Connections between biodiversity and ecosystem functioning in large-scale natural ecosystems

Billions of years of evolution have given us a planet that supports a remarkable diversity of life. Estimates for the number of Eukaryotic species frequently number in the millions and the Prokaryotes are much more diverse than that. This biodiversity makes up the ecosystems that we, as humans, rely on to sustain almost every aspect of our lives. But, despite our reliance on these biodiverse ecosystems, we are eroding them at an alarming rate through habitat destruction, overexploitation and our transformation of the climate. Indeed, some estimates suggest that the rate at which species are going extinct is as high as previous mass extinction events that have sporadically occurred throughout earth's history. How will this loss of biodiversity affect the functioning of ecosystems that we rely on? How much biodiversity do we need for healthy ecosystems? These are some of the questions that researchers began to address in the early 1990's. Based on hundreds of experimental manipulations of biodiversity, there is a general scientific consensus that biodiverse ecosystems tend to be more stable and more productive than depauperate ones. However, much of this work has taken place in artificial, experimental systems and at small scales of space and time. Thus, several questions remain. For example, if small-scale experiments show that biodiversity is important for ecosystem functioning, will the effects be the same at large scales? If ten species are required to maximise ecosystem functioning in a one square meter experimental grass patch, how many are required in a whole meadow, or in a landscape with many meadows? In my thesis, I attempt to extend our knowledge so we can better understand the consequences of biodiversity loss in natural systems and at larger scales of space and time.

James G. Hagan

ISBN 978-91-8069-499-5 (PRINT)
ISBN 978-91-8069-500-8 (PDF)
Available online: http://hdl.handle.net/2077/78770

Licentiate thesis

Connections between biodiversity and ecosystem functioning in large-scale natural ecosystems | James G. Hagan 2023

PH.D. THESIS