Course materials and syllabus 'Science and Expertise in Nature and Environment'

A brief introduction of the materials

These materials have been designed for the course 'Science and Expertise in Nature and Environment' in 2020-2021 at Wageningen University of a total of 6 credits that runs for 8 weeks (6 ECTS equals around 160 study hours in total, 21 hours per week). It is a mandatory course in the interdisciplinary bachelor in forest and nature management.

The course has used a combination of lectures, tutorials with in class activity, guest lectures to introduce cases or deepen specific topics, individual assignment, an essay assignment and a case study group assignment.

The primary audience is students in an interdisciplinary program with a strong focus on and interest in the natural sciences. Thus, the course assumes no prior knowledge in social sciences, including philosophy or sociology of science.

The level of the course can be late Bachelor as well as early Master. Higher level students, or students with more relevant prior knowledge may benefit from more complex individual assignments that focus less on reproduction and more on application, synthesis, or critical evaluation.

The course materials can be used in group sizes ranging from 15-100. Adjustments will need to be made primarily to the case study assignment (adding cases, or creating 4 instead of 2 groups per case) which is currently prepared for 36 students.

This document contains the following:

- The course syllabus
- 3 individual assignments
- A group case study assignment
- An individual essay assignment.

July 2021,
Esther Turnhout and Judith Floor

Please leave a comment if you would like to contact us

The Course Syllabus

FNP-32806
Science and Expertise in Nature and Environment

Course guide 2020-2021

Course coordinator: Judith Floor

Lecturers: Judith Floor, Nowella Anyango-van Zwieten, Esther Turnhout and various guest lecturers

Examiner: Dr. Judith Floor and Prof. dr. Esther Turnhout

Language of instruction and examination: English

INTRODUCTION

Assumed prerequisite knowledge

Introductory courses on the social and policy aspects of environmental governance, forest and nature conservation or natural resource management.

Profile of the course

Forestry, nature conservation and natural resource management are practices in which scientific knowledge and expertise play a key role. However, these issues are also characterized by competing values and perspectives, interests and claims. As a result, knowledge and expertise are not the only relevant factors determining the outcomes of policy and decision making processes. What the facts are is often contested, which means maintaining a strict separation between science and politics is difficult in practice. How are we to think of science and the claims of experts in this situation? Future practitioners need to be able to cooperate with experts and professionals with different disciplinary backgrounds, knowledge and expertise, values, interests and perspectives. In order to effectively contribute, they need to understand the relation between scientific knowledge and decision making, as well as reflect on the different roles that experts can play in policies and management of nature, environment and natural resources. This course will:

- Introduce state-of-the-art theories and concepts that deal with the role of science in policy and society (including amongst others the use of knowledge and uncertainties in controversies, the relation between science and lay knowledge, the role of experts and transdisciplinarity)
- Discuss the question of ‘what is science’ by introducing basic notions in philosophy and sociology of science.
- Stimulate critical reflection on how to organize the relation between science, society and policy, what options exist in different situations and what the main challenges and opportunities are.
- Enable students to link theories and concepts to empirical cases in essays and case reports

The course discusses and illustrates various theories and concepts using cases from forest and nature conservation practices, ranging from both developed and developing countries and from the local to the global level. In addition, guest lecturers will share their experiences about their role as scientists in society by presenting cases and by reflecting on challenges and opportunities.

The course integrates the following aspects: 1) theory and concepts about the relation between science, policy and society, 2) concrete examples and experiences, 3) debates about the implications, desirability and dilemma’s involved, and 4) the philosophical issue of how science can be understood. In doing so, the course integrates philosophy of science, sociology of science and concrete examples and experiences in order to provide an in depth and practice oriented basis for understanding and reflection. This course is relevant for

students in different study programs in the natural and social sciences because it prepares them for their future role as scientists in society.

Learning outcomes

After successful completion of this course students are expected to be able to:

- Explain the essential characteristics of the relation between science, policy and society, based on the theories and concepts discussed in the course
- Apply the course concepts in an analysis of an empirical case
- Develop a clear argument in an academic essay in which the course concepts are critically explained and applied.

Materials and resources

This course makes use of the book by Turnhout, E; Tuinstra, W & Halffman, W. 2019. *Environmental Expertise: Connecting science, policy and society.* Cambridge: Cambridge University Press. This book is available at Studystore. Other course materials including lecture slides, assignment descriptions, and other course materials will be made available through Brightspace.

Contact person, lecturers and examiner

Course coordinator: Judith Floor (FNP)

Lecturers: Judith Floor, Nowella Anyango-van Zwieten, Esther Turnhout

Guest lecturers: Tamara Metze-Burghouts, Josephine Chambers, Bas Arts, Annet Pauwelussen, Linde van Best

Examiner: Judith Floor and Esther Turnhout

This course has a limited email policy. Assignments sent by email cannot be accepted, but should be submitted through Brightspace.

COURSE SETUP

This course uses activating teaching methods, which require students to keep up with the course materials and offers opportunities for students to practice with these materials and deepen their learning process. This is why the course relies only partially on theoretical lectures in which students are introduced to new topics and concepts, and emphasizes course activities and assignments. The educational reasoning behind this is that philosophy is a verb and that critical thinking and reflection can only develop if students take charge of their learning process. The course consists of lectures, assignments, tutorials, individual essay writing, group work and report writing.

The course includes 3 graded elements. Full details and requirements of all assignments are available through Brightspace. The main criteria of the grading is on the ability of students to apply and critically evaluate the concepts and theories of the course.

Individual assignments portfolio

Throughout the course students are required to submit 4 short assignments that include questions on the course topics. Together they form a portfolio that will be graded.

Case study

This assignment is a written group report about a case. The case report assignment will include all the materials presented in the course and will test the students' understanding as well as their ability to apply and critically evaluate them. As preparation for the case simulation there is preparation assignment to improve the quality of the simulation.

Individual essay

This assignment consists of an individual essay in which a student is asked to offer their perspective on the democratization of environmental knowledge and its connection to an current trend in nature and environmental science, using the materials presented in the course. This essay will test students understanding of the concepts and theories presented in the course, their ability to link these concepts and theories to other texts, and their ability to critically evaluate texts and present this as a clear argumentation in an academic essay.

COURSE RULES AND REQUIREMENTS

The following course requirements apply:

- Timely submission of all assignments (penalties apply for late submissions)
- Equal contribution to group work

Failure to meet these requirements can result in exclusion from the course and from examination (which means that students will not be able to pass the course this academic year).

All course assignments have **fixed deadlines that are not negotiable**. Make sure you submit in time so that you can check your submission (if you submitted the correct file and if the submission was successful) and if necessary correct any errors before the deadline. All assignments, including the group report and the essay are handed in on Brightspace.

- If you are unable to submit because of illness, this should be communicated before the deadline to the course coordinator and an appropriate solution will be found.
- Problems of unequal contribution to group work should be reported to the course coordinator and will be addressed in an appropriate manner in consultation with the group.

Covid-19 situation

Because of the current restriction on campus this course is both online and on campus. We encourage you to be present on campus, however online alternatives are always provided.

EXAMINATION RULES AND PROCEDURES

Only students who meet the requirements of the course are eligible for examination.

The examination of the course consists of three different elements in which the learning outcomes are tested. The first is a portfolio of small assignments (25% of the grade). The second is a group report about a case (25% of the grade). The third part is an individual essay (50% of the grade). Students can pass the course if they meet the course requirements (as specified in the course outline), if they score a minimum of 5,5 for the individual essay, and if they score a minimum final grade of 5,5.

Small Assignments: Each assignment will test the students' understanding of the course materials, with particular focus on students' ability to apply and critically evaluate the concepts and theories of the course. The small assignments have to be handed in at the end of each week, you can find the assignments on Brightspace.

Group Report: The group report will be written on one of the three case studies presented during the course in order to allow the students to apply and engage with the concepts used in the course in relation to current case studies.

Individual Essay: For the individual essay you will analyse a current trend in nature and environmental science in relation to the thesis of democratization of environmental knowledge. The aim of the essay is to present a clear argument in a current debate on the science, policy, society relation in which the course concepts are critically explained and applied.

Academic integrity and plagiarism

Students are required to express their ideas in their own words. Failure to do so is plagiarism. Plagiarism ranges from copying entire papers or paragraphs without citation to more subtle forms where parts of sentences are copied or specified ideas are reproduced without crediting the source.

There are two general rules for proper referencing:

1. Reproducing ideas from others using your own words must include an in-text citation (with name and year) after every sentence and a complete entry in the bibliography.
2. Direct, literal, quotes of full sentences or parts of sentences must be between " ", they must include an in-text citation (with name, year and page number) after the closing " and a complete entry in the bibliography.

Most problems can be prevented by proper referencing and by avoiding excessive quotation of the work of others. Simply changing a few words, which is called paraphrasing, from other sources without acknowledging the source is the most common form of plagiarism among students. **Do not start your writing process by pasting bits of texts from others** with the idea that you will connect and reformulate later. Instead, formulate your own ideas in your own words and include references from the start. Another common and related problem may arise from working with another student in studying and carrying out assignments. Such collaboration is encouraged, but the work that you submit must be in your own words, and not jointly written or copied. **All cases of suspected plagiarism - whether accidental or intentional - will be reported to the examining board.** The examining board has the final say about the nature and degree of plagiarism and the sanctions.

Evaluation of the course

We strongly support the system of electronic evaluations of courses. They provide important feedback and give teachers an opportunity to reflect on how to improve the course and their performance. However, if you have comments, questions or ideas, don't wait until the evaluation. You can also contact us personally. The results of the electronic evaluations are used in various ways. They are widely distributed and are used to evaluate the performance of teachers. This means that it is crucial that the evaluations are representative and fair and we encourage all students to fill out the evaluation responsibly.

Re-exam

If you do not pass the course in period 2, there are two re-exam opportunities.
At the end of period 3 and in the summer.

READING MATERIALS

The course includes a number of lectures and interactive activities. For each activity, a list of required readings is offered. The required readings are essential for the course because they contain the basic explanations and definitions of the concepts that will be applied in the assignments. Take care to schedule your reading time so that you have a good grasp of all the concepts before you start working on the respective assignments in which you apply them. The readings listed below are from a recently published book which is mandatory for the course. The assignments may include additional materials (readings and or videos). These will be specified in the assignment texts and made available through Brightspace.

LECTURE 1: INTRODUCTION TO THE COURSE

- Halffman, W., Turnhout, E., & Tuinstra, W. (2019). 'Introduction: The Plight of the Environmental Scientists'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press.**.** Ch1, p. 1-10

LECTURE 2: WHAT IS SCIENCE?

- Halffman, W. (2019). 'What is science? (And Why Does This Matter?)'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Ch2, p. 11-35

TUTORIAL: FRAMING

- Halffman, W. (2019). 'Frames: Beyond Facts Versus Values'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press**.** Ch3, p. 36-57
- Hulme, M. (2019). 'Case A: Framing Climate-Change'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Case A, p. 58-67

LECTURE 3: KNOWLEDGE CONTROVERSIES & KNOWLEDGE UNCERTAINTIES

- Turnhout, E., & Gieryn, T. (2019). 'Science, Politics and the Public in Knowledge Controversies'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Ch4, p. 68-81
- Beck, S. (2019). 'Case B: What does 'Climategate' Tell Us About Public Knowledge Controversies'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Case B, p. 82-89
- Tuinstra, W., Ragas, A., Halffman, W. (2019). 'The Limits to Knowledge'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Ch5, p. 104-116

TUTORIAL: KNOWLEDGE UNCERTAINTIES

- Williams, L. & Macnaghten, P. (2019). 'Case C: Whose Deficit Anyway? Institutional Misunderstanding Of Fracking Sceptical Publics'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Case C, p. 90-103
- Ragas, A., Jacobs, M. (2019). 'Case D Angry Bulbs'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Case D, p. 117-125

LECTURE 4: USABLE KNOWLEDGE

- Tuinstra, W., Turnhout, E., Halffman, W. (2019). 'Usable Knowledge: Science, Policy and Society'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Ch6, p. 126-140
- Halffman, W. & Pastoors, M (2019). 'Case E: Expertise for European Fisheries Policy'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Case E, p 141-151

LECTURE 5: KNOWLEDGE INTEGRATION AND LAY KNOWLEDGE

- Turnhout, E. (2019) 'Interdisciplinarity and the Challenge of Knowledge Integration'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Ch7, p.152-164
- Miller, C. (2019). 'Case F: Knowledge Integration in The Millennium Ecosystem Assessment'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Case F, p 165-175
- Tuinstra, W. (2019). 'Case G: Integrated Assessment For Long-Range Transboundary Air Pollution'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Case G, p 176-183
- Turnhout, E. & Neves, K. (2019). 'Lay Expertise'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Ch8, p. 184-199
- Neves, K. (2019). 'Case H Lay Expertise and Botanical Science – A Case of Dynamic Interdependencies in Biodiversity Conservation'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Case H, p 200-209

TUTORIAL: KNOWLEDGE INTEGRATION

Same reading as lecture 5

LECTURE 6: ROLES OF EXPERTS

- Turnhout, E. (2019). 'Environmental Experts at the Science-Policy-Society Interface'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Ch9, p. 222-233

TUTORIAL: DILEMMA'S

- Waterton, C. (2019). 'Case I: 'The Loweswater Care Project'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Case I, p 210-221
- De Coninck, H. (2019). 'Case J: 'Group Think and Whistle Blowers in C02 Capture and Storage' In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Case J, p 234-246

LECTURE 7: DEMOCRATIZATING ENVIRONMENTAL KNOWLEDGE

- Turnhout, E., Halffman, W., Tuinstra, W. (2019). 'Environmental Knowledge in Democracy'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Ch10, p. 247-256
- Halffman, W., Tuinstra, W., Turnhout, E. (2019). 'Conclusion: Science, Reason and the Environment'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Ch11, p. 257-262

TUTORIAL: ENVIRONMENTAL EXPERTISE

All readings of the course

Individual Assignments

Assignment 1 – Chapters 1, 2 and 3

This assignment is based on the following texts:

- Halfmann, W., Turnhout, E., Tuinstra, W. (2019). 'Introduction: The plight of the environmental scientist', In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Ch1, pp. 1-10
- Halffman, W. (2019). 'What is science? (And Why Does This Matter?)'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Ch2, p. 11-35
- Halffman, W. (2019). 'Frames: Beyond Facts Versus Values'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Ch3
- Hulme, M. (2019). 'Case A: Framing Climate-Change'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Case A

Answer the following questions, make sure you use correct references when you paraphrase or quote texts. Your answer should be in total between 1 and 2 pages.

Task 1: The demarcation of science

a. Explain in your own words what the problem of trying to demarcate science is.
b. Explain how Karl Popper tried to demarcate science from non-science and give two reasons why his attempt failed.
c. Explain Bruno Latour's perspective on the search for universal demarcation criteria for science.

Task 2: The diversity of science

Explain how doing 'science' in practice, based on your current study, differs from how students of Climate studies who work on Climate modelling do 'science'. In your comparison use the elements of methods of doing science and disciplines and their traditions.

Task 3: The relation between facts, values and framing

a. Explain in your own words what frames are and give an example of framing.
b. Describe the relation between facts, values and framing, supported by a quote from chapter 3 by Halfmann.

Task 4: Framing climate change

Explain how different ways of framing the causes of climate change impact the responsibility for taking action on climate change. In your answer, make a comparison between two different ways of framing the causes of climate change. Make use of the five types of framing described by Mike Hulme in case A.

Assignment 2 – Chapters 4 & 5

This assignment is based on the following texts:

- Turnhout, E., & Gieryn, T. (2019). 'Science, Politics and the Public in Knowledge Controversies'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Ch4, p. 68-81
- Tuinstra, W., Ragas, A., Halffman, W. (2019). 'The Limits to Knowledge'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Ch5, p. 104-116
- Beck, S. (2019). 'Case B: What does 'Climategate' Tell Us About Public Knowledge Controversies'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Case B, p. 82-89
- Williams, L. & Macnaghten, P. (2019). 'Case C: Whose Deficit Anyway? Institutional Misunderstanding Of Fracking Sceptical Publics'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Case C, p. 90-103
- Ragas, A., Jacobs, M. (2019). 'Case D Angry Bulbs'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. Case D, p. 117-125

Answer the following questions, make sure you use correct references when you paraphrase or quote texts. Your answer should be in total between 1 and 2 pages.

Task 1: The linear model of science-society relations

a. In your own words, describe the linear model of science-society interactions, including a discussion of how this model considers the ideal relation between knowledge and decision-making.

b. Give three points of critique on the linear model of science-policy relations.

c. Indicate if you agree or disagree with the critique on the linear model of science-policy interactions by Turnhout & Gieryn. Use an example to support your opinion.

Task 2: Climategate

This task focuses on the example of Climategate as described by Silke Beck (case B). To get an idea of the debate triggered in the US by Climategate watch this short video of FOX in 2009: https://www.youtube.com/watch?v=aTiKJF-QzPY

a. Explain why Climategate is an example of a knowledge controversy. Include in your answer what a knowledge controversy is.

b. Explain why climate critics reinforce the linear model of science-society relations according to Silke Beck.

Task 3: Uncertainties

a. Describe in your own words the three different conceptions of what uncertainties are.
b. From the perspective of a local resident living near a field of lily bulbs (see case D), give an example for each type of uncertainty.

Assignment 3 – Chapters 6, 8 & 9

This assignment is based on the following texts:

- Turnhout, E. (2019). 'Environmental Experts at the Science-Policy-Society Interface'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. **Ch9**, p. 222-233
- Halffman, W. & Pastoors, M (2019). 'Case E: Expertise for European Fisheries Policy'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. **Case E**, p 137-144
- Neves, K. (2019). 'Case H Lay Expertise and Botanical Science – A Case of Dynamic Interdependencies in Biodiversity Conservation'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. **Case H**, p 200-209
- Waterton, C. (2019). 'Case I: 'The Loweswater Care Project'. In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press**. Case I**, p 210-221
- De Coninck, H. (2019). 'Case J: 'Group Think and Whistle Blowers in C02 Capture and Storage' In Environmental Expertise: Connecting Science, Policy and Society. Cambridge University Press. **Case J**, p 234-246

Answer the following questions, make sure you use correct references when you paraphrase or quote texts. Your answer should be in total between 1 and 2 pages. Task 3, your mission statement is also input for the last tutorial.

Task 1: Boundary organization PBL

This task focuses on the Dutch Planbureau voor de Leefomgeving (PBL). For this task you have to look at the PBL publication http://infographics.pbl.nl/website/globalco2-2016/ . Particularly at the infographic **"Which are the largest emitters?"**. It shows numbers about CO2 emissions expressed in three different units.

a. Indicate which, if any, of the three ways of calculating do you consider to be the most neutral, objective and/or scientific (you can choose one or more of these three terms). Explain your answer.

b. Indicate what role the PBL takes in the presenting of their infographic, using the modalities (servicing, advocating and diversifying) as presented in Chapter 9.

c. Explain the tensions for the PBL as science-policy boundary organisation in policy debates. Include in your answer what you mean with boundary organisations.

Task 2: The production of usable knowledge is political

In this task you are asked to support the following statement: 'The production of usable knowledge is political'. To support this statement you can use the European fishery policy (case E) or botanical gardens (case H).

a. Explain what it means to say 'The production of usable knowledge is political'

b. Give argumentation to support the statement: 'The production of usable knowledge is political' using an example from the European fishery policy (case E) or the Botanical gardens (case H).

Task 3: Mission statement of your consultancy

For this task you imagine that you want to start a consultancy for expert knowledge and advice in the environmental domain. Most organizations have so-called mission statements and ethical codes in which they explain how they work and what norms they adhere to. For your mission statement you have to choose and apply characteristics of the different modalities of servicing, advocating and diversifying. In your statement, you don't have to restrict yourself to one modality or role. Furthermore, these roles are implicit in your text, you write your mission statement for the general public. The aim of this assignment is to encourage you to reflect on the ethical implications of the many decisions experts have to make in practice. Your statement will be input for the tutorial on environmental expertise.

a. Write a short integrity statement of your consultancy (about 250 words).
b. Reflect on your mission statement by indicating which modality or modalities has your preference and how this impacted your mission statement.

Group Case Study Assignment

Case study group assignment

In the case study group assignment, you will study a concrete case that involves both scientific and societal controversies, debates and issues. The course will be divided in 6 groups of 6 students called A1, A2, B1, B2, C1 and C2. Each group will work on one of three cases that will be called A,B and C. Descriptions of the cases you can choose from can be found at the end of the document. Each case will be introduced with an expert tutorial.

The case assignment consists of three main parts.

Part 1: Exploring the case and preparing the role play simulation

In the first part, the two groups working on the same case (A1&A2, B1&B2, C1&C2) will work together to prepare the role play simulation. Each case description has identified 5 actor roles and also has one chair role. Each role will be assigned to one student from each group. These two students will prepare their role together. Representatives for actors 1,2, 3, 4 and 5 will gather information on the case from their actor position. The chairs will try to get an overview perspective and focus on the relations between the actors. Students can use the case descriptions and the list of sources as well as the guest lectures as the starting point for information gathering. The results of these preparations will be consolidated in one document and submitted. This part ends with the two chairs sending a meeting invitation and agenda to the other participants of their role play simulation.

Part 2: The role play simulation

Just like in part 1, the two groups working on the same case (A1&A2, B1&B2, C1&C2) will work together in role play simulation. Each actor will play out their role in the negotiations and conversations. The chairs will facilitate the process and attend to the relations and contributions of the different actors.

Part 3: Writing the report

In this part you work in your own group of 6 students. With this smaller group, you will write the final case study report. The experiences and evaluation of the role playing simulation exercise are used in the report. Make sure that the report offers a good balance between description of factual information of your case study and analysis using the concepts of the course of around 50/50%. Make sure that the report contains all requested elements, is well structured and proofread. Support all claims with literature or other sources.

1. Preparation assignment for the role play simulation

In the first step of the case study assignment, you will explain and introduce the case from the perspective of the different actors and you will also consider the relations between these actors and the role of different forms of knowledge. The cases and the different actors are introduced in the case descriptions.

The cases involve a combination of scientific and societal controversies, debates and issues. Read/watch the information provided on your case. In addition, you are encouraged to look for extra sources of information that can further help you to understand and describe the problem. Do this

from your actor position (e.g. check the website of a nature organization if that is your role). It is your task to describe and analyse the claims made by the actor that you represent and the type of knowledge that is used to support these claims. As a preparation assignment you provide an explanation and analysis of the position and perspective of this specific actor. So, you are encouraged to step into the role of this specific actor, including a consideration of what types of knowledge this actor would use. The assignment for the actors and for the chairs is different (see below).

Assignment for the actors (2-3 A4)

Give a short introduction of the stakeholder that you represent in the simulation exercise. Indicate three claims that this actor will make in the role play meeting, and indicate which knowledge this actor would use to support their position, and which knowledge uncertainties are relevant according to this stakeholder. Make sure you use references to make clear what your knowledge sources are. Shortly indicate what the situated practice is in which this knowledge is produced (e.g scientific laboratory, field measurements, scientific literature, internet fora, personal experience ect.).You should also indicate which concrete persons you will play out in the role play simulation. For example, one person could represent the stakeholder, while the other is an expert that is invited by the stakeholder to support him/her during the meeting (this can be a scientific expert, but also expertise based on 'lay knowledge').

Elements of the preparatory assignment:

- Introduction of the stakeholder and their position in the debate

- 3 claims that you will make in the role play meeting, support your claim with knowledge and/or knowledge uncertainties. Add a short reflection indicating in which situated practice this knowledge is produced.

-reference list

- Indicate who you will be in the role play (what is their professional position)

Assignment for the chairs (2-3 A4)

Introduce the simulation meeting. In this introduction, you highlight the main societal and scientific controversies that play a role in your case. You will also give an overview of the relevant stakeholders, the relation between the different actors and the potential conflicts and communalities between the actors. You will continue be explain the reason, rationale and aims for the meeting. Indicate what concrete persons you will play out in the meeting (for example, are you connected to an organization or professional facilitator). Finish with the agenda of the meeting. Add a short reflection what your expected outcome is of the meeting.

Elements of the preparatory assignment

- Introduction the background of the meeting and general information of the case

- Introduction of the stakeholders that are invited for the meeting

-Reference list

- Indicate who you will be in the role play (what is their professional position)

- Agenda of the meeting

- Expected outcomes and objectives of the meeting

- Preparation assignment simulation -Consolidate all separate preparatory assignments and combine them in one document. Upload only word files. File title: Preparation assignment, name case, group names (e.g. Preparation assignment Mussels A1 and A2) -

2: Role play simulation

The aim of the role play is to deepen the understanding about the controversies in the case, the knowledge claims involved and the relationships between actors. You do not have to come to a consensus and offer a single solution, but you are invited to explore options.

During the role play, groups will discuss the issues relevant for their case. The chairs will host the meeting, that will take about 65-70 minutes, including a break provided by the chairs. The chairs are in charge of the discussion and they regulate the order of speaking. The meeting starts with each participant (2 people for each stakeholder) introducing themselves including an explanation of their backgrounds, knowledge and views. Subsequently, the discussion starts during which each participant makes sure to represent the arguments, knowledge claims and the style of reasoning of their actor.

After 70 minutes, the meeting is stopped by the lecturer of your case study. The lecturer will facilitate a reflection on the experience to be a specific actor in a controversy, the relations between the actors, the level of reality of the meeting and highlight elements that are relevant for this course. So make sure you are well prepared to realistically play out your role!

- After the role play we start start working in the smaller groups of 6 or 7 people (with one chair and one person per stakeholder). With this group you write the final report -

3. Analyse the case and write the report

To complete the case study assignment you write a final report, consisting of the following parts:

1) Introduce the case and present the scientific and societal controversies within your case.
2) Present the actors involved, their relations and their knowledge claims. Include both the actors that were represented in the simulation role play and the actors that were missing from the simulation but relevant for the case.
3) Offer a reflection of the role play, highlighting the insights you gained on the relations between actors, power differences and the use of knowledge.
4) Analyse the case by applying concepts and theories from the course and answering the 6 questions below. Make sure to substantiate the claims you make by referring to material from the case and to literature about the concepts. This is a crucial step in the assignment and forms a substantial part of the case report. Make sure you pay sufficient attention to explaining and applying the concepts and theories of the course to the case.

5) Conclude the report by wrapping up the main findings of the previous steps and by offering an outlook for the future.

Questions to address in the analysis:

1. What kinds of uncertainty can you identify in your case?
   - Discuss how uncertainty was expressed (as risk, as incomplete knowledge, as unpredictability, as ambiguity).
   - Discuss how uncertainties played a role in the debate (reflect on the precautionary approach and adaptive management approach).

2. How do science, policy and society interact in your case and how are non-scientists and their knowledge treated?
   - Discuss the relations between the actors in your case (with a specific focus on the non-scientists and their knowledge).
   - Show to what extent these relations can be explained by the (expectations based on) the linear model and the information deficit model.

3. To what extent and in what ways was knowledge made usable in your case?
   - Discuss the relations between the actors in your case and which knowledge was usable for specific actors.
   - Discuss the relation between knowledge production and policy making. In your analysis use at least one of these three options: credibility-salience-legitimacy, boundary object or boundary organisation.

[For question 4, you are asked to build on and integrate your previous answers on uncertainties and the knowledge of non-scientists and usable knowledge and use these to the different ways of framing that you can observe in your case].

4. How did different ways of framing the problem play a role in your case?
   - Describe which different ways of framing you can observe in your case.
   - Discuss how these different ways of framing played a role, e.g. Where there coalitions?; Was there domination of a specific frame?; Where the different frames an obstacle to find a common solution or was there also a shared understanding?

5. Who were perceived as experts in your case and what kind of role did they play?
   - Discuss what the practice of knowledge production was of the experts (scientific-lay knowledge) and indicate what type of knowledge production took place (mono, inter en trans disciplinarity and participatory knowledge production)
   - Indicate what roles you can observe of the experts (servicing, advocating, diversifying), also explain which roles were not played.

[For question 6, you are asked to build on and use your previous answers to show a logical

connection between the problems you observe and the solutions you provide].

6. What is your assessment of the relation between science, policy and society and how can this relation be improved?
    - Discuss current obstacles and challenges in your case and reflect how a more participatory approach could be implemented.

*- The final report - Upload only word files File title: Case assignment Final report case name Group number (*e.g Case assignment Final report Mussel A1*) -*

Grading the case study group assignment.

The group assignment will be assessed on the following criteria:

- Analyse based on questions (explanation and application course concepts), 50%
- Description of the case (problem perception and knowledge claims), 25%
- Reflection on the simulation, 25%
- Writing skills (clear structure, correct grammar and spelling, references), should be correct

We expect that the group work is a shared effort with equal contributions of all participations. However, our aim is also to ensure that the grades are a fair representation of the contributions that students made. Therefore, we invite students to deliberate these relative contributions in their group. When appropriate, differentiated grading for members of the same group can be applied in consultation with the course coordinator.

Summary of the main activities of the assignment

- Week 1: Selection of preferred case study.
- Week 1-2: Preparation for the tutorial with the expert lecturer of your case. Make sure you have read at least the indicated article and that you have assigned the roles for the role play.
- Week 2-3: Preparation for the simulation in duos to play out your specific role. Upload the preparation assignment
- Week 3: Undertake the role play simulation.
- Week 6: Finalize the case report including the reflection on the role play simulation.

Case Description - Mussels in the Dutch Wadden Sea

Mussel fishery in the Dutch Wadden Sea is a controversial topic, especially because of the potential effects of fishery on the nature values of the Wadden Sea. The Wadden Sea is a shallow estuarine sea and large parts of it fall dry during low tides, which makes it an important feeding ground for millions of (migrating) birds. At the same time the Wadden Sea is an area with a high number of economic activities. One of these economic activities is mussel fishery and cultivation. Since the 1950s mussel cultivation takes place in the Dutch Wadden Sea. Mussel farmers rent seabed areas from the national government to cultivate mussels. They use juvenile mussels, the mussel seed, as input for their production cycle. The mussel fishing activity has become controversial since the 1990s when nature organisations blamed fishermen for the high mortality of eider ducks. This debate triggered the regulation of the fishery in 1993 and large scale research on fishery effects. Although the research project EVA II was expected to resolve uncertainty issues, instead it resulted in intense debates in 2003, in which also scientists were placed in pro nature and pro fishery camps. The policy context changed with the implementation of the European Bird and Habitat Directive, mussel fisherman needed to show there is no significant effect of their activity on the protected nature area. This claim was disputed by nature organizations at the supreme court of justice (Raad van State). In 2008 the nature organizations won the court case, based on the perception there was scientific doubt on the claim of no significant effect. In reaction to the crisis that followed, a covenant is signed between the mussel fisherman, nature organizations and the government, stating there will be a transition of the mussel fishery practice. The aim was to stepwise close the Wadden Sea for fishing in 2020 and use alternatives for mussel seed fishing, specifically mussel seed collectors. At the moment, only 40% of this transition has taken place. One of the current questions are if mussel seed collectors should completely replace mussel seed fishery. There are also debates on the effects of the mussel seed collectors and the extent they fit in the Wadden Sea landscape, especially by recreational boating and shrimp fisherman.

Specific issues in this case are: The role of the linear model of science-policy interactions; the role of lay knowledge of fisherman and other practitioners within the Wadden Sea; the role of different scientific disciplines and associated claims on food availability for birds; the role of uncertainties and their strategic use

Actors

For the simulation role play, you can prepare the following five roles – and study what types of knowledge they use (expert or experiential), and how they frame this knowledge:

1. Mussel fishery & cultivation Producers Organisation
2. Representatives from the Wadden Natuurlijk Coalition (Cooperation between: the Society for the Protection of Birds, the Wadden Sea Society, the WAD Foundation and the Society for the Preservation of Nature Monuments in the Netherlands).
3. The Ministry LNV (Ministry of Agriculture, Nature and Food Quality)
4. Representatives of Shrimp fishermen
5. Program Towards a Rich Wadden Sea (in Dutch Programma Rijke Waddenzee)

The simulation situation

The current Mussel fishery Transition Covenant ends in 2020. At the moment the following actors come together to discuss the renewal of the Transition Covenant for after 2020: representatives from the Mussel fishery & cultivation Producers Organisation, representatives from the Wadden Natuurlijk Coalition (Cooperation between: the Society for the Protection of Birds, the Wadden Sea Society, the WAD Foundation and the Society for the Preservation of Nature Monuments in the Netherlands), representatives from the Ministry LNV (Ministry of Agriculture, Nature and Food Quality) and representatives of Shrimp fishermen. The Program Towards a Rich wadden Sea is responsible for the current Covenant Musselfishery. In the meeting they discuss the current progress of the Mussel fishery transition, the impact on the Wadden Sea and its users, and the new goals for a renewed covenant.

Required reading for the expert tutorial:

- Floor, J. R., van Koppen, C. S. A., & van Tatenhove, J. P. M (2019) Knowledge uncertainties in environmental conflicts: how the mussel fishery controversy in the Dutch Wadden Sea became depoliticised, *Environmental Politics*, 28:7, 1236-1258, https://doi.org/10.1080/09644016.2018.1546561

Reading suggestions

- Visual perspectives on the Wadden Sea: Wadden Sea, UNESCO World Heritage http://www.youtube.com/watch?v=lNbNU_ghCew ; The musselconflict in 2008 https://www.youtube.com/watch?v=D_cuwlgrKtY ; Research on mussel seed collectors [timeslot between 4.00 and 5.00] http://www.youtube.com/watch?v=d0YQSb_0m7w
- Research rapports, EVAII and PRODUS, see http://www.wur.nl/en/Expertise-Services/Research-Institutes/marine-research/Projects/PRODUS-Sustainable-shellfish-culture/Reports-Presentations-and-Products.htm
- Floor, J.R. (2018), Knowledge uncertainties in nature conservation - Analysing science-policy interactions in the Dutch Wadden Sea, PhD thesis, Wageningen University. See http://edepot.wur.nl/441198
- Floor, J. R. & Van Koppen C. S. A (2019). Natuurbeheer, ecologie en onzekerheid – een analyse van het mosselvisserijconflict in de Waddenzee. Landschap: tijdschrift voor landschapsecologie en milieukunde, 36(3), 157-165.
- Floor, J. R., van Koppen, C. S. A., & van Tatenhove, J. P. M (2019) Knowledge uncertainties in environmental conflicts: how the mussel fishery controversy in the Dutch Wadden Sea became depoliticised, *Environmental Politics*, 28:7, 1236-1258, https://doi.org/10.1080/09644016.2018.1546561
- Floor, J. R., van Koppen, C. S. A., & van Tatenhove, J. P. M. (2016). Uncertainties in the assessment of "significant effect" on the Dutch Natura 2000 Wadden Sea site – The mussel seed fishery and powerboat race controversies. Environmental Science & Policy, 55, Part 3, 380-392. https://doi.org/10.1016/j.envsci.2015.03.008
- Floor, J. R., van Koppen, C. S. A., & Lindeboom, H. J. (2013). A review of science–policy interactions in the Dutch Wadden Sea — The cockle fishery and gas exploitation controversies. Journal of Sea Research, 82, 165-175. https://doi.org/10.1016/j.seares.2012.06.001

- Hanssen, L., Rouwette, E., & Katwijk, M. M. v. (2009). The Role of Ecological Science in Environmental Policy Making: from a Pacification toward a Facilitation Strategy. Ecology and Society, 14, 43 [online]. http://www.ecologyandsociety.org/vol14/iss1/art43/
- Imeson, R.J. & Van den Bergh, J.C.J.M. (2006) Policy failure and stakeholder dissatisfaction in complex ecosystem management: The case of the Dutch Wadden Sea shellfishery. Ecological Economics 56: 488-507. https://doi.org/10.1016/j.ecolecon.2005.02.007
- Turnhout, E., Hisschemoller, M., & Eijsackers, H. (2008). Science in Wadden Sea policy: from accommodation to advocacy. Environmental Science & Policy, 11, 227-239. https://doi.org/10.1016/j.envsci.2007.07.004
- Van der Molen, F., Puente-Rodríguez, D., Swart, J. A. A., & van der Windt, H. J. (2015). The coproduction of knowledge and policy in coastal governance: Integrating mussel fisheries and nature restoration. Ocean & Coastal Management, 106, 49-60. https://doi.org/10.1016/j.ocecoaman.2015.01.012

Case Description– The contested role of game farming in South Africa

South Africa's colonial and apartheid past has left highly unequal land rights, with at least 80% of the land still privately owned, and mostly by white farmers (Kamuti 2019). As a result, post-Apartheid land reforms (seeking redistribution of land) have left many white farmers feeling threatened and in search of ways to strengthen their existing claims. One increasingly common way is through "game farming", which involves the consolidation of land to support wildlife tourism. Game farming is often presented as a "win-win" strategy for nature conservation and local development, through job creation and tourism, backed by research examining the more technical aspects of game farming impacts (Langholz & Kerley 2006; Yolk 2015). However, up until 2007, little research had looked critically at the distribution of benefits of game farming *among* stakeholders.

As a result of growing concerns over visible changes occurring in South Africa's countryside related to farm conversions, a collaborative initiative emerged in 2007, led by South African and Dutch researchers (Brandt et al. 2018). In order to get actors with conflicting views on board with the work (e.g. farm dwellers, game farmers, NGOs representatives, government officials, land reform activists), the researchers did not reject "win-win" claims upfront, but set out to examine the impacts of game farming on one of the most marginalized groups in the countryside – farm dwellers. Yet, stakeholders had contradictory expectations of the findings, thinking it would confirm their vested interests. When the emerging research was highly critical of the "win-win" narrative, uncovering devastating consequences for evicted farm dwellers (Brooks & Kjelstrup 2014; Spierenburg 2019), alongside additional critiques that profit agendas of game farming are at odds with conservation agendas, such as through the practice of intensively breeding higher hunting value "colour variants" (Snijders 2014; Pitman et al. 2017; Hart 2017), game farmers began to position themselves against the research (calling it "sloppy") and hindering access. In addition, civil society organizations demanded that they be given access to researchers' raw data to use for campaigns and lawsuits, posing ethical challenges. Nevertheless, through workshops in the KwaZulu-Natal province, researchers managed to bring together land rights activists, farm dwellers who had gone through traumatizing evictions, and game farmers who had conducted illegal evictions. Some common ground was found around frustrations over the State and big commercial farming; yet, many power inequalities were not addressed, farm dwellers remained largely unrecognized by stakeholders, and government officials chose to not engage (Brandt et al. 2018).

Important issues to explore in this case include: contested views on the environmental and social impacts of game farming; the influence of vested interests and power relations on the production of research and the framing and circulation of narratives; the potential and challenges for researchers to facilitate the exploration of political problems that require political solutions.

Actors

For the simulation role play, you can prepare the following roles – and study what types of knowledge they use (for example, experts, experiential), and how they frame this knowledge:

1. Farm dwellers / workers (predominantly black)
2. Game farmers / land owners (predominantly white)
3. Provincial nature conservation agency (Ezemvelo KZN Wildlife) representatives
4. Land rights activists (fighting dispossessions and advocating land reform)
5. National government officials (from agriculture and environmental affairs)

The simulation situation

Following the KwaZulu-Natal workshops, the South African and Dutch researchers felt that – as far as they could tell – they struggled to convince participants of the problems with the dominant discourse on game farming as a win-win strategy for nature conservation and rural development. They felt that the limited number of multi-stakeholder engagements was not sufficient to resolve the land-based conflicts, and that enabling the inclusion and agency of farm dwellers required a more long-term process with actors involved who had the power to develop real possibilities for short-term practical and long-term political solutions. As a result, the researchers decide to organize a meeting with five key stakeholder groups – farm dwellers, game farmers, Ezemvelo KZN representatives, land rights activists and national government officials – to determine what sort of long-term platform and initial activities could help foster improved relationships and changes in practice and legislation that better support social wellbeing and wildlife conservation in the KwaZulu-Natal province.

Required reading for the expert tutorial:

- Brandt F, Josefsson J, Spierenburg M. 2018. Power and politics in stakeholder engagement: farm dweller (in)visibility and conversions to game farming in South Africa. *Ecology and Society* 23:32. https://doi.org/10.5751/ES-10265-230332.

Reading suggestions

- Video: Dougan, L Payne S. 2019. Bitter Harvest: Farm evictions sow the seeds of discontent. Available from https://www.dailymaverick.co.za/article/2019-06-17-bitter-harvest-farm-evictions-sow-the-seeds-of-discontent/.
- Video: Yolk, R. 2015. Public Response by WRSA (Wildlife Ranching South Africa) to Public Criticism. Available from https://www.youtube.com/watch?v=zX2BMcWQARI.
- Brandt F, Josefsson J. 2017. Sexuality and power on South African game farms; reflections on positionality and emotions in ethnographic research. Emotion, Space and Society **23**:26–32. https://doi.org/10.1016/j.emospa.2017.02.004.
- Brandt F, Josefsson J, Spierenburg M. 2018. Power and politics in stakeholder engagement: farm dweller (in)visibility and conversions to game farming in South Africa. *Ecology and Society* 23:32. https://doi.org/10.5751/ES-10265-230332.
- Brooks S, Kjelstrup L. 2014. An anatomy of dispossession: post-apartheid land rights and farm dweller relocation in the context of a private game reserve initiative, northern KwaZulu-Natal. Journal of Contemporary African Studies **32**:238–257. http://dx.doi.org/10.1080/02589001.2014.925301.

- Hart A. 2017, August 14. Conservation versus profit: South Africa's 'unique' game offer a sobering lesson. The Conversation. Available from https://theconversation.com/conservation-versus-profit-south-africas-unique-game-offer-a-sobering-lesson-82029.
- Josefsson J. 2014. Safe-guarding the colonial present: game farms on the frontier in KwaZulu-Natal's 'Battlefields Route.' Journal of Contemporary African Studies **32**:258–274. http://dx.doi.org/10.1080/02589001.2014.925302.
- Kamuti T. 2014. The fractured state in the governance of private game farming: the case of KwaZulu-Natal Province, South Africa. Journal of Contemporary African Studies **32**:190–206. http://dx.doi.org/10.1080/02589001.2014.936678.
- Kamuti T. 2019, November 14. South Africa struggles to manage wildlife ranching: why it's a problem. The Conversation. Available from https://theconversation.com/south-africa-struggles-to-manage-wildlife-ranching-why-its-a-problem-126439.
- Langholz JA, Kerley GIH. 2006. Combining Conservation and Development on Private Lands: An Assessment of Ecotourism- Based Private Game Reserves in The. 56. Centre for African Conservation Ecology, Port Elizabeth, South Africa. Available from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.453.4768&rep=rep1&type=pdf.
- Pitman RT, Fattebert J, Williams ST, Williams KS, Hill RA, Hunter LTB, Slotow R, Balme GA. 2017. The Conservation Costs of Game Ranching. Conservation Letters **10**:403–413. Available from https://earthmind.org/sites/default/files/2016-SocietyForConservationBiology-CostsofGameRanching.pdf.
- Snijders D. 2014. Wildlife policy matters: inclusion and exclusion by means of organisational and discursive boundaries. Journal of Contemporary African Studies **32**:173–189. http://dx.doi.org/10.1080/09637494.2014.937163.
- Spierenburg M. 2020. Living on Other People's Land; Impacts of Farm Conversions to Game Farming on Farm Dwellers' Abilities to Access Land in the Eastern Cape, South Africa. Society & Natural Resources **33**:280–299. https://doi.org/10.1080/08941920.2019.1584342.
- Taylor WA, Lindsey PA, Nicholson SK, Relton C, Davies-Mostert HT. 2020. Jobs, game meat and profits: The benefits of wildlife ranching on marginal lands in South Africa. Biological Conservation **245**:108561. https://doi.org/10.1016/j.biocon.2020.108561.

Case Description – The energy controversy over shale gas

Energy is crucial in our modern day and age: we need it for our digital work spaces, for building and heating our houses, for preparing food and many other things. In a world with a growing population and a growing average income, estimated global energy consumption is expected to increases up to 56% between 2010 and 2040 (EIA 2013). At the same time it is no secret that fossil fuels are depleting and by the end of the century almost all conventional fossil fuels will be gone (EIA 2004). Yet, many of our policies, infrastructures and technological resources are built on fossil fuels and this path-dependency is creating a 'global carbon lock in' (Unruh and Carrilli-Hermosilla 2006). The jubilation over newly accessible shale gas resources from the 2000s onward symbolizes this carbon lock in. Even though it has been embraced in some states in the United States and in some countries in Europe, hydraulic fracturing with horizontal drilling has become a hotly contested technology in other places.

Flaming faucets and turbid drinking water versus clean blue natural gas retrieved with hard and honest work are but two of many competing images of hydraulic fracturing for shale gas. Hydraulic fracturing for shale gas is a relatively new way to extract previously inaccessible gas resources located in deep shale layers. The technique has caused controversies, both in society and in academia. Some consider it an energy 'game changer' that increases energy independence and economic revenues (Wall Street Journal, 2009; Mäkinen, 2010; Newell, 2010). In this line of thinking, shale gas is a geopolitical force that will release countries from dangerous dependence on authoritarian oil and gas producers (De Wijk, 2013, De Jong et al., 2014), or meet energy needs in countries such as China where demand is predicted to increase drastically by 2015.[1] Yet, others argue it is a highly risky technology with potential, for example, to contaminate drinking water (EPA, 2011; Howarth et al., 2011; Osborne et al., 2011; Tyndall Centre, 2011), cause earthquakes, and proliferate industrial landscapes (Meng, 2014).

For this case, the proposed focus is on Dutch decision making on shale gas. Specific issues for attention in this case are: the discussions and contestations about the environmental impact of hydraulic fracturing for shale gas; the uncertainties about the revenues and the possibilities and costs of production; and the different conflicting perceptions of facts and uncertainties between industry, experts, NGOs and the public.

Actors

For the simulation role play, you can prepare the following roles – and study what types of knowledge they use (for example, experts, experiential), and how they frame this knowledge:

1. Ministry of Economic Affairs (&Innovation/ &Climate)
2. Cuadrilla Resources
3. Schaliegasvrij Nederland (shale gas free the Netherlands)
4. Gemeente Boxtel (community of Boxtel) or community Noordoost Polder.

[1] http://www.forbes.com/sites/simonmontlake/2013/10/30/shale-gas-revolution-not-coming-to-china-anytime-soon/

5. TNO applied sciences.

The simulation situation

The four actors meet in a Sounding Board meeting. This Sounding Board has been established by the Ministry of Economic Affairs in order to establish a research agenda for a commissioned research on the "Safety and risks of hydraulic fracturing for shale gas in the Netherlands". The scope of the research has been determined by the Ministry of Economic Affairs. The research focusses on safety and risks during the production process and the impacts on the physical environment. The research has been commissioned to a consortium of consultancy-agents Witteveen+Bos, Arcadis Nederland and Fugro Ecoplan. In this meeting, the actors aim to decide on the scope of the research proposal. Debate will if all risks and safety issues that are of concern to the stakeholders can be included.

Required read for the expert tutorial:

- Metze, T. (2017/ 2014 online) "Fracking the Debate: Frame Shifts and Boundary Work in Dutch Decision Making on Shale Gas" *Journal of Environmental Policy and Planning*, Volume 19, 2017 - Issue 1. https://doi.org/10.1080/1523908X.2014.941462

Reading suggestions

- Documentaries Gasland (https://www.youtube.com/watch?v=6mp4ELXKv-w) and Gasland 2 (https://vimeo.com/97358756)
- Bomberg, Elizabeth (2017, 2015 online first) Shale We Drill? Discourse Dynamics in UK Fracking Debates *Journal of Environmental Policy & Planning* https://doi.org/10.1080/1523908X.2015.1053111
- Cotton, M., I. Rattle, and J. Van Alstine. 2014. "Shale gas policy in the United Kingdom: an argumentative discourse analysis." *Energy Policy* 73:427-438. https://doi.org/10.1016/j.enpol.2014.05.031
- Dodge, J. and L. Jeongyoon (2017/2016 online first) Framing Dynamics and Political Gridlock: The Curious Case of Hydraulic Fracturing in New York, *Journal of Environmental Policy & Planning* (online first). https://doi.org/10.1080/1523908X.2015.1116378
- Dodge, J. ; Metze, T. (2017) "Hydraulic fracturing as an interpretive policy problem: lessons on energy controversies in Europe and the U.S.A. *Journal of Environmental Policy and Planning* 19 (1). - p. 1 - 13. https://doi.org/10.1080/1523908X.2016.1277947
- Herber, H., & De Jager, J. (2010). Oil and gas in the Netherlands—Is there a future? *Netherlands Journal of Geosciences*, 89, 119–135.
- Jaspal, R., and B. Nerlich. 2014. "Fracking in the UK media: Threat dynamics in an unfolding debate." *Public Understanding of Science* 23 (3):348-363. https://doi.org/10.1177/0963662513498835
- Ligtvoet, A., E. Cuppen, O. Di Ruggero, K. Hemmes, U. Pesch, J. Quist, D. Mehos (2016) 'New future perspectives through constructive conflict: Exploring the future of gas in the Netherlands',

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- Metze, T. (2017/ 2014 online) "Fracking the Debate: Frame Shifts and Boundary Work in Dutch Decision Making on Shale Gas" *Journal of Environmental Policy and Planning*, Volume 19, 2017 - Issue 1. https://doi.org/10.1080/1523908X.2014.941462
- Metze, T. (in press), Fuel to the fire: Risk governance and framing of shale gas in the Netherlands, *EXIS* (ask Tamara: tamara.metze-burghouts@wur.nl)
- Metze, Tamara, and Jennifer Dodge (2016) Dynamic Discourse Coalitions on hydro-fracking in Europe and the United States *Environmental Communication* Vol. 10 , Iss. 3,2016 https://doi.org/10.1080/17524032.2015.1133437
- Small, Mitchell J., Paul C. Stern, Elizabeth Bomberg, Susan M. Christopherson, Bernard D. Goldstein, Andrei L. Israel, Robert B. Jackson, Alan Krupnick, Meagan S. Mauter, Jennifer Nash, D. Warner North, Sheila M. Olmstead, Aseem Prakash, Barry Rabe, Nathan Richardson, Susan Tierney,Thomas Webler, Gabrielle Wong-Parodi, and Barbara Zielinska (2014) Risks and Risk Governance in Unconventional Shale Gas Development, *Environmental Science and Technology* 2014 (48), 8289−8297
- Williams, Laurence, Phil Macnaghten, Richard Davies, Sarah Curtis (2017) Framing 'fracking': Exploring public perceptions of hydraulic fracturing in the United Kingdom, *Public Understanding of Science* 2017, Vol. 26(1) 89 –1. http://journals.sagepub.com/doi/pdf/10.1177/0963662515595159

Individual Essay Assignment

Individual Essay Assignment

In this assignment, you will get the opportunity to demonstrate your knowledge and understanding of the materials of the course and to express your reasoned opinion and position yourself in current debates about the relation between science, policy and society. The starting point of your essay is Chapter 10 'Environmental Knowledge in Democracy' of the course textbook. In this essay, you will contrast and compare the arguments for democratizing knowledge that the authors make in this chapter with a current trend in science-society relations. Students can choose between the following trends: the first is evidence-based conservation (as explained by Sutherland et al. (2004) and Cooke et al. (2017). The second is citizen science (as explained by Irwin (2018)). In your essay you should use the concepts of the course and provide examples, for example from the cases of the book.

The task

A good way to write a paper is to **imagine that you are asked by a (scientific) journal to contribute a short piece** – in this case 2000-2500 words (journals are very strict in their word limits, so if your text is longer, you have to reduce it to what you think is most important in order to fit the word limit). Your audience is highly educated, but not necessarily a specialist in this topic. This means that you will have to explain the concepts you use and be explicit in your application and arguments. The editor of the journal you will submit your piece to invites you to respond to the book Environmental Expertise of Turnhout et al. (2019) and specifically to their chapter on the democratization of environmental knowledge (Chapter 10). You are asked to address the following aspects:

A. Provide a succinct explanation of what, according to the authors, the democratization of environmental knowledge entails and why it is needed.
B. Introduce one of two possible current trends in environmental science: evidence-based conservation or citizen science. Explain what, according to proponents of these trends, the current challenges are in science-policy society relations and how these relations should or are expected to change.
C. Compare these trends with the characteristics of the democratization of environmental knowledge. What are the differences and similarities?
D. Provide your reasoned opinion on the democratization of environmental knowledge using the trend you have analysed. Indicate what aspects you agree with or not and why. You are invited to Illustrate your answer with other examples as well.

In your essay, you are required to explain and apply the following concepts: technocracy; participatory knowledge production; (iii) democratic norms (accountability, contestation and humility). You are also asked to provide a critical explanation of the problems of the fact-value dichotomy (chapter 3) and the information deficit model (chapter 4) using the concept of situated knowledge (chapter 8).

The journal uses the following **formal criteria**: Word count: 2000-2500 words & Reference list (2-8 sources)

Tips for writing

Give your essay a good title and make sure you have clear paragraphs and a good structure and set up of the argument. Good essays always have an **introduction** that explains the aim and structure of the essay. Then you develop the **main body** of the essay: your analysis of the democratization of

environmental knowledge, the trend you selected, and the comparison of the two. In this main part, make sure that you demonstrate and illustrate your claims and arguments using course material,s references, and examples. In the end, you should formulate a **conclusion** in which you briefly reiterate the main points of your story and offer a more general reflection on the thesis of democratisation of environmental knowledge.

Sources for evidence-based conservation:

- Sutherland, W.J., Pullin A.S., Dolman P.M., Knight, T.M. (2004). The need for evidence-based conservation. *Trends in Ecology and Evolution*, 19, 305-308 https://www.sciencedirect.com/science/article/pii/S0169534704000734
- Cooke, S.J., Johansson, S., Andersson, K. *et al.* (2017) Better evidence, better decisions, better environment: emergent themes from the first environmental evidence conference. *Environ Evid* 6, 15. https://doi.org/10.1186/s13750-017-0092-0

Sources for citizen science:

- Irwin, A. (2018) No PhDs needed: how citizen science is transforming research. *Nature*, 562, 480-482 (2018) https://www.nature.com/articles/d41586-018-07106-5