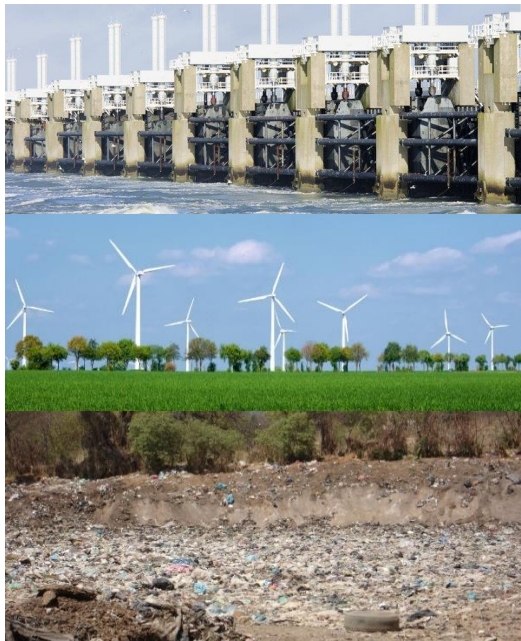




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Thesis topics at the Environmental Economics and Natural Resources Group



Environmental
Economics and
Natural Resources

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AUTHOR
Rolf A. Groeneveld

Introduction

Environmental and resource economics is an exciting field that integrates insights from economics and the natural sciences to address a pressing issue: how do we cater for the needs of future generations without imperilling future generations and ecosystems?

This brochure lists possible topics for a BSc or MSc thesis at the Environmental Economics and Natural Resources Group (ENR). *The brochure is by no means meant as an exhaustive list of thesis topics.* You are always free to suggest a topic by yourself!

The topics are listed in no particular order, so you can browse through the list to find a topic of your liking or just be inspired. At the end of the brochure you will find an index of keywords to help you find thesis topics associated with a particular policy domain or methodology.

For each thesis topic we also suggest courses that will be helpful. Be aware that this is an indication of relevant knowledge and not necessarily a requirement. You can discuss the required background with the contact person.

For more information on BSc and MSc theses and internships at ENR you can contact Mohammed Degnet: mohammed.degnet@wur.nl.

You can also follow our group via Facebook¹ or enrol in the ENR thesis and internship Brightspace site by downloading and filling out the intake form² and sending it to Mohammed Degnet.

¹ <https://www.facebook.com/WURENR>

² <https://www.wur.nl/web/file?uuid=7ac3b48d-2409-42bf-8606-bb2d146da696&owner=497277b7-cdf0-4852-b124-6b45db364d72&contentid=604248>

ENR staff



Francisco Alpizar

francisco.alpizar@wur.nl

Prof Alpizar is the chair of the Environmental Economics and Natural Resources Group. Alpizar's work has explored incentive based approaches to generate improved private and public management and use of natural resource with a particular focus on climate change and developing countries.

Hans-Peter Weikard

hans-peter.weikard@wur.nl

My research examines game theoretic modelling options for cooperation between agents that are assumed to be either selfish or have other-regarding preferences (altruism, fairness). I focus on the management of public goods, where free-rider incentives hamper cooperation. I am also interested in theoretical issues of environmental ethics, biodiversity, and natural resources.





Rolf Groeneveld

rolf.groeneveld@wur.nl

I am the education coordinator of the ENR group. My teaching and research focus on the economic analysis of ocean and coastal management. This includes such issues as fisheries policy, non-market valuation of marine and coastal ecosystem services, and spatial planning. I am open to all kinds of theses in this domain, but

my main expertise lies in applied bioeconomic modelling in GAMS, R, or Python, and in non-market valuation and cost-benefit analysis.

Andries Richter

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My research deals with the interaction between society and ecosystems, and the role of institutions in this interaction. In such "social-ecological systems" human behaviour has profound impacts on natural resources and vice versa. Whether these systems are sustainably managed depends on the formal laws and informal norms that couple the natural and the socioeconomic system. In my research I disentangle the two-way feedbacks between humans and nature by using theoretical models, empirical analyses, and behavioural experiments.





Edwin van der Werf

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My teaching and research focus on climate change mitigation, that is, reductions of greenhouse gas emissions, and (forest) carbon sequestration. For the theses I've supervised, students typically have used applied econometrics and/or statistics (on existing data or data that they collected themselves, e.g. through an (online) survey), or used a forest management model, but I'm certainly open to other research methods.

Xueqin Zhu

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My research develops integrated environmental-economic models of food, water, and biofuel. I focus on two issues: (1) regional food production under climate change; and (2) the food-biofuel-water nexus. Water is an essential input for both food and biofuel production and the natural environment

is an input for agricultural production. Both are likely to be heavily affected by climate change. My methods include applied general equilibrium modelling, mathematical programming, econometric analysis and stochastic frontier analysis, in GAMS and Stata.





Anna Lou Abatayo

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I am interested in examining and understanding the dynamics between individual choices and the environment. In the past, I worked on projects in the management of common pool resources, biodiversity conservation, and climate change, mainly

looking at individual cooperative behaviour: what fosters it, what breaks it down, and what institutions can be put in place to incentivize cooperative behaviour. My methods involve working with data from: (1) economic experiments (*primarily*), (2) own surveys, (3) panel / longitudinal surveys, and (4) other observational data (e.g., GIS and Twitter).

Suphi Sen

suphi.sen@wur.nl

My research focuses on applied econometrics and applied theory to analyse questions within environmental and resource economics, with a particular focus on climate policy and fossil resources. One of my current research interests, for example, is the



issue of asset stranding which can arise in the transition to a clean economy. In this research, I analyse stock market data with econometric methods to answer questions such as: How do climate change and policy beliefs interact with asset prices?

**Mohammed Degnet**

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I am the thesis and internship coordinator at the ENR group. My research interests centre around the topics of sustainable natural resource management and environmental economics. In particular, I am keen to carry out research on the role of behavioural factors in influencing resource management and the impacts of interventions on sustainable production and consumption. In addition, I am interested to look into the development outcomes of sustainable resource management. My research methods are mainly applied econometric and statistical analyses, but I am open to other research methods.

Joyce Delnoij

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As a behavioural game theorist and experimental economist, I am fascinated by understanding how behavioural factors explain human decision making. In my current research I examine healthy and sustainable food systems, and specifically explore consumer preferences and the tools that encourage healthy and sustainable behavior. I am also interested in issues regarding cooperation, trust and online marketplaces. My preferred methods include experiments, surveys and non-cooperative game theory, but I am also open to other methods.



Thesis topics

Fishing for history in the mesopelagic

Many international fisheries are managed by a quota system where the proportion of each country in the Total Allowable Catch (TAC) is fixed. The proportion of each country is often determined by a variety of social, economic, and political factors, but a very important factor is how much each country's fishery was catching before the quota were introduced: the higher the historical catch, the larger the proportion in the TAC. For new fisheries, such as the emerging mesopelagic fishery, this creates an incentive to catch a lot, even at a short-term loss, in order to enhance one's negotiation position when the TAC is introduced. How strong is this incentive? What factors determine it? How likely is such a "positioning fishery" for the mesopelagic?

Starting literature:

- Ekerhovd N-A. 2008. Essays on the Economics of Shared Fishery Resources. Norwegian School of Economics and Business Administration, Bergen, Norway.
<http://hdl.handle.net/11250/163469>.
- Standal D, Grimaldo E. 2020. Institutional Nuts and Bolts for a Mesopelagic Fishery in Norway. Marine Policy 119:104043.
<http://dx.doi.org/10.1016/j.marpol.2020.104043>.

Suggested courses	ENR-31306, UEC-52803
Keywords	fisheries, mesopelagic, game theory
Contact	Rolf Groeneveld, Hans-Peter Weikard

Understanding Donation Behaviour to Save the Aral Sea

The shrinking of the Aral Sea is one of the worst manmade environmental disasters in modern history. Once the fourth largest body of water in the world, it has shrunk to the point

where it could dry up altogether, giving rise to major environmental, economic, and social issues in Central Asia, especially in its epicenter – Karakalpakstan, Uzbekistan, and directly affecting the local environment and economy of more than 33 million inhabitants of the Aral Sea basin. While there are several initiatives aimed at the recovery of the Aral Sea and the reclamation of previous sea basins that have now become deserts, one major obstacle that these initiatives face is inadequate funding.

With possible help from the Multi-Partner Human Security Trust Fund for the Aral Sea region, a trust fund jointly established by the Government of Uzbekistan and the United Nations, this master's thesis project aims to investigate the factors that could incentivize individuals around the world to donate more to save the Aral Sea. Do pooling donations, donation matching, and an individual's belief about how much their peers are donating influence one's donation? Is more information about the Aral Sea and its devastating effects on people and the environment relevant to increased donation amounts? Which persuasion techniques are effective at increasing donations and which are not?

This master's thesis project involves (1) studying the literature on donation behaviour and making a list of what has worked and what has not; (2) creating a survey to study donation behaviour, which the trust fund can help disseminate globally; and (3) analysing the survey results.

Suggested courses	AEP-32306, DEC-54306
Keywords	behavioural economics, statistical analysis, water, donations, finance
Contact	Anna Abatayo

Understanding the market for deep-sea fish

Mesopelagic fish (i.e. those that live between 200m and 1000m below the surface of the ocean) are a potentially interesting source of fish meals and oils for non-human consumption. Before more can be understood about the potential of these species to contribute to non-human consumption value chains, an assessment of the existing value chains must be made.

This thesis project would involve understanding how the fish meal market currently operates, with particular focus on deep sea species. How did/does a market for deep sea fish products come about? What are the potential linkages between such markets and key actors there (i.e. legislation, fishers, fishing companies, buyers)?

Suggested reading:

Naylor et al. 2000. Effect of Aquaculture on World Fish Supplies. *Nature* 405:1017–1024.

Österblom et al. 2015. Transnational corporations as 'keystone actors' in marine ecosystems. *PloS one* 10(5):e0127533.

St John et al. 2016. A dark hole in our understanding of marine ecosystems and their services: perspectives from the mesopelagic community. *Frontiers in Marine Science* 3(31).

Suggested courses	YSS-35306
Keywords	Applied General Equilibrium modelling, fisheries, mesopelagic, aquaculture, food policy
Contact	Rolf Groeneveld, Xueqin Zhu, Suphi Sen

Design of payment schemes for carbon remuneration in plantation forests

A recent analysis of the VCS (Verified Carbon Standard) has revealed that the fund can improve its carbon payment scheme

to more effectively incentivise carbon storage in plantation forests. This leaves open the question of how an ideal carbon remuneration scheme would look like.

Starting literature:

Documentation of the VCS payment scheme from their website (<https://verra.org/project/vcs-program/>).

Indrajaya et al (2021) unpublished research paper; available on request.

Suggested courses	ENR-31306
Keywords	forests, optimal rotation, theory of the firm
Contact	Hans-Peter Weikard

Coping with climate change – insights from community governance in Cambodia

Climate change has a massive impact on traditional farming in many parts of the world since rainfall patterns have become irregular. These irregularities cause periods of extreme water scarcity for the local population. People have developed several coping mechanisms to deal with (temporal) scarcity (income diversification, savings, migration) and the conflicts that may arise in close-knit communities due to scarcity and how these are solved (establishment of a local water governance system, the impact of the cause of resource scarcity e.g. overconsumption or natural causes such as droughts).

We collected survey data in rural Cambodia which we collected in 2019. The survey was carried out in Kampong Chhnang, a Cambodian province in which the rural population relies mainly on rice farming for income. We are looking for a master student with a working knowledge of multivariate analysis in Stata or R who is interested in natural resource management in developing countries.

Suggested courses	MAT-20306, AEP-21306, YSS-34306, DEC 30306
Keywords	climate change, resilience, statistical analysis, community governance, coping mechanism, Cambodia
Contact	Andries Richter

Optimal lockdown: What should determine the optimal lockdown policy to manage the Corona crises?

Policy makers all over the world have responded with a lockdown to the recent Corona crises. A lockdown reduces contacts between people and therefore the spread of the disease; it also comes at a considerable cost. In fact the costs are increasing over-proportionally with the length of the lockdown.

One of the key questions is now how long the lockdown should last. This question can be addressed in a dynamic optimization model. In a recent working paper (Alvarez et al. 2020) have developed such a model.

The thesis research would start from this or a similar model. It could be calibrated with data for the Netherlands published by RIVM.

Starting literature:

Alvarez, F.E., Argente D. and Lippi, F. (2020) A simple planning problem for the COVID-19 lockdown. NBER working paper 26981.

Suggested courses	ENR-31306
Keywords	COVID-19, optimal control, policy instruments
Contact	Hans-Peter Weikard

Estimating the economic benefits of healthy plants on human health

About 2 billion people are malnourished with iron, zinc, and vitamin deficiencies, which leads to higher maternal and child mortality and to stunting, wasting, chronic illnesses, and loss of cognitive skills. One of the drivers of this problem is that the nutritional content of cereals, fruits and vegetables have decreased dramatically over the past five decades due to breeding and unbalanced fertilization. The application of fertilizers that contain balanced amounts of (micro)nutrients has been found to increase crop yield and nutritional content. This approach of “agronomic fortification (AF)” improves the overall health of the plants and comes with co-benefits include enhanced crop resilience to drought, pests, and diseases, elongation of shelf-life, and hence human nutrition. However, cost-benefit analyses of AF that include human health are scarce.

The objective of this thesis research therefore is to 1) create an overview of current economic estimates about AF through literature search, to 2) develop a methodology to estimate the economic impact of AF on human and national benefits and 3) to estimate these benefits.

Suggested courses	AEP-32306
Keywords	food security, health, fertilizers
Contact	Xueqin Zhu

Market survey for price premiums for mesopelagic feeds (salmon aquaculture)

A sustainability challenge for salmon aquaculture is the quality and source of the feed that is used to raise the fish. Carnivorous species such as salmon require diets rich in protein and omega 3 and other micronutrients. Many feed producers use wild-caught species such as sardines or anchovies to enrich feed, but the

industry is looking for alternatives. Soy beans or insect larvae are examples of alternative sources of protein, but these do not have the same omega 3 content as fish oils. An alternative is to use mesopelagic fish such as lanternfish, which are currently not exploited commercially and are high in the micronutrients desired by the feed producers.

This project would involve exploring the state-of-the-art of salmon feed production and considering whether consumers would be willing to buy mesopelagic-fed salmon.

Suggested reading

Naylor et al. 2000. Effect of aquaculture on world fish supplies.

Nature 405(6790): 1017-1024.

Olsen et al. 2020. Can mesopelagic mixed layers be used as feed sources for salmon aquaculture? *Deep Sea Research Part II: Topical Studies in Oceanography* 180:104722.

Ytrestøyl 2015. Utilisation of Feed Resources in Production of Atlantic Salmon (*Salmo salar*) in Norway. *Aquaculture* 448:365–374.

Suggested courses	AEP-32306
Keywords	choice experiments, fisheries, mesopelagic, aquaculture, food policy
Contact	Rolf Groeneveld

Climate change and food production in the long-run

The world population is expected to increase to 11 billion by the end of the century. With many more mouths to feed, and changing dietary patterns across the world, agricultural production levels need to increase as well. However, at the same time the impacts of climate change – sea level rise, higher temperatures, drought – threaten to increase food security especially in low- and middle-income countries. What can we

learn from history when it comes to climate change adaptation in food production? This project either (1) analyses historical trends in climate change and food production, or (2) studies one or two societies in the recent or more distant past which have tried to reduce vulnerability to drought, sea level rise, insect outbreaks or other adverse effects of climate change. What factors encourage or hamper the ability to successfully adapt to climate change? The thesis will be supervised largely by the RHI group.

Suggested courses	FPH-21306; RHI-50806
Keywords	climate change, food production, history
Contact	Ewout Frankema (RHI)

Do Extreme Temperatures Affect Public Opinion on Climate Change?

Public opinion plays a critical role in the response to global warming. How do extreme temperatures affect this public opinion? This project involves working with two US datasets on a yearly-level that are available online: (1) county-level or state-level temperatures, and (2) public opinion on climate change of a representative US sample. It is also possible to do the analysis for a different country if such data are available.

Suggested literature:

Brulle, R. J., Carmichael, J., & Jenkins, J. C. (2012). Shifting public opinion on climate change: an empirical assessment of factors influencing concern over climate change in the US, 2002–2010. *Climatic change*, 114(2), 169–188.

Cody, E. M., Reagan, A. J., Mitchell, L., Dodds, P. S., & Danforth, C. M. (2015). Climate change sentiment on Twitter: An unsolicited public opinion poll. *PloS one*, 10(8), e0136092.

Suggested courses	AEP-21306, DEC-32806
Keywords	Climate Change, Public Perceptions, Statistical Analysis
Contact	Anna Abatayo

Slave trades, mortality and the environment

The Atlantic slave trade has had a profound impact on African development. There is a large body of literature analysing the mechanisms behind the slave trade from the African continent, paying attention to – amongst others – socioeconomic and political factors. Recent research suggests that also environmental factors played a role (Fenske & Kala, 2014). Climate seems to have had an influence on the number of slaves that were shipped across the Atlantic Ocean. More slaves were captures and transported in colder years, as mortality was lower and agricultural yields were higher. Warmer temperatures, in contrast, increased the costs of capturing and feeding slaves. In this thesis project the student will follow-up on this research by analysing the relationship between slave trade and the environment. How have geographic characteristics and environmental shocks impacted on mortality and slave trades? The thesis will be supervised largely by the RHI group.

Starting literature

J. Fenske & N. Kala (2014). Climate and the slave trade.
<https://cde.williams.edu/files/2014/10/FenskeKalaClimateAug2014.pdf>

Suggested courses	RHI-51806
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Keywords	slave trade; mortality; environment; history
Contact	Ewout Frankema (RHI)

Radioactive Waste disposal: How is it done and what does it cost?

Storing radioactive waste involves a long-term cost. The (perceived) risks involved in operating nuclear power plants but also the unresolved question how waste should be stored has led the German government to decide a phase-out of nuclear power. In France, policy makers have not taken such action. Also, the share of nuclear power in the energy sector in France is high compared to other countries. Therefore, an understanding of French policies concerning nuclear waste management is important in a European perspective. The thesis would have descriptive part with an up to date summary of relevant policies and it would offer a risk assessment of the nuclear waste disposal. This thesis can be done for a single country, like France, or comparing strategies of different countries.

Starting literature

Lehtonen, M. (2015) Megaproject underway: Governance of nuclear waste management in France. In Brunnengräber et al. (eds.) Nuclear Waste Governance. Berlin: Springer. 117-138.

Suggested courses	ECH-51806, ENR-21306
Keywords	nuclear waste management, risk assessment, risk management, France
Contact	Hans-Peter Weikard

Risk!

Attitudes towards risk have a profound impact on how we deal with decisions. But why are some individuals more risky than

others? And to what extent are attitudes towards risk shaped by our environment?

We collected survey data in Norway where we elicited risk preferences with fishers (a risky profession) and the general public. You will analyze what explains risk and whether risk preferences are distributed across Norway. Are people living in isolated areas more or less risky than people living in urban areas? We are looking for a master student with a working knowledge of multivariate analysis in Stata or R.

Suggested courses	MAT-20306, AEP-21306, YSS-34306, DEC 30306
Keywords	risk, social norms, Norway, no risk no fun
Contact	Andries Richter

Circular farming: What is it? What are the costs and what are the environmental benefits?

In recent debates "circular farming" has been advocated. The thesis would be the first to offer an environmental economic assessment of circular farming methods. The research starts with the search for a proper definition of the catch word "circular". Only then one can define appropriate indicators for environmental impact. Going one step further the thesis would explore and assess potential policy measures that are currently discussed.

Starting literature

Mansholt lecture 2018 "Circularity in agricultural production" by prof Imke J.M. de Boer and prof Martin K. van Ittersum

Suggested courses	ENR-21306, AEP-32306
Keywords	circular farming, impact assessment
Contact	Hans-Peter Weikard / Joyce Delnoij

Aviation taxes

Greenhouse gas emissions from the aviation sector increase rapidly. How do fuel price changes affect passenger numbers? What are the effects of existing policies on ticket sales? How do ticket and fuel price changes affect the local economy? We are looking for a student who would like to apply econometric methods to answer one or more of these questions.

Suggested courses	AEP-21306, YSS-34306
Keywords	climate change, aviation, econometrics
Contact	Edwin van der Werf

How will fishers in the North Atlantic respond to a market for deep sea fish?

Mesopelagic fish (e.g. lanternfish, found 200m-1000m below the surface of the ocean) are a vastly abundant resource. They are not fished commercially at large scales at present, but they are potentially interesting as ingredients in aquaculture or terrestrial livestock feed, or as ingredients in nutraceutical oils and supplements. Experimental fisheries are attempting to determine the stock size and potential sustainability of this fishery. There is currently a fleet of vessels that do not target mesopelagic species, but which could theoretically switch to targeting these fish if a market arises.

This thesis project would involve creating an Agent Based Model or other similar alternative to illustrate a theoretical understanding of the conditions necessary for fishers to switch to targeting this new fishery. The student will create this model based on (limited) available empirical data and well-motivated assumptions developed by the student and their supervisor(s).

Recommended reading

Prellezo 2019. Exploring the economic viability of a mesopelagic fishery in the Bay of Biscay. *ICES Journal of Marine Science* 76(3):771-779.

St John et al.2016. A dark hole in our understanding of marine ecosystems and their services: perspectives from the mesopelagic community. *Frontiers in Marine Science* 3:31.

Janssen & Ostrom 2006. Empirically based, agent-based models. *Ecology and society*, 11(2).

Suggested courses	INF-22306, INF-34806, INF-51806
Keywords	agent-based modelling, fisheries, mesopelagic
Contact	Rolf Groeneveld

What can be done about land subsidence? What does it cost? who should pay?

Land subsidence in the Netherlands (but also in other parts of the world) threatens agricultural production, causes damages to buildings and infrastructure, and increases flood risks.

There are open questions about the adequate adaptation measures. These should be guided by assessments of costs and benefits of measures. The thesis would comprise a description of the costs of land subsidence and the costs of measures to slow it down. Interesting economic questions arise around the issue of responsibility and fair burden sharing.

Starting literature

van Hardeveld, H.A., Driessen, P.P.J., Schot, P.P., Wassen M.J. (2018) Supporting collaborative policy processes with a multi-

criteria discussion of costs and benefits: The case of soil subsidence in Dutch peatlands. *Land Use Policy* 77, 425-436.

Suggested courses	ENR-21306, AEP 32306
Keywords	land subsidence, cost-benefit analysis, institutions, burden sharing
Contact	Hans-Peter Weikard

Information and uncertainty – the case of Fisheries

Fishing is uncertain business. How do fishers deal with risks and take important decisions, such as investing in equipment, vessels or quota in light of immanent uncertainty? And what do fishers do to make the future a little bit more certain?

We have conducted a survey conducted with Fishers in Norway that may shed light on those questions. We are looking for a master student with a working knowledge of multivariate analysis in Stata or R.

Suggested courses	MAT-20306, AEP-21306, YSS-34306, DEC 30306
Keywords	risk, uncertainty, Norway, fisheries
Contact	Andries Richter

Was Faustmann right?

Recently the famous Faustmann model that determines the optimal rotation for a forest stand has been challenged by Li et al. (2020); see starting literature. Li et al. claim that the cost function of the timber producer (forest manager) implicit in the Faustmann model is not appropriate. This challenge of the seminal Faustmann model deserves careful scrutiny. An MSc thesis on this topic would review the competing model approaches and spell out the conditions under which one or the other approach is preferred. It should also be explored how

recommendations for forest managers differ when one or the other approach is used.

Starting literature:

Any textbook chapter on the Faustmann model.

Li, X.Y., G. Lu, R.S. Yin. 2020. Research Trends: Adding a Profit Function to Forest Economics. *Forest Policy and Economics* 113 (102133).

Wang, Y.F., L.Y. Li, R.S. Yin. 2021. A primer on forest carbon policy and economics under the Paris Agreement. *Forest Policy and Economics* 132 (102595).

Suggested courses	ENR-31306
Keywords	forests, optimal rotation, theory of the firm
Contact	Hans-Peter Weikard

Economy-wide impacts of a biofuel policy

Population growth and increasing per capita income will increase demand for food and energy in the coming decades. It is projected that 9 billion people will need to be fed by 2050, while biofuels have been advocated as an alternative renewable energy source in many countries for energy security. Agricultural production of food and biofuels imposes tougher demands on the land available and other natural resources such as water and phosphorus. The need to ensure food security and preserve the planet's resources for future generations is pressing (FAO, 2009). In the thesis, you are going to analyse economy-wide impacts of a specific biofuel policy in a particular country. This will require you to develop an applied general equilibrium model with relevant sectors (e.g. food, biofuel and other sectors) or modify an existing model from literature (e.g. Zhu & Van Ierland, 2005). The model is solved by the GAMS software programme and can be applied to various scenarios (e.g. different policy targets).

References

- Zhu, X. and E. C. van Ierland (2005). A model for consumers' preferences for Novel Protein Foods and environmental quality. *Economic Modelling* 22:720-744.
- FAO (2009). *How to feed the world in 2050*. Rome.

Suggested courses	ENR-31306, YSS-35306
Keywords	food security , water, biofuel policy, GAMS modelling, Applied General Equilibrium modelling
Contact	Xueqin Zhu

Calculating ecosystem services values for a (potential) deep sea fishery

The mesopelagic zone (200m-1000m deep in the ocean) performs many ecosystem services for humanity. For example, fish in this ecosystem play a significant role in sequestering carbon, recently estimated as having a monetary value to humanity of US\$300-US\$900 billion per year (Hoagland et al. 2019). However, the ecosystem contains roughly 10 billion tons of nutrient-dense fish, which are not being fished commercially but which may become interesting as a resource in the future. Ecosystem services estimations of the value of a mesopelagic fishery for use in nutraceutical products or as input for aquaculture or even livestock feed have not been performed.

This thesis project would involve reviewing recent academic literature about potential uses of mesopelagic resources and combining this with economic data to arrive at an ecosystem services assessment for either the value of the fishery for feed (either aquaculture or livestock), or as a supplement to human diets, or for non-economic values. Depending on the student (BSc or MSc), a non-market valuation survey might be appropriate.

Recommended reading:

St John et al. 2016 A dark hole in our understanding of marine ecosystems and their services: perspectives from the mesopelagic community. *Frontiers in Marine Science* 3:31.

Hoagland et al. 2019. *Ecosystem Services of the Mesopelagic*, Woods Hole Oceanographic Institute, https://www.researchgate.net/publication/338103267_Ecosystem_Services_of_the_Mesopelagic

Suggested courses	AEP-32306
Keywords	non-market valuation, ecosystem services, mesopelagic
Contact	Rolf Groeneveld

Causes and consequences of famines in history

Famines have occurred regularly throughout world history. For the period from the 1860s until 2016, it has been estimated that as a result of episodes of extreme hunger about 128 million people died across the world (Our world in data, 2017). Famines may result from natural causes, as was for example the case for the Chinese famine of 1907 in which heavy rains led to extensive flooding causing the deaths of an estimated 25 million people. Other famines, such as the Holodomor (which means “to kill by starvation”) of 1932-1933, which killed millions of Ukrainians living under the Soviet regime, were man-made.

In modern history, however, the presence of famines has diminished significantly. Smaller regions of the world are now at risk of famines, and famines have become less deadly. Still, even in recent history natural disasters as well as wars and totalitarianism have led to mass starvation. This project analyses the causes and consequences of famines in history. The student may analyse one or several case studies, based on both

qualitative and quantitative sources. The thesis will be supervised largely by the RHI group.

Source

Our world in data. (2017). Famines.
<https://ourworldindata.org/famines>

Suggested courses	FPH-21306
Keywords	famine; causes; consequences; history
Contact	Ingrid de Zwarte (RHI)

Can tropical forests save our climate?

Forests in tropical areas (both plantation forests and managed natural forests) have a huge technical potential to store carbon dioxide. But these forests are managed by people, and these people need incentives not to cut down trees if society wants more forest carbon sequestration. How can we design these incentives such that they are effective? What is the potential of a forest to store carbon at various carbon prices?

Suggested courses	ENR-31306
Keywords	climate change, forests, renewable resources
Contact	Edwin van der Werf

Do Protected Areas Increase Housing Prices?

To address the current biodiversity crisis in Europe and the rest of the world, in June 2021 the European Parliament adopted the resolution "EU Biodiversity Strategy for 2030: Bringing nature back into our lives." President Joseph Biden also signed an executive order to tackle the US's biodiversity problems shortly after his inauguration in January 2021. Both the EU and the American biodiversity strategies aim to conserve 30% of lands

and waters by 2030, to preserve biodiversity as well as to provide natural sinks for carbon dioxide. Protected areas, however, will not only preserve (or increase) biodiversity and combat climate change, but will also benefit households living nearby these areas (i.e., living near forests have been found to benefit physical and mental health) and hence, may increase the market value of these houses.

This master's thesis project uses the hedonic pricing method to investigate the environmental value of protected areas (i.e., how protected areas affect housing prices). The project involves working with georeferenced datasets, cleaning up various datasets on housing sales prices and characteristics in either Stata or R, and running statistical analyses.

Suggested courses	AEP-32306
Keywords	non-market valuation, ecosystem services, nature conservation, Hedonic Pricing, statistical analysis
Contact	Anna Abatayo

Exploiting one of the last frontiers in the oceans – fishing in the mesopelagic zone as a threat to ocean sustainability

Mesopelagic fish (e.g. lanternfish, found 200m-1000m below the surface of the ocean) are a vastly abundant resource. They are not fished commercially at large scales at present, but they are potentially interesting as ingredients in aquaculture or terrestrial livestock feed, or as ingredients in nutraceutical oils and supplements. There is currently a fleet of vessels that do not target mesopelagic species, but which could switch to targeting these fish if a market arises. The mesopelagic zone is an 'open access' resource that is currently not actively governed. At the same time, it is an important carbon sink for our planet and it is unknown how fishing activities would affect carbon sequestration

and wider ecosystem dynamics. If fishing pressure is strong enough it is possible that the system may cross tipping points and is pushed outside a safe operating space. Whether this is likely, will depend fundamentally on the costs of exploitation. You will develop an open access bioeconomic model in a numerical software (R, Matlab, Python, Excel) to simulate how various cost-scenarios may affect the safe operating space of mesopelagic fishing.

Suggested courses	ENR-21306, ENR-31306, YSS 35306
Keywords	safe operating space, fisheries, mesopelagic
Contact	Andries Richter

Stability and effectiveness of the Paris Agreement

The Paris agreement opens a new chapter in climate policy making. But whether the agreement can be successful remains an open question. This question can be examined with the tools of game theory to reveal countries' incentives to participate (ratify) in the agreement and to make substantial contributions to greenhouse gas abatement.

Suggested courses	ENR-31306, ECH-31306
Keywords	climate change, international environmental agreements, game theory
Contact	Hans-Peter Weikard

Sustainable life style and economy-wide impacts

New concepts such as circular economy, sustainable life style and investment on renewable energy become more important for the improvement of economic efficiency and the environmental quality, which requires fundamental research. Sustainable lifestyle is defined as a way of living with lower environmental

impact. It attempts to reduce the use of resources and to enhance the sustainability of the planet. For example, a low animal-based protein diet is advocated to reduce the environmental pressure from animal production, and green energy produced from non-fossil fuel is advertised to consumers to replace the traditional fossil fuel based energy. Although we need to know that lifestyle change is not easy, it provides great opportunities to sustainably use our resources in the world. Meanwhile, a life style change is not automatically leading to a saving of the resource use because there is a general-equilibrium effect, i.e. consumers may consumer more other products or producers may export their products to other countries without sustainable lifestyle (e.g. externalities). In the thesis, you can look in depth how a small change in the consumption of a green product can impact the reallocation of the resources and the emissions from the economic system. You can use a stylized economic model (e.g. an applied general equilibrium model cf. Zhu and van Ierland, 2005; Zhu et al., 2006) to simulate the changes of a lifestyle in a certain country/region/world to identify the real impacts. This would allow you to discuss to what extent the lifestyle change can make real contribution to the saving of the resources in the planet.

References

- Zhu, X. and E. C. van Ierland (2005). A model for consumers' preferences for Novel Protein Foods and environmental quality. *Economic Modelling* 22: 720-744.
- Zhu, X., L. van Wesenbeeck and E. C. van Ierland (2006). Impacts of Novel Protein Foods on sustainable food production and consumption: lifestyle change and environmental policy. *Environmental & Resource Economics* 35: 59-87.

Suggested courses	ENR-31306, ENR31806, ENP32306
Keywords	sustainable lifestyle, green products, modelling
Contact	Xueqin Zhu

Forest carbon sequestration by smallholder farmers

Many smallholder farmers in developing countries have no or few trees on their plots. A REDD system might help such farmers to increase their earnings and store carbon. Under what conditions might such a system work? What payment systems have been tried, and which ones have been successful? We are looking for a BSc student who wants to do a literature study on forest carbon sequestration by smallholder farmers.

Suggested courses	ENR-20306, ENR-21306, FNP-24306
Keywords	climate change, forests, renewable resources Payments for Ecosystem Services, carbon sequestration
Contact	Edwin van der Werf

Modelling stock dynamics of macro- and/or microplastics

The amount of plastic waste has increased exponentially during past decades. In Europe, post-consumer plastic waste was estimated to be about 25.8 million tonnes in 2014 (Plastics Europe 2015). There is increasing concern about the risks caused by plastic waste in general, and by microplastics in particular. Being highly persistent, macroplastics degrade very slowly into smaller pieces (called microplastics). As such they can become easily ingested by living organisms (fish, birds), and can sorb other toxic (PBT) chemicals, increasing the risks of exposure to humans. So far, very little has become known about the severity of this externality. One possibility to approach this problem is to examine stock pollution properties of macro- and microplastics.

The aim of the MSc thesis is to develop a (dynamic) stock pollution model for analysing the accumulation of plastic waste in, for example, marine or freshwater systems. We are looking for a student with interest in theoretical modelling, and basic programming skills (e.g. Matlab or Mathematica)

Suggested courses	ENP-32306, ENR-31306, UEC-51806
Keywords	plastic pollution, stock dynamics assessment, risk management, modelling
Contact	Hans-Peter Weikard

Do Natural Disasters in Developing Countries Affect Media Coverage of Climate Change in Europe?

China, the United States, India, the European Union, and Russia are the top five largest emitters of greenhouse gases, the primary driver of climate change while other countries, like Japan, the Philippines, Sri Lanka, and Kenya, are among the top ten countries most threatened by and vulnerable to climate change. One way to combat climate change is by encouraging individuals in emitting countries to change their attitudes and behaviours in relation to climate change. One way to do this is through media coverage of climate change. But while media coverage of climate change has been found to be one of the fundamental factors in shaping climate change attitudes and behaviours, its determinants are largely under-investigated.

This master's thesis project examines the effect of natural disasters in countries that are most threatened by and vulnerable to climate change on climate change media attention in Europe. Possible datasets include (1) a database of natural disasters in the world and (2) a historic archive of newspapers in Europe. The project involves data crawling, cleaning, and merging datasets in Stata or R, and running statistical analyses.

Suggested courses	INF-34306
Keywords	natural disasters, media attention, data crawling, climate change, statistical analysis
Contact	Anna Abatayo

Rebound effects in the Circular Economy

The recent policy initiative towards a circular economy aims at a reduction of waste and an improvement of the availability of raw materials. This calls for technological advances that favour reuse and recycling. However, through reuse and recycling material become more readily available and good produced with such materials will get cheaper such that a reduction of resource use will not be achieved: a rebound effect. The research examines determinants of the strength of the rebound effect and how it can be built into analytical resource extraction models.

Suggested courses	ENR-31306
Keywords	circular economy, reuse and recycling, raw materials, dynamic modelling, behavioural responses, waste management
Contact	Hans-Peter Weikard

Integrated environmental-economic modelling of the food-water-energy-climate nexus

Agricultural productivity heavily depends on environmental conditions such as water quantity and quality, soil fertility and climate conditions, and the natural environment follows a series of intrinsic biophysical processes. Agriculture has substantial interactions with soil, water and air, and there is a clear challenge for integrated assessment (Britz et al., 2012). Furthermore, climate change threatens global agricultural production because

of the change in the water system and soil conditions. There is an urgent need for research on sustainable food provision and the related biofuel issue for the competition for land and other natural resources, particularly water (Hellegers et al., 2008; Tilman et al., 2009).

To tackle the food-energy-water-climate nexus, we need to integrate the relevant environmental inputs and outputs in economic models to identify solutions to sustainable food provision and pay specific attention to climate change (Zhu and van Ierland, 2012). This will require a reconsideration of current agricultural practices in many regions of the world.

The integrated environmental economic modelling can be based on the AGE framework, because it allows to include the interactions between different agents of an economy (e.g. food producer, energy producer and water sector) and different systems (e.g. economic and environmental system), and can be combined with bio-economic modelling (e.g. incorporating crop growth models), and hydro-economic modelling (e.g. hydrological cycle models).

References

- Hellegers, P., D. Zilberman, P. Steduto and P. McCornick 2008. Interactions between water, energy, food and environment: evolving perspectives and policy issues. *Water Policy* 10 (1):1-10.
- Tilman, D., R. Socolow, J.A. Foley, J. Hill, E. Larson, L. Lynd, S. Pacala, J. Reilly, T. Searchinger 2009. Beneficial Biofuels—The Food, Energy, and Environment Trilemma. *Science* 325:270-271.
- Britz, W., M. van Ittersum, A. Oude Lansink, T. Heckeley 2012. Tools for integrated assessment in agriculture state of the art and challenges. *Bio-based and applied economics* 1:125-150.

Zhu, X. and E.C. van Ierland 2012. Economic modelling for water quantity and quality management: a welfare program approach. *Water Resources Management* 26:2491–2511.

Suggested courses	ENR-31306, ENR31806, ENP32306
Keywords	food security, food-energy-water-climate nexus, Applied General Equilibrium modelling, integrated environmental-economic modelling
Contact	Xueqin Zhu

Cod crash investigation – The collapse of the Newfoundland cod fishery

In 1992, the Newfoundland cod fishery crashed and up to today never recovered. The consequences were devastating for local communities. An entire industry was wiped out and about 10,000 people lost their jobs. How is it possible that such a large and important fishery just hit the wall at full speed? The goal of this project is to unravel this unfortunate chain of events that has led to the collapse of the Newfoundland cod fishery.

This project requires digging into published and unpublished reports to understand better the economic context of the cod crash. Ideally, economic and biological data will be analysed jointly, in order to understand how biological and economic forces have contributed to the unfortunate fate of Newfoundland cod.

Suggested courses	ENR-31306, YSS-34306
Keywords	tipping points, resilience, statistical analysis, fisheries
Contact	Andries Richter

Approaches for transforming environmental impacts of chemicals into values for decision-making

Under the new European chemicals legislation REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) chemicals of very high concern (particularly toxic, persistent, bioaccumulative chemicals) can only be placed on the market if its use is explicitly authorised by the European Commission. Applying for an authorisation requires that a company provides a socio-economic assessment (SEA) showing that the benefits of use outweigh the potential negative (human health and/or environmental) impacts of the chemical. The MSC project will explore how negative environmental impacts arising from the use of chemicals can be monetarised in order to include these values in a standard cost-benefit analysis. The student will investigate if – and to what extent – existing approaches for monetarising negative impacts as used in other risk management domains (water management, human health care, traffic) can be used or need to be modified. The valuation approaches identified will be applied to selected chemicals as a case study. In addition, the student will develop a database format for transforming environmental impacts into monetary values in order to support data compilation and the identification of existing data gaps.

Suggested courses	ENP-32306, AEP-32306
Keywords	chemical tests, risk and uncertainty, cost-benefit analysis, cost-effectiveness analysis
Contact	Hans-Peter Weikard

Who adopts a carbon price?

Many countries have adopted a carbon tax or a cap and trade system. But why do they choose to price carbon? And if they decide to adopt a carbon price, what affects their choice for a

carbon tax or a cap and trade system? These questions can be answered using country-level data using econometric methods.

Suggested courses	AEP21306, DEC32806, YSS-34306
Keywords	carbon price, econometrics, carbon tax, cap and trade
Contact	Edwin van der Werf

Economic assessment of alternative adaptation options in the agricultural sector

Food productivity differentials between developed and less-developed countries are caused by different natural environmental conditions, production technologies and policies. Climate change effects (e.g. droughts and extreme weather) affect food productivity, both in industrialised and in less-developed countries. Adaptation of agro-food production systems is needed to cope with climate change. However, different adaptation options have different benefits and costs. Therefore, we need to carefully analyse the potential impacts of the different options and identify the most efficient ones. This can be selected by a welfare optimization model which considers the benefits and costs of the different options (Zhu et al., 2016).

Starting literature

Zhu, X., M. Moriondo, E.C. van Ierland, G. Trombi, and M. Bindi. 2016. A model-based assessment of adaptation options for Chianti wine production in Tuscany (Italy) under climate change. *Regional Environmental Change* 16: 85-96.

Suggested courses	ENR-31306, ENR31806, ENP32306, AEP-32306
Keywords	food security, cost-benefit analysis, climate change, agriculture, optimization modelling
Contact	Xueqin Zhu

Options for an International Environmental Agreement to combat marine plastic litter

Marine Plastic litter has been recognised as a problem with growing importance. Plastics are stock pollutants and their impact stretch over long periods of time. At the same time the quality of the marine environment requires global international cooperation. What are key elements of an international agreement for the reduction of marine litter? What are the incentives for countries to participate in such an agreement?

Suggested courses	ENR-31306, ECH-31306
Keywords	plastic pollution, marine plastic litter, stock pollutants, international environmental agreements
Contact	Hans-Peter Weikard

Assessing and valuing impacts of endocrine disrupting chemicals

Endocrine disrupting chemicals (EDs) are substances which interfere with the hormonal system of living organisms. A prominent example is Bisphenol A, which has been used in plastic bottles. Exposure to EDs can lead to a number of severe adverse effects in humans and animals even at low exposure doses. Therefore, EDs are classified as 'Substances of Very High Concern' under the European Chemicals Legislation REACH. Companies producing or manufacturing EDs require a authorisation from the European Commission. Such formal

approval can only be granted if companies can show that socio-economic benefits outweigh negative impacts of use. In this MSc projects the student will develop a framework for socio-economic assessment of EDs. The framework can either use cost-effectiveness or cost-benefit analysis. Part of the research will be to develop an inventory of health impacts and costs for control measures for EDs. Interested students should be willing to study into both the economics and toxicological literature. Interest in interdisciplinary modelling is required. Students with a background in natural sciences, who have followed courses in (environmental) economics are also explicitly encouraged.

Suggested courses	ENP-32306, ENR-31306, UEC-51806
Keywords	plastic pollution, stock dynamics assessment, risk management, modelling
Contact	Hans-Peter Weikard

The evolution of social norms for cooperative resource harvesting

One of the key properties of social-ecological system is that social and natural processes are intrinsically linked and mutually influence each other. Marine systems, for example, are highly affected – or even shaped – by fishing activity. Fishermen, on their side, adapt their fishing practices to any changes that may occur below the water. In reality, the story is even more complicated, because resource users (such as fishermen) are embedded in a social context and tend to make decisions contingent on what people around them do. Restraining fishing activity, for instance, is generally perceived to be acceptable if everybody else follows suit. But no one wants to be the sucker that is being taken advantage of. How does this fragile social structure interact with any changes that may occur in the natural system? The goal of this project is to use evolutionary game

theory to understand under which conditions cooperative harvesting norms emerge. Building upon prior work by Richter and Grasman (2013); Richter et al. (2013); and Sethi and Somanathan (1996), the project will analyze how resource scarcity promotes or hinders cooperation. In particular, it will be considered whether the social norm to approve or disapprove of others will depend on resource scarcity.

This project requires theoretical modelling. A good understanding of mathematical modelling is a must and prior knowledge of Matlab would definitely help.

References

- Richter, A., Grasman, J. (2013) The transmission of sustainable harvesting norms when agents are conditionally cooperative. *Ecological Economics* 93, 202-209.
- Richter, A., van Soest, D., Grasman, J. (2013) Contagious cooperation, temptation, and ecosystem collapse. *Journal of Environmental Economics and Management* 66, 141-158.
- Sethi, R., Somanathan, E. (1996) The Evolution of Social Norms in Common Property Resource Use. *American Economic Review* 86, 766-788.

Suggested courses	YSS-35306, ENR-31306
Keywords	common pool resources, social norms, institutions, modelling
Contact	Andries Richter

National policies and the adoption of electric vehicles in the EU

Usage of the internal combustion engine negatively affects local air quality and contributes to climate change. Electric vehicles (EVs) appear to be the future. National policies to support EV adoption differ a lot within the EU. How have these policies

differed in the past decade? How has this affected EV adoption in EU countries? These and related questions can be answered using econometric models.

Suggested courses	AEP-21306, YSS-34306, DEC-32806
Keywords	transport , electric vehicle
Contact	Edwin van der Werf

Paris Allows Cyclists to Jump Red Lights!

In 2015, Paris allowed cyclists to ignore red lights when turning right or going straight through a T-junction. Many claimed that this has led to greater bicycle safety; i.e., fewer general crashes and fatal crashes. However, there is no proper empirical investigation on the effect of what is known as the “Paris Stop” on bicycle safety. This research project provides this empirical investigation using open data from the French national road traffic accident database. The research project would be a good fit for students with a good working knowledge of French or those willing to work with Google Translate.

Suggested literature:

Tekle, A. M. (2017). Roll On, Cyclist: The Idaho Rule, Traffic Law, and the Quest to Incentivize Urban Cycling. *Chi.-Kent L. Rev.*, 92, 549.

Arkhangelsky, D., Athey, S., Hirshberg, D. A., Imbens, G. W., & Wager, S. (2021). Synthetic difference-in-differences. *American Economic Review*, 111(12), 4088-4118.

Suggested courses	AEP-21306, DEC-32806
Keywords	Bicycles, Law, Policy Evaluation, Statistical Analysis
Contact	Anna Abatayo

The 'resource curse' in Africa and/or Latin America

Are natural resources, such as fossil fuels and minerals, a blessing or a curse for development? The relationship between resource extraction and economic development has been the subject of intense debates since the 1950s. Research shows that countries with an abundance of resources often underperform economically. The term 'resource curse' was coined by Richard Auty in 1993 to describe this phenomenon.

Many resource-rich countries not only rank as the poorest in the world, they moreover have lower levels of democracy, higher levels of inequality, and less developed public services such as education and health care. What are the reasons for, and exceptions to, these adverse outcomes? In both Africa and Latin America, resources – such as gold, silver, copper, iron ore, and petroleum – are abundant. Countries within these regions, however, show a mixed picture when it comes to the relationship between resources and development. This project analyses one or two case studies from Africa and/or Latin America to enable a better understanding of the mechanisms behind the 'resource curse'. The thesis will be supervised largely by the RHI group.

Suggested literature

Richard Auty, *Sustaining Development in Mineral Economies. The Resource Curse Thesis*. (London: Routledge, 1993).

Suggested courses	RHI-55306; RHI-51806
Keywords	resources; development; Africa; Latin America
Contact	Ewout Frankema (RHI)

How to regulate chemicals with multiple hazardous properties? The case of persistent, bioaccumulative and toxic (PBT) chemicals

Many chemicals in use are, in addition to being toxic, also persistent and bioaccumulative (PBT chemicals). An on-going use of persistent chemicals causes environmental concentrations to increase over time. Bioaccumulative chemicals can accumulate in organisms. Clearly, the environmental and health risks caused by chemicals with multiple hazardous effects differ from those which are purely toxic. Identifying appropriate risk management measures requires tools for assessing combined damage. The concept of bioaccumulation has, so far, not been integrated in any pollution and damage assessment models. The aim of this MSc research is to develop a theoretical model for combined damage (cost) assessment of chemicals. Depending on data availability the model can be applied to specific chemicals, e.g. persistent organic pollutants. Interested students should have knowledge in micro-economics, analytic thinking, and should be willing to read some toxicological literature.

Suggested courses	ENP-32306, ENR-31306
Keywords	damage cost assessment, chemicals, combined risks, regulation
Contact	Hans-Peter Weikard

Network effects in the adoption of electric vehicles

Usage of the internal combustion engine negatively affects local air quality and contributes to climate change. Electric vehicles (EVs) appear to be the future. However, the adoption of electric vehicles comes with network effects: the more EVs are on the road, the more charging infrastructure will be available, and the more attractive it becomes to buy an EV. Yet if there are few charging stations, there is little incentive to purchase an EV as the owner is then restricted to the range of the battery. What is the role of such network effects in EV adoption? This question can be analysed using agent-based modeling or econometric modeling.

Suggested courses	AEP-21306, YSS-34306, INF-34806
Keywords	transport, electric vehicle
Contact	Edwin van der Werf

Pollution as an input into the production process

We all know the Cobb-Douglas production function that combines capital and labour into output. But capital and labour are not the only inputs: firms use energy and cause pollution in their production process. And the Cobb-Douglas function is only a simple tool and not a realistic representation of a production process. The World Input-Output Database and the World KLEMS (capital, labour, energy, materials statistics) database contain lots of data on these issues and allow researchers to explore the relation between pollution and production. Do you like working with data? And did you take an econometrics course? Then this might be the right topic for you.

Suggested courses	AEP-21306, YSS-34306
Keywords	pollution, econometrics, energy
Contact	Edwin van der Werf

Time matters: Including stock dynamics in health impact assessments of toxic metal exposure in urban environments (MSc)

Urban populations are highly exposed to toxic metals such as methylmercury, cadmium, lead or arsenic. Exposure occurs either via the air, through drinking water, or through the uptake of food (e.g. fish). Recent studies (e.g. Nedellec and Rabl 2016, Giang and Selin 2016) have suggested an approach for assessing the impacts and health damage costs from metal pollution, or the benefits from pollution control measures. Existing approaches assume that exposure to the pollutants remains constant over time. However, several metals (e.g. methylmercury, lead) are known to be highly persistent. As a consequence, exposure concentrations in humans accumulate over time.

The aim of the MSc research is to explore how stock pollution effects can be included in existing models for health damage cost assessment. In addition, you can elaborate on a case study quantifying health damage costs for specific urban environments. Data can be compiled from the literature and national statistical databases.

References

- Nedellec, V., Rabl, A. (2016). Costs of health damage from atmospheric emissions of toxic metals – methods and results. *Risk Analysis* 36(11), 2081-2095.
- Giang, A., Selin, N.E. (2016). Benefits of mercury controls for the United States. *PNAS* 113(2), 286-91.

Suggested courses	ENR-31306, UEC-51806, DEC 31306
Keywords	urban pollution, health impacts, stock dynamics
Contact	Hans-Peter Weikard

Non-renewable resources and waste management

Many of the resources we use are non-renewable. The most well-known example are fossil fuels, but another example is phosphate, which is an essential fertilizer. Because of their non-renewability, the use of such resources needs to be well-planned, taking into consideration future generations. Moreover, we need to use (and reuse, and recycle) these resources efficiently. You can therefore think of the following topics:

- How much recycling is optimal?
- What role can economic incentives play in stimulating people to collect waste separately?
- What barriers exist to investments in renewable energy projects in developing countries?
- What is the right discount rate in dealing with problems that affect future generations?

A thesis on non-renewable resources or waste management is likely to involve cost-benefit analysis, general equilibrium modelling, or other economic modelling techniques.

Suggested courses	ENR-31306, YSS-35306, ENP-32306, AEP-32306
Keywords	phosphate, recycling, modelling, cost-benefit analysis
Contact	Hans-Peter Weikard

The effect of Dutch electric vehicle policies on the decarbonisation of road transport

Usage of the internal combustion engine negatively affects local air quality and contributes to climate change. Electric vehicles (EVs) appear to be the future and the Dutch government has applied various policies in the past decade to support the adoption of electric vehicles, such as tax advantages for leased and private cars, support for the roll-out of charging infrastructure. However, these policies have not been stable, which has probably contributed to strong fluctuations in the annual numbers of new EVs. How have past policies affected the adoption of EVs? This and related questions can be answered using econometric models.

Suggested courses	AEP-21306, YSS-34306, DEC-32806
Keywords	transport , electric vehicle
Contact	Edwin van der Werf

Do climate shocks cause migration? Harnessing historical evidence

There is a lively debate in many academic disciplines, with a leading role for economics, on the effects of climate shocks and climate change on migration (see for a literature review, Cipolina, De Benedictis and Scibè (2021)). There is a lot of scaremongering in the media about large scale 'climate migration', especially from Africa to Europe. Empirical findings, however, are extremely mixed: climate shocks seem to cause some migration, but this is not always the case, and the effect is not very strong. Historical data can help us understand this relationship better. In this project, you will use a panel dataset with historical migration data from Rwanda and Burundi to Uganda (1920-1960), as well as qualitative data from colonial archives, to study the relationship between rainfall shocks, food prices and emigration on a district

level. Other case studies may be explored as well (historical as well as more contemporary), as long as appropriate data can be found. The thesis will be supervised largely by the RHI group.

Suggested courses	RHI-54806
Keywords	migration; climate shocks; colonial history
Contact	Michiel de Haas (RHI)

Discounting health impacts – good or evil? (MSc and BSc)

Our modern life-style is increasingly causing diverse health problems such as obesity, the increase of allergies, diabetes, and pulmonary or cardiovascular diseases. Identifying appropriate health treatments or regulatory strategies (e.g. a ban of cars in urban centres) requires to compare the costs of an intervention against expected health benefits. In many cases expected health benefits cannot be monetised but are expressed in terms of utility measures such as quality of adjusted life years (QALYs) or disability adjusted life years (DALYs). Cost-effectiveness analysis is then used to compare and rank costs and benefits of the intervention. If monetary costs stretch over long(er) periods, economists apply discounting to determine the present value of costs. For many years, there is a controversial debate in the health economics literature whether health impacts expressed as QALYs or DALYs should be discounted as well, and how (e.g. Johannesson et al. 1994, Claxton et al. 2006).

The aim of this BSc or MSc thesis is to reflect upon the economic foundations of discounting in (regulatory) decision-making, and to disentangle the arguments for and against discounting health impacts. The topic can be addressed at the level of a BSc or an MSc thesis. Furthermore, depending on your preference, it can be approached from a theoretical economics' or an environmental ethics perspective.

References

- Johannesson, M., Pliskin, J.S., Weinstein, M.S. (1994): A note on QALYs, time tradeoff, and discounting. *Medical Decision Making* 14, 188-193.
- Claxton, K., Sculpher, M., Culyer, A., McCabe, C., Briggs, A., Akehurst, R., Buxton, M., Brazier, J. (2006): Discounting and cost-effectiveness in NICE: stepping back to sort out a confusion. *Health Economics* 15, 1-4.

Suggested courses	ENR 21306, ENR-31306, UEC-51806
Keywords	urban pollution, health impacts, discounting
Contact	Hans-Peter Weikard

Does generating bioenergy from European forests help reducing carbon emissions?

Many European forests have seen a growth of stocks over the past decades. It has been suggested by policy makers at the national and the European level that forest resources, when used for bioenergy, could reduce carbon emissions and play a role in the transition to a low carbon economy. However, the effectiveness of such policy is debated. The research should survey and evaluate different assessment methods of carbon impacts of the use of forest resources.

Suggested courses	ENR-31306
Keywords	climate change, forests, renewable resources
Contact	Hans-Peter Weikard

Is the Dutch gasoline tax too high?

According to Parry and Small (*American Economic Review*, 2005), the American gasoline tax is too low and the UK one is too high.

What about the Dutch one? And does car size (not included in the Parry-Small study) matter?

Suggested courses	ENR-22306, UEC51806
Keywords	gasoline, microeconomics, fuel tax
Contact	Edwin van der Werf

Economics of water management

Water is everywhere, but clean water for consumption or irrigation is becoming increasingly scarce. Economic analyses of water management deal with questions such as:

- How should water trading be organized?
- What are the costs and benefits of water management?
- How should international agreements on international rivers be organized?
- How can we allocate water within river catchments efficiently?
- What economic instruments should we use to manage water?

A student conducting an economic analysis of water management is likely to collaborate with hydrologists. He or she may develop an economic model, perform a game theoretical analysis, or conduct a monetary valuation survey.

Suggested courses	ENR-31306, ENP-31806, AEP-32306
Keywords	water, flooding, modelling, food security, game theory
Contact	Xueqin Zhu

Is there a behaviouralist revolution in economics?

Economic orthodoxy has focussed on rational selfish agents and equilibrium states. Recent years have seen a rise of behavioural

approaches in economics where economic agents are driven by other-regarding preferences (e.g. altruism) and they make “mistakes”. The envisaged thesis research would explore these developments of the discipline of economics through the lens of Thomas Kuhn’s theory of scientific revolution. Is the turn towards behavioural approaches in economics a scientific revolution in the Kuhnian sense?

Suggested courses	DEC-22803, ECH 51306
Keywords	economic methodology
Contact	Hans-Peter Weikard

What are the welfare effects of Dutch fuel pricing?

Global energy subsidies are huge and the related welfare losses as well. The subsidies may be explicit, but most are implicit subsidies by taxing the fuel (coal, oil, natural gas, gasoline, diesel) at a lower rate than socially optimal. What does the Dutch tax structure look like for various fuels? Are they over- or under-taxed? And what are the welfare consequences.

Suggested courses	ENR-22306, UEC51806
Keywords	gasoline, microeconomics, fuel tax
Contact	Edwin van der Werf

The economics of water scarcity

Why do citizens have access to clean water in some countries, while others struggle to get this basic natural resource? How do institutions, politics and markets influence the provision (public or private) of water services? What is the impact of inequalities in access to clean water on societal outcomes, such as health, education or economic performance? Tackling these questions is critical to achieve an equitable, sustainable and prosperous

society, a key goal of the international development agenda as stated in the Sustainable Development Goals by the United Nations.

This thesis project will deal with the ultimate reasons explaining the under provision of clean water, especially in relation to how markets and politics interact with the management of environmental resources. The student may study contemporary communities in developing countries that lack access to basic drinking services, or past societies that suffered the ills of water scarcity but that overcame this major obstacle during the 20th century. The thesis will be supervised largely by the RHI group.

Suggested courses	RHI-10806; ENP-23806
Keywords	water scarcity; institutions; politics; natural resources
Contact	Daniel Gallardo Albarrán (RHI)

Regulatory chemicals policies based on “essential use”

The European Union is preparing a revision of its chemical policies, that is how pollutive and toxic substances are regulated. A key concept that is potentially to become an important regulatory tool is the “essential use” concept. In brief, a chemical can remain in the market if its use is considered essential for the functioning of society, otherwise it will be phased out.

The Dutch National Institute for Public Health and the Environment (RIVM) offers the opportunity to participate in the analysis of a large representative survey that explores people’s assessment of which uses of chemicals are considered essential. RIVM is offering this opportunity to a student with strong quantitative skills (statistical analysis, econometrics) to work on

the survey results and their interpretation. The research could be done as an internship or as MSc thesis research.

Starting literature:

European Commission (2021) Chemicals Strategy for Sustainability. (https://ec.europa.eu/environment/strategy/chemicals-strategy_en).

DeCanio & Norman (2007) Journal of Environmental Management 85,1-8.

Suggested courses	AEP-31306, Statistics, Econometrics
Keywords	chemical pollution management, regulatory policy design
Contact	Hans-Peter Weikard

Fish exports, poverty and undernourishment

Many developing countries that suffer from undernourishment are net exporters of seafood (Smith et al. 2010). One may think that food exports contribute to the undernourishment problem. However, exports also create revenues that may be used to import cheaper food or machines that help producing other types of food, making the link between food security and fish exports ambiguous. The students will econometrically analyse global trade and World Bank data and investigate the link between fish export, poverty, and undernourishment.

References

Smith, M.D. et al. 2010. Sustainability and global seafood. *Science* 327(5967):784-786.

Suggested courses	ENR-31306, AEP-21306, YSS-34306
Keywords	trade, fisheries, food security, poverty, econometrics,
Contact	Andries Richter

Water pricing and quality control

Water policies aiming at sustainable allocation and quality conservation of water becomes more and more important. The challenges in water management analysis include water pricing and dealing with externalities and compensation. We are looking for students with good modelling skills (preferably GAMS) who are interested in the development of integrated water management models to optimize the water allocation among different sectors and to determine the optimal water quality level in a local water system. A background in hydrological cycle and economics will be helpful.

Suggested courses	ENR-31306, ENR31806
Keywords	water, Applied General Equilibrium modelling, optimization modelling, food security
Contact	Xueqin Zhu

Globalization, roving bandits, and marine resources

In their highly influential policy paper, Berkes et al. (2006) have postulated that the widespread overexploitation of marine resource is mostly fueled by highly mobile fishing fleets from the industrialized world moving like “roving bandits” from sea to sea, leaving behind poverty and empty oceans. While anecdotal evidence seems to suggest that there is some merit in Berkes’ analysis of the problem, profound empirical analysis is so far lacking. The goal of this project is to investigate whether more

empirical evidence can be found supporting (or rejecting) the notion of roving bandits.

This project requires the student to dig into the databases of FAO, OECD and perform large scale statistical analyses. Sound knowledge of statistics (using software like Stata, R, or Eviews) is essential.

References

Berkes, F. et al. 2006. Globalization, Roving Bandits, and Marine Resources. *Science* 311:1557-1558.

Suggested courses	AEP-21306, ENR-31306, YSS-34306
Keywords	fisheries, institutions, globalisation, statistical analysis
Contact	Andries Richter

Coping with climate hazards in colonial Southeast Asia

Why are some societies more susceptible to disaster than others? The number and intensity of climate hazards, as well as the severity of their impacts, have been unequally distributed across the globe, with formerly colonized countries in the Global South particularly affected. While most current research emphasizes societal factors as crucial determinants of vulnerability and resilience, we know little about how the economics and institutions of colonialism affected societies' long-run abilities to cope with hazards.

This project examines economic and institutional determinants of disaster impacts and responses in parts of colonial Southeast Asia (c.1850-1950). This is an appropriate area to study because of its relatively high exposure to hazards and colonization by different colonial powers. The student may pick one or several cases studies, and will analyse data on annual climatic variations, their impacts, and economic and institutional

intervening factors, by exploiting a range of primary and secondary sources. The thesis will be supervised largely by the RHI group.

Suggested courses	RHI-50806
Keywords	climate; natural disasters; resilience; inequality; Southeast Asia
Contact	Pim de Zwart (RHI)

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