Strategy for the Department of Environmental Science 2016-2020
Short version

17 May 2016
Vision, mission and aim

Vision
The vision of Department of Environmental Science is to develop the knowledge, talent and leadership to understand and help solving the huge resource- and environmental challenges facing the world now and in the years to come.

Mission
The mission of Department of Environmental Science is to conduct strong environmental research building on natural and social science expertise. The research is the fundament for providing science-based advice, business collaboration, teaching and dissemination to the broader public.

Aim
The aim of Department of Environmental Science is to undertake basic and applied research of highest quality, to provide science-based advisory services in specific areas and to build and provide education for solving some of the major environmental challenges that society is facing. The latter includes pollution and pollution control mechanisms, pollution exposure and health impacts, management of land, soil, water, air and biodiversity, protection of ecosystem services and climate change impacts, mitigation and adaptation. Presently, teaching at BSc, MS, and PhD level are offered by individual scientist at several courses at other departments at AU, and at other universities. The advisory services are offered to Danish ministries as well as to other national and international stakeholders providing scientific advice for environmental policy development.
Strategy

Research

It is the endeavour of Department of Environmental Science to be an international well known research environment within its disciplines as well as within cross-disciplinary environmental research. The Department of Environmental Science has strong international collaboration with partners from the European Union (EU) and the Nordic countries within these areas. The department has developed three large internationally recognized research areas (flagships) which define the overall research strategy of the department. The flagship areas are identified as the three internationally strongest research areas which cover most of the research activities in the department. In addition to the flagships the department has defined strategic growth areas combining the research of the department within thematic areas of high scientific and societal importance. The department management team will focus on developing these strategic growth areas to become the best on the Nordic research scene and strive to make each of them among the top 10 research groups in the area globally. Department of Environmental Science will further prioritise selected interdisciplinary research centres within the faculty of Aarhus University, expected to be organised as cross-department centres within the strategy period (2016-2020).

More than half of the turnover at Department of Environmental Science derives from externally funded research projects, of which many belongs to applied research funded by EU, the Danish Council for Strategic Research/Innovation Fund Denmark, etc. Applied research is therefore an important part of the activity at the department, and has resulted in strong international and national collaboration and networks.

Much of the Department of Environmental Science research is strengthened by the synergy between the science-based advisory and monitoring activities that Department of Environmental Science researchers are continuously providing to different Danish authorities, and vice versa. This synergy has fostered unique research groups at the department of which some are included in the flagships, and has ensured knowledge based advisory services of highest quality.

Atmospheric Pollution Research Flagship

The department has considerable expertise within the physical, chemical and biological processes in the atmosphere, including how inorganic, organic and biological environmental constituents affect health, environment and climate. This area focusses on Denmark, Europe and the Arctic environment and combines field experimental work, monitoring, atmospheric modelling and integrated assessment.

Environmental Contaminants Research Flagship

Another flagship investigates the persistence, transformation and effects of chemical and biological contaminants released to the environment. The environmental and health consequences of exposure to contamination of water, air, soil and food is an important issue for the society, and the department has a strong record in tracking exposure sources, transformation routes, the exposure-effect coupling and effective ways to reduce emissions of contaminants.

Ecosystem Services Research Flagship

The third flagship focusses on the contributions that ecosystems make to human well-being, including provision of food and fibre, regulation of the biosphere and cultural services. The research investigates how management of ecosystems and their configuration in the landscape and the ensuing ecological processes influence the services humans derive. The ecosystem service concepts and the spatially explicit ecosystem
services models involve cross-disciplinary collaboration and helps initiate science-policy platforms on biodiversity and ecosystem services.

**Strategic growth areas**

The strategic growth areas have been defined as important areas on the present research agenda. The aim of the areas is to conduct excellent research, to facilitate knowledge exchange and to integrate the researchers in big funding applications with colleagues from the department as well as with national and international partners. The list of strategic growth areas is not considered as static, but can be continuously revised according to societal challenges and the ensuing research agenda, as well as the development of the research environment in the Department.

At the moment 8 strategic growth areas are chosen for further development and growth:

- Arctic research
- Integrated spatial modelling
- Circular resource flows
- Atmospheric pollution and impacts on human health
- Environmental DNA
- Remediation of water and soil
- Climate change, mitigation and adaptation
- Sustainable Energy and Environment

**Talent**

Department of Environmental Science also aims to build and provide a leading, internationally recognized and research-based learning environment for both master and PhD students in environmental science. A critical indicator for this aim is the attraction of funding for talents. In the 2016-2020 strategy phase strong effort will be given to support the strong research groups within the prioritised flagship areas and to facilitate the growth of the strategic research areas thus generating possibilities for funding from international sources. This will help attract funding for PhD students and postdocs. Moreover, the department will use strategic resources for this purpose. High priority will be given to recruiting top level scientists with an established record of funding from sources like the European Research Council (ERC).

**Teaching**

The staff at Department of Environmental Science teaches courses at AU, both at Faculty of Science and Technology and Aarhus School of Business and Social Sciences and further contributes to teaching as guest lecturers at other Universities in Denmark and abroad. Starting in 2018 Department of Environmental Science plans to establish new teaching programmes developed in collaboration with departments at Copenhagen University. The plan is to offer bachelor education giving basic introduction to environmental science and environmental social science, and two master programmes: one in environmental science and one in environmental social science. The vision for the programmes is to teach students to successfully tackle complex environmental problems taking the interactions between physical, biological and chemical environmental components as well as the economic, human and political dimensions, and their interactions into account.
Science-based advisory activities

Department of Environmental Science holds a strong and unique position in environmental advisory services within air emissions (as single national entity for air pollution and greenhouse gas emission inventories to the EU and UN), air quality assessment and impact (as responsible for the Danish air quality monitoring), measuring of environmental and emerging contaminants, pathogenic microorganisms and environmental social science. Department of Environmental Science also has a strong position advising the Danish Ministry of Environment and Food by projects funded and undertaken outside the contracts, especially within the areas of air quality, emission inventories, land use change, environmental social sciences and chemical assessment of environmental contaminants. Much of the sampling and chemical analyses performed on air pollution and environmental pollutants are accredited according to ISO 17025 by the Danish Accreditation Fund (DANAK).

Department of Environmental Science has further been successful in attracting international research projects that supports advisory work. This is commissioned by a large number of international clients especially within EU. The department will seek to strengthen the interaction with relevant ministries and the international networks that can form consortia for international bids.

Business collaboration

Collaborations with companies are expected to increase in the strategy period. This is partly because the new funding landscape both within EU’s Horizon2020 and Innovation Fund Denmark has increased focus on collaboration between universities and businesses. The collaboration that Department of Environmental Science already undertakes with private industries, companies and businesses includes various activities. The different sections at Department of Environmental Science have experiences such as selling data and models, targeted collaborations in water treatment, or developing and testing beneficial microorganisms. A few smaller companies have also been established as a result of research and business collaboration. However, formalized partnerships with larger companies with global coverage and national representations have not yet been established, which potentially could enlarge the possible market. The department has established a dedicated committee to propose activities for strengthening this area.

Staff and culture

Department of Environmental Science is performing research that often has great and immediate interest to the society. These activities can potentially be of high political interest and therefore part of the staff has profound experience in contact with the press. The advisory activities to the ministers often require a high degree of management and resource allocation in an ever changing environment of tasks and deadlines. In combination with the high demand for external funding, this creates a high workload on many employees. Hence, working life balance is of great concern in the department, which aims to follow up on critical areas found in physical and psychological work place assessments, and as far as possible exerting a preventive practice.

Organisational structure

The department has about 130 employees divided into six sections (Figure 1). The department management team consists of the head of department, deputy head of department, seven heads of section (one section is split into two for advisory and research activities) and the Head of secretariat. In addition to the sections, the
The department has a series of committees: Business Collaboration Committee, Department Forum, Teaching Committee, Committee for Science-based Advice, Research Committee, PhD Committee, Occupational health Health and Safety Committee and Liaison Committee, in which large parts of the senior scientist group is taking part.

Figure 1 Organisational diagram for the Department of Environmental Science (2016).

**Facilities**

Department of Environmental Science is located at DTU campus Risø, Roskilde, 35 km west of Copenhagen. The laboratory facilities are divided in organic and inorganic laboratory areas as well as a microbiology laboratory area. Within five years the department will move to AU campus Emdrup in Copenhagen.

Some facilities at Department of Environmental Science laboratories are clearly state of the art: these include (1) an advanced organic environmental chemicals analysis laboratory able to perform a suite of advanced environmental chemical analysis in environmental samples, (2) an environmental microbial genomic laboratory including a core sequencing facility and (3) labscale reactors for advanced removal of organic contaminants from water. Besides the laboratories, Department of Environmental Science is running a large number of large and smaller air quality monitoring stations in Denmark as well as the new high profile research station in North-East Greenland, Villum Research Station. Finally, Department of Environmental Science is running a centre for atmospheric modelling as well as a research infrastructure for spatial data analysis.