

Development of international joint Master's Degree in Ecology, specialization in Alpine Ecology

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Introduction

Twenty-four per cent of the surface area of the Earth is covered by alpine areas, and mountains occur in all biogeographical regions of the world. They contain a great variety of climates, geological and physiographic features, and are the gathering grounds of much of the world's water. Because of their history, isolation, and great variability of habitat, they are treasuries of high biodiversity and rich in endemic species. Alpine areas are also important centres of agro-biodiversity with a great variety of locally adapted crops and livestock, an important genetic resource and an asset for assuring food security for a growing global population.

Today, alpine ecosystems are facing enormous pressure from global changes related to drivers such as climate change, pollution, increased human population, and changes in land use that place added demands on the alpine ecosystems. Especially climate change is one of the major challenges of our time, and mountain regions around the world are known to react especially sensitive on global warming. Both direct instrumental records and environmental records indicate that historical and recent changes in climate in many mountain regions of the world are often greater than those observed in the adjacent lowlands. Many glaciers disappear; the water regime is changing, and the processes influence surrounding areas. In high mountains, plants and animals are in a tight corner. Unlike temperate species, they have fewer capabilities for coping with change, yet the ecological 'islands' they inhabit are shrinking as global warming goes on, and climate change has already triggered species distribution shifts in many parts of the world. Mountains represent unique areas for the detection of climatic change and the assessment of climate-related impacts. Information about species and biotopes occurring in alpine areas and possible threats to their existence is imperative. Considering the fragility of mountains and their vulnerability in the face of climate change, pollution, invasive species and other anthropogenic chang-

es, the conservation of mountain biodiversity has so far received inadequate attention. Management of mountain biodiversity is now increasingly being recognized as a global responsibility, and mountain-specific conservation issues need to be considered in global, regional, and national debates, negotiations and agreements.

Project description

Project summary

The main goal of the project is to develop a joint master's degree study programme of high quality, within the field of Ecology, with specialization in Alpine Ecology that will give students the opportunity to have at least one semester at Telemark University College (TUC) and one at University of Žilina (ŽU), as well as doing field work and receive joint supervision from teachers at both institutions. The study programme will be designed for students all over the world, who have interest in Alpine Ecology.

One of the main project aims will be to educate specialists in alpine ecology who will be able to work with the current challenges of alpine ecosystems all over the world. Important elements of the planned joint master have already been established. It has been agreed upon by all parties that the joint degree will consist of 120 ECTS, which is the norm of a master's degree in both countries. Both institutions will contribute with a minimum of 30 ECTS. The students who graduate from the joint master, will receive one common diploma, since national and institutional legislations in both countries allow for joint diplomas. The mobility of students and lecturers will be an important part of the planned joint program, and students will spend minimum one semester (30 ECTS) at the partnering institution. In addition, extensive use of modern technology for flexible learning, like web-based courses and video conferences, will be important, as well as joint supervision of master projects. The institutions involved are strongly committed to developing a joint master's programme, and have already appointed both academic and administrative staff who will work with the development of a joint degree. The institutional support has also been expressed by the Head of Departments and Deans involved, as well as the Rectors of the University of ŽU and TUC.

In 2014 a Consortium Agreement was developed and signed by the rectors at both institutions.

The Consortium Agreement is an important document that states the responsibilities of both institutions, and is essential for the implementation and running of the joint programme. Furthermore, the Consortium Agreement has been important when applying for accreditation on both sides.

Partnering institutions

The Department of Environmental and Health Studies (DEHS), Faculty of Arts and Sciences, Telemark University College is located in Bø in Telemark, and has educated students in nature and environmental subjects since 1972. The department has a strong scientific staff within the field of ecology, and has offered a Master's program in Environmental Health and Science since 2000 and a PhD programme in Ecology since 2011. For example in 2012 these programmes had 70 master and 10 PhD registered students. DEHS has master and PhD - projects within a wide range of topics (freshwater ecology, ecological biodiversity, population ecology, climatology, ecotoxicology, management, behavioural ecology, genetics and microbiology). The department has high quality lab facilities within chemistry, biology, microbiology and molecular ecology. The main focus of the department has been to educate candidates with a broad professional background within ecology and management, environment and health. Several research projects at the department are related to alpine ecology.

The Institute of High Mountain Biology (IHMB), the University of Žilina is located in the small Tatra village Tatranská Javorina in Slovakia, and is a biological research facility of the University of Žilina. The institute is devoted to the study of mountain ecosystems, and was established in 2000 as a centre for the development of alpine biological research in the West Carpathians. The mission of the institute is to facilitate research to better understand the unique processes of biological and physical systems in mountains, and how environmental changes may affect these processes. Another important purpose of the institute is to promote the protection of high mountain ecosystems. Currently, the institute facilities include housing for up to 20 researchers and 20 students, conference hall, molecular ecology, zoological, and botanical laboratories. Participating in international cooperation within alpine research projects is an important part of the work at IHMB.

Previous cooperation

The cooperation between TUC and ŽU was first established in 2006, and has involved student exchange, visits, guest lecturing and a joint Summer School. IHMB is responsible for publishing "Oecologia Montana", an international journal in mountain ecology. Some of the academic staff from the DEHS contributed with articles in this journal.

The ŽU and TUC have had bilateral Erasmus agreements since 2006, and such agreements will continue in the future as well. Many students from ŽU, and particularly bachelor students from IHMB, have come to Telemark University College. Most of them have studied Alpine Ecology (one or two semesters) at DEHS. For example during the academic year 2012/2013 TUC had a total of 16 students from

the ŽU studying at the Faculty of Arts and Sciences, 10 of them were from IHMB. In addition there were four former bachelor students from IHMB taking a two year Master's Degree in Environmental Science at DEHS. They received supervision from both IHMB and DEHS. During the academic year 2014/2015 there were four bachelor students from IHMB studying at DEHS and eight former students from IHMB were taking their Master's degree at DEHS.

In 2009, four representatives from DEHS visited the Institute of High Mountain Biology. The visit consisted of formal meetings, lectures, fieldwork and the planning of a joint Summer School (2010) and future scientific and administrative cooperation. In 2010, DEHS and IHMB held a joint Summer School. The Summer School involved three teachers from Norway and three teachers from Slovakia, 15 students from Norway and 10 students from Slovakia, and took place at both institutions (three weeks in Slovakia and three weeks in Norway). In October 2012, two representatives from Institute of High Mountain Biology, the University of Žilina, (including Dr. Marián Janiga), visited the Faculty of Arts and Sciences, Telemark University College, for five days. They had several meetings with various departments at TUC, in which we discussed further cooperation between the two institutions, particularly the possibilities of developing a joint master programme. In November 2012, two representatives, one academic and one administrative staff, visited the University of Žilina and IHMB in order to prepare the application for the joint degree. The visit included meetings with researchers at the Plant Production Research Center (PPRC) in Piešťany, meetings with the Rector, the Vice Rector for Education and the Erasmus Coordinator at ŽU, as well as a workshop with staff at IHMB. In the spring 2013 a kick - off meeting for joint degree project was held in Slovakia. During the workshop which all involved participants, the content of Consortium Agreement was discussed as well as content of the study programme and division of tasks and work - plan in detail. In the autumn 2013 a workshop was held in Norway in order to map resources related to study programme and to prepare the master programme and courses.

In the spring 2014 the Consortium Agreement was finalized. The accreditation application was prepared and sent to the accreditation board at ŽU, which later approved the application, and forwarded it to the Slovakian authorities for further accreditation at national level. The application for approval was also sent to the Steering Board at TUC and approved.

Program focus

The focus of the planned master's program will be on alpine ecosystems and the challenges they face due to different environmental impacts. One aim of the program will be to provide the students with deeper insight into ecological, environmental and conservation issues related to mountain areas. Recent advances in molecular technology have now allowed the integration of genetics and ecology, and biotechnology constitutes a new and powerful tool in conservation and management. The program will therefore also have a genetic focus. The program will have a strong in-

terdisciplinary approach, and the students will be able to study the whole range of organization levels, from molecules to organisms to individual behaviour to ecosystem processes.

Program subjects

The main academic discipline of the program will be ecology, with emphasis on the ecology of alpine areas. Courses are planned to be given within the following subjects: scientific methodology, biology, chemistry, climatology, biotechnology, and conservation biology. Development of new courses is an important part of the cooperation, as will the future delivery of the courses. Giving the students excellent practical skills in field and laboratory work will be of high priority in the program, and field and lab methodology will be an important part. DEHS already has several master courses taught in English that could be relevant in the planned program, while IHMB does not provide master courses today.

Existing study programmes and research - the basis for the new joint degree

DEHS offers bachelor programmes in Ecology and Natural Resource Management, and in Pollution and the Environment. The bachelor study in Ecology and Natural Resource Management is particularly aimed at students who wish to work with nature management, sustainable resource management or conservation biology. The bachelor of Pollution and the Environment is aimed at students who want to work in the public or private sector on issues related to pollution of soil, water and air, water supply etc. The institution also offers international one-year programmes on bachelor level in Alpine Ecology and Environmental Management and Ecotourism and Sustainability.

IHMB offers the bachelor programme «Ranger» (Nature Protection and Landscape Management) for Slovak and international students. The programme is focused on ecology and applied ecology, biology, nature conservation, renewable and non-renewable natural resources, management, information technologies, social and human sciences.

These bachelor programmes will be important recruitment arenas for the planned Master's program. External recruitment will also be given priority. The focus of the planned program is strongly connected to the research interests at both institutions. Alpine ecology is an important area of research at DEHS, and IHMB is devoted to research on alpine ecosystems and processes. Both institutions have strong research groups and teaching capacity within the field of Alpine Ecology that will complement each other. DEHS has experience in offering international master programs, and today offers a master in Environmental Science for international students. TUC also has a PhD programme in Ecology, and a master in Alpine Ecology will qualify for this programme.

Added value of the new study programme

The planned program is closely linked to the strategic goals of the participating institutions, as well as to the research fields and projects of the academic staff. The program should strengthen the research networks of the participants, and encourage increased research cooperation. This will benefit the researchers involved in the project, and the complementary strengths of the academic staff will also increase the academic quality of the program for the students. The strengthening of the scientific groups will also lead to more options in the choice of master thesis topics. The involved participants have complementary strengths that should heighten the quality of the program. Both DEHS and IHMB have a multidisciplinary staff within a broad field of research areas, but with different academic approaches. While ecology is the main focus at both institutions, PPRC participates with a strong research group in biotechnology. DEHS has a long experience in providing master's education, with both national and international programs. IHMB is on the other hand highly research based, and does to a greater extent provide students with the opportunity to participate in research projects.

The focus on alpine ecology makes the planned program complementary to the existing master programs at DEHS. The department is also currently working on joint master programs within aquatic ecology, one national and one international. A master within the field of alpine ecology will further strengthen the department's profile as a strong provider of education within ecology. The planned program can also be a potential recruitment arena for strong candidates to the DEHS' PhD program in Ecology.

IHMB does not offer a master's program, and the planned program will provide Slovakian students with the opportunity to continue with a master's degree at IHMB after finishing their bachelor degree. For the students, the program will give them the benefit of spending one semester in a foreign country, which will provide them with insight into the culture and research traditions in two countries. They will also get field experience from quite different alpine ecosystems in Norway and Slovakia. The plan is for the students to spend the whole first year together, which should give them a strong sense of group membership. As the program is in English, the students will also get the benefit of improved English skills. The focus on alpine ecosystem is increasing internationally, and master programs that focus on alpine ecology are rare. This should increase the relevance and attractiveness of the program to both Norwegian and international students. The program should also benefit society by increasing the academic and professional capacity in the field.

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