

Conservation in farmland –Exam thesis project proposals

We offer a number of exam thesis projects that concern preservation/restoration of biodiversity in farmland. In addition to these projects, you are welcome to discuss your own ideas about exam thesis projects with us.

Does landscape heterogeneity affect the decline of farmland birds?

In Sweden farmland bird populations have declined for decades, reflecting trends throughout



northern Europe. It has been suggested that these declines result from a loss of ecological heterogeneity at multiple spatial and temporal scales as a universal consequence of agricultural intensification. If so, research should develop cross-cutting policy frameworks and management solutions that restore that heterogeneity as the key to restore and sustain biodiversity in farmland. However, it is not clear at which spatial scale ecological heterogeneity is important. This project

examines the *effect of ecological heterogeneity at several spatial scales* on bird biodiversity. In one subproject, we evaluate the effect of the amount of field-borders on bird biodiversity in landscape of different types (dominated by mixed farming or by cereal farming). In another sub-project we evaluate the effect of between-field heterogeneity (pastoral, cereal or mixed



farms) on bird biodiversity when matching for other structures in the landscape. Study sites are selected using GIS-analyses of spatially explicit habitat data as a tool. Birds are monitored using transect counts. A third sub-project concerns foraging ecology of birds in contrasting landscapes. The projects will be supported by a field assistant. Supervisor: Henrik Smith (Henrik.Smith@zoekol.lu.se)

Does habitat management for wildlife benefit passerine

birds

Multifunctional use of farmland has been suggested to be one way to improve conditions for biodiversity. Some farmers improve their land for the benefit of wildlife, because they are interested in sports hunting. It has been suggested that this may improve conditions for breeding birds in general. However, neither has the general idea been evaluated in Sweden or the effect on biodiversity of the different measures that are used to improve conditions for wildlife, been evaluated. In this project, bird biodiversity and density on estates with and without explicit wildlife management is evaluated. The project will be supported by a field assistant. Supervisor: Henrik Smith



(Henrik.Smith@zoekol.lu.se)

Ecosystem functioning and agricultural intensification



Agricultural intensification has been suggested to negatively affect the ecosystems ability to provide essential ecosystem services, i.e. the benefits people obtain from ecosystems. Increased landscape heterogeneity and conversion to organic farming might be potential tools to reduce the negative effects of intensification and contribute to maintained ecosystem functioning. In this project, there will be possibilities to study at least two ecosystem service providing the service (e.g. bees, hoverflies, predatory insects) or the product of the service (e.g. seed-set in plants, number of pests), or a combination of both. By identifying factors that affect ecosystem services you can

suggest measures that will sustain future ecosystem functioning. Supervisor Maj Rundlöf (Maj.Rundlof@zoekol.lu.se)

Alfa and beta diversity on organic and conventional farms

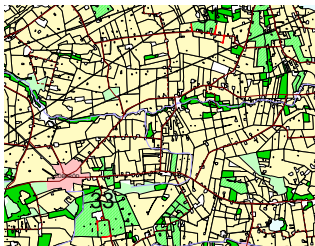
Ecological heterogeneity has been identified as a key factor for restoring and sustaining biodiversity in agricultural landscapes. Organic farming, which is differentiated from



conventional farming by the exclusion of agrochemicals, have been suggested to increase heterogeneity. The aim of this project is to study heterogeneity on matched organic and conventional farms. By measuring local diversity (α -diversity, within community diversity) and the variation in local diversity (β -diversity, between community diversity) and relate this measures to farming practice you can draw conclusions on the community heterogeneity between organic and conventional farms. Farm heterogeneity might be an important

mechanism for the often beneficial effect of organic farming on biodiversity. Supervisor Maj.Rudlof@zoekol.lu.se

GIS as a tool to study effects of land-use intensity on farmland birds



Many farmland birds are declining strongly in distribution and abundance, to a large degree because of the intensified land-use in agricultural landscapes. By combining a regional bird survey in southern Sweden with spatially explicit land-use information in Arc GIS, you can study the effect of land-use intensity (organically or conventionally managed) on the distribution of bird territories. The project includes selection of an appropriate bird species, digitizing of bird territories and spatial analyses to combine territory and land-

use data. Supervisor: Maj Rundlöf (Maj.Rundlof@zoekol.lu.se)

The need of wild insects for crop pollination

Many economically important crops are assumed to depend on insects for pollination, but the knowledge for many crop species is surprisingly poor. One such example is brown beans, which at least regionally is an important crop. In other cases, it is known that the crop depend on insects for pollination, but the relative importance of pollinator species is unknown. In collaboration with Torslunda försöksstation (experimental farm) on Öland, you will study pollinators and pollination on a few selected crop species. From these data it is also possible to extrapolate the economic value of the pollination performed by wild insects. Supervisor Erik Öckinger (Erik.Öckinger@zoekol.lu.se)



Is butterfly species richness related to land use history?

There is increasing evidence that the local distribution of at least some plant species is strongly related to the land use history. However, it is not known to what extent this has cascading effects on insects. In this project, you will survey butterfly species richness in an area on Öland (Jordtorp) with well-known land use history. Patterns in butterfly species richness and the distribution of individual butterfly species can then be related to historical land use data and to existing data on plant species richness. Supervisor Erik Öckinger (Erik.Öckinger@zoekol.lu.se)

Species richness in urban environments



Which factors affect biodiversity in urban environments? How is species richness of different taxonomic groups in urban areas correlated? How should urban green areas be designed and managed in order to maximize biodiversity? Here, you can survey your favourite group of species and compare to existing data on species richness of butterflies in the city of Malmö. Supervisor Erik Öckinger

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Pollen collection and preferences in bumblebees

Bumblebees are decreasing in agricultural areas across most of the world. Some species are more adversely affected by modern agricultural practices than others. There may be several reasons for this, e.g. the degree of forage (nectar and pollen plant) specialisation. In this project you may work with one or more bumblebee species; collect wild bees and/or use reared colonies. You will work in an experimental system of localities of contrasting heterogeneity. You will identify pollen collected by bees via reference material from flowers. An experimental system of localities of contrasting heterogeneity, already used in other project may also be used here. Supervisor Anna Persson (Anna.Persson@zoekol.lu.se)

Importance of private gardens for wild bee foraging



In a simple, intensely farmed landscape flowers are scarce and some periods may be almost completely void of nectar and pollen resources. Mass flowering crops, e.g. oilseed rape, flower during a very restricted period. Private gardens may offer bees the necessary pollen and nectar resources over the whole season. You may for example do inventories of bees, bumblebees and flower resources and identify pollen from garden flowers. An experimental system of localities of contrasting heterogeneity, already used in other project may also be used here.

Supervisor Anna Persson (Anna.Persson@zoekol.lu.se)

Foraging behaviour of solitary bees

In solitary bees the female gathers pollen to put into cells where she lays an egg. The cell is then sealed off and another one is constructed outside of the first. The distance travelled to forage is thought to differ between species. The time it takes to find enough pollen for one cell may be important e.g. to the number and quality of offspring produced and consequently survival of the bee population. Via use of artificial nesting places, direct observation and video cameras you may investigate the effects of flower resources and foraging time on reproduction in bees. It may also be possible to compare species. An experimental system of localities of contrasting heterogeneity, already used in other project may also be used here. Supervisor Anna Persson (Anna.Persson@zoekol.lu.se)

Migrating birds in farmland

Modern agricultural techniques have been shown to have negative effects on many different organism groups. Among birds, many species that are connected to farmland in one way or the other have declined dramatically during the last decades. Numerous studies have been done on bird species that either breed or over-winter on arable land. Some migrating species, however, do also spend an important part of their life cycles in arable landscapes. Since both time- and energy constraints are high also during migration, we'd expect these species to be affected as well. But studies on birds using farmland during migration are rare. During my PhD-project, I try to find out more about which bird species use arable areas during migration, and whether modern agriculture is beneficial to those species or not.

In a general approach, I monitored birds on different farms in respect to landscape type, farming practice (organic vs non-organic) and different crops. But there are still many questions to answer! So, if you are interested to study birds during their migration season, and to see how today's farmland practices affect them, there are many opportunities for a variety of projects!

I also do more ***detailed studies*** on the Golden Plover (*Pluvialis apricaria*), a wader species that occurs in high numbers each autumn (and spring) in Southern Sweden, using the most intensively arable areas as a stop-over site. In this study, radio-transmitters are used in combination with catching, time-budget studies, respirometer studies and intense observations during day and night to learn more about the bird's behaviour and ecology in Scania. Even within this project, there are plenty of possibilities for honour projects.

Does any of this sound interesting to you, please contact: Juliana Dänhardt, Juliana.danhardt@zoekol.lu.se, 046-222 37 95. We can then discuss possible projects according to your own interests!

Climate change and the expansion of rare species

With a warming climate many species are expected to expand northwards, provided there is suitable habitat available. However, to predict the potential of a species to expand, knowledge about its habitat requirements, habitat distribution and dispersal ability are needed. I have started a study aiming at understanding the effect of macro- and micro-climate and on the distribution and population dynamics of the rare butterfly species *Pyrgus armoricanus*. In this system, several different projects on for example the importance of micro-climate for habitat selection or metapopulation dynamics are possible. Contact me for discussions if you are interested in this topic. Supervisor Erik Öckinger (Erik.Öckinger@zoekol.lu.se)

Population dynamics and conservation of solitary bees



Contact: Markus Franzén (markus.franzen@zoekol.lu.se) or Sven G. Nilsson (sven.nilsson@zoekol.lu.se).

Clearcuts as refuges for farmland butterflies

Clearcuts are getting more and more attention as refuge habitats for many butterfly species. In



particular, butterflies that decrease in the farmland landscape have often colonized clearcuts. But little is known about how clearcut age influences butterfly diversity. Here, you will quantify the butterfly fauna of clearcuts of different age categories in a design which takes overall landscape variability into account. The project is suitable for June/July/August. Supervisor: Lars Pettersson (lars.pettersson@zoekol.lu.se)

Host plants as a key to understanding the distribution of geometrid moths

The Cumbrian UMBER, *Horisme aquata*, is a geometrid moth which is closely associated with its host plant (*Pulsatilla pratensis*, fältspippa). The distribution of this endangered red listed moth is restricted



to Scania and Blekinge. However, despite the fact that the host plant populations are well known, no attempt has been made to use this information to map and understand the distribution and abundance of the endangered moth. In this project (suitable for a project start in April/May), you will survey Cumbrian UMBER populations and relate distribution patterns to host plant abundance as well as to environmental parameters. Supervisor: Lars Pettersson (lars.pettersson@zoekol.lu.se)

Where are all the moth caterpillars?

Many studies point towards grasslands being highly important for moth diversity. Numerous moth species pupate in the soil and birds use moth caterpillars from grassland to feed their young during peak breeding effort. Nevertheless, most studies trying to quantify the density of these moth larvae and pupae have failed. There simply hasn't



been a good way of sampling emerging noctuid moths. But now there is. In this project, you will use multiple emergence traps to quantify moth recruitment patterns from natural habitats in the Revinge area. The project is suitable for June/July/August. Supervisor: Lars Pettersson

(lars.pettersson@zoekol.lu.se)

Moth diversity in short rotation willow coppicing

Short rotation coppicing (energiskogsodling) is abundant in the landscape but its impact on invertebrate biodiversity is little known. Coppicing is often seen as a potential problem that may lead



to trivialization of the landscape. At the same time, willow (*Salix*) attracts numerous insects and is associated with the major peak in moth diversity during April-May. In this project, you will investigate moth diversity as a function of age and size of short rotation willow stands.

Supervisor: Lars Pettersson (lars.pettersson@zoekol.lu.se)

Flight altitude of summertime moths

Rooftop mercury lamp moth traps have recently demonstrated that a considerable number of large moths are active far above the ground level. Many of these species are typical migrants. By using a



network of rooftop and ground-level trap pairs, you will be able to characterize an important but largely unknown part of the Swedish moth fauna. There will both migrants and residents and your probability of finding new species for Sweden is quite good – maybe a bonus? The project is suitable for June/July/August. Supervisor: Lars Pettersson (lars.pettersson@zoekol.lu.se)

Spatial dynamics of moth diversity during willow flowering

Willow (*Salix*) flowering is associated with a peak in moth diversity in April-May. However, these



patterns have rarely been investigated on a landscape scale. In this project, you will quantify spatial and temporal dynamics of larger moths in relation to host plants and landscape characteristics. The project is suitable for April/May.

Supervisor: Lars Pettersson (lars.pettersson@zoekol.lu.se)