Seminar (experimentelle) Biodiversitätsforschung (A12, GM3, F29)

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Vorbesprechung & Einführung

25. Oktober 2010 10:00-11:30 Uhr S22

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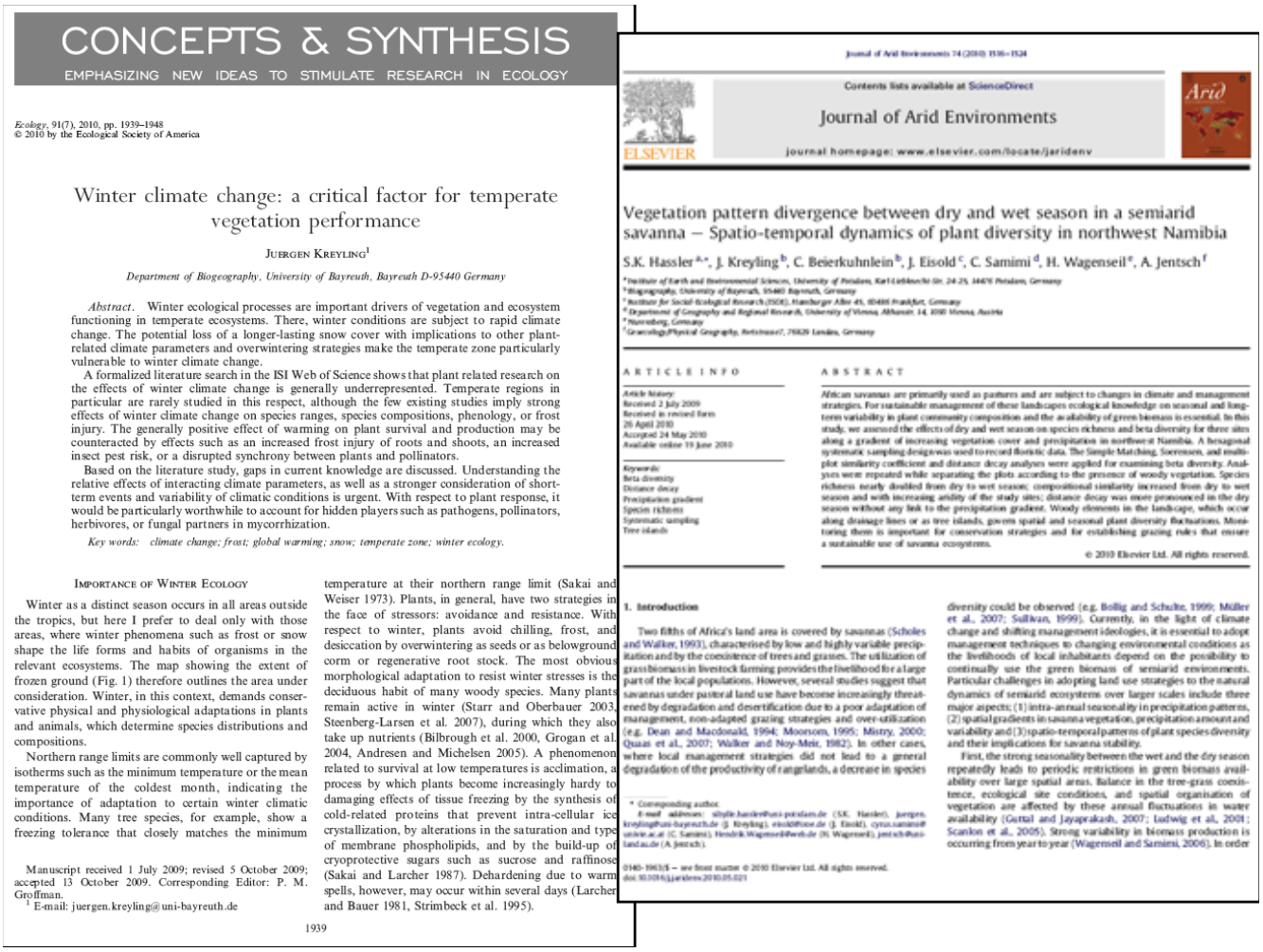
Seminar Biodiversität Winter 2010/11 – Einführung und Vorbesprechung

Einordnung

MSc Geoökologie A12:
„Methoden der Biodiversitätsforschung“
(gemeinsam mit Übung „Multivariate Analyse komplexer biologischer Datensätze“ (Steinbauer)

(MSc Geoökologie GM3:
„Angewandte Biogeographie“
gemeinsam mit Naturschutzpraxis (Frobel/ Moder))

MSc Biodiversity & Ecology F29:
„Angewandte Biogeographie“
(gemeinsam mit Naturschutzpraxis (Frobel/ Moder))



CONCEPTS & SYNTHESIS
EMPHASIZING NEW IDEAS TO STIMULATE RESEARCH IN ECOLOGY

Ecology, 91(7), 2010, pp. 1939–1948

Winter climate change: a critical factor for temperate vegetation performance

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Abstract. Winter ecological processes are important drivers of vegetation and ecosystem functioning in temperate ecosystems. There, winter conditions are subject to rapid climate change. The potential loss of a longer-lasting snow cover with implications to other plant-related climate parameters and overwintering strategies make the temperate zone particularly vulnerable to winter climate change.

A formalized literature search in the ISI Web of Science shows that plant related research on the effects of winter climate change is generally underrepresented. Temperate regions in particular are rarely studied in this respect, although the few existing studies imply strong effects of winter climate change on species ranges, species compositions, phenology, or frost injury. The generally positive effect of warming on plant survival and production may be counteracted by effects such as an increased frost injury of roots and shoots, an increased insect pest risk, or a disrupted synchrony between plants and pollinators.

Based on the literature study, gaps in current knowledge are discussed. Understanding the relative effects of interacting climate parameters, as well as a stronger consideration of short-term events and variability of climatic conditions is urgent. With respect to plant response, it would be particularly worthwhile to account for hidden players such as pathogens, pollinators, herbivores, or fungal partners in mycorrhization.

Key words: climate change; frost; global warming; snow; temperate zone; winter ecology.

IMPORTANCE OF WINTER ECOLOGY

Winter as a distinct season occurs in all areas outside the tropics, but here I prefer to deal only with those areas, where winter phenomena such as frost or snow shape the life forms and habits of organisms in the relevant ecosystems. The map showing the extent of frozen ground (Fig. 1) therefore outlines the area under consideration. Winter, in this context, demands conservative physical and physiological adaptations in plants and animals, which determine species distributions and compositions.

Northern range limits are commonly well captured by isotherms such as the minimum temperature or the mean temperature of the coldest month, indicating the importance of adaptation to certain winter climatic conditions. Many tree species, for example, show a freezing tolerance that closely matches the minimum temperature at their northern range limit (Sakai and Weiser 1973). Plants, in general, have two strategies in the face of stressors: avoidance and resistance. With respect to winter, plants avoid chilling, frost, and desiccation by overwintering as seeds or as belowground corm or regenerative root stock. The most obvious morphological adaptation to resist winter stresses is the deciduous habit of many woody species. Many plants remain active in winter (Starr and Oberbauer 2003, Steenberg-Larsen et al. 2007), during which they also take up nutrients (Bilbrough et al. 2000, Grogan et al. 2004, Andresen and Michelsen 2005). A phenomenon related to survival at low temperatures is acclimation, a process by which plants become increasingly hardy to damaging effects of tissue freezing by the synthesis of cold-related proteins that prevent intra-cellular ice crystallization, by alterations in the saturation and type of membrane phospholipids, and by the build-up of cryoprotective sugars such as sucrose and raffinose (Sakai and Larcher 1987). Dehardening due to warm spells, however, may occur within several days (Larcher and Bauer 1981, Strimbeck et al. 1995).

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Vegetation pattern divergence between dry and wet season in a semiarid savanna – Spatio-temporal dynamics of plant diversity in northwest Namibia

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ABSTRACT

African savannas are primarily used as pastures and are subject to changes in climate and management strategies. For sustainable management of these landscapes ecological knowledge on seasonal and long-term variability in plant community composition and the availability of green biomass is essential. In this study, we assessed the effects of dry and wet season on species richness and beta diversity for three sites along a gradient of increasing vegetation cover and precipitation in northwest Namibia. A hexagonal systematic sampling design was used to record floristic data. The Simple Matching, Sorensen, and multi-plot similarity coefficient and distance decay analyses were applied for examining beta diversity. Analyses were repeated while separating the plots according to the presence of woody vegetation. Species richness nearly doubled from dry to wet season; compositional similarity increased from dry to wet season and with increasing aridity of the study sites; distance decay was more pronounced in the dry season without any link to the precipitation gradient. Woody elements in the landscape, which occur along drainage lines or as tree islands, govern spatial and seasonal plant diversity fluctuations. Monitoring them is important for conservation strategies and for establishing grazing rules that ensure a sustainable use of savanna ecosystems.

1. Introduction

Two fifths of Africa's land area is covered by savannas (Scholes and Walker, 1993), characterised by low and highly variable precipitation and by the coexistence of trees and grasses. The utilization of grass biomass in livestock farming provides the livelihood for a large part of the local populations. However, several studies suggest that savannas under pastoral land use have become increasingly threatened by degradation and desertification due to a poor adaptation of management, non-adapted grazing strategies and over-utilization (e.g. Dean and Macdonald, 1994; Moorsom, 1995; Mistry, 2000; Quaas et al., 2007; Walker and Noy-Meir, 1982). In other cases, where local management strategies did not lead to a general degradation of the productivity of rangelands, a decrease in species diversity could be observed (e.g. Bollig and Schulte, 1999; Müller et al., 2007; Sullivan, 1999). Currently, in the light of climate change and shifting management ideologies, it is essential to adopt management techniques to changing environmental conditions as the livelihoods of local inhabitants depend on the possibility to continually use the green biomass of semiarid environments. Particular challenges in adopting land use strategies to the natural dynamics of semiarid ecosystems over larger scales include three major aspects: (1) intra-annual seasonality in precipitation patterns, (2) spatial gradients in savanna vegetation, precipitation amount and variability and (3) spatio-temporal patterns of plant species diversity and their implications for savanna stability.

First, the strong seasonality between the wet and the dry season repeatedly leads to periodic restrictions in green biomass availability over large spatial areas. Balance in the tree-grass coexistence, ecological site conditions, and spatial organisation of vegetation are affected by these annual fluctuations in water availability (Guttal and Jayaprakash, 2007; Ludwig et al., 2001; Scanlon et al., 2005). Strong variability in biomass production is occurring from year to year (Wagenseil and Samimi, 2006). In order

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Dieses Seminar…

… dient der Vertiefung des wissenschaftlichen Schreibens inklusive dem Kennenlernen von Publikationsabläufen

… soll das Interesse an Biodiversität wecken bzw. verstärken und einen Überblick über aktuelle Fragen der Biodiversitätsforschung vermitteln

… dient zur Vorbereitung von Abschlußarbeiten in diesem Bereich (inhaltlich & technisch)

... mündet in einer Ausgabe von „Biodiversitätsforschung aktuell“ (Online Journal mit peer-review)

Anforderungen

- gut aufbereitete (Graphen, Darstellung), fehlerarme **Präsentation** pro Mensch, 20 min + 10 min Diskussion
- „peer-reviewte“ wissenschaftliche **Ausarbeitung** dazu 2 Woche vorher (ca. 10 S.) (und anschließend Einarbeitung eventuell nötiger Korrekturen)
- **Anwesenheit** bei den Sitzungs-Terminen
- **Teilnahme** an den Diskussionen
- **Leitung der Diskussion** bei einem anderen Referat
- **Review** von zwei anderen Arbeiten

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Wissenschaftliche Ausarbeitung?

- Einstiegsliteratur, dann eigenständige Recherche in wissenschaftlichen Datenbanken (Web of Science)
- Korrekte Zitierweise
- Richtige Rechtschreibung
- Englische Texte & Vorträge möglich
- Mindestens fünf aktuelle Artikel gelesen, behandelt und zitiert

- => siehe AGB Manuskripterstellung und Skript wissenschaftliches Arbeiten auf der Biogeo-Webseite!

Ablauf „peer review“

- analog zum Vorgehen in Fachzeitschriften
- Abgabe in elektronischer Form 2 Wochen vor Termin beim „Editor“ (= ich)
- Der Editor gibt das Manuskript an 2 anonyme „Gutachter“ weiter, die innerhalb einer Woche das Manuskript anhand der „AGB Manuskripterstellung“ begutachten und Mängel aufzeigen (konkret & konstruktiv, inhaltlich & formal)
- Die Gutachten gehen an den Editor und zusammen mit seiner Einschätzung an den Autor zurück. Mängel werden im Vortrag und der endgültigen Ausarbeitung behoben

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als Diskussionsleiter/in

- Der Diskussionsleiter hat die Verantwortung für eine sinnvolle inhaltliche Nutzung der 10-minütigen Diskussion
- Zunächst kurze Zusammenfassung geben
- Als erstes Verständnisfragen abhandeln, dann weitergehende Fragen (Reihenfolge der Fragenden beachten, evt. notieren)
- Eigene Fragen vorbereiten

Themenvergabe

1	Was ist Biodiversität und (wie) kann man sie messen?
2	Räumliche Biodiversität – jenseits von Artenzahlen
3	Die Bedeutung genetischer Diversität und aktuelle Forschungsbeispiele
4	„und die im Dunkeln sieht man nicht" - Biodiversität der Bodenlebewesen
5	Unter Wasser ist es auch dunkel – zur Biodiversität der Ozeane
6	Die Evolution von Biodiversitätsexperimenten
7	Design & Auswertung von Biodiversitätsexperimenten
8	Koexistenz: Ursachen des Zusammenlebens vieler Arten
9	Bedeutung von Skalen in der Biodiversitätsforschung
10	Diversität und Klimawandel – Prognosen und Funktionen von Diversität
11	Ist mehr besser? Biodiversität und Invasibilität
12	Biodiversität in der Kulturlandschaft
13	Indikatoren für hohe Artenzahlen in verschiedenen Taxa
14	functional traits and types – Fortschritt & Kritik
15	Störung und Diversität – die “Intermediate disturbance Hypothesis”
16	Die Bedeutung von „remnant species“?
17	Schutz von Biodiversität

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Terminvereinbarung

- Dienstag 18.01. 10-13 Uhr S1.23 (Biogeo-Seminarraum)
- Dienstag 25.01. 10-13 Uhr S1.23 (Biogeo-Seminarraum)