Stay informed – get involved!

Briefing Sheets inform every six months on the progress within the activities and can be downloaded from our website. If you are interested in receiving the *EcoChange newsletter* on a six month basis, please subscribe to ecochange@seri.at or register on our website. You will then also get an invitation to the stakeholder workshop in summer 2011, where EcoChange results will be discussed with the public.

Find more information at www.ecochange-project.eu!

The EcoChange Project

Aim and Focus

The aim of EcoChange is to assess and forecast changes in terrestrial biodiversity and ecosystems. The project will assess the ability of biodiversity and ecosystems to supply humans with required goods and services and to buffer against climate and land use change.

The project concentrates on the one hand on the improvement of models and the generation of new data. On the other hand it will integrate the findings with socio-economic analysis. The work is organised within six activities.

Project information

EcoChange -"Challenges in assessing and forecasting biodiversity and ecosystem changes in Europe" is an Integrated Project with 22 Partners from all across Europe. It is supported by the 6th Framework Programme of the European Union.
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The consortium of EcoChange is led by the National Centre for Scientific Research (CNRS), Grenoble, France. Project Co-ordinator: Pierre Taberlet, pierre.taberlet@ujf-grenoble.fr

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EcoChange

Briefing Sheet Series
July 2008

New DNA-based Dispersal Data

Work Description of EcoChange Activity 3

Most species distribution models and dynamic global vegetation models ignore long-distance migration effects of plants and thus miss a possibility to predict these aspects of systems behaviour under scenarios of climate and land use change. Activity 3 will provide the theoretical basis and practical application for several plant species to estimate migration rates using novel statistical techniques. These estimates of long-distance dispersal will then be used for model development and improvement in the subsequent modelling activities. Thus, Activity 3 provides an important input to improve the accuracy of species distribution models and to make models more useful for decision and policy makers.

EcoChange Briefing Sheet

Activity 3
New DNA-based dispersal data

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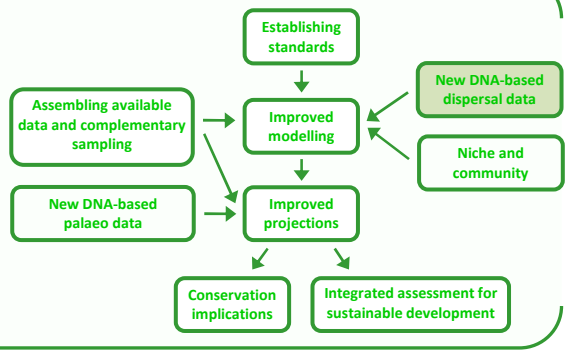

Overview

Although several modelling studies have predicted the way species' habitat may be shifted, few explicitly included the possibility for species or group of species to actually migrate to new habitats. If species frequently disperse over long distances, colonisation and migration rates can increase considerably.

Most species distribution models and dynamic global vegetation models (DGVMs) ignore such spatial processes. They thus miss an important driver of local to landscape-scale biodiversity distribution and the ability to predict the transient system's behaviour under scenarios of climate and land use change. Integrating dispersal mechanisms in predictive models of species range shift will help identifying which type of species will be able to track climate change occurring at a predicted rate. New possibilities to include these aspects would thus significantly increase the utility of such models for policy and decision makers.

Short-distance dispersal is relatively well studied in plants. However, the frequency of rare long-distance dispersal events is extremely difficult to estimate. However, according to pilot studies, dispersal potential of individual species can be estimated from the genetic makeup of the plants.

Populations of plant species with frequent long-distance migration are expected to be genetically more similar than the populations of plants with limited long-distance dispersal. Using this principle, a species' migration rate can be analysed by studying the differences between populations using genetic markers. This approach is a novel alternative to the traditional inference of migration rates from observed seed dispersal, which fails to capture the rate of long-distance dispersal events.

Objectives

Activity 3 will – based on molecular genetic markers – provide estimates of migration rates. These estimates of long-distance dispersal will then be used for model development and improvement in the subsequent modelling activities (mainly Activity 5 and 6) in order to assess the effects of plant dispersal on the structuring of historical and potential future ecosystems and biomes.

The theoretical part of this activity will assess how genetic markers can be used to evaluate the rare occurrences of long-distance dispersal for plants, and develop an experimental field protocol for estimating the dispersal abilities of plant species. Following the theoretical part, data for several key species will be sampled and analysed according to the protocol in order to infer long-distance dispersal for these.

Approaches

The first task was to investigate how best to spread the sampling effort, i.e. number of samples (individuals) per locality, spacing of samples within localities, spacing and numbers of localities, and number of genetic markers. Based on these outcomes a protocol for estimating plant dispersal based on molecular markers has been designed. The outcomes showed that many populations and many individuals need to be sampled to get a good idea of the rate of long-distance dispersal.

Within the 2nd part of Activity 3, knowledge about long-distance dispersal of several key species will be obtained, by applying the developed protocol. The objective will be to extract DNA from all samples and to analyse the produced data, according to the strategy designed in the theoretical part of Activity 3. In addition, the developed statistical method will be used to estimate the rate of long-distance dispersal for 40 species using existing data from the IntraBioDiv (http://intrabiodiv.vitamib.com/) project.

Expected results

- protocol for studying plant dispersal based on molecular markers
- estimate of long-distance dispersal for several key plant species in order to improve modelling within Activities 5 and 6