* session [CS & NW, 1hr]	**AM/PM:** Work on Final Assignment
Thu 4 MAR			**17:00** Submit Final Assignment in Athena

Learning outcomes

After completing the course, course participants are expected to:

1. Be able to define and describe key concepts including: common pool resources, institutions, norms and rules, social dilemmas, rational choice and tragedy of the commons.
2. Have insights into how to perform institutional analyses.

3. Have insights into the role of experiments in understanding individual and collective behaviour.
4. Be able to apply the above components to real settings.

Assessment and Grading

Component	Weighting (%)	**Learning Outcomes**
Homework 1+2+3+4	Pass/fail	1, 2, 3, 4
Seminars	Pass/fail	1, 2, 4
Experiments Exercise	Pass/fail	1, 3
Experiments exercise peer-review	Pass/fail	3
Final Assignment	100%	1-4
Module Evaluation Workshop	Compulsory	

Attendance of lectures and participation in **all** seminars and exercises is compulsory. Participation does not only mean attendance; the participant must have prepared for and take an active role in the lectures, seminars and exercise. The individual course evaluation at the end of the course is compulsory.

Criteria for assessment

The participant must achieve passing grades for all parts of the module in order to pass the module as a whole. Failure to submit on time will result in a maximum grade C. The maximum grade for a re-submitted Fx grade is an E. Re-examination will be sent out on 31 March 2021 and submitted by 12 April 2021. The following grades are issued; the lower limit for each grade is expressed as a percentage of the maximum points available:

A 95% Excellent
B 85% Very good
C 75% Good
D 65% Satisfactory
E 60% Sufficient (pass)
Fx 50% Insufficient (fail)
F Below 50% Poor or insufficient conduct (fail)

In addition to specific grading criteria handed out with specific assignments, the following criteria are used for grading assignments:

A	requires excellent insight and deep understanding of the modules' concepts and how they relate to one another and to the Commons. The text clearly demonstrates independent thinking, an ability to connect key concepts presented during the module, and to make connections beyond the immediate subject area. The text has no faults with *formalia*.
B	requires very good insight and deep understanding of the modules' concepts. The text demonstrates a clear ability to connect key concepts presented during the module. The text has at most minor faults with *formalia*.
C	requires good insight into the modules' concepts and how they are interrelated, as well as independent sound judgements and analytical skills in discussing them. The text demonstrates an ability to connect key concepts presented during the module. The text has smaller faults with formalia.

D	requires additional skills in discussing and explaining the modules' concepts. The text demonstrates an ability to connect key concepts presented during the module. Concepts are defined and in general correctly used, and applied. The text has faults with *formalia*.
E	is issued to participants who can recapitulate the contents of the module. The text indicates an ability to define and to some extent connect the key concepts presented during the module. The text has faults with *formalia*.
Fx	is issued where the text has serious faults with *formalia*. Concepts are poorly defined and used incorrectly. The maximum grade for a re-submitted Fx grade is an E
F	is issued where the text indicates an inability to connect key concepts presented during the course. The text does not follow *formalia* requirements; concepts are incorrectly defined and/or misapplied.

Reading List – readings should be done prior to lectures!

Week 1: Tragedy and Drama of the Commons: Institutions (Theories focus)

a. Lecture: Tragedy to Drama of the Commons

Watch and read in the order provided here. This will guide you through the concepts as they build on each other.

- Watch: TEDEd What is the tragedy of the commons? (4:57 min): https://www.youtube.com/watch?v=CxC161GvMPc
- Skim Hardin's (1968) paper and focus on the section 'Tragedy of Freedom in a Commons in: Hardin, G. 1968. The Tragedy of the Commons. *Science* **162**:1243–1248.
- Chapters 1+4 of Anderies, J.M. and Janssen, M.A. 2013. Sustaining the Commons. Published by: Center for the Study of Institutional Diversity, Arizona State University, Tempe. Freely available online as pdf or e-book here: https://sustainingthecommons.org/

Additional Reading:

- Dietz, T., Ostrom, E. and Stern, P.C. 2003. The Struggle to Govern the Commons. *Science* **302**(5652):1907–1912.
  - Note: Read this if you would like to learn more about strategies for adaptive governance of the commons beyond local contexts. It also provides a useful overview of commons research between Hardin's paper in 1968 and early 2000.
- Watch: Elinor Ostrom's Whiteboard Seminar "Going Beyond the Tragedy of the Commons" (8 min): https://www.stockholmresilience.org/news--events/seminars-and-events/whiteboard-seminars/2009-04-02-elinor-ostrom-going-beyond-the-tragedy-of-commons.html
  - Note: Watch this if you would like to learn more about what is conceptually problematic with the Tragedy of the Commons and how the tragedy can be avoided in Elinor's own words.
- Van Laerhoven, F., M. Schoon, and S. Villamayor-Tomas. 2020. Celebrating the 30th Anniversary of Ostrom's Governing the Commons: Traditions and Trends in the Study of the Commons, Revisited. *International Journal of the Commons* **14**(1):208–224.
  - Note: Read this if you would like to get a better sense about the commons research field, its traditions and trends (depicted in several statistics) since the publication of 'Governing the Commons'.

b. Lecture: Institutions to govern the Commons

Read in the order provided here. The ideas, frameworks, concepts have a historical logic.

- Anderies, J.M. and Janssen, M.A. 2013. Sustaining the Commons. Published by: Center for the Study of Institutional Diversity, Arizona State University, Tempe.
    - Chapter 2 (focus on sections 2.1-2.3 and Critical reflections),
    - Chapter 7,
    - Chapter 11 (focus on understanding the difference between rules and norms, and not in how to exactly apply the syntax suggested in this chapter).
- Ostrom, E. 2009. A general framework for analyzing sustainability of social-ecological systems. *Science* **325**(5939):419–22.

Additional Reading:

- Ostrom, E. 2000. Collective action and the evolution of social norms. *Journal of Economic Perspectives* **14**(3):137–158.
    - Note: Read this if you would like to learn more about what empirical studies about the commons have taught us about individual and collective action as opposed to the ʻdefault view of rational, self-interested individuals (that will not act to achieve the common interest). In particular, the role of laboratory experiments for developing a theory of collective action.
- Haider, L.J., Neusel, B., Peterson, G.D., and Schlüter, M. 2018. Past management affects success of current joint forestry management institutions in Tajikistan. *Environment, Development and Sustainability*:1–42.
    - Note: Read this if you would like to know more about the case study that we use in the lecture as an application example of using the design principles, the SES framework, and resilience thinking in combination.
- RE:THINK Feature. Marika Haeggman. Resilience lessons from a water goddess. 09 Feb 2017. https://rethink.earth/resilience-lessons-from-a-water-goddess/ (9 min read)
    - Note: Read this if you would like to know about another well-researched case study on the role of institutions to govern the commons.

Homework 3 (case study for individual coding exercise)
Tengö, M., Johansson, K., Rakotondrasoa, F., Lundberg, J., Andriamaherilala, J.-A., Rakotoarisoa, J.-A. and Elmqvist, T. 2007. Taboos and Forest Governance: Informal Protection of Hot Spot Dry Forest in Southern Madagascar. *AMBIO* **36**(8):683–691.

Seminars: Applying Week 1's material
Social norms and the commons: Nyborg, K., Anderies, J.M., Dannenberg, A., Lindahl, T., Schill, C., Schlüter, M., et al. 2016. Social norms as solutions. *Science* **354**(6308):42–43.

Global commons: Stern, P. C. 2011. Design principles for global commons: Natural resources and emerging technologies. *International Journal of the Commons* **5**(2):213–232.

Feminist perspective on the analysis of the commons:
Clement, F., Harcourt, W., Joshi, D. and C. Sato. 2019. Feminist political ecologies of the commons and commoning (Editorial to the Special Feature). *International Journal of the Commons* **13**(1):1–15. Link to Special Feature:
https://www.thecommonsjournal.org/collections/special/feminist-political-ecologies-of-the-commons-and-commoning72779/

Commons of developed industrialized countries: Berge, E., and M. McKean. 2015. On the commons of developed industrialized countries (Editorial to Special Feature). *International Journal of the Commons* **9**(2):469–485. Link to Special Feature: https://www.thecommonsjournal.org/collections/special/the-commons-of-developed-industrialized-countries79520/

Globalisation and the commons: Dell′Angelo, J., P. D′Odorico, M. C. Rulli, and P. Marchand. 2017. The Tragedy of the Grabbed Commons: Coercion and Dispossession in the Global Land Rush. *World Development* **92**:1–12.

COVID-19 and the commons:
https://www.youtube.com/playlist?list=PLAAFvhxfMjvfv5sZ0xuIof9Yw6_bvx1h-

Week 2: Behavioural and Simulations Experiments (Methods focus)

Lecture: The Value-Added of Using Behavioural and Simulation Experiments to Study the Commons

- Lindahl. T, Janssen, M.A. and Schill, C. Controlled Behavioural Experiments Controlled Behavioural Experiments. Pages XX in Schlüter, M., Biggs, R., Clements, H., de Vos, A., Maciejewski, K. and Preiser, R., editors. *Routledge Handbook of Research Methods for Social-Ecological Systems*. In press. (Available via Athena)
- Schill, C., Lindahl, T. and Crépin, A.-S. 2015. Collective action and the risk of ecosystem regime shifts: insights from a laboratory experiment. *Ecology and Society* **20**(1):48. ***Including*** Appendix 1 (instructions of the ″Threshold treatment”).
- Watch: Juan Camilo Cárdenas Invisible hands working together” (4:40 min): https://www.youtube.com/watch?v=BqEOGDX766Q
- Read the introduction and conclusion of: Schill, C., Wijermans, N., Schlüter, M. and Lindahl, T. 2016. Cooperation Is Not Enough—Exploring Social-Ecological Micro-Foundations for Sustainable Common-Pool Resource Use. *PLoS ONE* **11**(8):e0157796–24. *Read after Schill et al. (2015).*
- Poteete, A. R., Janssen, M. A., & Ostrom, E. (2010). **Working Together: Collective Action, the Commons, and Multiple Methods in Practice.** Princeton University Press.
    - Chapter 7 - Agent-Based Models of Collective Action: p171-177 (until Repeated Prisoner's dilemma) and Conclusion p191-193;
    - Chapter 8 - Building Empirically Grounded Agent-Based Models: Agent-based models of laboratory and field experiments (p198-204) and methodological challenges (p210- 212).

Additional Material:

- Anderies, J.M. and Janssen, M.A. 2013. Sustaining the Commons. Published by: Center for the Study of Institutional Diversity, Arizona State University, Tempe. Chapter section 8.1 (1 page intro only) and Chapter 9.
    - Note: Read this if you want to know more details about the initial common-pool resource and public good experiments as well as the role of communication and costly punishment.
- Anderies, J.M. and Janssen, M.A. 2013. Sustaining the Commons. Published by: Center for the Study of Institutional Diversity, Arizona State University, Tempe. Chapter sections 8.2-8.6.

- Note: Read this for an introduction to the different types of social dilemma experiments, apart from common-pool resource and public good experiments.

- Ostrom, E. 2006. The value-added of laboratory experiments for the study of institutions and common-pool resources. *Journal of Economic Behavior and Organization Organization* **61**(2):149–163.
  - Note: Read this if you want to get to know Elinor Ostrom′s motivation for using behavioural (economic) experiments and a more detailed description of the experimental evidence on the importance of communication and sanctioning.
- Janssen, M.A., Lindahl, T. and Murphy, J.J. 2015. Advancing the understanding of behavior in social-ecological systems: results from lab and field experiments. *Ecology and Society* **20**(4). [Introduction to special issue in *Ecology and Society* on ″Advancing the understanding of behavior in social-ecological systems: results from lab and field experiments" of which the Schill et al. (2015) paper is part of; link: http://www.ecologyandsociety.org/issues/view.php/feature/102]
  - Note: Read this if you would like to have an idea about some recent experimental studies on the commons (both lab and field) with a particular SES angle.
- Anderies, J.M., Janssen, M.A., Bousquet, F., Cardenas, J.-C., Castillo, D., Lopez, M.-C., Tobias, R., Vollan, B. and Wutich, A. 2011. The challenge of understanding decisions in experimental studies of common pool resource governance. *Ecological Economics* **70**(9):1571–1579.
  - Note: Read this if you would like to know about methodological and ethical challenges of the experimental method (mostly economic experiments) and ways of complementing experimental data to gain understanding about the role of individual attributes and the social-ecological context on behavioural responses.
- Wijermans, Nanda, Schill, Caroline, Lindahl, Therese, Schlüter, Maja (2016, November 13). ″AgentEx" (Version 1.0.0). CoMSES Computational Model Library. Retrieved from: https://www.comses.net/codebases/5181/releases/1.0.0/
  - Note: Download and explore the model if you are curious what such a model looks like and how simulation experiments can be run as described in the reading: Schill et al (2016).

Module 10: Adaptive processes in social-ecological systems (4 hp)

Module leader: Jon Norberg (JN)

Instructors: *Kirill Orach (KO), Maricela De la Torre Castro (MDlTC), Matilda Petersson (MP), Johanna Hedlund (JH)*

Brief description

The use and abuse of natural resources have resulted in a decline of ecosystem health. Despite significant efforts, management has failed at regional and global scales. Consequently, innovative approaches to improve ecosystem health are needed, based on a deeper understanding of the adaptive processes in social-ecological systems (SES). Understanding of the social, political, legal and economic aspects of resource management and governance, coupled with a deep understanding of ecology, has been advocated as being imperative for successful outcomes.

This module will introduce students to theory, methods, case studies and practical implementation of adaptive management. Scenarios are useful for bringing future considerations into present decisions when prediction is not possible. Scenarios also provide an effective tool to capture divergent and/or shared visions among multiple stakeholders of ″what” to manage, ″how” and for ”whom”. It also presents an instrument that can help to highlight obstacles and possibilities for management of social-ecological systems under great uncertainty and in situations where the cost for management mistakes is large. Role-plays offer one type of scenario planning.

During this module students will be actively engaged through participation in a role-play that will be running throughout the whole module. Participants will assume the role and perspective of different stakeholders tasked to participate in adaptive processes in SES. Students will also practically experience the challenges and opportunities of conducting research during this exercise. The experiences gained through the role-play will be continuously developed, discussed and reflected on, using case studies of adaptive management with different degrees of social and ecological complexity. Throughout the role-play and in the case studies presented, students will become acquainted with qualitative interview techniques, text analysis, interpretation of data, social network analysis and the process of leading participatory stakeholder dialogues.

In lectures, students will be exposed to a variety of case studies, presented by experts. Students will independently search for literature and interpret data. Discussion seminars will be provided throughout the module.

Module content

Concepts	***Methods***	**Applications**
Week 1:		
What is a role-play?	Literature search, lectures	Empirical data collection for social-ecological systems studies
Week 2:		
What is adaptive management?	Participatory observations, theories for studying social-ecological systems, text analysis and interviews	Science-policy dialogues, empirical data collection for social-ecological systems studies
How does adaptive management work in practice?	Role play	Designing research program on social-ecological system
Week 3:		
How does adaptive management work in practice?	Role play	Designing research program on social-ecological system

Schedule

Schedule - All lectures are on Zoom unless otherwise noted

	Lectures	*Class exercises*	Home work
Week 1: Adaptive processes: introduction and preparation for role-play			
March Friday 5 9:30-12:00	**AM:** Module introduction; Practical instructions for the role play; Handing out individual examination task (KO, JN, KJ)	**PM: Le**cture and discussion (JN) (how to write a proposal, prep for examination)	Readings
Week 2: Case studies and role play			
Monday 8 10:00-12:00	**AM:** Adaptive processes (JN)	**AM:** Political context of adaptive management (KO)	Collection and interpretation of literature/data for role-play.
Tuesday 9 10:00-12:00 13:00-15:30	**AM:** Introduction to adaptive management (JN)	**PM:** Discussions on paper	Collection and interpretation of literature/data for role-play.
Wednesday 10 9:30-12:00 13:00-15:30	**AM**: Role-play year 1 (session 1) (KO, KJ, MP)	**PM**: Role-play year 1 (session 2) (KO, KJ, MP)	Collection and interpretation of literature/data for role-play.
Thursday 11 10:00-12:00 13:00-15:30	**AM: A gender perspective.(MDlCT)**	**PM:** Preparation for the role-play year 2	Collection and interpretation of literature/data for role-play.
Friday 12 10:00-12:00 13:00-15:30	**AM: Discussion:** Changing values and contextual dynamics (JN)	**PM:** Role-play year 2 (session 3) (KO, KJ, MP), Kirill will publish and present the final assignment.	Collection and interpretation of literature/data for role-play.
Week 3: role play, case studies and Independent work on essay			
Monday 15 11:00-12:00 13:00-15:30	**AM:Prepare role play**	**PM: prepare role-play**	
Tuesday 16 10:00-12:00 13:00-15:30	**AM:** Role-play year 10 (session 4) (KO, KJ)		Collection and interpretation of literature/data for role-play.
Wednesday 17 10-12:00 13:00-15:30	**AM:**	**PM:**	
Thursday 18		Work on individual examination	
Friday 19		Work on individual examination	
Monday 22		Work on individual examination	**17:00** Hand in individual examination

Learning outcomes

Following the module the participants are expected to be able to:

1. Understand basic aspects of adaptive management
2. Have an empirical understanding of case studies of adaptive management
3. Understand how to apply basic methods for studying adaptive management processes (interviews, social network analysis, text analysis)
4. Have a basic understanding of how social, political, economic and ecological contexts influence adaptive management outcomes
5. Know how to engage in role-play and understand basic aspects of how to develop a strategy for adaptive management within any given social-ecological context.
6. Understand basic aspects related to how to conduct scenario planning and stakeholder dialogues.

Assessment and Grading

Component	Weighting (%)	Learning Outcomes
Individual report	100%	1-6
Participation in class discussions, exercises and role-play	Compulsory	1-6
Module Review	Compulsory	
	100%	

Attendance of lectures and participation in all seminars is compulsory. Participation does not only mean attendance, the participant must have prepared for and take an active role in the seminar. The individual course evaluation at the end of the course is compulsory.

Criteria for assessment

The participant must achieve passing grades for all parts of the course in order to pass the course as a whole. Failure to submit on time will result in a maximum grade C. The maximum grade for Fx grade is an E. Re-examination will be sent out on 19 April 2021 and submitted by 26 April.

The following grades are issued, the lower limits for each grade is expressed as the percentage of total points that must be obtained to reach that grade:

A 95% Excellent
B 85% Very good
C 75% Good
D 65% Satisfactory
E 60% Sufficient (pass)
Fx 50% Insufficient (fail)
F Below 50% Poor or insufficient conduct (fail)

A	Outstanding insights and understanding of the concepts and theories used within the course. Outstanding skills in written analysis and synthesis.
B	Very good insights and understanding of the concepts and theories used within the course. Very good skills in written analysis and synthesis.

C	Good insights and understanding of the concepts and theories used within the course. Good skills in written analysis and synthesis.
D	Show some understanding but requires further insights in concepts and theories.
E	Able to refer and define concepts and theories but lack understanding.

Reading List
Compulsory reading material (i.e. research articles) will be distributed via "Mondo" at the start and throughout the course.

Schill, Caroline, John M. Anderies, Therese Lindahl, Carl Folke, Stephen Polasky, Juan Camilo Cárdenas, Anne-Sophie Crépin, Marco A. Janssen, Jon Norberg, and Maja Schlüter. 2019. ″A More Dynamic Understanding of Human Behaviour for the Anthropocene.” *Nature Sustainability* 2 (12): 1075–82.

Levin, S. A. 1998. ″Ecosystems and the Biosphere as Complex Adaptive Systems.” *Ecosystems* https://link.springer.com/article/10.1007/s100219900037.

Folke, C., T. Hahn, and P. Olsson. 2005. ″Adaptive Governance of Social-Ecological Systems.” *Annual Review of Environment and Resources*. https://www.annualreviews.org/doi/abs/10.1146/annurev.energy.30.050504.144511.

Levin, S., T. Xepapadeas, A. S. Crépin. et al. 2013. ″Social-Ecological Systems as Complex Adaptive Systems: Modeling and Policy Implications.” *Environment*. https://www.cambridge.org/core/journals/environment-and-development-economics/article/socialecological-systems-as-complex-adaptive-systems-modeling-and-policy-implications/C02DE8F7767B295C3289F51E83D845B4.

Inglehart, Ronald F. 2008. ″Changing Values among Western Publics from 1970 to 2006.” *West European Politics* 31 (1-2): 130–46.

Hughes et al. (2005) Adaptive management of the Great Barrier Reef and the Grand Canyon World Heritage Areas. *Ambio*, **36**: 586-592.

Walters, C. J. and Holling, C. S. 1990. Large-scale management experiments and learning by doing. *Ecology*, **71**(6):2060-2068.

Österblom et al. (2010) Making the ecosystem approach operational - Can regime shifts in ecological- and governance systems facilitate the transition? *Marine Policy*, **34**, 1290-1299.

Voß, J.-P. & Bornemann, B. The Politics of Reflexive Governance: Challenges for Designing Adaptive Management and Transition Management. *Ecology and Society* **16**, (2011).

Valman, M. Institutional stability and change in the Baltic Sea: 30 years of issues, crises and solutions. *Marine Policy* **38**, 54–64 (2013).

Orach, K. & Schlüter, M. Uncovering the political dimension of social-ecological systems: Contributions from policy process frameworks. *Global Environmental Change* **40**, 13–25 (2016).

West, Schultz & Bekessy (2016). Rethinking Social Barriers to Adaptive Management. *Environmental Management* **58**,(3): 399-416.

Westley (2002). The Devil in the Dynamics: Adaptive Management on the Frontlines. [In Panarchy]

Österblom et al. (2011) Incentives, social–ecological feedbacks and European fisheries. Marine *Policy*, **35,** 568-574.