Institute of Environmental Sciences (CML)
Department of Conservation Biology (CB)
Internship possibilities 2015-2016

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Dear student,

This is the updated list 2015-2016 of possible internships at the department of Conservation Biology of the Institute of Environmental Sciences (CML). We have deliberately chosen for a simple presentation, most projects have, a title a short description and the supervisor name and contact information, as we try to define the definite content of the projects with the students themselves.

The projects are divided according to the different scale levels at which our department operates:

Populations:

- Individual species and populations in interaction with anthropogenic threats are the focus here

Ecosystems and communities:

- Species communities in relation to the functioning of ecosystem and their interactions are the focus here. In most topics, we evaluate its functioning in relation to human impacts

Biodiversity and ecosystem services:

- Drivers of regional and global biodiversity patterns; conservation and predictions;
- The services provided by ecosystems, interactions with human needs and the role biodiversity plays in providing services for human kind are the focus here

You can get more information from the CML-instructors or students present at the stand or contact the appropriate supervisor through e-mail or by phone. If you are interested in another or related environmental internship, you can also discuss that with your potential supervisor. For MSc-students it is also possible to do an internship externally outside the Leiden University, with additional supervision by CML. For general questions, please contact:

Krijn Trimbos: tel. 7457, e-mail trimbos@cml.leidenuniv.nl

Populations

Human-wildlife conflicts and large cat genetics in Bardiya NP, Nepal
During this MSc research students will contribute to PhD research by Subodh Upadhyaya in Nepal. Field work will cover tiger/leopard and prey population assessments, large cat movements and home ranges, tiger/leopard diets, large cat genetics and human-lion conflicts. Of specific interest will be the use of genetic analysis of scats to evaluate their diets using next generation sequencing analysis.
Supervisor: prof. dr. H.H. de Iongh, tel. 7431, e-mail iongh@cml.leidenuniv.nl

Lion- human conflicts around Nairobi national park, Kenya
During this MSc research students will contribute to PhD research by Francis Lesilau in Kenya. Field work will cover lion and prey population assessments, lion movements and home ranges (of GPS satellite collared lions) , lion diets, lion genetics, and human-lion conflicts. Of specific interest will be the use of genetic analysis of scats to evaluate their diets using next generation sequencing analysis.
Supervisor: prof. dr. H.H. de Iongh, tel. 7431, e-mail iongh@cml.leidenuniv.nl

Impact of land use on distribution and ecology of Ethiopian wolves, Ethiopia
During this MSc research students will contribute to PhD research by Girma Eshete Gembere. Field work will cover Ethiopian wolf population assessments, Ethiopian wolf movements and home ranges, wolf diets, wolf genetics and conflicts with local communities.
Supervisor: prof. dr. H.H. de Iongh, tel. 7431, e-mail iongh@cml.leidenuniv.nl

Dosimetry of nano-particles, fate + responses
During the BSc or MSc research students will contribute to the studies of PhD-students. Our groups investigates many different aspects of ecological effect assessments for metal-based nanoparticles. NPs are rapidly finding their way into ever more products. NPs have structural properties intermediate between those of atoms and bulk materials. This is due mainly to the nanometer size of the materials, giving them a high proportion of surface atoms, high surface energy, spatial confinement and reduced imperfections. Primary particles may be either agglomerate or aggregate. Currently we do not know how to express responses; should we do it on the chemical concentration or on the physical properties. We work with key species of in the aquatic system, such as different crustacean species,zebra fish eggs, duckweed species but we would like to test even a more broader range of organisms as they all react differently. After all, each organism has specific typical traits, feeding modes, uptake routes, sensitivity. The student can contribute on experimental testing, or performing meta-analysis, or secondary data analysis.
Supervisor: dr. Martina Vijver: tel. 1487, email vijver@cml.leidenuniv.nl

Ring-necked parakeets in the Netherlands: Reproduction, food choice and diseases
In the last 50 years Ring-necked parakeets have rapidly spread across Europe. In that time they have become an abundant member of the avian community. They are however primarily associated with human dominated landscapes like cities. There are several different invasion-ecology topics related to this exotic bird that needs be studied in greater depth.

1. Life-history parameters of Ringnecked parakeets: reproduction:

Quite a number of parakeets have been banded and tagged. This will be continued. This will enable us to collect and research their live history parameters, like longevity, dispersal and distribution, and mortality per year class. The increase in population size seems to be halted for some unknown reason. We therefore, need more research, besides mortality into the reproduction success of Ring-necked parakeets: number of eggs, number of hatchlings and fledglings.
Supervisor: Roelant Jonker MSc and dr. Wil Tamis, tel. 7479, e-mail tamis@cml.leidenuniv.nl

2. Molecular research/metagenomics: spill over of diseases to other birds and what is the role of anthropogenic food?:

Alien invaders are never alone. They potentially bring a myriad of diseases with them that when spread to naïve native biota could spell disaster. What can we expect from Ring-necked parakeet in this regard? We'll continue our survey for two diseases, PBFD and Psittacosis on basis of the presence of it in their droppings. We also want to start research into the food composition of Ring-necked parakeets especially in the winter. Are they really dependent on human resources (bird feeders).
Supervisor: Roelant Jonker MSc and dr. Wil Tamis, tel. 7479, e-mail tamis@cml.leidenuniv.nl

Ecosystems and Communities

Impacts of reindeer grazing on fire probabilities in Arctic tundra
Arctic tundra stores large part of Earth carbon budget. Tundra fires release this carbon and cause severe damages to tundra ecosystems. Tundra plants differ in the ability to ignite and to burn. Plant species composition is controlled by reindeer grazing. This project will investigate whether and how reindeers affect fire abundance in Arctic tundra.
Supervisor: dr. Nadia Soudzilovskaia: email n.a.soudzilovskaia@cml.leidenuniv.nl, tel 7485.

Impacts of mycorrhizas on soil carbon budgets
Mycorrhiza is a symbiotic relationship between plant and fungi, in which plant provides fungi with carbon, and fungi supplies nutrients and water to plant. Mycorrhizas might have different forms depending on plant and fungal taxa involved. These distinct types of mycorrhizas differently affect soil carbon budgets. However, the mechanisms underlying this phenomenon are mostly unknown. MSc and BSc projects are available within this subject.
Supervisor: dr. Nadia Soudzilovskaia: email n.a.soudzilovskaia@cml.leidenuniv.nl, tel 7485.

The role of soil communities in driving soil nutrient dynamics
Soil biota are of critical importance for carbon decomposition and sequestration processes (and hence for the global carbon balance) as well as determine nutrient release for use by plants. So far, however, they have been treated as a black box in soil models. Using an unique dataset of 800 sites in France with soil DNA, soil organic matter and productivity data, you will analyse the extent to which soil micro-organisms are important for modelling carbon and nutrient fluxes and if so, whether their species identity matters (i.e. whether soil micro-organisms are functionally redundant or not).
Supervisors: prof.dr. Peter van bodegom; email p.m.van.bodegom@cml.leidenuniv.nl tel 7486.
Dr. Yuki Fujita; email yuki.fujita@kwrwater.nl

How to define soil microbial strategies?
Micro-organisms constitute a substantial proportion of the living biomass in soils. Increasingly, we have information on the identity of soil micro-organisms, we hardly know anything about who is doing what (and when). Moreover, we have no answers to fundamental questions related to the ecological strategies of soil micro-organisms or their functional trade-offs (e.g. what is the functional cost of bacteria that grow fast?). In international collaboration, we have compiled a database of genetic information of hundreds of soil microbial species to which we attached functional attributes. Here, you will evaluate the information available to define fundamental soil microbial strategies.
Supervisor: prof.dr. Peter van bodegom; email p.m.van.bodegom@cml.leidenuniv.nl tel 7486.

Effects of anthropogenic stressors across ecosystem boundaries
Obtaining realistic predictions of how existing and emerging anthropogenic stressors can potentially affect our natural environment and the organisms living therein is essential to provide the necessary management tools to mitigate ecosystem threats. While the basic idea is straightforward, attaining such reliable estimates on the fate of ecosystems proved to be notoriously challenging and, to date, did not provide the means to tackle ongoing declines in biodiversity. So far, studies aiming to resolve impacts of stressors on biodiversity largely focused on a limited number of stressors and organisms in laboratory settings, and therefore it remains uncertain whether observed patterns are ecologically relevant. Moreover, most studies focus on restricted ecosystem compartments, while anthropogenic pressures likely extend beyond the boundaries of an ecosystem. We currently have a number of projects that aim to unravel these cross-ecosystem linkages by performing large scale field experiments complemented with outdoor mesocosm and laboratory microcosm experiments. For instance, we aim to understand the effects of agricultural land use and practices (e.g. pesticide application, fertilization) on the biology of adjacent drainage ditches, including microbial and invertebrate biodiversity and ecosystem functioning. Students participating in these projects will contribute to conceptualization, experimental work in both field and laboratory and data analysis, in which there is plenty of room for students to pursue their own interest.
Supervisors:
dr. Maarten Schrama: tel. 7481, email m.j.j.schrama@cml.leidenuniv.nl
dr. Ellard Hunting: tel. 7475, email e.r.hunting@cml.leidenuniv.nl
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dr. Martina Vijver: vijver@cml.leidenuniv.nl

Pesticide atlas and others

We also work on pesticides, metals, and other contaminants in general and their subsequent impact on water quality. One example is our work on the tool www.pesticidesatlas.nl, in which pesticide measurements are graphically presented using a GIS framework. Sometimes there are vacancies on those topics as well to do an internship. Last remark, when you come with your own research topic of interest – and it does fit in this research line – then you are more than welcome to join the team as well.

Supervisor: dr. Martina Vijver: tel. 1487, email vijver@cml.leidenuniv.nl

Factors that influence Environmental DNA concentrations

Global biodiversity is facing a major crisis, which makes ecological monitoring studies ever more important, to facilitate science-based effective management of biodiversity. A highly promising recent development to overcome current problems with community-wide sampling strategies, on the basis of morphology, is to assess environmental DNA (eDNA). This technique is based on the fact that all species lose cells containing DNA to the environment they live in. While eDNA has been used to determine species presence/absence, its next level application to evaluate species densities is still in its infancy; it is still unclear how eDNA concentration truly relates to species abundance and biomass. Different species might be present in the same amount but might still show higher eDNA concentrations than other species due to higher DNA production patterns. Additionally, in different aquatic ecosystems alternate abiotic (pH, temp, UV)/biotic (microbial activity) conditions might influence DNA degradation differently. For this research line we aim at developing a generic and comprehensive approach for determining species community composition aquatic freshwater environments. We will attempt to do this by determining eDNA concentration, which is dependent on eDNA production and degradation rate, and disentangle how this relates to species abundance or biomass of entire communities. The research will include laboratory live set ups using water tanks with several freshwater macrofaunal species and molecular DNA work (extractions, PCR). To do this we need several BSc or MSc students for 2 different research directions:

1. eDNA production:

For this research direction we are interested in how eDNA production differs between different species. For instance species with an exoskeleton are expected to show a lower speed of eDNA production in the aquatic environment than species without an exoskeleton, since exoskeletons form a natural barrier between the cells containing the DNA and the aquatic environment. The rate at which DNA of a certain species builds up in the environment might also depend on how fast they move/how active they are/how high their metabolic rate is. Here we will try to understand and finally model how these factors influence eDNA production so that we will be able predict eDNA production rate for certain species.

Supervisor: dr. K.B. Trimbos, tel. 7457, e-mail trimbos@cml.leidenuniv.nl

2. eDNA degradation:

For this research direction we will focus on how different abiotic and biotic setting influence the eDNA degradation process. For instance higher temperatures might increase DNA degradation through heatstress or by increasing microbial activity. Here we will look for a way to understand and finally model how these factors influence eDNA degradation so that we will be able predict eDNA degradation rate at certain conditions.

Supervisor: dr. K.B. Trimbos, tel. 7457, e-mail trimbos@cml.leidenuniv.nl

Monitoring of biodiversity in the 'Leidse Ommelanden'
The 'Leidse Ommelanden' is a program in which 8 municipalities around Leiden (incl. Leiden itself) cooperate to take biodiversity aspects seriously into consideration in a number of land use (planning) projects and their site management.

1. Keeping track of Flowers and Bees along roadsides:

One of the projects in the 'Leidse Ommelanden'is to enhance the biodiversity of road sides by creating and developing a network of bee- and flower friendly roadsides. This should boost the diversity and populations of especially the local flora and pollinator fauna. To study the effects of the planning, design and management efforts to achieve this, data on flora and fauna are being collected and further sampling is needed, to monitor the changes in the coming years and to analyze whether these can be related to the actions measures and taken. A baseline for monitoring future developments has to be set up and a preliminary analysis of available data for improving the monitoring program has to be made. First task in to bring all available data together by combining the existing monitoring data with other data available, especially data from Waarneming.nl and the National Database on Flora and Fauna. Various spatial pattern analyses will be carried out to look for specific patterns of congruencies between the various taxa in time and space.

2. What biodiversity data are available for the 'Leidse Ommelanden':

About 40 projects are currently implemented in the 'Leidse Ommelanden' or will start soon. For each of these projects it is essential to have a baseline to be able to monitor changes and analyze the effects of the measures and management in view of the biodiversity goals envisaged. To prepare these baselines, a first step is to explore the various existing data bases and select those specifically relevant for the respective project sites. The next step is to compile site data bases by adjusting the format of these data and analyze their relevance for future monitoring, in terms of details, grid size, density, etc. Explore all possible sources of data from waarneming.nl, the National Database on Flora and Fauna, the specific PGO's, province, Waterschap, etc. and select the potentially relevant data, geographically and taxonomically.
Supervisors: Wil Tamis (CML) and Marco Roos & Menno Reemer (Naturalis):
marco.roos@naturalis.nl & tamis@cml.leidenuniv.nl

Biodiversity and Ecosystem Services

Ecosystem services of Dutch dunes
The "Amsterdamse Waterleidingduinen (AWD) are part of the Natura2000 region of Kennemerland-Zuid and therewith belong to the best nature reserves for dune habitats in Europe. At the same time, they play an essential role in providing the city of Amsterdam of drinking water, partly thanks to the unique biodiversity characteristics of the dunes. Other services include coastal protection and recreation. The actual services provided by the dunes and their potential trade-offs in space and time are currently not well understood. Here, you will make an inventory thereof to be able to better manage and restore the dunes, accounting for the various services provided.
Supervisors: prof.dr. Peter van bodegom; email p.m.van.bodegom@cml.leidenuniv.nl tel 7486.
Ir. Luc Geelen email luc.geelen@waternet.nl tel.06-13602995

What drives species distribution patterns?
While many theories exist on drivers of species distributions, such as climate, land use or biotic interactions, the actual relative importance of each of those drivers is highly debated. Such understanding is pivotal, however, when making predictions of future biodiversity. Pines are a dominant contributor of forests throughout Europe, while the importance of climate (why is it profitable to be an evergreen), lag times (restoration of the distribution since the last ice age) and

biotic interactions (competition with broadleaved trees) is unknown. In international collaboration, we compiled a unique dataset on pinaceae traits, distributions of individual species and high resolution climate and land use maps. Here, we will analyse the available information to better understand why pines are distributed the way they are and the traits that make them so successful.
Supervisor: prof.dr. Peter van Bodegom; email p.m.van.bodegom@cml.leidenuniv.nl tel 7486.

Functional diversity from space
Policy makers, nature managers and companies increasingly demand high resolution information on biodiversity. Inventories are not capable of providing that information. Instead, new satellites with high resolution performance may be able to do so. However, the information on biodiversity is "locked" within the satellite reflectance signals in currently unknown ways. We aim to bring this application a step closer. Possible topics include: i) measurement of hypespectral reflectance for a range of algal species to allow determining the spatial distribution of algae, ii) deciphering the contribution of plant leaf components to the observed signal. Here, a special role is attributed to chlorophyll, the prime driver of vegetation productivity, for which its distribution across different plant species is currently not known (but essential when linking reflectance to plant species identity), and iii) Developing tools (in collaboration with University College London) to derive functional diversity of vegetation from satellite images.
Supervisor: prof.dr. Peter van Bodegom; email p.m.van.bodegom@cml.leidenuniv.nl tel 7486.

How will biodiversity change in the near future?
Global vegetation models have been used extensively during the last decade to make predictions about the projected vegetation changes upon climate change (e.g. used in the IPCC reports). For long, this models neglected biodiversity completely and assumed that e.g. all tropical forests function in the same way, independent of location. Recently, we improved these models by incorporating variation in vegetation characteristics within these models. However, by including biodiversity, new questions were raised: How quickly will vegetation by able to change its characteristics, through which process (plasticity, adaptation, species replacement) and will each vegetation type be able to respond similarly quickly? Through a review of existing knowledge, these questions will be evaluated within the context of the ecological strategies of the species involved.
Supervisor: prof.dr. Peter van Bodegom; email p.m.van.bodegom@cml.leidenuniv.nl tel 7486.

Interdependency of connected habitats: macro-invertebrates diversity in ditches
The community of species that are found at a location are determined by local factors, but also by the connectivity of the location to other locations of the same habitat. Macro-fauna in ditches are an excellent model-system to study the importance of connectivity.
Supervisor: dr. C.J.M. Musters, tel. 5618, e-mail musters@cml.leidenuniv.nl

Traits of species and environmental stressors
In the Netherlands, environmental stress on aquatic systems (by nutrients or pesticides) may differ greatly per location. Are these ecosystems also different in the trait modalities that can be found within the communities? Or do the same species show different trait expressions under different stress? And what can that tell us about nature conservation measures?
Supervisor: dr. C.J.M. Musters, tel. 5618, e-mail musters@cml.leidenuniv.nl

Global analysis of plant intraspecific trait variation patterns. MSc project The question to what extent are leaving organisms able to vary their functional traits (species-specific morphological and physiological features) is the fundamental ecological challenge and is currently a very hot topic in ecological research. Within this project you will work with the world-largest plant trait data base TRY https://www.try-db.org/TryWeb/Home.php/. You will seek to answer the question what are the

intraspecific (i.e. within species) variation patterns of distinct plant functional traits; and how these variation patterns could help us to explain the evolution of mechanisms determining the ability of plants to adapt to their environment.

Supervisor: Dr. Nadia Soudzilovskaia. Email : n.a.soudzilovskaia@cml.leidenuniv.nl