



Bilagsoversigt

Prækvalifikationsansøgning for kandidatuddannelse i Miljøvidenskab ved Science and Technology, Aarhus Universitet

Bilag 1 Notat med beskrivelse af uddannelsens indhold, opbygning og struktur

Bilag 2 Notat indeholdende resultater af spørgeskemaundersøgelse blandt aftagere

Bilag 3 Notat indeholdende de overordnede resultater af kvalitative aftagerinterviews

Proposal for degree programme in

Environmental Science and Policy

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Profile of the MSc Environmental Science and Policy degree

The Environmental Science and Policy MSc programme is a research lead 2 year MSc, educating students to become professionals in the environmental sector. The programme equips students with a broad foundation in Environmental Science, Management and Policy analysis, and requires students to select a specialization in either environmental science, emphasizing the natural sciences; or in policy analysis, emphasizing the environmental social sciences.

Environmental science is an interdisciplinary and problem driven academic field that integrates physical, chemical and biological sciences to the study of the environment, and the solution of environmental problems. Environmental science takes an integrated, quantitative, and interdisciplinary approach and brings a holistic systems approach to the study of environmental problems and sustainable resource management. **Environmental Social Science** is equally is an interdisciplinary field, integrating economics, political science and sociology, to study human interaction with the environment.

In contrast to existing environmental degrees, the degree in Environmental Science and Policy focuses on further development of core disciplinary strength as a pre-requisite for meaningful interdisciplinary exchange. The vision for the degree programme is to develop a teaching programme that will enable successful students to tackle complex environmental problems in collaboration with other environmental professionals with complementary skills. This includes the ability to develop potential technical and management solutions; and the ability to analyse environmental problems and proposed solutions in their societal context.

Completing the programme the students will have acquired the following competences;

Knowledge

Successful students have

- An in depth knowledge of the significant methods and theories in environmental science. Furthermore, the student will be able to identify, describe, discuss and synthesize the relevant scientific disciplines which together create the basis for understanding environmental problems and their potential solutions
- An in depth disciplinary scientific knowledge of a sub-field within environmental science

Skills

Successful students have the ability to

- Evaluate feasibility and suitability of theoretical, experimental and practical approaches to address and analyse scientific issues and problems related to the environment
- Describe, analyse and interpret environmental problems in a societal as well as a broader environmental context

- Identify methods to generate, analyse and operationalise data and information in specific environmental fields and select, apply and discuss scientific methods
- Conclude, combine and integrate methods and evaluate suggested responses to environmental challenges in a holistic manner
- Interpret and discuss environmental issues in a local-global context and the relationship between environmental science, management and policy
- Articulate and communicate complex scientific issues to a scientific as well as a general professional or public audience

Competences

Successful students have acquired the competence to

- Collaborate with professionals from other scientific backgrounds on environmental issues
- Structure own competence development
- Independently plan and complete projects; both independently defined projects and projects defined in collaboration with other actors.

Structure of the Environmental Science and Policy degree

The teaching programme consists of 120 ECTS. Each specialisation consists of compulsory modules to build core competencies (30 credits), compulsory modules designed to teach interdisciplinary research and vocational skills to all students (30 credits), semi-compulsory thematic modules to allow students to specialize in key areas of environmental studies (15 credits), elective modules (15 credits), and a research project with a core focus within the specialisation chosen by the student (30 credits).

The degree is taught in 4 quarters per year, in total 8 quarters. All modules are a multiple of 5 ECTS, each quarter therefore typically focusses on three modules.

Module structure for the MSc-Programme

The two specialisations follow an identical structure to enable the cross disciplinary teaching activities. The interdisciplinary activities, across the social and natural sciences, take place in the compulsory joint modules (displayed in blue), semi-compulsory joint modules (displayed in light blue). The teaching activities within the natural and social sciences takes place in the compulsory specialisation specific modules (displayed in red). Elective modules (displayed in yellow) allow student to strengthen their individual profile. The MSc dissertation is required to be conducted within a subject related to the specialisation of the student.

Table 1: Module structure for each specialisation. Compulsory joint programme modules  ; Semi-Compulsory joint modules  Compulsory specialisation modules  ; Electives  ;Dissertation 

YEAR 1: Environmental Science

1 Quarter	2. Quarter	3. Quarter	4. Quarter
The grand challenges in Environmental Science	Environmental Research Methods and Design	Environmental Project	Sustainable Flows of Materials and Resources: Tools and Techniques
The Environmental System, physical-chemical processes and cycles	Environmental Fieldwork and Monitoring	Environmental Data Analysis and Modelling	External Placement
Human impacts on the Environmental System	Semi-compulsory ^A	Elective	Semi-compulsory ^B

YEAR 2: Environmental Science

1 Quarter	2. Quarter	3. Quarter	4. Quarter
External Placement	Management of Human and Environmental Health	MSc Dissertation	
	Semi-compulsory ^B		
Elective	Elective		

YEAR 1: Environmental Policy Analysis

1 Quarter	2. Quarter	3. Quarter	4. Quarter
The grand challenges in Environmental Science	Environmental Research Methods and Design	Environmental Project	Environmental Sociology
Environmental Social Science – Comparative Approaches	Environmental Economics	Environmental Policy and regulation	External Placement
Environmental Social Science - Applications and Cases	Semi-compulsory ^A	Elective	Semi-compulsory ^B

YEAR 2: Environmental Policy Analysis

1 Quarter	2. Quarter	3. Quarter	4. Quarter
External Placement	Environmental Policy Analysis: Theory and Applications	MSc Dissertation	
	Semi-compulsory ^B		
Elective	Elective		

Semi-compulsory Modules:

There are two kinds of Semi-compulsory modules; A) Research methods; B) Interdisciplinary modules on selected Environmental themes;

A options: Students select between Qualitative Methods and Environmental Statistics

B options: Students select between models addressing specific environmental problems. The courses will vary from year to year depending on emerging issues and interests of the students. As examples six modules have been described to illustrate the way in which the disciplinary perspectives are integrated within the modules. The six examples are; Integrated Water Management and Policy; Ecoindustrial Networks Management; Climate Change Science, Management and Policy; Sustainable cities; Environmental Change in the Arctic; Ecosystem Service: Science and Policy; Sustainable Energy.

Elective modules: Students select options to develop their specific academic profile. Modules can be selected from AU-ENVS modules and existing modules at AU, KU or other universities. Selection has to be approved by the Board of Studies.

Course descriptions for the individual modules are outlined in appendix I.

The interdisciplinary teaching components:

The programme is based on a systemic, interdisciplinary approach to the understanding and management of environmental problems. It takes disciplinary training as a prerequisite for developing and practicing interdisciplinary academic work. For the individual student, this means a progressive development of her/his disciplinary background within the environmental field, while also being confronted with the interdisciplinary characteristics of real-world environmental problems through problem based teaching activities. Thus, the programme develops the synergies between specialized disciplinary learning/training and interdisciplinary learning/training.

Through joint compulsory modules and projects, the students are trained in understanding and analyzing environmental problems from a range of disciplinary perspectives. Furthermore, this activity trains the students in communicating own disciplinary knowledge and perspectives on environmental problems to students with different academic backgrounds. During these modules and in particular during joint interdisciplinary projects, the students will acquire a common language for conceptualising, analysing and discussing environmental problems. This will enable students to develop the skills to collaborate across disciplines on management of environmental problems, including hands-on experience on synergies and conflicts between different disciplinary perspectives. This will provide the students with an experience-based and nuanced understanding of the different aspects that are relevant for addressing environmental problems, as well as the interaction between the different forms of knowledge involved.

Moreover, in joint methods modules, the students will gain understanding of and perform basic training in the data production and collection of other disciplines, as well as discuss problems of representation,

validity and accountability of data produced with different methods and conceptualized in different disciplinary academic debates.

The programme is based on a systemic rather than a technological perspective and focusses on providing a thorough understanding of the interaction between the different elements of the system in which a specific environmental problem is located. Through the joint modules, the students gain expertise in identifying which forms of disciplinary knowledge that are significant for managing and solving environmental problems and gain insights on the relevant knowledge on different aspects of the environmental problem offered by different disciplines. Moreover, all interdisciplinary modules, including common, thematic and methods modules, are developed by teams of relevant academic researchers and include both natural scientists and social scientists.

Employability and vocational skills

Candidates completing the programme in Environmental Science and Policy will have skills to fill positions within the following employment

- 1) Positions in regional, national or international regulatory environmental agencies
- 2) Environmental Consultancies
- 3) Non-Governmental Organisations (NGOs) and sustainability organisations within larger companies
- 4) Positions in industries developing new technologies or finding or applying scientific solutions for environmental issues (e.g. water purification, soil mitigation, air pollution reduction or climate change mitigation or adaptation).
- 5) Further research career within environmental science,
- 6) Teaching positions within their specialisation.

Candidates completing the programme in Environmental Science and Policy will obtain the following vocational skills

- 1) Ability to interact and collaborate with other academic disciplines that are relevant for understanding and tackling environmental questions
- 2) Ability to identify and acquire relevant forms of knowledge and methods and to include relevant disciplines for addressing environmental problems
- 3) Written and oral communication of approaches and results to peers and other actors in the environmental field as well as the public

Appendix I

Module Descriptions

Compulsory joint programme modules

Title: The grand challenges in Environmental Science

This module gives an introduction to Environmental Science and Policy. It gives the students a common reference point for further exploration during the programme. The module will introduce some of the main environment challenges, the development of environmental science as a field of study and the current challenges for environmental policy making. After completing the course the student will have a broad understanding of the key concepts in environmental science and policy debates.

Title: Environmental Research Methods and Design

By the end of this module students should be aware of the relationship between philosophy of science and research practice, as well as different disciplinary and interdisciplinary research paradigms and strategies. They should understand relationships between theory, conceptualization, method, hypotheses or research questions, evidence and measurement, as well as issues related to objectivity, generalisability, reliability and utility of research. Furthermore, the module will provide an introduction to a wide range of methods for conducting research in the environmental field for all students in the programme. The module will take a multidisciplinary approach and will include methods from the physical, biological and social science area. The module will allow students to discuss approaches to, and results of, research outside their fields as well as provide an introduction to the methods used in the students's core area.

Title: Environmental Project

This module introduces students to integrated research concepts. The Environmental project requires students to compare, combine and integrate different concepts, methods and tools, and transferring them to a case study context. The students need to develop a project plan, which will be carried out in student project teams during the course. In groups, students will further develop essential skills and sharpen their ability to design, conduct and evaluate their results on a real-life case study. Attention will be paid to the challenges that can emerge when applying different methods and tools in practice. This includes dealing with uncertainty, incomplete information, data sources, data quality, indicators, critical assumptions, different perspectives etc. Moreover, the relations between the selected tools ('how tools work together') will be discussed to sharpen the students awareness synergies and challenges involved in integrative research. The students will be supervised on the contents and scientific quality of their work and on their skills in conducting integrative research.

Title: External placement

The module of environmental project placement is central to the development of competencies during the second year of the programme. It provides the students with opportunity to work in practice with environmental problems and explore and apply the knowledge and competencies acquired during the first year of the master. In this model students conduct an environmental project in collaboration with an external partner under academic supervision by ENVS staff. On completion of this module students will be able to undertake a focused professional environmental project relevant to the clients problems, manage the project and develop corrective work plans as the project develops. Furthermore, the students will be able to apply specialist knowledge to a client's problem, synthesise information coherently and critically and communicate their findings effectively in oral and written form, acceptable both to an academic audience as well as the external partner. Placement institutions and companies are suggested by the students, assisted by the proposed academic placement supervisor. The placements need to be approved by the Board of Studies.

Compulsory modules: Environmental Science specialisation

Title: The environmental system, physical-chemical processes and cycles

The aim of the course is to provide a detailed understanding of the natural chemical, biological and physical processes in the soil, water, air and marine environment. Focus will be on 1) specific environmental processes in and between soil, air and water that govern the biogeochemical cycling of C, N and P, 2) the processes that govern the climate system and 3) the services provided to society.

Title: Human impacts on the Environmental System

This module will teach understanding of the processes involved in the interaction between the human and the natural system and how it influences the environment including the climate system. Focus will be on 1) manmade emissions (e.g. nutrients and toxicants) and their impacts on the natural biogeochemical cycles and the ecosystem, 2) management systems for efficient use of resources with focus on sustainability (e.g. waste, wastewater, biomass and energy carriers) and 3) the fate, lifetime and cycling of contaminants and their degradation products as well as how they influence the quality of resource cycling and the ecosystem itself including water, soil and air.

Title: Environmental Fieldwork and Monitoring

After completion of the module the students will have experience with fieldwork techniques and experimental methods. They will be able to 1) identify the data needs, 2) choose appropriate environmental sampling techniques in relevant media, 3) perform data collection 4) use appropriate techniques for analysing samples in the laboratory, 5) interpret and report results.

Title: Environmental Data Analysis and Modelling

The aim of the module is to give the students an insight into how to study environmental problems using models and how to parameterise and model environmental processes in different media. After completing the module the student will be able to 1) use various types of existing predictive environmental models and to identify their requirements and limits; 2) use data from field trials to parameterise existing

environmental models; 3) develop predictive models appropriate to specific environmental problems; 4) to evaluate model results.

Title: Sustainable Flows of Materials and Resources: Tools and Techniques

This module will provide students with the theory and methods to analyse resource flows across sectors by physical-chemical measurements (e.g. the waste and the agricultural sector) and environmental effective technologies (i.e. green and clean technologies designed for environmental restoration). Focus will be on 1) how to reduce loss of renewable and nonrenewable resources to the environment, e.g. essential minerals, nutrients and metals, 2) identification of critical flows and actors to sustain circular resource supply for green production, 3) the kinetics of transport, fate and processes inside defined resource management systems, and 4) treatment technology, e.g. waste water treatment technologies.

Title: Management of Human and Environmental Health

This module will provide students with in depth understanding of the regulatory frameworks dealing with environmental hazards/risks. Focus will be on 1) human health and ecotoxicology, 2) identification of environmental hazards and risks, 3) effects of emission of pollutants (e.g. heavy metals, pesticides, organic micro-pollutants, atmospheric particles of different origin) and pathogens, 4) assessment of effectiveness of proposed management options. The module will address both primary and secondary effects affecting human and environmental health.

Compulsory modules: Environmental Policy specialisation

Title: Environmental Social Science – Comparative approaches

This module offers an overview of the different social sciences and their approach to the study of environmental problems. This will include overview of theories on environmental motivation, choice, behaviour and practice, as well as introduction to theories of public management (regulation, administration, policy, planning) of environmental problems. On successful completion of this module the students will appreciate the different underlying rationales and assumptions of key social science disciplines and be able to critically discuss the strength and challenges of individual approaches. Furthermore, the students will be aware of key contributions shaping the discipline.

Title: Environmental Social Science – Applications and Cases

This module will further develop the theoretical and methodological approaches introduced in Environmental Social Science through a series of applications of current areas of environmental concern, e.g. biodiversity, water management, climate change mitigation, climate change adaptation, chemical toxics, air pollution.

Title: Environmental Policy and Regulation

In this module the students are introduced to theories and social science perspectives relevant for understanding and analysing environmental policy and environmental law including theories of environmental policy, choice of policy instrument, implementation, institutional setting, decision-making and decision-makers, policy-science interface, multilevel governance, network governance, participation.

Title: Environmental Economics

This module explains how economic theory can be applied to develop policies to manage a range of pressing environmental problems. The module encourages students to combine rigorous microeconomic theory with topical environmental applications, implemented via dynamic modelling and econometric analysis. On completion, students should be able to (a) apply microeconomic theory and frameworks to analyse interactions and interdependencies between the economy and the environment, and (b) appreciate the strengths and shortcomings of a range of different economic frameworks and policies for managing environmental quality.

Title: Environmental Sociology

The module provides overview and deeper insights into the key areas and debates of environmental sociology, and thus expands the students' knowledge on the social aspects of environmental science and policy. The module includes key discussions and application of key literature and different theoretical perspectives within environmental sociology and introduces the students to central, established as well as emerging environmental problem areas. On successful completion students will be able to analyse environmental problems through the application of core environmental sociological concepts and theories, including theories of practice, life style, mobility, sustainable cities, risk society, participation and socio-technical systems.

Title: Environmental Policy Analysis: Theory and applications

Description: This module introduces to the use of methods of policy analysis. These are applied on a range of cases that demonstrate evidence of successes and failures in environmental policy making, at local to global scale, including e.g. REACH, Kyoto Protocol, Ozone Layer Convention, Danish water management, local air pollution, limiting the use of pesticides in agriculture.

Semi-compulsory modules

A) MODULES

Title: Environmental Statistics

The Module provides students with the quantitative data analysis tools used in Environmental Research. The module content will include a thorough grounding in classical methods of statistical inference with an introduction to selected more recent developments in statistical methodology. At the end of the course students will be able to 1) choose appropriate statistical methods for testing hypothesis on relationships in environmental data 2) use statistical software to implement statistical analysis 3) Interpret the results of statistical analyses.

Title: Qualitative Analysis

This module explores Qualitative Research Methods. In part, the module is practical, giving students experience at different qualitative research methods, including in-depth and semi-structured interviews,

discourse analysis, document analysis, observational techniques and action based approaches. At the same time, the course will give students the opportunity to reflect *theoretically* on the types of data that is produced with qualitative methods, including which types of studies where qualitative methods are useful and relevant. The course will moreover give the students the opportunity to reflect upon theoretical and intellectual issues relating to the *practice* of doing qualitative research. The module will address key issues, debates and controversies relevant for the design and evaluation of qualitative studies. In particular, the interplay between the philosophy of social science and the practices of the qualitative researcher, including in relation to quantitative research approaches will be a central theme.

B) MODULES

Title: Ecoindustrial System Analysis

This module will enable students to analyse existing and innovative resource management systems and technologies as a network of actors impacting environmental quality and environmental and economic performance indicators of industries and households. The students will gain familiarity with selected resource management tools to assess technologies to optimize utilization, diminish loss and increase regeneration of elements, materials and energy in the society. The course will enable students to evaluate policy options for production of energy and biobased products from different types of biomasses (e.g. algae, energy cropping) and wastes (e.g. household waste).

Title: Integrated Water Management and Policy;

During the module the students will be introduced to the main environmental issues connected to the management of water resources, including both freshwater and marine water. The students will be introduced to the main stressors of the water resources, the main pollution problems and to the competing use of water resources. The students will furthermore be introduced to the regulatory frameworks and relevant policy instruments used to manage the use of water resources, and the management of the environmental pressures on the water resources. As part of this the understanding of how policy instruments works to regulate the water pollution problems cost-effectively will be developed. The students will be introduced to models and tools to identify cost-effective solutions to water pollution problems, and the students will gain skills and knowledge to apply such models and understanding the solutions, applied on case studies. Through this course the students will gain a basic level of knowledge and skills in integrated water management with emphasis on policy relevant issues such as the implementation of the Water Framework Directive and the Marine Strategy Directive, and the students will learn to analyse the implementation of such initiatives at regional, national and international scales.

Title: Climate Change Science, Management and Policy;

This module gives an overview of the physical science base on climate change, climate change impact assessment and predictions, and key concerns and strategies of adaptation to and mitigation of climate change. It covers climate impact causation, impact assessment methods, sectoral and regional climate change impact predictions, environmental risks and hazards, vulnerability assessment, analyses of the economic case for climate change mitigation and adaptation, and adaptation and mitigation policy frameworks. Students will work in groups on selected transdisciplinary climate change issues.

Title: Sustainable cities;

This module is a thematic module that introduces the students to the topic of Sustainable Cities. The module will provide a basic understanding of cities as a concentration of people and activities that is enhanced by urbanisation. Students will during the module explore key issues in sustainable urban development from a multi-disciplinary perspective which will give the students a comprehensive overview of particular areas of environmental problems of cities. This will including the combination of technical and natural science perspectives with social science perspectives on the backgrounds of specific problems and how these problems are addressed in governance and everyday life, as well as in the development of technologies to manage these problems. The module expects the student to participate actively and apply their disciplinary knowledge in trans-disciplinary activities and discussions.

Title: Environmental Change in the Arctic;

This module will give students insights into the challenges the Arctic is facing in the coming decades. The module will include environmental aspects that will affect the Arctic directly and the feedback effects on the global scale as well as include the analysis of the social aspects for the Arctic community. The course will tackle the key issues associated to Arctic warming, atmospheric pollution and cryospheric changes as e.g. ice melt and also handle socio-economic benefits or disadvantages with respect to e.g. future oil spilling or shipping in the Arctic. The course will also discuss the international politics of the Arctic.

Title: Ecosystem Services: Science and Policy.

During the module, students will be introduced to the concept of Ecosystem Services as the contributions that ecosystems make to human well-being, exemplified as the goods and services such as food, coastal protection, carbon capture, water security, through to aesthetic, social and cultural dimensions. The students will acquire the understanding needed to identify, analyse and discuss issues relevant for conducting ecosystems service analysis. Analysing ecosystem services requires an understanding of key ecological principles, processes, functionality and dynamics of ecosystems governing the provision. Furthermore, it requires methods and tools to measure and analyse the range of services and values ecosystems provide to society. Through this course the students gain the knowledge and skills to develop integrated evaluations of environmental policies options using an ecosystem service framework. The module provides hand-on experience with Ecosystem services assessments using both economic and non-economic evaluation criteria. Successful completion of the course will enable students to evaluate and discuss the current policy developments at national, EU and global levels in the area of Ecosystem Services.

Title: Energy and the Environment

TBD

Elective Modules

The Semi-compulsory modules described above will be offered as elective modules. In addition, students will be able to choose from a list modules approved by the board of studies. These modules include e.g.

Environmental GIS, Environmental Law and Environment and Development. Furthermore, students will be able to earn credits within more specialized fields under supervision. This requires that the student identifies a topic of study and an agreed set of activities in collaboration with an ENVS lecturer. The teaching activity needs to be approved by the board of studies.

Title: MSc Dissertation

Students follow an individual programme of original research under the supervision of a staff member appointed as their supervisor. The students will identify and develop a research question within the field of environmental science and policy ; demonstrate the ability to execute a sustained programme of original research following academic standards for analysis and academic reporting; show in-depth understanding of a major theme or argument and ability to discuss relevant theories and analytical perspective in the chosen subject, including an independent critical engagement with the topic chosen; identify and apply the conceptual understandings, methodologies and practical research skills necessary for the thorough and coherent exploration of their chosen topic; making use of appropriate primary and secondary sources and tools of analysis and generalise the findings; Finally, successful students complete a structured and fully-argued piece of written work. The module will be accompanied by a series of seminars supporting key stages in the research process. These are developed on ad hoc basis to support the topics chosen by the students.



Notat

Arbejdsmarkedsefterspørgslen efter kandidater i Miljøvidenskab ved Science and Technology, Aarhus Universitet



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Indledning

I dette notat redegøres for resultaterne af en kvantitativ undersøgelse af arbejdsmarkedsefterspørgslen efter en ny kandidatuddannelse i Miljøvidenskab.

Formålet med undersøgelsen er at afdække den konkrete efterspørgsel efter kandidaterne på kort og mellemlangt sigt.

Spørgeskemaundersøgelsen er sendt til et udsnit af de respondenter, som fagmiljøet ved Institut for Miljøvidenskab har vurderet til at være potentielle aftagere af kandidatuddannede i miljøvidenskab. Alle respondenter er blevet kontaktet telefonisk af fagmiljøet hvorefter et elektronisk spørgeskema er sendt ud til respondenterne via e-mail med personligt link. Det anvendte spørgeskemaet fremgår af bilag 3.



1. Potentielle aftagere og respondenter

I det følgende redegøres for, hvilke ansættelsesområder en kandidat i miljøvidenskab kunne tænkes at finde beskæftigelse i, hvilke respondenter, der blev udvalgt, samt en beskrivelse af de respondenter, som valgte at svare på spørgeskemaet.

1.1 Potentielle aftagere for kandidater i miljøvidenskab

Kandidater i miljøvidenskab forventes at finde beskæftigelse i den offentlige sektor i arbejdet omkring miljøforvaltning og gennemførelse af beslutningsprocesser i kommuner og statslige organer (f.eks. omkring affald, klima, ressourcestrategier, grønne infrastrukturer, bæredygtig transport), ved NGO institutioner, i konsulentfirmaer inden for miljøområdet og i større virksomheder med behov for ekspertise omkring miljøledelse og bæredygtighed.

Uddannelsen vil også forberede den uddannede kandidat til et eventuelt Ph.d. forløb.

1.2 Respondenter

Respondenterne er udvalgt af fagmiljøet. De adspurgte er ledere eller medarbejdere i ministerier, styrelser, kommuner eller i private virksomheder (overvejende konsulent- og rådgivningsvirksomheder).

Respondenterne har ansættelsesansvar og/eller et generelt strategisk ansvar i deres institution eller virksomhed. Der er repræsentanter fra landets største kommuner, relevante styrelser samt de større rådgivnings- og konsulentvirksomheder i branchen. Det er vurderingen, at disse respondenter kan give en vurdering af behovet på deres arbejdsplads og givet deres erhvervserfaring og ekspertise kan give et kvalificerede bud på behovet i deres egne brancher. For et overblik over de valgte respondenter, se bilag 1.

Tabel 1 viser, hvilke overordnede institutionstyper der deltager i undersøgelsen, samt fordelingen af respondenterne i hver type.

Tabel 1 - Respondenter fordelt på institutionstype

Institutionstype	# Respondenter	Procent
Private	7	58 %
Offentlige	5	42 %
I alt	12	100 %

I alt er spørgeskemaet sendt til 13, hvoraf 12 har svaret.

2. Arbejdsgivers efterspørgselsvurdering

Respondenterne er blevet præsenteret for en beskrivelse af uddannelsen (se bilag 2) og på den baggrund tage stilling til behovet for kandidater i miljøvidenskab. En stor del peger på et aktuelt behov for kandidater i miljøvidenskab på deres arbejdsplads og i deres brancher. Endvidere, peger de på et stigende behov for kandidater inden for deres felt i fremtiden.



2.1 Arbejdsgivers egen efterspørgsel

Tabel 2.1 viser respondentens vurdering af behovet for kandidater i miljøvidenskab i deres egen institution/virksomhed. 92 % af respondenterne svarer, at de vurderer, der i nogen eller høj grad er et behov for kandidater i miljøvidenskab i deres egen institution/virksomhed.

Tabel 2.1 - Vurdering af efterspørgsel for kandidater i miljøvidenskab i egen institution, fordelt på institutionstype

	I høj grad	I nogen grad	I mindre grad	Slet ikke	Ved ikke	I alt
Privat	5	1	1	-	-	7
Offentlig	1	4		-	-	5
I alt	6	5	1	0	0	12

Respondenterne er ligeledes blevet spurgt, hvor mange kandidater i miljøvidenskab de vil kunne bruge i egen virksomhed/institution i dag og om 3-5 år.

I alt angiver respondenterne at de vil kunne bruge 66 kandidatuddannede i miljøvidenskab i dag. Om tre til fem år vil respondenterne kunne bruge 92 uddannede kandidater i miljøvidenskab.

Disse efterspørgselstal er ikke et direkte estimat på det samlede behov for kandidater i miljøvidenskab, da alle potentielle arbejdsgivere naturligt ikke har haft mulighed for at svare. Det antal, som er angivet, er den samlede estimerede efterspørgsel for de 12 institutioner og virksomheder, som er repræsenteret i undersøgelsen. Det er rimeligt videre at antage, at en lang række lignende institutioner vil have et tilsvarende efterspørgselsniveau, og at den samlede efterspørgsel vil være væsentligt højere end det tal, som er angivet her.

2.2 Arbejdsgivers vurdering af den generelle efterspørgsel

Tabel 2.2 viser, respondenternes vurdering af behovet for kandidater i miljøvidenskab i deres egen branche. 92 % af respondenterne svarer, at de i nogen eller høj grad vurderer, at der er et positivt behov for kandidater i miljøvidenskab i deres branche.

Tabel 2.2 Vurdering af efterspørgsel for kandidater i miljøvidenskab i egen branche, fordelt på institutionstype

	I høj grad	I nogen grad	I mindre grad	Slet ikke	Ved ikke	I alt
Privat	4	2	1	-	-	7
Offentlig	1	4	-	-	-	5
I alt	5	6	1	0	0	12



2.3 Miljøvidenskabs merværdi i forhold til lignende uddannelser

Tabel 2.3 viser respondenternes vurdering af, hvorvidt kandidatuddannelsen i miljøvidenskab, opfylder et uddannelsesbehov, som ikke allerede er dækket af eksisterende uddannelser.

33 % respondenter svarede, at kandidatuddannelsen i nogen grad udfylder et hidtil udækket uddannelsesbehov, som ikke allerede er dækket af eksisterende uddannelser. 50 % vurderer, at det i mindre grad gør sig gældende. To respondenter svarer ved ikke.

Tabel 2.3 - Vurdering af hvorvidt miljøvidenskab udfylder et udækket behov som ikke allerede er dækket af andre eksisterende kandidatuddannelser, fordelt på Institutionstype

	I høj grad	I nogen grad	I mindre grad	Slet ikke	Ved ikke	I alt
Privat	-	3	2	-	2	7
Offentlig	-	1	4	-	-	5
I alt		4	6		2	12

Respondenterne er således generelt, på baggrund af det materiale de har modtaget omkring uddannelsen (bilag 2), kun i nogen eller mindre grad overbeviste om, at uddannelsen adskiller sig fra eksisterende uddannelser. På den baggrund er det valgt at gennemføre kvalitative interviews med udvalgte respondenterne med henblik på at forklare og give et mere fyldestgørende billede af de kompetencer kandidaterne i miljøvidenskab kommer ud med. Gennemførelsen af kvalitative interviews kan således substantiere og nuancere resultaterne fra nærværende undersøgelse og give kvalificerede input til yderligere udvikling af uddannelsens faglige profil (se notat omkring de overordnede resultater fra kvalitative interviews gennemført januar 2014).

3 Opsamling og vurdering af efterspørgslen for kandidater i miljøvidenskab

Denne aftagerundersøgelse er udformet således, at en række potentielle arbejdsgivere er blevet spurgt til deres nuværende og kommende efterspørgsel efter kandidater i miljøvidenskab. I alt har 13 ledere og medarbejdere i ministerier, styrelser, kommuner eller i private virksomheder (overvejende konsulent- og rådgivningsvirksomheder) fået tilsendt et spørgeskema. Generelt findes der i undersøgelsen en betydelig efterspørgsel efter kandidater i miljøvidenskab blandt disse relativt få respondenter, hvilket indikerer et større arbejdsmarkedsbehov efter kandidater i miljøvidenskab generelt.

92 % af respondenterne vurderer, at der i høj eller nogen grad er et behov for kandidater i miljøvidenskab på deres egen arbejdsplads. Ligeledes 92 % af respondenterne vurderer, at der høj eller nogen grad er et behov for kandidaterne i deres egen branche. En tredjedel af respondenterne vurderer, at uddannelsen i nogen grad udfylder et udækket behov, som eksisterende danske uddannelser i dag ikke udfylder. Mens de resterende to tredjedele svarer, at det i mindre grad gør sig gældende eller ved ikke.



Samlet vil de adspurgte respondenter kunne bruge 66 kandidater i dag og 92 kandidater om tre til fem år. Den samlede arbejdsmarkedsefterspørgsel antages derfor at være betydeligt større, da ikke alle potentielle arbejdsgivere er blevet spurgt i undersøgelsen. Det angivende antal er derfor en indikation på en væsentlig (og stor) arbejdsmarkedsefterspørgsel efter kandidater i miljøvidenskab.



Bilag 1 - Respondenter

Stilling	Navn	Institution	Svar
Senior Chief Advisor	Jørn Bo Larsen	Department for Environmental Assessment, Rambøll	X
Direktør	Birgit Munck-Kampmann	Copenhagen Ressource Institut	X
Seniorkonsulent	Anne-Belinda Bjerre	Teknologisk Institut	
Direktør	Marianne Madsen	Miljøafdelingen, Orbicon	X
Kontorchef	Henrik Knudby	Naturstyrelsen	X
Fuldmægtig	Niels Erik Vedel	Natur og Teknik, Ålborg kommune	X
Specialkonsulent	Jørn Kirkegaard	Miljøstyrelsen	X
Chefkonsulent	Camilla Damgaard	NIRAS	X
Divisionsdirektør	Helle Vang Andersen	Vand og miljø, COWI	X
Planchef	Lykke Leonardsen	Teknik- og miljøforvaltningen, Københavns Kommune	X
Vicekontorchef	Marie Louise Madsen	Miljø og Teknik, Kommunernes Landsforening	X
Kontorchef	Claus Nickelsen	Natur og miljø, Aarhus kommune	X
Bæredygtighedsdirektør	Pernille Blach Hansen	Grundfos	X



Bilag 2 – Kort præsentation af kandidatuddannelsen i miljøvidenskab

Kandidatuddannelse i miljøvidenskab

Forståelse for og håndtering af de større samfundsmæssige udfordringer på bl.a. miljøområdet stiller krav til forskere, administratorer, konsulenter og ledere om, at de er i stand til at angribe komplekse problemer fra flere faglige vinkler. Samtidig er det væsentligt at fastholde en dyb faglighed i tilgangen til miljømæssige udfordringer. Der er således et behov for at uddanne kandidater med en stærk kernefaglighed kombineret med interdisciplinære kompetencer.

Kandidatuddannelsen i miljøvidenskab er en interdisciplinær uddannelse med fokus på samspillet mellem miljø og samfund adresseret fra både en natur- og samfundsvidenskabelig vinkel. I forhold til eksisterende naturvidenskabelige og samfundsvidenskabelige kandidatuddannelser med miljø som tema kombinerer uddannelsen udviklingen af en stærk samfundsvidenskabelig eller naturvidenskabelig faglighed med udvikling af evnen til at sætte egen faglighed i spil og koble natur- og samfundsvidenskabelige metoder og teorier.

Studerende vil blive optaget på enten et samfundsvidenskabeligt eller et naturvidenskabeligt spor afhængig af adgangsgivende grundlag og vil følge undervisning inden for de faglige hovedretninger omkring 50 % af det samlede forløb. Den resterende del af undervisningsforløbet vil fokusere på tværfaglige problemstillinger og integrerende metoder. I denne del vil de studerende fra de to spor undervises sammen og fokus vil være på de interdisciplinære aspekter.

Strukturen sikrer, at kandidaterne ved uddannelsens afslutning har en stærk kernefaglighed inden for fagretningerne, og samtidig har opnået interdisciplinære færdigheder og kompetencer på et niveau, der giver kandidaterne en solid baggrund for at forstå og løse miljøproblemer i en interdisciplinær kontekst.

Kompetenceprofil

Efter endt masteruddannelse har kandidaten opnået kompetencer inden for følgende overordnede kompetencemål:

- kandidaten kan vurdere anvendeligheden og hensigtsmæssigheden af teoretiske, eksperimentelle og praktiske tilgange til analyse og løsning af miljøfaglige spørgsmål og problemstillinger
- kandidaten kan identificere, beskrive, diskutere og sammenfatte de relevante faglige discipliner som tilsammen danner grundlag for at forstå miljøproblemer og deres mulige løsninger
- kandidaten kan beskrive, analysere og fortolke miljøproblemstillinger i en miljø- og samfundsmæssig kontekst,
- kandidaten har kendskab til og kan identificere metoder til at generere, analysere og operationalisere data og information, samt udvælge, anvende og diskutere fagspecifikke metoder
- kandidaten kan sammenfatte, kombinere og integrere metoder og vurdere helhedsorienteret løsningsforslag til håndtering af miljøproblemer
- kandidaten kan fortolke og diskutere miljøproblemstillinger i en lokal-global kontekst og sammenhængen mellem miljøforskning og politik
- kandidaten kan samarbejde med kandidater fra andre fagdiscipliner omkring miljøproblemstilling
- kandidaten kan strukturere egen kompetenceudvikling
- kandidaten kan selvstændigt planlægge og gennemføre projekter; både selv-definerede projekter og projekter defineret i samarbejde med aktører fra styrelser, kommuner, NGO institutioner, og private virksomheder
- kandidaten kan formidle og kommunikere faglige spørgsmål og problemstillinger i såvel et



videnskabeligt som et alment forum

Målgruppe

Følgende bacheloruddannelser giver adgang til kandidatuddannelsen i miljøvidenskab:

- Naturvidenskabelige bacheloruddannelser inden for et eller flere af områderne: fysik, kemi, biokemi, biologi og geografi eller tilsvarende.
- Diplomingeniøruddannelser inden for områderne miljø og kemi
- En samfundsvidenskabelig bacheloruddannelse inden for et eller flere af områderne: statskundskab, sociologi og økonomi, eller tilsvarende.

Aftagere

Kandidaterne vil kunne finde beskæftigelse i den offentlige sektor i arbejdet omkring miljøforvaltning og gennemførelse af beslutningsprocesser i kommuner og statslige organer (f.eks. omkring affald, klima, ressource-strategier, grønne infrastrukturer, bæredygtig transport), ved NGO institutioner, i konsulentfirmaer inden for miljøområdet og i større virksomheder med behov for ekspertise omkring miljøledelse og bæredygtighed.



Bilag 3- Spørgeskema

Kandidatuddannelsen i miljøvidenskab

Aarhus Universitet undersøger, om der er et arbejdsmarkedsbehov for en ny kandidatuddannelse i miljøvidenskab. Derfor har vi brug for din hjælp i en spørgeskemaundersøgelse om arbejdsgivernes efterspørgsel efter kandidater i miljøvidenskab.

I spørgsmålene beder vi dig vurdere jeres specifikke behov for kandidater i miljøvidenskab. Før du besvarer spørgsmålene, beder vi dig læse beskrivelsen af uddannelsen via dette link:

<http://scitech.au.dk/uddannelse/kandidat-og-civilingenioer/ny-uddannelse-i-miljoevidenskab/>

Du kan besvare spørgeskemaet ved at klikke på dette link:

På forhånd tak for din ulejlighed!

1. Vurderer du, der er behov for kandidater i miljøvidenskab i din virksomhed/organisation?

- (1) ☐ Ja, i høj grad
- (2) ☐ Ja, i nogen grad
- (3) ☐ Ja, i mindre grad
- (4) ☐ Nej, slet ikke
- (5) ☐ Ved ikke

2. Vurderer du, der er behov for kandidater i miljøvidenskab indenfor din branche?

- (1) ☐ Ja, i høj grad
- (2) ☐ Ja, i nogen grad
- (3) ☐ Ja, i mindre grad
- (4) ☐ Nej, slet ikke
- (5) ☐ Ved ikke



3. Hvor mange kandidater i miljøvidenskab vurderer du, I vil kunne bruge på din arbejdsplads på nuværende tidspunkt?

(Angiv cirka antal)

4. Hvor mange kandidater i miljøvidenskab vurderer du, I vil kunne bruge på din arbejdsplads om 3-5 år?

(Angiv cirka antal)

5. Vurderer du, der er behov for kandidater i miljøvidenskab, der ikke dækkes af allerede eksisterende kandidatuddannelser?

- (1) ☐ Ja, i høj grad
- (2) ☐ Ja, i nogen grad
- (3) ☐ Ja, i mindre grad
- (4) ☐ Nej, slet ikke
- (5) ☐ Ved ikke

6. Har du supplerende kommentarer og/eller spørgsmål til elementer der burde indgå i uddannelsen?



Mange tak for besvarelsen!

Eventuelle spørgsmål rettes til Maya Jepsen, Dekansektariatet Science and Technology, Aarhus

Universitet: maj@science.au.dk



Notat

Arbejdsmarkedsefterspørgelsen efter kandidater i Miljøvidenskab ved Science and Technology, Aarhus Universitet

I dette notat redegøres kort for de overordnede resultater af seks individuelle interviews gennemført i januar 2014 blandt potentielle aftagere af kandidater i miljøvidenskab. De kvalitative interviews er gennemført af en samfundsvidenskabelig og en naturfaglig repræsentant for uddannelsesudvalget, tog alle mellem 1 og 1½ time og blev afholdt ved besøg på interviewpersonens virksomhed/institution. Interviewene var en opfølgning på en spørgeskemaundersøgelse foretaget i september 2013. Formålet med interviewene var at substantiere og nuancere resultaterne af spørgeskemaundersøgelsen, samt at få kvalificeret input til udvikling af uddannelsens faglige profil.

I spørgeskemaundersøgelsen deltog 12 respondenter og heraf blev 6 udvalgt til interviews. De seks personer er udvalgt ud fra en ligelig fordeling af offentlige og private virksomheder/institutioner og repræsentativt for de afgivne svar i spørgeskemaundersøgelsen. (Se oversigt nedenfor).

Resultaterne i spørgeskemaundersøgelsen viser, at respondenterne i stor udstrækning vurderer, at der eksisterer et aktuelt og et fremadrettet behov for kandidater i miljøvidenskab. Respondenterne er imidlertid i spørgeskemaundersøgelsen mere i tvivl omkring hvorledes uddannelsen adskiller sig fra eksisterende uddannelser. Et væsentligt formål med de gennemførte interviews har på den baggrund været at forklare og give et mere fyldestgørende billede af de kompetencer kandidater i miljøvidenskab kommer ud med og hvorledes de adskiller sig fra eksisterende miljøuddannelser. På den baggrund har det været forventningen at få et mere kvalificeret indtryk af de interviewede potentielle aftageres vurdering af eget behov for uddannelsens kompetencer, samt aftagerens vurdering af uddannelsens særkende baseret på et mere indgående kendskab til uddannelsens rationale, struktur og elementer.

Hovedresultater af aftager-interviews:

1. 5 ud af 6 aftagerinterviews bekræftede behov for og mangel på kandidater inden for miljøområdet med faglig tyngde (kernefaglige kompetencer) og evner til at indgå i tværfagligt projektsamarbejde. Aftagerne støttede positivt den måde, hvorpå de to specialiseringer kombineres i uddannelsen. I et enkelt interview blev der givet udtryk for, at aftagerorganisationen foretrækker kandidater med en meget "tydelig kernefaglighed". Derudover viste interviewene, at 5 ud af 6 klart kunne se og anerkende uddannelsens profil samt hvordan den adskiller sig fra eksisterende generalist- og specialistuddannelser på miljøområdet.
2. Aftagerne var generelt positive i forhold til at inkludere et erhvervsrelateret projektforsløb, hvor de studerende ud fra ophold på erhvervsvirksomheder/-institutioner udarbejder et erhvervsprojekt. Der



var stor interesse i at medvirke blandt de interviewede aftagere. Derimod har flere understreget et behov for at forløbet var længere end de oprindelige planlagte 3 måneder.

3. Flere har peget på behovet for at de juridiske aspekter af miljøforvaltning integreres mere tydeligt i uddannelsen, da det vurderes vigtigt at kandidater i miljøvidenskab har en forståelse for de juridiske rammer for miljøforvaltning og politik.

Respondenter udvalgt til interviews januar 2014

Stilling	Navn	Institution
Direktør	Marianne Madsen	Miljøafdelingen, Orbicon
Kontorchef	Henrik Knudby	Naturstyrelsen
Specialkonsulent	Jørn Kirkegaard	Miljøstyrelsen
Chefkonsulent	Camilla Damgaard	NIRAS
Divisionsdirektør	Helle Vang Andersen	Vand og miljø, COWI
Vicekontorchef	Marie Louise Madsen	Miljø og Teknik, Kommunernes Landsforening