Zoologische und botanische Forschung in Südtirol
Ricerca zoologica e botanica in Alto Adige
Zoological and botanical research in South Tyrol

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Zoologische und botanische Forschung in Südtirol
Ricerca zoologica e botanica in Alto Adige

Tagungsprogramm | **Programma del convegno**

DONNERSTAG / GIOVEDÌ / THURSDAY 03.09.2020

8:00 Anmeldung / Registrazione / Registration

8:50 Eröffnung der Tagung / Inaugurazione del convegno / Conference opening

Pflanzen und Tiere in ihrer Umwelt
Piante e animali nel loro ambiente
Plants and animals in their environment

Session chair: Michael Steinwandter, Institute for Alpine Environment, Eurac Research, Bozen/Bolzano (I)

9:00 **Dynamik im Fluss: Status, Bedrohung und Zukunftsperspektiven von Kiesbankheuschrecken in den Alpen**
ARMIN LANDMANN
Institut für Ökologie, Universität Innsbruck (A)

9:20 **Intensivierung der Landwirtschaft in Obst- und Mähwiesen verändert die Boden-Makroinvertebraten-Gemeinschaften unterschiedlich**
ELIA GUARIENTO[1,2], FILIPPO COLLA[1,2], MICHAEL STEINWANDTER[1], JULIA PLUNGER[1], ULRIKE TAPPEINER[1,2] & JULIA SEEBER[1,2]
[1]Institut für Alpine Umwelt, Eurac Research, Bozen (I)
[2]Institut für Ökologie, Universität Innsbruck (A)

9:40 **Fledermäuse im Südtiroler Etschtal – intensiver Obstbau versus Schutzgebiete**
EVA LADURNER
Naturmuseum Südtirol, Bozen (I)

10:00 **Einfluss von Bodenfaktoren auf die taxonspezifische Zusammensetzung von Gefäßpflanzen der *Festucetalia valesiacae* - Eine Bestandsaufnahme sekundärer Trockenrasengesellschaften ausgewählter Untersuchungsflächen in der Umgebung von Bozen und im Unteren Eisacktal**
MARION FINK & JULIA SEEBER
Institut für Ökologie, Universität Innsbruck (A)

10:20 **Dendrochronologische Datierung alter Baumstämme aus dem Schrummsee, Ulten**
BIRGIT LÖSCH[1], KURT NICOLUSSI[2] & KLAUS STAFFLER[3]
[1]Lana (I)
[2]Institut für Geographie, Universität Innsbruck (A)
[3]Forststation Ulten (I)

10:40 **Diskussion / Discussione / Discussion**

10:50 **Kaffeepause / Pausa caffè / Coffee break**

Klimawandel
Cambiamento climatico
Climate change

Session chair: Brigitta Erschbamer, Department of Botany, University of Innsbruck (A)

11:20 **Diversity changes along elevation gradients in the Central and Southern Alps, Italy**
LENA NICKLAS, NILS BERTOL, IRIS TRENKWALDER, MARTIN MALLAUN & BRIGITTA ERSCHBAMER
Department of Botany, University of Innsbruck (A)

11:40 **Plant communities along elevational and temporal gradients at the GLORIA sites in the Dolomites**
NILS BERTOL, LENA NICKLAS, MARTIN MALLAUN & BRIGITTA ERSCHBAMER
Department of Botany, University of Innsbruck (A)

12:00 **Plant community development and soil characteristics in the glacier foreland of Zufallferner (Martell Valley, South Tyrol)**
KATHARINA RAMSKOGLER[1], SVENJA MÜLLER[2], BETTINA KNOFLACH[2], JOHANN STÖTTER[2], CLEMENS GEITNER[2] & BRIGITTA ERSCHBAMER[1]
[1]Department of Botany, University of Innsbruck (A)
[2]Department of Geography, University of Innsbruck (A)

12:20 **Resident vegetation modifies climate-driven elevational shift of a mountain sedge'**
HARALD CREPAZ[1], GEORG NIEDRIST[1], JOHANNES WESSELY[2], MATTIA ROSSI[3] & STEFAN DULLINGER[2]
[1]Institute for Alpine Environment, Eurac Research, Bozen/Bolzano (I)
[2]Department of Botany and Biodiversity Research, University of Vienna (A)
[3]Institute for Earth Observation, Eurac Research, Bozen/Bolzano (I)

12:40 **Pattern di diversità multitaxon lungo gradienti altitudinali nelle Alpi e nel massiccio della Majella**
JURI NASCIMBENE[1], CHIARA VALLESE[1], LUCA DI NUZZO[1,2], RENATO BENESPERI[1,2], ALESSANDRO CHIARUCCI[1], GABRIELE GHEZA[1], PAOLO GIORDANI[3], WALTER DI CECCO[4], LUCIANO DI MARTINO[4], MICHELE DI MUSCIANO[4], CHIARA LELLI[1], PETRA MAIR[5] & DANIEL SPITALE[5]
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[2]Università di Firenze (I)
[3]Università di Genova (I)
[4]Parco Nazionale della Majella (I)
[5]Museo di Scienze Naturali dell'Alto Adige, Bolzano (I)

13:00 **Diskussion / Discussione / Discussion**

13:10 **Mittagspause / Pausa pranzo / Lunch break**

Biodiversität, Verbreitung, Taxonomie
Biodiversità, Distribuzione, Tassonomia
Biodiversity, Distribution, Taxonomy

Session chair: Georg Niedrist, Institute for Alpine Environment, Eurac Research, Bozen/Bolzano (I)

14:30 **Biodiversitätsmonitoring Südtirol: Überblick über das Projekt und erste Ergebnisse aus dem Erhebungsjahr 2019 / Monitoraggio della biodiversità dell'Alto Adige: Panoramica del progetto e primi risultati della stagione di campo 2019**
ANDREAS HILPOLD[1]*, MATTEO ANDERLE[1]*, ELIA GUARIENTO[1], EVA LADURNER[2], LISA OBWEGS[1], CHIARA PANICCIA[1]*, JULIA PLUNGER[1], FLORIAN REICHEGGER[1], ALEXANDER RIEF[3], JOHANNES RÜDISSER[4], ALBERTO SCOTTI[1], JULIA SEEBER[1,4], DANIEL SPITALE[2], MICHAEL STEINWANDTER[1], SIMON STIFTER[1]*, JULIA STROBL[1], GEORG NIEDRIST[1], ROBERTA BOTTARIN[1] & ULRIKE TAPPEINER[1,4]

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[2]Naturmuseum Südtirol, Bozen (I)/ Museo di Scienze Naturali dell'Alto Adige, Bolzano (I)
[3]Innsbruck (A)
[4]Institut für Ökologie, Universität Innsbruck (A)
*presenting authors

15:20 **Taxonomie der Buntschwingel (*Festuca varia* s. latiss.) aus den Ostalpen**
PETER ENGLMAIER
Fakultät für Lebenswissenschaften, Universität Wien (A)

15:40 **I Molluschi Bivalvi Unionidi nei laghi di Monticolo e Caldaro (Provincia di Bolzano)**
MASSIMO MORPURGO[1], ELSA FROUFE[2], MANUEL LOPES-LIMA[2,3] & NICOLETTA RICCARDI[4]
[1]Museo di Scienze Naturali dell'Alto Adige, Bolzano (I)
[2]Aquatic Ecology and Evolution Group, CIIMAR - Interdisciplinary Centre of Marine and Environmental Research, University of Porto (P)
[3]Applied Ecology Group, CIBIO/InBIO - Research Center in Biodiversity and Genetic Resources, University of Porto (P)
[4]CNR – Istituto di Ricerca sulle Acque, Verbania Pallanza (I)

16:00 **Diskussion / Discussione / Discussion**

16:10 **Kaffeepause / Pausa caffè / Coffee break**

Session chair: Georg H. Niedrist, Department of Ecology, University of Innsbruck (A)

16:40 **Preliminary study on genetic diversity of *Anonconotus italoaustriacus* (Insecta - Orthoptera)**
FEDERICO MARANGONI[1], ISABEL MARTINEZ SANUDO[2], GIACOMO ORTIS[2], FILIPPO M. BUZZETTI[3], PAOLO FONTANA[4] & LUCA MAZZON[2]
[1]Università degli Studi di Verona (I)
[2]Università degli Studi di Padova (DAFNAE) (I)
[3]Fondazione Museo Civico di Rovereto (I)
[4]Fondazione Edmund Mach - Centro Trasferimento Tecnologico, Pergine Valsugana (I)

17:00 **Phylogeography and population genomics of alpine grasshoppers and bush crickets with highly fragmented distributions**
PHILIPP KIRSCHNER[1,2] & PETRA KRANEBITTER[1]
[1]Museum of Nature South Tyrol, Bozen/Bolzano (I)
[2]Department of Botany, University of Innsbruck (A)

17:20 **Akte „Small Mammals" – Die ungelösten Fälle der kleinen Säugetiere Südtirols**
EVA LADURNER[1], FEDERICA LAZZERI[1], PAOLO COLANGELO[2] & PETRA KRANEBITTER[1]
[1]Naturmuseum Südtirol, Bozen (I)
[2]Research Institute on Terrestrial Ecosystem, CNR, Montelibretti (I)

17:40 **Diskussion / Discussione / Discussion**

17:50 **Ende der Vorträge / Fine delle relazioni / End of lectures**

FREITAG / VENERDÌ / FRIDAY
04.09.2020

8:00 Anmeldung / Registrazione / Registration

Biodiversität, Verbreitung, Taxonomie
Biodiversità, Distribuzione, Tassonomia
Biodiversity, Distribution, Taxonomy

Session chair: Andreas Hilpold, Institute for Alpine Environment, Eurac Research, Bozen/Bolzano (I)

8:30 **Artenkenner gesucht – Das „Österreichische Freilandbotanik-Zertifikat“**
KONRAD PAGITZ
Institut für Botanik, Universität Innsbruck (A)

8:50 **Die Moosdatenbank des Naturmuseums Südtirol**
PETRA MAIR, JULIA PLUNGER & DANIEL SPITALE
Naturmuseum Südtirol, Bozen (I)

9:10 **Due nuovi ritrovamenti del genere *Cortinarius* per la Provincia di Bolzano.**
CLAUDIO ROSSI[1] & FRANCESCO BELLÚ[1,2]
[1]Comitato Scientifico Provinciale del Gruppo Micologico Bresadola, Bolzano (I)
[2]Museo di Scienze Naturali dell'Alto Adige, Bolzano (I)

9:30 **La medusa d'acqua dolce *Craspedacusta sowerbii* (Hydrozoa: Limnomedusae) nei laghi di Monticolo (Provincia di Bolzano): variazioni stagionali, alimentazione e genetica**
MASSIMO MORPURGO[1]*, PETER SCHUCHERT[2], SAMUEL VORHAUSER[3] & RENATE ALBER[3]*
[1]Museo di Scienze Naturali dell'Alto Adige, Bolzano (I)
[2]Museo di Storia Naturale di Ginevra (CH)
[3]Laboratorio Biologico, Provincia Autonoma di Bolzano – Alto Adige, Laives (I)
*presenting authors

9:50 **Monitoraggio del lupo in Alto Adige / Südtirol, dati storici e attuali (2014-2020); caso di studio mediante telemetria satellitare su una femmina alfa radio marcata.**
DAVIDE RIGHETTI, MARTIN STADLER, LUIGI SPAGNOLLI, ANDREAS AGREITER, WALTER RIENZNER, MANFRED MESSNER & MARTIN TRAFOIER
Provincia Autonoma di Bolzano – Ripartizione foreste, Ufficio Caccia e Pesca, Bolzano (I)

10:10 **Diskussion / Discussione / Discussion**

10:20 **Kaffeepause / Pausa caffè / Coffee break**

Natur und Mensch, Landschaftsökologie
Natura e uomo, ecologia del paesaggio
Nature and human, landscape ecology

Session chair: Renate Alber, Biological laboratory, Autonomous Province of Bozen / Bolzano– South Tyrol, Leifers (I)

10:50 **Veränderung der inneralpinen Trockenrasen des Vinschgaus (Südtirol, Italien) nach 40-50 Jahren**
MAXIMILIAN LÜBBEN & BRIGITTA ERSCHBAMER
Institut für Botanik, Universität Innsbruck (A)

11:10 **Sanierungs- und Restaurierungsarbeiten am Völser Weiher - Bereits erfolgte Aktionen und weiteres Vorgehen**
SAMUEL VORHAUSER & RENATE ALBER
Biologisches Labor, Autonome Provinz Bozen – Südtirol, Leifers (I)

11:30 **Räumlich-zeitliche Analyse der Jagdstatistiken zur Beurteilung der Veränderungen der Landschaftsqualität**
ERICH TASSER[1], BIRGITH UNTERTHURNER[2], JOHANNES RÜDISSER[3], ULRIKE TAPPEINER[1,3], LOTHAR GERSTGRASSER[2] & ANDREAS AGREITER[4]
[1]Institut für Alpine Umwelt, Eurac Research, Bozen (I)
[2]Südtiroler Jagdverband, Bozen (I)
[3]Institut für Ökologie, Universität Innsbruck (A)
[4]Amt für Jagd und Fischerei, Bozen (I)

Landwirtschaft, Pathologie
Agricoltura, Patologia
Agriculture, Pathology

Session chair: Renate Alber, Biological laboratory, Autonomous Province of Bozen / Bolzano– South Tyrol, Leifers (I)

11:50 **Genetic Diversity and Variability of the Chestnut Blight Pathogen in South Tyrol**
FAROOQ AHMAD & SANJA BARIC
Faculty of Science and Technology, Free University Bozen-Bolzano (I)

12:10 **Welche Rolle spielen Südtirols Apfelanlagen in der Pollenversorgung der Honigbiene?**
JACOB GEIER[1], BENJAMIN MAIR[1], MANFRED WOLF[1] & EDITH BUCHER[2]
[1]Land- und Forstwirtschaftliches Versuchszentrum Laimburg, Auer (I)
[2]Biologisches Labor, Autonome Provinz Bozen – Südtirol, Leifers (I)

12:30 **Diskussion / Discussione / Discussion**

12:40 **Mittagspause / Pausa pranzo / Lunch break**

14:00 Posterpräsentation / Presentazione poster / Poster presentation

Session chair: Thomas Wilhalm, Museum of Nature South Tyrol, Bozen/Bolzano (I)

Gewässerökologie
Ecologia acquatica
Aquatic ecology

Session chair: Roberta Bottarin, Institute for Alpine Environment, Eurac Research, Bozen/Bolzano (I)

15:00 **Kurzfristige und langfristige Auswirkungen der beschleunigten Erwärmung von Alpenwässern**
GEORG H. NIEDRIST & LEOPOLD FÜREDER
Institut für Ökologie, Universität Innsbruck (A)

15:20 **Assessing variation of stream benthic macroinvertebrates following changes in the catchment of the Long Term Ecological Research site of the Matsch Valley (South Tyrol)**
MAGDALENA VANEK, ALBERTO SCOTTI, ROBERTA BOTTARIN & ERICH TASSER
Institute for Alpine Environment, Eurac Research, Bozen/Bolzano (I)

15:40 **Which environmental factors shape the aquatic bryophyte community in selected mountain streams of the Eastern Alps?**
MAGDALENA WIDMANN[1], KARL HÜLBER[1], PETRA MAIR[2] & HARALD ZECHMEISTER[1]
[1]Division of Conservation Biology, Vegetation Ecology and Landscape Ecology, University of Vienna (A)
[2]Museum of Nature South Tyrol, Bozen/Bolzano (I)

16:00 **Kaffeepause / Pausa caffè / Coffee break**

Gewässerökologie
Ecologia acquatica
Aquatic ecology

Session chair: Roberta Bottarin, Institute for Alpine Environment, Eurac Research, Bozen/Bolzano (I)

16:30 **ALFFA - Gesamtheitliche (skalenübergreifende) Analyse der Einflussfaktoren und ihre Wirkung auf die Fischfauna im inneralpinen Raum**
KATJA SCHMÖLZ[1], ROBERTA BOTTARIN[1], AGNES FELBER[2], FELIX LASSACHER[3], WOLFGANG MARK[2], MICHAEL NIEDERWANGER[2], BERND PELSTER[2], ARIANNA PERON[4], MARTIN SCHLETTERER[5,6], ALBERTO SCOTTI[1], MELANIE THALER[7], JOSEF WIESER[7] & ERICH TASSER[1]
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[2]Institut für Zoologie, Universität Innsbruck (A)
[3]Ingenieurbüro für Biologie und Gewässerökologie, Innsbruck (A)
[4]Department of Atmospheric and Cryospheric Sciences (ACINN), Universität Innsbruck (A)
[5]TIWAG – Wasserkraft AG, Innsbruck (A)
[6]Institut für Hydrobiologie und Gewässermanagement (IHG), Universität für Bodenkultur Wien (A)
[7]Aquatisches Artenschutzzentrum, Agentur Landesdomäne der Autonomen Provinz Bozen, Schenna (I)

16:50 **Wiederherstellung des Fließgewässerkontinuums in Südtirol**
KATHRIN BLAAS* & PETER HECHER*
Agentur für Bevölkerungsschutz - Wildbachverbauung, Autonome Provinz Bozen – Südtirol, Bozen (I)
*presenting authors

17:10 **Fischmonitoring an den Wasserkraftwerken der Alperia-Gruppe**
MATTIA PERGHER[1] & GIORGIO CARMIGNOLA[2]
[1]Engineering and Consulting, Alperia AG, Bozen (I)
[2]Sustainable Water & Environmental Management, Alperia Greenpower GmbH, Bozen (I)

17:30 **Diskussion / Discussione / Discussion**

17:40 **Ende der Tagung / Fine del convegno /End of the conference**

Zoologische und botanische Forschung in Südtirol
Ricerca zoologica e botanica in Alto Adige

Vorträge – Kurzfassungen | **Relazioni – riassunti**

Genetic Diversity and Variability of the Chestnut Blight Pathogen in South Tyrol

FAROOQ AHMAD & SANJA BARIC
FACULTY OF SCIENCE AND TECHNOLOGY, FREE UNIVERSITY BOZEN-BOLZANO (I)

Chestnut blight is a fungal disease caused by *Cryphonectria parasitica* that is responsible for the chestnut decline in Europe. It causes canker-like symptoms on the stem and branches of susceptible host trees. Its ability to cause disease is decreased by a fungal virus, *Cryphonectria hypovirus 1*. This virus, that can naturally spread through hyphal anastomosis and fungal spores, was artificially introduced to South Tyrol in the 1990s. However, virus-mediated biocontrol can be hindered by a high diversity of vegetative compatibility (VC) types and a high rate of sexual reproduction. In recent years, an increase in the chestnut mortality rate has been perceived in South Tyrol. To successfully rely on the biocontrol measures in the region, updated information about the genetic diversity of *C. parasitica* is needed. This study aimed to investigate the genetic diversity and variability of *C. parasitica* in South Tyrol based on DNA analysis of the VC type loci, the mating type locus, and the internal transcribed spacer (ITS) region. Bark samples of diseased chestnut trees were collected from 35 different chestnut stands and one forest population representing the major chestnut growing areas of the region. *C. parasitica* was isolated from the diseased samples on nutrient medium and DNA was extracted from purified cultures. A high VC type diversity was found in sub-populations of South Tyrol. 23 out of 64 possible VC types were identified, resulting in a Shannon-diversity index of 1.88 and Evenness Index of 0.60. Furthermore, a balanced ratio (close to 1:1) of both mating types was found, which points to a high potential of sexual reproduction in the region. Based on ITS sequence analysis, the isolates from South Tyrol were more closely related to Asian isolates as compared to other European isolates. This study provided fundamental information needed to apply biocontrol measures in South Tyrol to control chestnut blight in the region and beyond.

Plant communities along elevational and temporal gradients at the GLORIA sites in the Dolomites

NILS BERTOL, LENA NICKLAS, MARTIN MALLAUN & BRIGITTA ERSCHBAMER
DEPARTMENT OF BOTANY, UNIVERSITY OF INNSBRUCK (A)

High elevation species in the Alps are considered particularly sensitive to climate change: up to 50% are expected to go extinct by the end of the 21st century due to competitive displacement by newly invading low-elevation species. This master thesis continues the monitoring of the GLORIA (**Gl**obal **O**bservation **R**esearch **I**nitiative in **A**lpine Environments, www.gloria.ac.at) sites in the Dolomites, started in 2001, and analyses the plant communities at the southern slopes from the treeline to the GLORIA-permanent plots at the summits. According to previous GLORIA studies, south-facing slopes are those with the highest changes.
In order to understand migration patterns and future developments, the investigation of the slopes below the summits and the determination of the local species pool is important. Therefore, this study analyses the vegetation of the south-facing slopes below the GLORIA-summits of the Dolomites (Trentino-South Tyrol, Northern Italy). After a phytosociological analysis, the plant communities of the slopes were compared with the ones found at the summits at the surveys of 2001 and 2015. In order to get a functional overview about the plant species occurring at the slopes, Landolt's ecological indicator values were used together with plant strategy types. Furthermore, differences of these ecological indicator values between the first and the last survey at the summits were analysed.
The high presence of thermophilic and mesophilous species along the transects as well as their increase on the summits give reasons to concern for the cryophilic species on the summits.

Wiederherstellung des Fließgewässerkontinuums in Südtirol

KATHRIN BLAAS* & PETER HECHER*
AGENTUR FÜR BEVÖLKERUNGSSCHUTZ - WILDBACHVERBAUUNG, AUTONOME PROVINZ BOZEN – SÜDTIROL, BOZEN (I)
*PRESENTING AUTHORS

Vor 20 Jahren trat die EU-Wasserrahmenrichtlinie in Kraft und mit den Zuständigkeiten für Etsch und Eisack gingen auch die letzten Fließgewässer vom Staat an das Land über. Die ehemalige Abteilung Wasserschutzbauten – seit 2016 Teil der Agentur für Bevölkerungsschutz – ist seitdem zuständig für Hochwassersicherheit und ökologische Funktionsfähigkeit aller Fließgewässer Südtirols (Ausnahme: Bonifizierungsgräben der Talsohlen).
Von zentraler Bedeutung für die Wiederherstellung der ökologischen Funktionsfähigkeit ist die Wiederherstellung des Fließgewässerkontinuums. Dieses ist eines der Hauptziele bei Revitalisierungsarbeiten und dabei wird unter anderem Fischen die Möglichkeit zurückgegeben, sich entsprechend ihrer natürlichen Veranlagung frei zu bewegen. So können sie, je nach Entwicklungsphase, Altersstufe und Jahreszeit, geeignete Gewässerabschnitte und Unterstände aufsuchen – ein Grundpfeiler eines gesunden und resilienten Gewässersystems mit natürlichen Fischbeständen.
Der prioritäre Fischwanderraum Südtirols, der 37 Fließgewässerabschnitte umfasst und eine Gesamtlänge von 452 km aufweist, war im Jahr 2000 noch durch künstliche Hindernisse (Wasserschutzbauten, Wasserfassungen und Stauanlagen) und in knapp 650 Fragmente zerstückelt. Insgesamt konnte die Agentur für Bevölkerungsschutz dort 42 Revitalisierungsprojekte erfolgreich umsetzen. Auch die Betreiber von Wasserkraftwerken leisten ihren Beitrag und so wurde bis zum Frühjahr 2020 die Zerstückelung um rund 250 Fragmente reduziert und der zusammenhängende Fischwanderraum um 69 km erweitert. Soweit eine Zwischenbilanz, die nächsten Revitalisierungsprojekte sind bereits in Planung und manche kurz vor Baubeginn.

Restoration of the river continuum in South Tyrol

The EU Water Framework Directive came into force 20 years ago and with responsibility for the Adige and Isarco rivers, the last rivers also passed from the state to the province. The former Department of Hydraulic Engineering – part of the Agency for civil protection since 2016 – has since then been responsible for flood safety and the ecological functionality of all river waters in South Tyrol (exception: drainage ditches in the valley floor).
The restoration of the river continuum is of central importance for the restoration of ecological functionality. This is one of the main objectives of the revitalization work, which will, among other things, give fish the opportunity to move freely according to their natural predisposition. Depending on their stage of development, age and season, they will be able to find suitable sections of water and shelters - a cornerstone of a healthy and resilient water system with natural fish stocks.
The priority fish migration area in South Tyrol, which comprises 37 river sections and a total length of 452 km, was broken up in 2000 by artificial obstacles (water protection structures, water catchments and dams) and broken down into almost 650 fragments. The Agency for civil protection was able to successfully implement 42 revitalization projects there. The operators of hydropower plants also make their contribution, and by spring 2020 the fragmentation was reduced by around 250 fragments and the contiguous fish migration area was expanded by 69 km. So far, for an interim assessment, the next revitalization projects are already being planned and some are about to start construction.

Resident vegetation modifies climate-driven elevational shift of a mountain sedge'

HARALD CREPAZ[1], GEORG NIEDRIST[1], JOHANNES WESSELY[2], MATTIA ROSSI[3] & STEFAN DULLINGER[2]
[1]INSTITUTE FOR ALPINE ENVIRONMENT, EURAC RESEARCH, BOZEN/BOLZANO (I)
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Many plant species have started to shift their ranges upslope in response to global warming, especially in alpine regions. However, these shifts vary considerably in rate, extent and direction, but the reasons of this variation are yet poorly understood. A process potentially important for mountain plant re-distribution is the competition between colonizing species and the resident vegetation. In this study we focus on the impact of this process using the recent elevational shift of the sedge *Carex humilis* in the Mazia Valley (South Tyrol) as a model system. We repeated a historical sampling (conducted in 1976) of the species in the study region and used the historical distribution data and historical climatic maps to parameterize a species distribution model (SDM) and compared the historical and the current re-survey in regards of the species' distribution area, migration and possible competitor effects influencing the species dispersal. We

found that *Carex humilis* in the Mazia Valley has shifted its leading range margin upward rapidly during the last 40 years (57.9 m per decade) but at the same time left many sites that have become climatically suitable since 1976 according to the SDM uncolonized. These suitable but uncolonized sites show significantly higher coverage of all dwarf shrub species and higher NDVI (Normalized Difference Vegetation Index) than the sites occupied by the sedge. These results suggest that resistance of the resident vegetation against colonization of migrating species can indeed play an important role for controlling the re-distribution of mountain plants under climate change.

Taxonomie der Buntschwingel (*Festuca varia* s. latiss.) aus den Ostalpen

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Die Buntschwingel (*Festuca* sect. Eskia bzw. *Festuca vari*a in der weiten Fassung HACKELS 1882) sind eine gesamtheitlich gut abgrenzbare Gruppe der südeuropäischen Hochgebirge, ihre interne Untergliederung wird aber nach wie vor kontroversiell diskutiert.
Seit der letzten umfassenden Darstellung durch WALLOSSEK (1999, 2000) wurden, einem allgemeinen Trend zur Fassung von Sippen im Artrang folgend, einige nomenklatorische Änderungen vorgeschlagen (FOGGI & al. 2007), die einer kritischen Prüfung im Kontext der gesamten Gruppe bedürfen. Molekularphylogenetische Untersuchungen, wie sie zwischenzeitlich von iberischen Sippen vorliegen (TORRECILLA & al. 2013) haben die geläufigen Sippenabgrenzungen bestätigt, an alpinen Sippen sind solche in Bearbeitung. Zudem sind vielerlei morphologische, ökologische und arealgeographische Details bekannt geworden, die eine Neubewertung der Taxonomie dieser Gruppe geboten erscheinen lassen:
Acidophile Sippen:
Mit *Festuca acuminata* reicht nur eine einzige diploide Sippe von Westen in den Ostalpenraum herein. Ihr seit MARKGRAF-DANNENBERG (1979) in Umrissen bekanntes, zerstückeltes Gesamtareal stellt WALLOSSEK (2000) anschaulich dar, zur weiter nach Südosten und Nordosten reichenden Arealgrenze siehe ENGLMAIER & WILHALM (2018).
Die karpatisch-sudetische Schwestersippe *F. versicolor* wurde mit den basiphilen Sippen des Nordostalpenraumes vereinigt (MARKGRAF-DANNENBERG 1979), morphologische und ökologische Gründe sprechen jedoch für eine Trennung im Artrang.
Die tetraploide *F. varia* s. str. hat ein klar umgrenztes Areal in den Ostalpen, dessen südlichste Vorposten bis Slowenien reichen.
Mehrere hexaploide Sippen mit auffällig reduzierter Anzahl von Rippen auf der Blattinnenseite reichen von den Westalpen bis in die südlichen Ostalpen. Sie werden unter *F. scabriculmis* vereinigt: subsp. *scabriculmis* (Westalpen), subsp. *luedii* (2 distinkte Teilareale in den westlichen Südalpen) und subsp. *handel-mazzettii* (Dolomiten, Sarntaler Alpen). Diese taxonomische Fassung betont deren enge Beziehungen und vermeidet überdies die Diskrepanz zwischen Typus und Protolog des für letztere im Artrang gebrauchten Namens *F. pseudovaria* (VETTER 1950). Die taxonomische Stellung der var. *cenisia* (WALLOSSEK 2000) ist unklar.
Für die davon stark abweichende und morphologisch weitgehend *F. varia* ähnliche Sippe der Gebirge des obersten Drautales wurde eine Benennung im Artrang (*F. winnebachensis*) vorgeschlagen (FOGGI & al. 2007), angemessener erscheint aber die Benennung im Unterartrang nach FOGGI & al. (2005), allerdings unter *F. varia*.
Basiphile Sippen
Die beiden sehr ähnlichen diploiden Sippen der nordöstlichen Kalkalpen werden als (schwach geschiedene und durch Übergangformen verbundene) Unterarten unter *Festuca brachystachys* gefasst. Der Gebrauch des Epithets „*pallidula*“ für die Tieflagensippe ist nur im Unterartrang möglich.
Die beiden gut geschiedenen diploiden Sippen der Südalpen, *F. alpestris* (westlich) und *F. calva* (östlich) zeigen eine Arealüberschneidung im Gebiet des Soča/Isonzotales. Der fälschlich auf die subsp. *winnebachensis* angewendete Name „var. *crassifolia*“ bezieht sich auf *F. calva*. Die ebenfalls diploide *F. bosniaca* kommt im Alpenraum nicht vor.

Taxonomy of varicoloured fescues (*Festuca varia* s. latiss.) from the Eastern Alps

Varicoloured fescues (*Festuca* sect. Eskia, *Festuca varia* in the wide circumscription of HACKEL 1882) are a well distinguishable group in south European high mountains, but their subdivision is still controversially discussed.
Since the last overview by WALLOSSEK (1999, 2000) some nomenclatural changes were proposed, following the general trend to raise such taxa to species rank (FOGGI & al. 2007), they all need a critical evaluation relating to the whole group. Molecular phylogenetic investigations, as already done with Iberian taxa (TORRECILLA & al. 2013), confirmed the common taxa delimitations, with Alpine taxa such investigations are in progress. Moreover, a lot of morphological, ecological and phytogeographical details were found, requiring a taxonomical revision of this group:
Acidophilous taxa:
Festuca acuminata is the only diploid species touching the Eastern Alps from the west. Since MARKGRAF-DANNENBERG (1979), the outlines of its fragmented area are known, impressively shown by WALLOSSEK (2000) and completed to the northeast and southeast by ENGLMAIER & WILHALM (2018).
The Carpathian/Sudetian sister taxon is *F. versicolor*, it was merged by MARKGRAF-DANNENBERG (1979) with the two basiphilous taxa in the Northeastern Alps, but morphological and ecological characteristics call for a separation on species rank.
Tetraploid *F. varia* s. str. has a clearly delineated area in the Eastern Alps with southern outliers in Slovenia.
Several hexaploid taxa with notably reduced number of ribs on the inner leaf surface occur from Western to Southern Alps. They are grouped under *F. scabriculmis*: subsp. *scabriculmis* (Western Alps), subsp. *luedii* (area fragmented into two parts in the west of the n Southern Alps) and subsp. *handel-mazzettii* (Dolomites, Sarntal Alps). With this taxonomic treatment, the close relations between them are accented and confusion on the divergence between type and protolog (VETTER 1950) of *F. pseudovaria* (the name used for the latter on species rank) is avoided. Var. *cenisia* (WALLOSSEK 2000) remains in unclear taxonomic status.
The strongly different taxon occurring in the mountains around the upper Drau valley was named on species rank (*F. winnebachensis*) by FOGGI & al. (2007), but it seems to be better placed on subspecies rank, following FOGGI & al. (2005), under the morphologically similar *F. varia*.
Basiphilous taxa
Two very similar taxa in the Northeastern Calcareous Alps, showing various transition forms, are grouped as (weakly differentiated) subspecies under *Festuca brachystachys*. The use of the epithet "*pallidula*" for one of them is only possible on subspecies rank.
Two well differentiated diploid taxa occur in the Southern Alps, the westernmost *F. alpestris* and the easternmost *F. calva*. Both are occurring together in the Soča/Isonzo area. The name "var. *crassifolia*" was wrongly applied to subsp. *winnebachensis*, but means *F. calva*. A further diploid, *F. bosniaca*, does not occur in the Alps.

Einfluss von Bodenfaktoren auf die taxonspezifische Zusammensetzung von Gefäßpflanzen der *Festucetalia valesiacae* - Eine Bestandsaufnahme sekundärer Trockenrasengesellschaften ausgewählter Untersuchungsflächen in der Umgebung von Bozen und im Unteren Eisacktal

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In der vorliegenden Arbeit wird nach der Verschaffung eines Überblicks hinsichtlich der Entwicklung von Trockenrasengesellschaften und des Zusammenspiels lebensraumprägender Triebkräfte der Frage nachgegangen, welche Auswirkungen speziell Bodenfaktoren auf die floristische Artzusammensetzung sekundärer Trockenrasengesellschaften haben. Dazu wurden für ausgewählte Aufnahmeflächen in der näheren Umgebung von Bozen sowie im Unteren Eisacktal sowohl der floristische Artenbesatz an Gefäßpflanzen, als auch die Messwerte aus Bodenmischproben des mineralreichen Oberbodens hinsichtlich der Bodenart, der Korngrößenverteilung, des pH-Wertes und des Nährstoffgehalts erhoben und auf Korrelationen hin verglichen. In gleicher Weise wurden andere Einflussgrößen und Störungseffekte mit einbezogen, um einen möglichst umfassenden Einblick hinsichtlich der Entstehung, Erhaltung und Bestandszusammensetzung dieser ökologisch wertvollen Kleinstlebensräume darlegen zu können.

Influence of soil factors on the taxon-specific composition of vascular plants of the Festucetalia valesiacae - An inventory of secondary dry grassland communities of selected study sites in the vicinity of Bozen and in the Lower Eisack Valley

In the present study, after providing an overview on the development of dry grassland communities and the interaction of habitat determining driving forces, the question is addressed as to which effects soil factors in particular have on the floristic species composition of secondary dry grassland communities. For this purpose, the floristic species composition of vascular plants as well as characteristics of the mineral-rich topsoil with regard to soil type, soil texture, pH-value and nutrient content were analyzed for selected study sites in the vicinity of Bozen and the Lower Eisack Valley and associated with each other via correlational analyses. Likewise, other influencing variables and disturbance effects were included in the analyses in order to provide the most comprehensive insight possible into the formation, conservation and composition of these ecologically valuable micro-habitats.

Welche Rolle spielen Südtirols Apfelanlagen in der Pollenversorgung der Honigbiene?

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Pollen spielt in der Ernährung der Honigbienen eine besondere Rolle, da er die einzige Eiweißquelle darstellt. Im Jahresverlauf tragen die Bienen Pollen von verschiedenen Pflanzenarten ein. Der täglich von einem Volk gesammelte Pollen variiert nicht nur mengenmäßig, sondern auch aufgrund seiner botanischen Herkunft. Dies wurde im Projekt Palyn und Palyn II untersucht.
Gleichzeitig erhob man im Rahmen dieser Projekte die potenziellen Pollenspender an Wald- und Wiesenrändern als auch in den Apfelanlagen.
Die Vegetationsaufnahmen in den Apfelanlagen liefern einen Überblick über die vorkommenden Arten und deren Blühverhalten und somit darüber, wann welche Pflanzenarten in den Apfelanlagen als potenzielle Pollenspender zur Verfügung stehen. Die melissopalynologischen Untersuchungen zeigen, dass der Großteil des eingetragenen Pollens meist von 1-3 Arten stammt und es sich größtenteils um holzige Pflanzen handelt.
Bei der Auswertung der botanischen und melissopalynologischen Untersuchungsergebnisse galt es zu berücksichtigen, dass viele der im Unterwuchs von Apfelwiesen vorkommenden Arten auch außerhalb landwirtschaftlich genutzter Flächen anzutreffen sind. Man kann daher nicht völlig ausschließen, dass bestimmte Pollen auch außerhalb der untersuchten Apfelanlagen gesammelt werden.
Es ist schwierig zu erfassen, wie groß die Anteile der von den Bienenvölkern gesammelten Pollenmengen aus Apfelanlagen und aus der näheren Umgebung sind. Nichtsdestotrotz kann man davon ausgehen, dass neben Apfelbaum-Pollen auch regelmäßig Pollen von Pflanzen im Unterwuchs der Apfelanlagen gesammelt wird.

Which role do South-Tyrolean apple orchards play in the pollen nutrition of the honeybee?

Because it is their only protein source, pollen plays an important role in the nutrition of honeybees. Over the course of the year, pollen is collected from different plant species. The daily rations collected by a bee colony do not only differ in their amounts, but also in their botanical origin. This has been investigated in the projects Palyn and Palyn II.
The aims of these investigations were to reveal which plants within a selected area around an apiary contribute to the daily collected pollen amounts of a honeybee colony, and to what extent single plant species supply to this amount.
Simultaneously, it has been examined which plant species were growing nearby the apiaries (for example forest, meadows) and also within orchards. These plants could be considered as potential pollen sources. Vegetation surveys within the apple plantations gave an overview of the occurring plants and times of blooming. Collected data shows exactly, which plants were present during certain periods in the orchards as potential pollen sources.
It is important to consider, that a lot of the plant species found in the orchards were also present outside of the cultivated areas. This means, pollen types can't be assigned unambiguously to one source (inside vs. outside orchard). It is likely, that additional to the pollen of the apple trees, the pollen of other plants growing inside the apple plantations are collected regularly by the honeybee-foragers as well. However, we could see that most of the collected pollen-pellet-samples consist of 1-3 species, most of which are woody plants.

Intensivierung der Landwirtschaft in Obst- und Mähwiesen verändert die Boden-Makroinvertebraten-Gemeinschaften unterschiedlich

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Landnutzungsänderungen und im Speziellen die Intensivierung der Landwirtschaft stellen momentan die größte Gefährdung für die globale Biodiversität sowohl ober- als auch unterirdisch dar. Mit einem komparativen Ansatz untersuchten wir in dieser Studie, inwieweit unterschiedlich intensive Bewirtschaftung von Obst- und Mähwiesen die Gemeinschaft an Boden-Makroinvertebraten beeinflusst. Wir verglichen dabei traditionell und extensiv bewirtschaftete Mäh- und Streuobstwiesen mit intensiv genutzten Mähwiesen und Apfelplantagen. Die Studie wurde auf 24 Feldern, aufgeteilt auf sechs Ortschaften in Südtirol, durchgeführt. Wie erwartet verminderte die Intensivierung der Landwirtschaft beider Systeme die Diversität der Bodenlebewesen. Die Gemeinschaft der Boden-Makroinvertebraten ähnelte sich in den extensiv bewirtschafteten Mäh- und Streuobst-Wiesen, nicht jedoch in den intensiv bewirtschafteten Feldern. Landwirtschaftliche Intensivierung führt also zu klaren Veränderungen der Bodentiergemeinschaft, die Richtung dieser Veränderung ist jedoch vom jeweiligen Bewirtschaftungstyp abhängig. Unseres Erachtens gilt die extensive und traditionelle Bewirtschaftung, welche eine artenreiche Gemeinschaft mit gut angepassten Bodenlebewesen begünstigt, als ein Referenzzustand für nachhaltige Landwirtschaft. Dieser sollte bei der Entwicklung neuer Produktionssysteme beachtet werden, um den Erhalt der Bodenbiodiversität und deren essentielle ökosystemare Leistungen aufrecht erhalten zu können.

Management intensification of hay meadows and fruit orchards alters soil macro- invertebrate communities differently

Land-use changes and especially management intensification currently pose a major threat to biodiversity both on and beneath the soil surface. With a comparative approach we investigated how management intensity in orchards and meadows influences soil macro-invertebrate communities. We compared soil fauna assemblies from traditional low-input sites with respective intensively managed ones. The design spans over 24 fields subdivided into six locations in South Tyrol. As expected, the taxonomical richness and diversity was lower in both intensive management types. Extensive management of both types revealed similar communities, while intensification led to substantial differences between management types. From these results we conclude that intensification of agricultural practices severely alters the soil fauna community and biodiversity in general, however, the direction of these changes is governed by the management form. In our view, extensive management, traditional for mountain areas, favors soil fauna communities that have adapted over a long time and can thus be viewed as a sustainable reference condition for new production systems that consider the protection of soil diversity in order to conserve essential ecosystem functions.

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Biodiversitätsmonitoring Südtirol: Überblick über das Projekt und erste Ergebnisse aus dem Erhebungsjahr 2019

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Auf Initiative der Südtiroler Landesregierung und unter der Leitung von Eurac Research wurde ein dauerhaftes Biodiversitätsmonitoring für Südtirol (BMS) eingerichtet. Das Monitoring dient nicht nur der Grundlagenforschung, sondern soll auch die wissenschaftliche Grundlage für politische Entscheidungen insbesondere im Zusammenhang mit Raumplanung, Landwirtschaft und Naturschutz liefern. Ziel des Biodiversitätsmonitorings ist die Erfassung von Artengruppen, die sensibel auf Landnutzungs- und Klimaänderungen reagieren.
Die Untersuchungsgebiete sind gleichmäßig über das Land verteilt und umfassen eine repräsentative Auswahl von Lebensräumen. Besonderes Augenmerk wird dabei auf die Lebensraumtypen der Kulturlandschaft, wie etwa Weinberge, Apfelanlagen und Mähwiesen, gelegt. Daneben werden auch zahlreiche, besonders Naturschutz-relevante Standorte, etwa Magerwiesen, Moore und Trockenrasen, untersucht. Innerhalb eines Zeitraums von fünf Jahren werden insgesamt 320 Standorte untersucht. Die Erhebungen werden in den Folgejahren regelmäßig wiederholt. Im Jahr 2019 wurden erste umfassende Erhebungen von Gefäßpflanzen, Moosen, Flechten, Vögeln, Fledermäusen, Tagfaltern, Heuschrecken und verschiedenen weiteren wirbellosen Tiergruppen durchgeführt.
Neben dem jährlich durchgeführten Standardmonitoring werden innerhalb des BMS auch Spezialprojekte zu verschiedenen relevanten Themen, etwa aus den Bereichen Naturschutz und Landwirtschaft, durchgeführt. Weitere Ziele des BMS sind die generelle Stärkung und bessere Vernetzung der Biodiversitätsforschung in Südtirol sowie die Sensibilisierung der Bevölkerung für die Biodiversität. Die Präsentation gibt einen Überblick über das Projekt und zeigt auch vorläufige Ergebnisse der ersten Feldsaison.

Monitoraggio della biodiversità dell'Alto Adige: Panoramica del progetto e primi risultati della stagione di campo 2019.

Su iniziativa della Provincia Autonoma di Bolzano e sotto la direzione di Eurac Research è stato istituito un Monitoraggio permanente della Biodiversità in Alto Adige (BMS). Il monitoraggio non ha come unico scopo quello di produrre materiale scientifico, ma anche quello di fornire un supporto scientifico per le decisioni politico-ambientali, in particolare in relazione alla pianificazione territoriale, alla gestione del patrimonio agricolo e alla protezione e conservazione della natura. Il BMS mira a rilevare gruppi di specie che reagiscono in modo sensibile ai cambiamenti ambientali e di utilizzo del territorio. Le aree di studio sono distribuite in modo uniforme in tutta la Provincia e comprendono una selezione rappresentativa degli habitat presenti.
Particolare attenzione è rivolta ai tipi di habitat del paesaggio colturale come vigneti, meleti e prati da sfalcio. Inoltre, vengono esaminati anche numerosi siti di particolare interesse per la conservazione della natura, come prati magri, torbiere e praterie secche. Entro un periodo di cinque anni, saranno esaminati complessivamente 320 siti. I monitoraggi saranno ripetuti regolarmente negli anni successivi. Nel 2019 sono state effettuate le prime indagini complete su piante vascolari, muschi, licheni, uccelli, pipistrelli, farfalle, cavallette ed altri gruppi di invertebrati.
Oltre al monitoraggio standard effettuato annualmente, all'interno del BMS vengono realizzati progetti speciali su diversi temi rilevanti, come la conservazione della natura e l'agricoltura. Ulteriori obiettivi del BMS sono di rafforzare e collegare meglio la ricerca sulla biodiversità in Alto Adige e di aumentare la consapevolezza e la sensibilizzazione della popolazione per la biodiversità. La presentazione offre una panoramica del progetto e mostra i risultati preliminari della prima stagione di campo.

Biodiversity Monitoring South Tyrol: Overview of the project and first results of the field season 2019

A permanent biodiversity monitoring for South Tyrol (BMS) has been set up on the initiative of the South Tyrolean provincial government and under the direction of Eurac Research. The monitoring not only serves basic research but is also intended to provide the scientific basis for political decisions, especially in connection with spatial planning,

agriculture and nature protection. The Biodiversity Monitoring aims at the survey of species groups that react sensitively to environmental and land use changes.
The study sites are distributed evenly over the country and include a representative selection of habitats. Particular attention is paid to the habitat types of the cultural landscape, such as vineyards, apple orchards and hay meadows. Furthermore, numerous sites of high relevance to nature conservation, such as nutrient-poor meadows, bogs and dry grasslands, are also investigated. In 2019, first comprehensive surveys of vascular plants, bryophytes, birds, bats and various insect groups, such as grasshoppers and butterflies, were carried out. Within a period of five years a total of 320 sites are investigated.
In addition to the annual standard monitoring, special projects on various relevant topics, such as nature conservation and agriculture, are also carried out within the BMS. Further goals of the BMS are to strengthen and better connect biodiversity research in South Tyrol and to raise general awareness and knowledge of the population for biodiversity. The presentation gives an overview about the project and shows also first results of the first field season.

Phylogeography and population genomics of alpine grasshoppers and bush crickets with highly fragmented distributions

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Present day species distributions are often a consequence of past changes of the environment in combination with geographical features that hindered range expansions. The present day distribution of many European species has been defined by Pleistocene glaciation cycles that often facilitated range fragmentation, especially in geographically heterogeneous areas such as the European Alps. Such range fragmentation is of large interest in biogeographic research as it allows to study the genetic consequences of isolation and also opens a window to past environmental changes. Species with fragmented and restricted ranges are also of large concern in nature conservation. In an ongoing project we focus on three Alpine grasshoppers and bush crickets (Orthoptera) that are of large conservation value, exhibit highly fragmented distribution ranges and are restricted to specific habitats: *Aeropedellus variegatus*, the genus *Anonconotus* and specifically *Anonconotus italoaustriacus,* and *Stethophyma grossum*. All these species are redlisted in South Tyrol, and the region harbors a large share of all known occurrences of *Ae. variegatus* in the Eastern Alps and *A. italoaustriacus* in all of the Alps. Specimens of all three species have been collected from South Tyrol and adjacent regions and were sequenced by high-throughput sequencing techniques. The resulting genomic data will be used to infer population structure, and explore past and present connections between isolated populations of each species. We will also model gene flow and population size changes over time and explore if such events can be linked to past environmental changes. Estimating population sizes and parameters on population fitness, will further allow us to derive direct recommendations for an effective conservation of these species. In case of *Anonconotus,* we also try to resolve phylogenetic relationship within the genus, and clarify the status of *A. italoaustriacus*.

Akte „Small Mammals“ – Die ungelösten Fälle der kleinen Säugetiere Südtirols

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Im Mittelpunkt des vom Forschungsfond der Südtiroler Landesmuseen geförderten Projektes (2019-2021) stehen Fragen zu ausgewählten Insektenfressern (Talpidae, Soricidae) und Nagetieren (Gliridae, Cricetidae, Muridae), die bislang nie geklärt werden konnten: *Talpa caeca*, *Sorex antinorii* und *Suncus etruscus* konnten bis heute in Südtirol nicht nachgewiesen werden, obwohl ihr Vorkommen sehr wahrscheinlich ist. *Talpa europaea* und *Arvicola* spp. weisen Verbreitungsgrenzen innerhalb des Landes auf, welche möglicherweise mit der Einwanderung der Arten nach der letzten Eiszeit zusammenhängen. *Muscardinus avellanarius* und *Dryomys nitedula* scheinen in den historisch bekannten Gebieten der Talsohle nicht mehr vorzukommen.
Je nach Fragestellung werden verschiedene Untersuchungsmethoden angewandt: die Sammlungsbelege des Naturmuseums Südtirol werden molekulargenetischen Analysen unterzogen, Schädel von *T. europaea* werden zudem mittels Kraniometrie und geometrischer Morphometrie untersucht. Erhebungen im Gelände umfassen sowohl

Lebendfang als auch den Einsatz indirekter Methoden wie Nisthilfen und Spurentunnel. Citizen Science Projekte zu *M. avellanarius*, *T. europaea* und *Arvicola* spp. ergänzen die standardisiert erfassten Daten.
Die ersten Ergebnisse sind vielversprechend: *S. antinorii* konnte im Süden des Landes nachgewiesen werden. Die Schwesterart *S. araneus* ist in Südtirol weit verbreitet, obwohl das Vorkommen in Italien zuletzt ungewiss war. Südtirol stellt für *T. europaea* sowohl genetisch als auch morphologisch eine Kontaktzone zwischen der europäischen und der italienischen Linie dar. Im Nordosten Südtirols kommt nur die mitteleuropäische Art *Arvicola amphibius* vor, während die italienische *A. italicus* bislang nicht gefunden wurde. In den tiefen Lagen des Etschtales konnten *M. avellanarius* und *D. nitedula* noch nicht nachgewiesen werden. Das Schulprojekt „Nussjagd“ erbrachte aber 4 neue Fundpunkte von *M. avellanarius*.

File "Small Mammals" - The unsolved cases of the South Tyrolean small mammal fauna

The project (2019-2021), which is supported by the Research fund of the Museums of South Tyrol, will focus on questions concerning insectivores (Talpidae, Soricidae) and rodents (Gliridae, Cricetidae, Muridae) that have never been clarified to date: *Talpa caeca*, *Sorex antinorii* and *Suncus etruscus* could not be detected in South Tyrol until today, although their occurrence is very likely. *Talpa europaea* and *Arvicola* spp. show distribution limits within the country, which may be related to the settlement history of the country after the last ice age. *Muscardinus avellanarius* and *Dryomys nitedula* do not seem to be present in the historically known areas of the valley floor.
Depending on the research question, different investigation methods are applied: the collection specimens of the Museum of Nature South Tyrol are subjected to molecular genetic analyses, skulls of *T. europaea* are also examined by means of craniometry and geometric morphometry. Field surveys include both live trapping and the use of indirect methods such as nesting aids and foodprint tunnels. Citizen Science projects on *M. avellanarius*, *T. europaea* and *Arvicola* spp. complement the standardised data collected.
The first results are promising: *S. antinorii* could be detected for the first time in South Tyrol in the south of the province. The sister species *S. araneus* is very common in South Tyrol, although its occurrence in Italy has recently been uncertain. For *T. europaea* South Tyrol represents both genetically and morphologically a contact zone between the European and the Italian lineage. Only the Central European species *Arvicola amphibius* occurs in the northeast of South Tyrol, whereas the Italian *A. italicus* has not been found so far. *M. avellanarius* and *D. nitedula* could not be found in the lowlands of the Adige valley. However, the school project "nut hunt" yielded 4 new finding sites of *M. avellanarius*.

Fledermäuse im Südtiroler Etschtal – intensiver Obstbau versus Schutzgebiete

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Das Südtiroler Etschtal zwischen Schluderns und Salurn ist vom intensiven Obstbau geprägt, mehr als 100 km durchgehende Apfelmonokultur dominieren die Landschaft der Talsohle. Weitgehend isoliert inmitten der intensiven Landwirtschaft gibt es einige Schutzgebiete, Reste der alten Natur- und traditionellen Kulturlandschaft des Etschtales. In standardisierten Erhebungen wurde untersucht, inwieweit die Fledermäuse den intensiven Obstbau als Jagdlebensraum nutzen und welche Bedeutung die Schutzgebiete für die Fledermäuse haben.
Im Jahr 2018 wurden in acht Obstanlagen zwischen Schlanders und Tramin Erhebungen mit Ultraschalldetektoren durchgeführt, die Hälfte davon in Flächen mit biologischer Anbauweise. Daneben wurden im Auftrag des Amtes für Landschaftsökologie der Autonomen Provinz Bozen-Südtirol zwischen 2016 und 2019 drei Natura 2000-Gebiete hinsichtlich ihrer Fledermausfauna untersucht (Tartscher Bühel, Falschauermündung, Kalterer See). Alle Untersuchungen wurden mit den Batdetektoren Batlogger M oder A+ in jeweils drei aufeinanderfolgenden Nächten zwischen Juni und August durchgeführt. Zusätzliche Daten wurden im Frühjahr 2016 je eine halbe Nacht lang in fünf weiteren Schutzgebieten des Etschtals gesammelt.
Das Artenspektrum war in den Obstanlagen mit durchschnittlichen 10,1 Arten/Untersuchungsfläche zwar größer als jenes in den Schutzgebieten mit 8,6 Arten/Standort. Die Anhang II-Arten *Rhinolophus ferrumequinum*, *R. hipposideros* und *Barbastella barbastellus* konnten aber ausschließlich in den Schutzgebieten beobachtet werden, während *Myotis myotis/blythii* und *Myotis emarginatus* auch im Obstbau nachgewiesen wurden. Große Unterschiede ergaben sich hinsichtlich der Rufaktivität, welche in den Schutzgebieten mit durchschnittlichen 355,2 aufgenommenen Rufen/Nacht gegenüber 117,4 in den Obstanlagen dreimal so hoch ausfiel. Ähnlich groß war auch der Unterschied bei der Jagdaktivität, mit einem durchschnittlichen Anteil an Fangrufen von 37% in den Schutzgebieten gegenüber nur 10%

im Obstbau. Die Natura 2000-Gebiete stellen somit für die Fledermäuse wertvolle Jagdlebensräume im intensiv genutzten Etschtal dar.

Monitoring and assessing copper concentrations in South Tyrolean agricultural soils

The South Tyrolean Adige Valley between Sluderno and Salorno is dominated by intensive fruit growing, more than 100 km of continuous apple monoculture characterises the landscape of the valley bottom. Largely isolated in the middle of intensive agriculture, there are some protected areas, rests of the ancient natural and traditional cultural landscape of the Adige Valley. In the course of standardised research it was analysed to what extent the bats use the intensively managed fruit-growing areas as hunting grounds and what significance the protected areas have for the local bat fauna. In 2018, standardized surveys with bat detectors were carried out in eight fruit-growing areas between Silandro and Termeno, half of them with organic farming methods. On the other hand, on behalf of the Office for Landscape Ecology of the Autonomous Province of Bolzano-South Tyrol, three Natura 2000 sites have been examined with regard to their bat fauna between 2016 and 2019 (Tartscher Bühel, Delta del Valsura, Lago di Caldaro). All the surveys were carried out with the bat detectors Batlogger M or A+ for three consecutive nights each between June and August. Additional data were collected in spring 2016 for half a night each in five other protected areas of the Adige Valley.
The species diversity was larger in the orchards with an average of 10.1 species/study area than in the protected areas with 8.6 species/area. However, the Appendix II species *Rhinolophus ferrumequinum*, *R. hipposideros* and *Barbastella barbastellus* could only be observed in the protected areas, while *Myotis myotis/blythii* and *M. emarginatus* were also found in the orchards. There were large differences in call activity, which was three times higher in the protected areas with an average of 355.2 recorded calls/night compared to 117.4 calls in the orchards. The difference in the measured hunting activity was similarly large, with an average proportion of "feeding buzzes" of 37% in the protected areas compared to only 10% in orchards. The Natura 2000 sites thus represent important hunting habitats for bats in the intensively used Adige Valley.

Dynamik im Fluss: Status, Bedrohung und Zukunftsperspektiven von Kiesbankheuschrecken in den Alpen

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Laut dem Alpenprogramm des WWF (2014) umfasst das Flussnetzwerk im Alpenbogen über 10.500 Einheiten mit insgesamt etwa 57.000 km Länge. Es ist alarmierend, dass von den größeren Fließgewässern weniger als 5 % oder weniger als 500 km noch in einem "guten ökologischen Zustand" sind. Besonderer naturkundlicher Wert kommt dabei den wenigen naturnahen Furkationsstrecken zu, die noch eine ausgeprägte Dynamik im Abflussgeschehen und der Ufermorphologie zeigen. Solche "Wildflussstrecken" haben jahrtausendelang in allen Regionen der Alpen nicht nur das Landschaftsbild bestimmt, sondern waren auch Schlüsselhabitate für eine Fülle hoch angepasster Pflanzen und Tiere und sind heute letzte Refugien für bedrohte Spezialisten.
Die spärlich bewachsenen Kiesbänke und Uferzonen der Alpenflüsse waren dementsprechend auch von einer beachtlichen Zahl xero- und geophiler Feldheuschrecken (Caelifera) besiedelt. Insgesamt waren ursprünglich über ein Dutzend Caelifera-Arten typisch für die Kiesbänke entlang alpiner Flüsse. Vor allem vier Arten: *Tetrix tuerki*, *Epacromius tergestinus ponticus, Bryodemella tuberculata und Chorthippus pullus* sind in den Alpen aber ganz eng an dynamische Habitate entlang der Wildflüsse gebunden.
Es ist daher wenig erstaunlich, dass sich alle diese Arten inzwischen in den Roten Listen der Länder im Alpenbogen in höheren Gefährdungskategorien finden oder gar schon als regional ausgestorben gelten. Dies trifft auch in Südtirol zu! Zudem nehmen die wenigen verblieben Restpopulationen aller Arten in den meisten Gebieten der Alpen weiterhin stark ab und sind als Folge von Regulationsmaßnahmen und Wasserkraftnutzung zunehmend voneinander isoliert.
Maßnahmen zum Schutz der letzten Populationen der genannten Spezialisten sind daher dringend nötig. Der Vortrag gibt einen Überblick über den aktuellen Status der vier Arten in den Ländern des Alpenbogens, inklusive Italien und Südtirol. Ich berichte zudem von bisher durchgeführten Schutzmaßnahmen und stelle insbesondere ein laufendes Flussrevitalisierungsprojekt im Tiroler Lechtal vor (Dynamic River System LIFE Lech 2016–2021), wo u.a. Kiesbankheuschrecken als Zielarten ausgewählt wurden.

Grasshoppers on dynamic riverbanks of the Alps: Actual status, threats and conservation prospects

According to the WWF European Alpine Program 2014 the pan-Alpine river network consists of more than 10.500 river units with a total length of about 57.000 km. Stretches of braided floodplains with high seasonal and year to year hydrological and morphological dynamics, for thousands of years have been keystone ecosystems in all parts of the Alps and served as refuge and hotspot for highly specialised plants and animals. Given this close association the notion is alarming that only less than 5 % or less than 500 km of the river network length of larger rivers have been assessed to still show a high ecological status by the WWF in 2014.The banks of such rivers are dominated by extensive gravel fields with sparse vegetation and are characterised by a high small-scale variability in soil structures, micro-topography and micro-climates. Therefore, these dynamic habitats traditionally have also been refuges for more than a dozen xerophilic and geophilic grasshopper species. In particular four species, namely *Tetrix tuerki, Epacromius tergestinus ponticus, Bryodemella tuberculata and Chorthippus pullus* in the Alps are more or less exclusively bound to dynamic habitats along wild rivers. Accordingly, specialised river dwelling Caelifera nowadays are listed in higher threat categories of the Red Lists of the countries which have part in the Alpine Arc, and even are regarded as "Regionally Extinct" in several states. What is more, all four species overall still show decreasing population trends in the Alps and most regional populations are severely fragmented and isolated now and continue to decline due to habitat deteriorations caused by ongoing river regulation programs, hydropower use or gravel-mining. Conservation measures therefore are urgently needed to preserve the last remaining alpine populations of these species. The talk first gives a short overview about the current population and threat status of the species in the Alpine Arc (including Italy and South-Tyrol) and about conservation activities which have been implemented so far. In particular, an actual river-restoration program funded by the EU-LIFE scheme (Dynamic River System LIFE Lech 2016–2021) at the Lech River (Tyrol, Austria) is presented.

Dendrochronologische Datierung alter Baumstämme aus dem Schrummsee, Ulten

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Der Schrummsee ist ein kleiner Bergsee, der auf 2180 m Meereshöhe in Ulten liegt. Er ist von Almwiesen und Almweiden eingefasst und in der Umgebung steht ein lichter Lärchenwald bestehend aus kleinen und jungen Bäumen. Im See versunken liegen einige z.T. recht stattliche Baumstämme, die auf einen Waldbestand in früheren Zeiten hinweisen.
2016 wurde erstmals eine Scheibe eines Lärchenstammes aus dem Schrummsee geborgen. Das bestens erhaltene Lärchenholz wurde am Institut für Geographie der Universität Innsbruck dendrochronologisch untersucht und konnte jahrgenau datiert werden. Der erste Jahrring an der Probe datiert in das Jahr 184 n. Chr. und der letzte gemessene Ring ins Jahr 726 n. Chr. Somit hat der Baum ein gemessenes Alter von 543 Jahren und liegt seit annähernd 1300 Jahren im See. Diese Lärche kam also in der Römerzeit auf, in welcher ein relativ warmes Klima herrschte.
Ein Jahr darauf wurde ein zweiter Lärchenstamm aus dem Schrummsee geborgen. Das Ergebnis der Untersuchung hat alle Erwartungen übertroffen: Für diese Lärche konnte eine Serie mit 615 Jahrringen erstellt werden, welche von 6506 bis 5892 v. Chr. gewachsen sind. Somit liegt diese Lärche schon seit knapp 8.000 Jahren im See und überdauerte diese Zeit weitgehend schadlos.
Die Datierung der Holzproben erfolgte anhand der Ostalpinen Nadelholz-Chronologie (Eastern Alpine Conifer Chronology, EACC), welche die letzten 10.000 Jahre bis heute durchgehend abdeckt und zu den weltweit längsten Jahrring-Chronologien gehört. Wie die Datierung belegt, überdauerte diese Lärche einen markanten Klimarückschlag, das sogenannte 8.2 ka Ereignis, eine Abkühlungsphase, die vor allem durch die grönländischen Eisbohrkerne bekannt wurde.
Es ist geplant im Sommer 2020 Proben von weiteren subfossilen Hölzern aus dem Schrummsee zu entnehmen und zu untersuchen.
Die ältere Schrummsee-Lärche reiht sich in eine Serie von älteren Baumfunden in Südtirol ein. Es gibt etwa ein Dutzend weiterer datierter Bäume aus Südtirol, die so alt oder noch älter sind. Die Schrummsee-Lärche übertrifft diese allerdings mit gut 600 vermessenen Jahrringen an Reihenlänge und damit nachgewiesener Lebensdauer.

Dendrochronological dating of old tree trunks removed from Lake Schrumm, Ulten Valley

Lake Schrumm is a small mountain lake located in Ulten Valley at an altitude of 2180 m a.s.l. The lake is surrounded by pastures and in the surrounding area there is a light larch forest consisting of small and young trees. Immersed in the lake there are some tree trunks, partly quite big, some of which indicate a forest stand in earlier times.
In 2016, the first sample of a larch trunk was removed from Lake Schrumm. The well preserved wood was dendrochronologically analysed and dated at the Institute of Geography at the University of Innsbruck. The first tree ring on the sample dates back to 184 A.D. and the last measured tree ring to 726 A.D. Thus, the tree has a measured age of 543 years and has been lying in the lake for almost 1300 years. This larch therefore grew in the Roman times which is characterized by a warm climate.
One year later a second larch trunk was recovered from Lake Schrumm. The result of the analysis surpassed our expectations: the tree ring series obtained is as long as 615 years, dated from 6506 to 5892 B.C. Hence, this larch trunk has been lying in the lake for almost 8000 years and remained nearly undamaged.
The sample could be crossdated with the Eastern Alpine Conifer Chronology (EAAC) which covers the last 10,000 years until today and is one of the longest continuous chronologies worldwide. The analysis shows that the larch survived the 8.2 ka event, a prominent decrease in global temperatures which became known through the Greenland ice cores.
It is planned to remove and analyse further samples of subfossil woods from Lake Schrumm in summer 2020.
The older Lake Schrumm larch is one of numerous discovered old trees in South Tyrol. There are about a dozen other dated trees in South Tyrol which have approximately the same age or are even older. However, the lake Schrumm larch exceeds the other trees in series length and life span due to more than 600 measured tree rings.

Veränderung der inneralpinen Trockenrasen des Vinschgaus (Südtirol, Italien) nach 40-50 Jahren

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Außerhalb des eurasiatischen Steppengürtels befinden sich in Mitteleuropa kleine, disjunkte Areale einer extrazonalen Steppenvegetation. Die Trockenrasen dieser Standorte werden floristisch mehrheitlich aus (sub)mediterranen oder pontisch-sarmatischen Arten aufgebaut und pflanzensoziologisch in der Klasse Festuco-Brometea Br.-Bl. et Tx. ex Soó 1947 zusammengefasst. Sie gehören im globalen Vergleich zu den floristisch artenreichsten Lebensräumen. Gleichzeitig sind sie durch Landnutzungsänderungen sowie den fortschreitenden Umweltwandel stark bedroht. Die westlichsten Vorkommen der eurasiatischen Steppenvegetation liegen in den inneralpinen Trockentälern, die von den Westalpen bei der Durance (FR) beginnend, über den Vinschgau (IT) bis in die Steiermark (AT) verteilt vorkommen. Der Vinschgau (Südtirol, IT) gehört zu den trockensten Tälern im Alpenraum und beherbergt die bedeutendsten inneralpinen Trockenrasen der Ostalpen. In den 1960er und ´70er Jahren wurde im Rahmen von drei Dissertationen (Strimmer 1969, Florineth 1973, Köllemann 1979) eine auf Vegetationsaufnahmen gestützte Vegetationskartierung im Vinschgau durchgeführt. Um ein aktuelles Zustandsbild der Vinschgauer Trockenrasen zu gewinnen und die Veränderungen nach rund 40-50 Jahren zu erfassen, haben wir aktuelle Vegetationsaufnahmen mit den alten Aufnahmen auf Basis von Vegetationstabellen und Ordinationen verglichen. Hierfür wurden im Juni 2019 von 92 Flächen Vegetationsaufnahmen durchgeführt. Diese konnten mehrheitlich dem Festuceto-Caricetum supinae Br.-Bl. 1936 im ostalpinen Verband der inneralpinen Trockenrasen Stipeto-Poion xerophilae Br.-Bl. et Richard 1950 innerhalb der Ordnung Festucetalia valesiacae Soó 1947 zugeordnet werden. In den letzten 40-50 Jahren hat sich eine floristische Dominanzverschiebung innerhalb der Trockenrasengesellschaften vollzogen, wobei Arten aus syndynamisch und –ökologisch verwandten Gesellschaften und ruderale Elemente in die Trockenrasen zugewandert sind.

Changes in the inner alpine dry grassland communities of the Vinschgau (South Tyrol, Italy) after 40-50 years

Outside the Eurasian steppe belt, there are small, disjunct islands of extra zonal steppes in Europe. These steppes are mainly composed by (sub-)mediterranean or pontic-sarmatic plant species. Phytosociologically, these dry grassland communities are included in the class Festuco-Brometea Br.-Bl. et Tx. ex Soó 1947. From a global perspective, the Eurasian steppes are among the most floristically diverse habitats. At the same time, they are threatened by land use - and environmental changes. The western-most outpost of the Eurasian steppe vegetation are found in the inner alpine dry valleys. These valleys stretch from the Western Alps at Durance (FR), the Vinschgau (IT) to Styria (AT). The Vinschgau (South Tyrol, IT) is one of the driest valleys in the Alpine region and contains the most important inner

alpine dry grasslands in the Eastern Alps. In the 1960s and 1970s, as part of three dissertations (Strimmer 1969, Florineth 1973, Köllemann 1979), a vegetation mapping in the Vinschgau was carried out based on relevés. To obtain an up-to-date view of the dry grassland communities of the Vinschgau and to record the changes after around 40-50 years, we compared current relevés with old ones by means of vegetation tables and ordinations. We sampled 92 plots in June 2019. Based on our investigation, the dry grassland communities can be classified as Festuceto-Caricetum supinae Br.-Bl. 1936 within the Eastern Alpine alliance Stipeto-Poion xerophilae Br.-Bl. et Richard 1950 within the order Festucetalia valesiacae Soó 1947. A shift in floristically dominance can be recognized over the last 40-50 years. Species from syndynamically and ecologically associated plant communities as well as ruderal elements have migrated to the dry grasslands.

Die Moosdatenbank des Naturmuseums Südtirol

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Die wissenschaftliche Datenbank des Naturmuseums Südtirol besteht mittlerweile seit 20 Jahren. Während dieser Zeit wurde sie kontinuierlich verbessert und weiterentwickelt. Seit 2014 sind aktuelle Daten zur Verbreitung regionaler Tier- und Pflanzenarten über das Online-Portal FloraFaunaSüdtirol (www.florafauna.it) auch für die Öffentlichkeit zugänglich. Im Rahmen des Projekts BRIOCOLL (2018-2020; finanziert durch den Forschungsfond der Südtiroler Landesmuseen) konnten im Februar 2020 auch die Verbreitungsdaten der Moose im Portal veröffentlicht werden. Dazu war es notwendig im Vorfeld den Datengrundstock entsprechend zu erweitern und aktualisieren. Dies gelang durch die Sichtung und Übertragung von Daten aus historischen und aktuellen Quellen, sowie von Daten aus privaten und öffentlichen Herbarien (z.B. Naturhistorisches Museum Wien und Landesmuseum für Naturkunde Karlsruhe). Das umfangreiche, dokumentierte Datenmaterial verdanken wir vielen bryologisch interessierten Menschen über fast 200 Jahre, beginnend im 19. Jahrhundert. Mehr als 100 Sammler bzw. Beobachter scheinen in der Datenbank auf, aber nur 11 davon lieferten mehr als 1000 Artbeobachtungen, so dass aktuell rund 39800 vorliegen. Von vielen interessanten Arten wurden Verbreitungskarten erstellt und Habitatpräferenzanalysen durchgeführt. Damit konnten auch entsprechende Wissenslücken: Erhebungs- und Verbreitungslücken sichtbar gemacht werden. An diesen können zukünftige Erhebungen zum besseren Verständnis der Ökologie der Arten ausgerichtet werden.

The bryological database of the Museum of Nature South Tyrol

The scientific database managed by the Museum of Nature South Tyrol is now 20 years old. During this time, it has been continuously improved and developed. Since 2014, distribution data are accessible to the public with the online portal FloraFaunaSüdtirol (www.florafauna.it). The portal provides the current state of knowledge about the regional distribution of wild animal and plant species. With the BRIOCOLL project (2018-2020; funded by the Research Fund of the Museums of South Tyrol), also the bryological database was added to the portal after a significant improvement and expansion of the number of records. This has been accomplished by collecting and transferring many bryophyte data from literature, but also from private and public collections (e.g. the Natural History Museum Vienna and the State Museum of Natural History Karlsruhe). This huge amount of records was possible thanks to the contribute of many people in nearly 200 years, starting in the 19th century. More than 100 collectors appear in the database, but only 11 provided more than 1000 records each one for a total of 39800. There are tens of interesting species for which we provided distribution maps and habitat preference analysis. Knowledge gaps were also identified in order to provide future objectives to improve our understanding of the species ecology.

Preliminary study on genetic diversity of *Anonconotus italoaustriacus* (Insecta - Orthoptera)

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Anonconotus is a genus endemic to the Alps and the Apennines. In Italy there are nine *Anonconotus* species mostly located in the western Alps, and only one in the eastern Alps: *A. italoaustriacus* Nadig, 1987. This species lives above 2000 m in mountain heliophile grasslands characterized by the presence of *Juniperus* sp., *Rhododendron* sp. and *Erica* sp. To date, only four populations have been reported on the Italian territory, and other populations of *A. italoaustriacus* are spread in the area of the High Tauern on Austrian territory.
Aim of this study was the preliminary genetic comparison of the different populations of this species. In the summer seasons of 2018 and 2019 all Italian areas reported from literature were sampled: San Candido (Monte Elmo, BZ), Sciliar Group (Alpe di Siusi, BZ), Baldo Group (Monte Altissimo, TN) and Belluno Dolomites (Vette Feltrine, Busa delle Vette, BL). An Austrian population in the High Tauern (Hainkerkalm) was also sampled.
The analysis of the mitochondrial gene (COI) of 71 specimens yielded sixty-six sequences 479 bp long. Results showed that the 4 populations analysed were characterized by a total of 5 haplotypes. A strict association between the geographical origin of the specimens and the haplotypes was found. The most frequent haplotype H1 was shared by samples from Monte Elmo and Hainkerkalm. The haplotype H2 was represented exclusively by specimens of Hainkerkalm population. Haplotypes H3 and H4 included only samples from Alpe di Siusi while H5 included exclusively samples from the Vette Feltrine. The former haplotype (H5) was the most phylogenetically distant, separated from the others by several missing intermediate haplotypes.
Mitochondrial analysis reveals a clear geographical pattern in genetic variability of *Anonconotus italoaustriacus* populations. Dispersal ability of the species is little known, however, data from similar flightless bush-crickets suggests its low ability to cross geographical barriers.
Further analysis considering other molecular markers (e.g. COII) will add more information regarding this species.

I Molluschi Bivalvi Unionidi nei laghi di Monticolo e Caldaro (Provincia di Bolzano)

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I Molluschi Bivalvi d'acqua dolce della famiglia Unionidae sono drammaticamente in declino a livello globale. Tutte le specie di questa famiglia sono protette in Provincia di Bolzano dalla Legge Provinciale n. 6 del 12 maggio 2010. A causa della grande variabilità della forma del loro guscio sulla base delle caratteristiche anatomiche è possibile determinare solo il genere, mentre per l'identificazione certa a livello di specie sono necessarie analisi genetiche.
Da novembre 2018 a giugno 2020 quattro ambienti acquatici in Provincia di Bolzano: Lago Piccolo e Lago Grande di Monticolo, Lago di Caldaro e il suo principale emissario la Fossa Grande di Caldaro sono stati indagati alla ricerca di molluschi bivalvi della famiglia Unionidae. Tramite immersioni subacquee sono stati raccolti dati sulla loro presenza e distribuzione batimetrica nei laghi, misure biometriche e presenza sulle loro conchiglie della specie alloctona invasiva cozza zebrata *Dreissena polymorpha*.
Le analisi molecolari (COI) effettuate su piccoli campioni di tessuto del piede di 25 individui (19 *Anodonta* e 6 *Unio*) hanno permesso la determinazione di quattro specie autoctone: *Anodonta anatina* e *A. cygnea*, *A. exulcerata* e *Unio elongatulus.*
Esemplari vivi di *Anodonta* e *Unio* sono stati trovati nel Lago Piccolo di Monticolo (da -2,5 a -4,9 m di profondità), Lago Grande di Monticolo (da -2,2 a -6,4 m di profondità), Lago di Caldaro (da -0,6 a -2,7 m di profondità), e nella Fossa Grande Caldaro.
Nel Lago Piccolo di Monticolo il 78% e nel Lago Grande di Monticolo il 62% dei molluschi *Anodonta* osservati presentava *Dreissena polymorpha* attaccate alla conchiglia in numero variabile da 1 a 81. Il peso complessivo delle

Dreissena attaccate sulla conchiglia arrivava fino a oltre il 41% del peso di *Anodonta*. *D. polymorpha* non è stata trovata nel Lago di Caldaro e nella Fossa Grande di Caldaro.

The freshwater bivalves of family Unionidae in the Lakes of Monticolo / Montiggl and Caldaro / Kaltern (Province of Bolzano / Bozen, Italy)

The freshwater bivalves of the family Unionidae are in dramatic decline globally. All species of this family are protected in the Province of Bolzano / Bozen by a Provincial Law. Due to the great variability in the shape of their shells based on anatomical characteristics, only the genus can be determined with confidence, while genetic analyses are required for more accurate species identification.
From November 2018 to June 2020 four aquatic environments in the Province of Bolzano/ Bozen (Italy): Small Lake and Large Lake of Monticolo / Montiggl, Lake Caldaro / Kaltern, and its main emissary Fossa Grande di Caldaro / Großer Kalterer Graben have been investigated in search of bivalves of the family Unionidae. Through scuba diving, data were collected on their presence and bathymetric distribution in the lakes, biometric measurements, and presence on their shells of the invasive allochthonous zebra mussel *Dreissena polymorpha*.
Molecular barcoding analyses (COI) carried out on small tissue samples of the foot from 25 specimens (19 *Anodonta* and 6 *Unio*) allowed the determination of four native species: *Anodonta anatina*, *A. cygnea*, *A. exulcerata* and *Unio elongatulus*.
Live specimens of *Anodonta* and *Unio* were found in Small Lake of Monticolo / Montiggl (between -2.5 and -4.9 m of depth), Large Lake of Monticolo / Montiggl (between -2.2 and -6.4 m of depth), Lake Caldaro / Kaltern (between -0.6 and -2.7 m of depth), and in Fossa Grande di Caldaro / Großer Kalterer Graben.
In Small Lake of Monticolo / Montiggl 78% and Large Lake of Monticolo / Montiggl 62% of the sighted *Anodonta* showed *Dreissena polymorpha* attached to the shell in numbers varying from 1 to 81. The total weight of the *Dreissena* attached reached up to 41% of the weight of *Anodonta*. *D. polymorpha* was not found in Lake Caldaro / Kaltern and in its emissary Fossa Grande di Caldaro / Großer Kalterer Graben.

La medusa d'acqua dolce *Craspedacusta sowerbii* (Hydrozoa: Limnomedusae) nei laghi di Monticolo (Provincia di Bolzano): variazioni stagionali, alimentazione e genetica

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La medusa d'acqua dolce *Craspedacusta sowerbii* Lankester 1880 è un taxon criptico, cosmopolita e invasivo che è presente in tutti i continenti ad eccezione dell'Antartide. Recenti studi molecolari suggeriscono l'esistenza di almeno tre linee genetiche molto diverse di *Craspedacusta*. Riportiamo la presenza sia di meduse che di polipi di questo taxon alloctono nel Lago Grande di Monticolo, lago naturale meso-eutrofico in Provincia di Bolzano. Le analisi molecolari della sequenza mitocondriale 16S indicano che questa popolazione appartiene a una linea diversa da quella che è stata recentemente descritta in Sicilia. Quindi in Italia sono presenti almeno due line genetiche ben distinte di *Craspedacusta*. Nel Lago Grande di Monticolo sono state osservate meduse per 5 estati consecutive (2015 – 2019), da luglio a settembre, in numero crescente negli anni. Tutte le meduse esaminate sono risultate essere maschi. Le analisi dei contenuti stomacali hanno mostrato che le prede preferite dalle meduse sono copepodi e cladoceri zooplanctonici di dimensioni comprese tra 0,3 e 0,8 mm. Polipi di *Craspedacusta* sono stati trovati nei due laghi di Monticolo in acque poco profonde su cozze zebrate *Dreissena polymorpha* attaccate alle superfici inferiori di substrati artificiali. Riteniamo che l'esame delle cozze zebrate possa essere un metodo semplice per verificare la presenza dello stadio polipoide di *Craspedacusta* in vari ambienti acquatici.

The freshwater jellyfish *Craspedacusta* (Hydrozoa: Limnomedusae) in the Lakes of Monticolo / Montiggl (Province of Bolzano / Bozen, Italy): seasonal variation, feeding and genetic

The freshwater jellyfish *Craspedacusta sowerbii* Lankester 1880 is a cryptic cosmopolitan invasive taxon, which occurs in all continents except Antarctica. Recent molecular studies suggest the existence of at least three very different genetic lineages of *Craspedacusta*. We report the presence of both medusae and polyps of this alien taxon in the Large Lake of

Monticolo / Montiggl, a meso-eutrophic natural lake in the Province of Bolzano / Bozen in Northern Italy. Molecular analyses of mitochondrial 16S sequences showed that this population belongs to a different lineage than that recently described for Sicily (Southern Italy). Therefore, there are two different genetic lineages of *Craspedacusta* in Italy. In the Large Lake of Monticolo / Montiggl medusae were observed in 5 consecutive summers (2015 – 2019), from July to September, in increasing numbers over the years. All the examined medusae were males. The stomach content analyses showed that zooplanktonic copepods and cladocerans with size range between 0.3 and 0.8 mm were the preferred prey of medusae. Polyps of *Craspedacusta* were recorded in the two Lakes of Monticolo / Montiggl on the zebra mussel *Dreissena polymorpha* in shallow water and on the underside of artificial substrates. The analyses of zebra mussels would therefore be a simple method to check the presence of the polyp stage of *Craspedacusta* in various aquatic environments.

Pattern di diversità multitaxon lungo gradienti altitudinali nelle Alpi e nel massiccio della Majella

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I cambiamenti climatici stanno impattando sulla biodiversità in tutto il mondo diventando una delle principali cause di estinzione nei prossimi decenni. I gradienti altitudinali sono di cruciale importanza per esplorare l'effetto dei cambiamenti climatici sulla biodiversità e l'utilizzo di un approccio multi-taxon accoppiato con un'analisi dei tratti funzionali delle specie lungo gradienti altitudinali è un approccio promettente per chiarire le dinamiche delle comunità. Durante gli ultimi quattro anni, stiamo portando avanti un progetto di ricerca incentrato sull'esplorazione dell'influenza dei fattori climatici sui pattern di diversità di licheni, briofite e piante vascolari lungo gradienti altitudinali sia nelle Alpi sia nel massiccio della Majella. I risultati indicano risposte contrastanti della comunità ai cambiamenti climatici tra i diversi gruppi tassonomici. Le principali differenze, in termini di ricchezza della comunità e composizione, sono state trovate tra licheni e briofite da una parte e piante vascolari dall'altra e sono probabilmente mediate da peculiari tratti funzionali. Sulla base delle nostre osservazioni, licheni e briofite potrebbero essere più influenzati dai cambiamenti climatici rispetto alle piante vascolari. Tuttavia, sono state anche trovate relazioni contrastanti specie-clima e tratti-clima tra licheni e briofite, suggerendo che ciascun gruppo può essere sensibile alle diverse componenti del cambiamento climatico.

Patterns of multitaxon diversity along elevational gradients in the Alps and in the Majella massif

Climate change is already impacting biodiversity worldwide becoming one of the major causes of species extinctions in the next decades. Altitudinal gradients have proved to be of crucial importance to explore the effect of climatic-induced changes on biodiversity and using a multi-taxon approach coupled with a species traits analysis along elevational gradients is a promising approach to better elucidate complex community diversity patterns. During the last four years, we have been carrying out a research project focused on the exploration of the influence of climatic factors on diversity patterns of lichens, bryophytes and vascular plants along steep elevational gradients both in the Alps and in the Majella Massif to predict dynamics under future climate change scenarios. Results indicate contrasting community responses to climate change among different taxonomic groups. The main differences, in terms of community richness and composition patterns, were found between cryptogams and vascular plants and are likely mediated by peculiar functional traits. On the basis of our observations, poikilohydric cryptogams could be more impacted by climate change than vascular plants. However, contrasting species-climate and traits-climate relationships were also found between lichens and bryophytes suggesting that each group may be sensitive to different components of climate change.

Diversity changes along elevation gradients in the Central and Southern Alps, Italy

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Plant diversity at the alpine zone is highly sensitive to climate change. Several re-visitation studies showed that species numbers are increasing as species from lower elevations are moving upwards. However, the species increase might only be a temporal phenomenon and cryophile species are expected to be threatened by competitive displacement and physiological constraints in the near future. Beside well investigated summits, only few studies have taken into account the species pool and the migration potential of the species from the slopes below the summits. We think that the answer to locally differing speed and magnitude of change can be found at these slopes as with decreasing elevation temperature increases and the space-for-time approach allows a glimpse into the future.
Here, we present the results from 14 years of standardized vegetation monitoring including eight GLORIA summits in the Central and Southern Alps in combination with transect analyses from the summits down to the treeline in steps of 100 m. Plant communities were defined by means of multivariate analyses. By using indicator values, we analyzed changes in community weighted means and differences of the species composition itself along the elevation and time gradient.
Plant communities could be clearly discriminated along the elevation gradients. The transect analyses allowed to define a set of potential migrators and to estimate the species pool. The summit communities mostly differed from the slope communities. They were hot spots of diversity due to their distinct aspects. Although changes in community weighted means over time were rather small, changes in species composition could be detected at the summits after 14 years.
The knowledge about the species pool in relation to the summit vegetation will be highly valuable for parameterizing the speed of change at the summits and predicting the future of the vegetation along the elevation gradients.

Kurzfristige und langfristige Auswirkungen der beschleunigten Erwärmung von Alpenwässern

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Die derzeitige Erwärmung der Atmosphäre geschieht mit bisher unbekannter Geschwindigkeit, wobei bestimmte Regionen deutlich höhere Steigungsraten als der globale Durchschnitt aufweisen. Neben diesem starken Anstieg ist besonders die ansteigende Frequenz von Hitzetagen ein Teil dieser Veränderung. Während diese Klimamuster an der Erdoberfläche mittlerweile systematisch aufgezeichnet werden, werden Umweltbedingungen und längerfristige Veränderungen im Boden oder in Gewässern – und dies insbesondere im Alpenraum – noch immer nur spärlich beobachtet und dauerhaft gemessen.
Analysen von verfügbaren letztjährigen Temperaturdaten verschiedener Gewässersysteme im Alpenraum zeigen, dass sich diese im globalen Vergleich besonders schnell erwärmen und dass Hitzeereignisse zu unregelmäßigen Temperaturschwankungen in Seen führen können. Umfangreiche gewässerökologische Erhebungen in Alpinen Bächen im Nationalpark Hohe Tauern (2010-2017) zeigten wiederum, dass diese Umweltveränderungen die allgemeine Härte dieser Lebensräume abmildern, wodurch sich neben Populationsstrukturen auch Funktionen der Fließgewässer verändern werden. Obwohl es Maßnahmen zur Abmilderung der Erwärmung der Gewässer umzusetzen gilt, ist von erheblichen Verschiebungen grundlegender Lebensraumbedingungen in Alpengewässern auszugehen. Aktuelle Analysen heimischer Gewässer und deren Wassertemperaturen, und Abgleiche von Lebensraumansprüchen unterschiedlicher Gewässerbewohner zeigen, welche Auswirkungen für Primärproduzenten, benthische Invertebraten und Kaltwasserfische zu erwarten sind.

Ecological real-time and long-term consequences of rapid contemporary warming of Alpine waters

The current atmospheric warming happens at unprecedented rates, with selected regions showing significantly faster increases than the global average. Besides overall increasing temperatures, the increasing frequency and intensity of hot days is part of this change. While these climate patterns are being systematically monitored at weather stations, environmental conditions and long-term changes in soil or water – and especially in the Alpine region – are still only sparsely recorded and permanently measured.
Analyses of recent temperature records from various aquatic systems in the Alpine region show that these habitats warm particularly fast in global comparison and that heat events can lead to irregular temperature fluctuations in lakes.

Ecological surveys in high-altitude streams in the Hohe Tauern National Park (2010 – 2017) reveal that these environmental changes alleviate the general harshness of these habitats, and consequently lead to changes in population structures and ecosystem functions of these rivers. Despite the necessary implementation of measures to mitigate the warming of the waters, we here demonstrate that significant shifts of habitat conditions in Alpine waters occurred already and can be expected for the near future. Current analyses of Alpine aquatic ecosystems and their temperature regimes, together with comparisons of habitat requirements of different aquatic inhabitants, show what effects are to be expected for aquatic primary producers, benthic invertebrates, and cold-water fish.

Artenkenner gesucht – Das „Österreichische Freilandbotanik-Zertifikat“

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Vor dem Hintergrund von Aussagen sinngemäß wie „Artenkenntnis steht auf der Roten Liste“ oder dass „versierte FreilandbiologInnen mit fundierter Artenkenntnis selbst zu den bedrohten Taxa zählen“, wurde nach einer Möglichkeit gesucht, einen Anreiz zu schaffen und Freilandbotanik und botanische Artenkenntnis wieder ins Gespräch zu bringen. Dabei wurde ein erfolgreiches Schweizer Modell aufgegriffen und für Österreich adaptiert. Seit 2019 wird nun das „Österreichische Freilandbotanik-Zertifikat“ angeboten.
Das Zertifikat ist auf Freilandbotanik und dafür relevante Inhalte wie Artenkenntnis, bestimmungsrelevante Merkmale, ökologische Zusammenhänge und Pflanzengemeinschaften zugeschnitten. Die Zertifizierung umfasst die Prüfungsabwicklung und Ausstellung des Zertifikates. Voraussetzungen zur Erlangung des Zertifikates gibt es nicht.
Die Ausstellung des Zertifikates erfolgt im Namen des „Vereins zur Erforschung der Flora Österreichs“, die verwaltungsmäßige Abwicklung und Leitung über das Institut für Botanik der Universität Innsbruck.
Derzeit umfasst das Zertifikat drei Stufen mit ansteigenden Anforderungen. Für die erste Stufe wird das verlässliche Erkennen von 250 Arten verlangt. Die weiteren Stufen erfolgen in Schritten von jeweils 250 zusätzlichen Arten, ergänzt durch weitere, für das Freiland relevante Kenntnisse. Die dritte Stufe stellt mit 750 Arten, 60 Gattungen und 40 Familien und deren Merkmalen, erweitert durch das Ansprechen von Lebensräumen und Lebensgemeinschaften, Kartierung und Bestimmung eine echte Herausforderung dar.
Es gibt eine einheitliche Zertifizierung für ganz Österreich, daher auch eine einheitliche Artenliste, wobei die Listen aufbauend sind. Regionale Unterschiede können aber berücksichtigt werden. Dazu ist der Austausch von maximal 50 Arten pro Stufe möglich.
Die Prüfungen zur Erlangung des Zertifikates erfolgen für die Stufen 1 und 2 dezentral, für die Stufe 3 zentral in Innsbruck (Institut für Botanik). Die Prüfungsantritte pro Person sind nicht begrenzt und ein Einstieg ist auf jeder Stufe möglich.

The Austrian certificate of outdoor botany

Against the background of statements like species expertise is on the Red List or experienced field biologists are endangered taxa we were searching for a possibility to resurrect interest in field botany in general but with a special focus on knowledge of plants species. As a result the „Austrian certificate of outdoor botany“ started in 2019.
The certificate concentrates on field botany and relevant aspects like species expertise, plant determination, ecological aspects or plant communities. The certification includes the examination and the issue of the certificate. Special courses are not included. The access to the certificate is free to everyone, without restrictions or requirements.
At the moment, 3 steps are offered. The first step covers the safe identification of 250 species. In the following steps the number of species increases by 250 per step, supplemented by additional aspects. The third step which requires the identification of 750 species and additionally 60 genera and 40 families and their morphological characters, knowledge of plant communities, mapping and plant determination will be a considerable challenge for candidates.
There is one general certificate for Austria with one list of taxa per step. Due to the floristic differences in different regions of Austria, there is a possibility to replace up to 50 species per step.
The examination to get the certificate is decentralised for step 1 and 2. Step 3 is offered in Innsbruck (Department of Botany) only. It is possible to start at any level and without restriction of attempts.

Fischmonitoring an den Wasserkraftwerken der Alperia-Gruppe

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Alperia Greenpower betreibt, als Tochter des Energieunternehmens Alperia AG, die Mehrheit der großen Wasserkraftwerke in Südtirol. Die Produktion von Strom aus Wasserkraft gilt im Allgemeinen als eine der umweltfreundlichsten Formen. Trotzdem gibt es für die Nutzung der natürlichen Ressourcen Interessenskonflikte zwischen Betreibern und den Ansprüchen des Naturschutzes. Mit den gemeinsamen Nutzern der Flussläufe, den Fischen, bestehen die häufigsten Berührungspunkte und von Seiten der Fischereivertretern das Verlangen zu einem ausgedehnteren Fischschutz. Gefordert werden zum Beispiel die Errichtung von Fischwanderkorridoren, das Verhindern des Eintretens der Fische in die Turbineneinläufe und die Reduzierung der Häufigkeit von Stauseespülungen. Alperia Greenpower sieht sich verantwortlich, diesen Forderungen entgegenzukommen, überprüft jedoch im Sinne der Nachhaltigkeit die Wirksamkeit der geforderten Maßnahmen vor und während deren Umsetzung mittels zoologischer Beobachtungen.
Da die Wasserkraftwerke teilweise bereits seit einem Jahrhundert bestehen, stellt die Anpassung der Wasserfassungen an den Fischschutz eine besondere bauliche Herausforderung dar. Deshalb wurde an mehreren Kraftwerken ein Fischmonitoring vor den Rechen der Turbineneinläufe durchgeführt, um die tatsächliche Schadensrate festzustellen. Diesbezüglich wurden mittels Kameramonitoring und Reussenbefischung das Verhalten der adulten Fische beobachtet. Da sich die Fische hauptsächlich bodennah aufhalten, zeigen die Ergebnisse deutliche Abweichungen zu den vermuteten Fischschäden und stellen den bereits vorhandenen Barrieren (Rechen) einen ausreichenden Fischschutz aus.
Als weiteren Punkt wird auf die Beobachtung der Fischwanderungen an den neu erstellten Fischwanderkorridoren an den Wasserfassungen eingegangen. In diesen Fällen erfolgen die Beobachtungen mittels Kameramonitoring.

Fish monitoring at the hydropower plants of the Alperia Group

Alperia Greenpower, a member of the energy company Alperia AG, operates the majority of the large hydropower plants in South Tyrol. The production of electricity from hydropower is generally considered one of the most environmentally friendly forms. Nevertheless, there are conflicts of interest between the operator and and the demands of nature preservation in the use of natural resources. The most frequent points of contact are with the common users of the river courses, the fish, and on the part of the representatives of the anglers, there is a desire for more extensive fish protection. Demands include, for example, the establishment of fish migration corridors, preventing fish from entering turbine intakes and reducing the frequency of reservoir flushing. Alperia Greenpower considers itself responsible for meeting these demands, but in the interests of sustainability, it checks the effectiveness of the required measures before and during their implementation by means of zoological observations.
Since some of the hydroelectric power plants have already existed for a century, the adaptation of the water intakes to the protection of fish poses a particular structural challenge. For this reason, fish monitoring was carried out at several power plants in front of the rakes of the turbine inlets to determine the actual damage rate. In this context, the behaviour of adult fish was observed using camera monitoring and net fishing. Due to the fact that the fish mainly stay close to the bottom, the results show clear deviations from the suspected fish damages and provide sufficient fish protection for the already existing barriers (rakes).
A further point is the observation of fish migration along the newly created fish migration corridors at the intakes. In these cases, the observations are made by camera monitoring.

Plant community development and soil characteristics in the glacier foreland of Zufallferner (Martell Valley, South Tyrol)

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Due to climate warming, glacier retreat opens new areas for colonization in the alpine and nival zone. These glacier forelands are perfect for analysing the development of plant communities from zero onward. Development of plant

communities does not only depend on the age of the moraines, but also on topography, microclimate, soil development, and geomorphological processes as well as on biotic interactions.
The study presented here is part of the project SEHAG (Sensitivity of high Alpine geosystems to climate change since 1850) with the superior hypothesis that cryospheric changes influence plant colonization and community evolution.
During the first study year of the project, we focused on the development of plant communities and soil in a glacier foreland. We hypothesized that: i) Climate warming accelerates glacier retreat and reduces duration of snow cover. Both changes have an effect on colonization and species composition. ii) Pioneer, early and late successional species differ in their effects on and responses to soil development and soil microclimate.
The study area Martell Valley (South Tyrol, Italy) is located in the southern part of the Central European Alps. We established 12 permanent plot clusters of 2 m x 5 m on areas deglaciated between 1985 and 2018, two clusters per retreat area. In each 1 m² of these clusters, species composition, cover, and number of individuals were recorded. On ground moraines exposed for a longer time we recorded species composition and cover on 10 m x 10 m plots. At all sites, plant-relevant soil parameters were analysed, and soil microclimate was measured continuously.
We found up to two vascular plant species per 1 m² on areas ice-free for one year and up to 16 vascular plant species per 1 m² on areas ice-free since 1985. On the moraines of 1905 up to 39 vascular plant species per plot with a mean cover of 52.5 % were recorded. On the moraines of 1885, we found up to 43 vascular plant species with a mean cover of 40 % and single trees. As expected, the ordinations (Principal Component Analyses, PCA) showed a clear relationship between vegetation and related soil characteristics.
In a next step, we will analyse the effects and responses of pioneers, early and late successional species to geomorphological processes by means of functional traits.

Monitoraggio del lupo in Alto Adige / Südtirol, dati storici e attuali (2014-2020); caso di studio mediante telemetria satellitare su una femmina alfa radio marcata.

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Per poter gestire una popolazione animale nell'interesse collettivo, risulta fondamentale avere un quadro il più preciso e corretto possibile, sia in termini distributivi sia numerici. Questo, soprattutto in Alto Adige dove il territorio è molto urbanizzato e conserva una diffusa zootecnia montana.
Per quel che riguarda la gestione dei grandi carnivori e del lupo in particolare bisogna fare uno sforzo aggiuntivo e analizzare dati di maggiore dettaglio sull'uso del territorio e delle sue risorse, sia di origine naturale che di origine antropica.
Applicando le informazioni raccolte nel nostro database, sia all'interno che all'esterno dell'area attuale di presenza della specie, cerchiamo di interpretare i possibili comportamenti e di identificare le aree che la specie potrebbe occupare in futuro. Questo soprattutto per analizzare il potenziale aumento delle interazioni uomo-lupo in futuro.
Nel presente lavoro si riassumono i dati storici e attuali raccolti in 6 anni di monitoraggio (2014-2020) in provincia di Bolzano e presentiamo i risultati derivanti dalla marcatura con collare GPS della lupa alpha WBZF001 del branco dell'alta val di Non. In questo caso di studio sono stati analizzati 8.853 *fix*, per un totale di 546 giorni coprendo un territorio (MCP al 100%) di 260.524 km^2 e percorrendo 8.141 km *point to point* (≈ 12.211 km sviluppati).

Wolf monitoring in South Tyrol, historical and current data (2014-2020) and case study using satellite telemetry on a GPS-collared alpha female.

Managing wildlife populations in the collective interest requires accurate and unbiased data of distribution and abundance. This is especially important in Southern Tyrol, where the territory is highly urbanized and maintains widespread mountain animal husbandry.
With respect to the management of large carnivores, and wolves in particular, an additional effort must be made to obtain detailed data on the spatial behavior, habitat selection, and use of both natural and anthropogenic resources.
Using the information compiled in our database, collected both inside and outside the current area of presence of the species, we try to interpret the spatial behaviors and identify areas that could be occupied in the future. This shall allow to analyse the potential increase in human-wolf interactions in the future.
In the present work we summarize the historical and current data collected in 6 years of monitoring (2014-2020) in the province of Bolzano. We also present the results from the GPS-collar marking of the she-wolf alpha WBZF001 of the

herd in the upper Val di Non. In this case study, 8,853 fixes per hour were analyzed, for a total of 546 days covering a territory (100% MCP) of 260,524 km^2 (26,052 h) and a travel distance of 8,141 km *point to point* (≈ 12,211 km developed).

Due nuovi ritrovamenti del genere *Cortinarius* per la Provincia di Bolzano.

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Vengono presentati due specie di funghi del genere *Cortinarius* nuovi per il censimento dei macromiceti della provincia di Bolzano.
Cortinarius armenicorius Soop & Brandrud ritrovato presso il bosco delle Tre Fontane a Trafoi in val Venosta e *Cortinarius flavipallens* Kytöv. Liimat. & Niskanen ritrovato lungo la valle che porta al passo Monte Croce a Sesto Pusteria.
Entrambe le specie, ad areale nordeuropeo, vanno ad arricchire la biodiversità di questo importante genere di funghi, ben rappresentato nella nostra provincia e importante come bioindicatore positivo dello *status* dei nostri boschi.

Two new species of the genus *Cortinarius* found in the province of Bolzano.

Two species of the genus *Cortinarius* new to the mapping of macromycetes in the province of Bolzano are presented.
Cortinarius armenicorius Soop & Brandrud found in the forest "Tre Fontane" in Trafoi in the Venosta valley and *Cortinarius flavipallens* Kytöv. Liimat. & Niskanen found along the valley leading to the Monte Croce pass in Sesto Pusteria.
Both species, typical of the northern European area, enrich the biodiversity of this important genus of mushrooms, well represented in our province and important as they represent a positive bioindicator of the status of our forests.

ALFFA - Gesamtheitliche (skalenübergreifende) Analyse der Einflussfaktoren und ihre Wirkung auf die Fischfauna im inneralpinen Raum

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Mit zunehmender Nutzung unserer Kulturlandschaft unterliegen auch die Gewässersysteme einem ansteigenden Einfluss durch diverse anthropogene Maßnahmen. Dies kann zu dramatischen Veränderungen der aquatischen Lebensräume und ihrer Organismengemeinschaften führen. Fische sind laut der europäischen Wasserrahmenrichtlinie (WRRL, 2000/60/EG) ein wesentlicher Indikator dafür, in welchem ökologischen Zustand sich ein Gewässer befindet. Über das vorhandene Artenspektrum, die Abundanz- und Dominanzverhältnisse und den Populationsaufbau der einzelnen Arten können verlässliche Aussagen über den Zustand eines Gewässers getätigt werden. Die teilweise dramatischen Veränderungen der Fischfauna in Tirol und Südtirol reichen vom lokalen Rückgang einzelner Populationen bis zur aktuellen Bedrohung der Bestände und im Einzelfall sogar bis zum Verschwinden von Arten. Das INTERREG Projekt ALFFA zwischen Österreich und Italien hat daher an 81 Untersuchungspunkten ein gesamtheitliches Bild über die tatsächliche Qualität der inneralpinen Fischlebensräume erstellt. Es wurden möglichst alle Einflussfaktoren (wie z.B. Landnutzung, Veränderungen in der Hydrologie und Morphologie, fischfressende Vögel, die Angelfischerei, das Makrozoobenthos als Nahrungsgrundlage der Fische, sowie hormonaktive Substanzen und

Wasserchemie), die auf die Fischfauna wirken, untersucht und bewertet. Erstmals wurde auch großflächig die Umlandnutzung im Einzugsgebiet betrachtet und die Auswirkungen auf den Fischbestand festgestellt.
Die Ergebnisse zeigen, dass die Landnutzung und Topografie im Einzugsgebiet am stärksten mit den Fischpopulationen korrelieren. Viele Gewässer sind durch Eingriffskombinationen aus z.B. intensiver Landnutzung, starken Verbauungen, gestörten hydrologischen Verhältnissen, wie etwa durch Wasserkraftwerke oder Schutzwasserbauten, hohem Fischereidruck und einer hohen Anzahl an fischfressenden Vögeln, mehrfach belastet. Wird ein Gewässer nur von einzelnen oder wenigen „Stressfaktoren" betroffen, können diese Einflüsse kompensiert oder zumindest vermindert werden. Ab einer kritischen Anzahl von Negativeinflüssen kommt es nicht nur zu einem Additions- sondern zu einem Multiplikationseffekt bezüglich der negativen Einflüsse auf das Gewässersystem.

ALFFA – Holistic (multiscale) analysis of the factors and their effect on the fish fauna in inner-Alpine region

River ecosystems are strongly influenced by landform and human activities within their catchments. Most rivers worldwide have been severely altered by a combination of different anthropogenic interventions, leading to dramatic changes in the aquatic habitat and the organism communities. With information about species composition, abundance, dominance and population structure it is possible to make reliable predictions about the status of the river ecosystem. Therefore, fishes have been established as a biological indicator for the good water status in the European Union in accordance with the European Water Framework Directive. In this context, the ALFFA INTERREG project between Italy and Austria has the aim of evaluating the effect of human activities on water quality and streamflow regimes, and therefore on the fish fauna, with special focus on Tyrol and South Tyrol. 81 sampling points have been selected, where the impacts of all influencing drivers (e.g. land cover, agriculture, macrozoobenthos, fisheries, fish-eating birds, water chemistry, pesticides, hydrology, etc.) have been evaluated. From the landscape perspective, a crucial aspect is the estimation of the anthropogenic alteration (i.e. degree of disturbance) of the river ecosystems and their catchments, due to agricultural management, urban sprawl or river management. To this aim, we used an integrative approach for analysing habitat diversity, landscape structuring, urban sprawl and land use in diverse cultivated and natural mountain areas. In fact, land use, landscape configuration and topography in the catchment significantly influence the biomass and biodiversity of the fish fauna. Additionally, the landscape affects a variety of different factors like the water quality and quantity, which, in turn, influence the fish fauna as intermediate factors. The characteristics of the catchment area and the morphological as well as the hydrological situation of the river proved to be the most relevant factors which affect the fish populations. However, a multitude of influencing drivers acting in concert may affect the abundance, biomass and diversity of fish populations. Single stressors have been shown to have a negative impact at a few sampling sites, which could even be compensated in some cases.

Räumlich-zeitliche Analyse der Jagdstatistiken zur Beurteilung der Veränderungen der Landschaftsqualität

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Im Laufe des letzten Jahrhunderts haben zunehmende menschliche Siedlungstätigkeiten, die Intensivierung der Landwirtschaft, veränderte klimatische Bedingungen und viele andere Faktoren die Landschaft und ihre Ökosysteme beeinflusst und geformt. Gerade in Gebirgen ist dadurch eine Mosaiklandschaft mit einem breiten Spektrum von Lebensräumen und Arten entstanden. Einige Tierarten bewohnen dabei sehr spezifische Lebensräume. Veränderungen in diesen Systemen können dazu führen, dass die Populationen zu- oder abnehmen oder im Extremfall verschwinden. In dieser Studie verknüpfen wir das Vorkommen von Wildarten mit Veränderungen der Landschaftsqualität, indem wir Abschussstatistiken verwendeten. Unser Ziel war es, Arten oder Artengruppen zu finden, die als Indikatoren zur Messung, Beschreibung und Bewertung der Veränderungen der Landschaftsstruktur und Landschaftsqualität in Südtirol innerhalb der letzten 150 Jahre verwendet werden können. Dafür wurden die langfristigen Abschussstatistiken aller Wildarten digitalisiert und ausgewertet. Arten wie das Auerhuhn (*Tetrao urogallus*) und das Rebhuhn (*Perdix perdix*) zeigen in den letzten 70 Jahren starke Bestandsrückgänge. Im Gegensatz dazu stieg die Gesamtsumme der erlegten Rothirsche (*Cervus elaphus*) von 114 Individuen (1953 bis 1964) auf 33.447 Individuen zwischen 2005 und 2014 an. Wir analysierten die Populationstrends unter Berücksichtigung aller möglichen treibenden Faktoren (z.B. Klima,

Wetter, Landschaftsstruktur, Landnutzung, Landmanagement, Jagdmanagement, interspezifische Konkurrenz, Prädation).

Spatio-temporal analysis of harvest statistics to assess changes in landscape quality

Over the last century, increasing areas of human settlement, intensification of agriculture, changing climatic conditions and many more factors affected and formed the landscape and its ecosystems. In mountain ecosystems, high variation in altitudinal and land-use gradients created a mosaic landscape containing a broad spectrum of habitats and species. Some animal species inhabit very specific habitats. Changes in these systems can cause population increases or declines or in extreme cases disappearance. In this study, we link the occurrence of game species with changes in landscape quality by using harvest statistics. We aim to find species or species groups which can be used as indicators to measure, describe and assess changes in landscape structure and landscape quality in South Tyrol, Italy, over the last 150 years. Therefore, long-term harvest quota of all game species were digitized and evaluated. Species like the capercaillie (*Tetrao urogallus*) and the grey partridge (*Perdix perdix*) show strong population declines over the last 70 years. By contrast, the total sum of harvested red deer (*Cervus elaphus*) increased from 114 individuals between 1953 and 1964 up to 33.447 individuals between 2005 and 2014. We analysed population trends by considering all possible driving factors (e.g. climate, weather, landscape structure, land use, land management, hunting management, interspecific competition, predation).

Assessing variation of stream benthic macroinvertebrates following changes in the catchment of the Long Term Ecological Research site of the Matsch Valley (South Tyrol)

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Freshwater systems are an essential part of our ecosystem, and although they constitute only a small part of Earth's surface, they harbor about 10% of the known animal species. Streams, particularly in the Alpine area, are sensitive to indirect and direct anthropogenic disturbance. For example, the European Alpine region is facing constant shifts in agricultural practices. Moreover, as part of the European strategy of fostering renewable energies, the presence of small hydropower plants is constantly increasing and influencing the stream environment.
The Matsch Valley and its main glacier-fed stream, the Saldur stream, are part of the International Long Term Ecological Research (ILTER) network (site IT-25). Our study in this area aimed to compare benthic macroinvertebrate assemblages – well established bioindicators – of the Saldur stream before and after the installation of a small "run-of-river" hydropower plant. In the years 2015 and 2020, we conducted surveys, following the same methodological approach, with the goal of elucidating the impact of the hydropower plant also considering land-cover changes as a side factor. With a monthly frequency, from April to September, we sampled benthic macroinvertebrates and measured a set of abiotic variables (discharge, suspended solids, conductivity, water temperature, channel stability) at six sites (5-11km from the glacier). To evaluate land-cover changes in the catchment, we conducted a GIS analysis at local scale.
We expect different macroinvertebrate community structures with higher spatial variability, especially at the beginning and at the end of the glacier-melt season 2020 vs. 2015, due to the hydropower plant influencing stream discharge. With regards to accompanying factors, we anticipate that changing land use (e.g. alpine agro-pastoral activities) only minimally affects density and diversity of the benthic community assemblages.

Sanierungs- und Restaurierungsarbeiten am Völser Weiher - Bereits erfolgte Aktionen und weiteres Vorgehen

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Der Völser Weiher ist ein kleines, seichtes Gewässer am Fuße des Schlern im Naturpark Schlern- Rosengarten. Der ehemals klare, Makrophyten-dominierte Weiher erfuhr nach einem illegalen Besatz von Graskarpfen eine zunehmende Verschlechterung des Zustandes mit einer einhergehenden Gefährdung der Badetauglichkeit. Graskarpfen fraßen große Mengen an Wasserpflanzen und haben nach kürzester Zeit den gesamten Pflanzenbestand vernichtet. Die Nährstoffe,

die normalerweise von den Wasserpflanzen aufgenommen werden, standen ausschließlich den einzelligen Algen und den potentiell Toxin bildenden Cyanobakterien zur Verfügung, wodurch Algenblüten begünstigt wurden.
Im Sommer 2019 hat das Biologische Labor der Landesagentur für Umwelt und Klimaschutz in enger Zusammenarbeit mit dem Amt für Natur, dem Amt für Jagd und Fischerei, der Forststation Kastelruth, der Agentur für Bevölkerungsschutz, der Gemeinde Völs, der Firma Systema GmbH, der Firma Limnological Solutions International und einigen Freiwilligen mit der Umsetzung einer Reihe von Restaurierungsarbeiten begonnen. Dazu wurden in einem ersten Schritt die im Sediment gespeicherten Pflanzennährstoffe anhand von mehreren entnommenen Kurzkernen ermittelt. Eine Echosondierung brachte Aufschluss über die Sedimentverteilung und über die Morphometrie des Gewässers. Nach einer Absenkung des Wasserpegels wurde mit Hilfe eines Zugnetzes ein Großteil des Friedfischbestandes entnommen und in einem nahe gelegenen Weiher besetzt. Die Graskarpfen konnten nach einer weiteren Absenkung aus dem Weiher endgültig entfernt werden. Nun steht eine Fixierung der pflanzenverfügbaren Phosphate im Wasser und Sediment mittels dem Produkt Phoslock, einem Lanthan modifizierten Benthonit, an. Somit ist der Weg für eine Etablierung verschiedener heimischer und lokaler Characeen-Arten geebnet. Diese sind durch ein niederwüchsig üppiges Wachstum gekennzeichnet und können somit eine große Menge an Nährstoffen im Zuge ihres Wachstumes aufnehmen, ohne dabei Badegäste zu stören.

Restoration of the Völser Weiher / Laghetto di Fiè - Actions already taken and further procedure

The Völser Weiher / Laghetto di Fiè is a small, shallow lake at the foot of the Mt. Schlern / Sciliar in the Schlern-Rosengarten / Sciliar-Catinaccio Nature Park. After an illegal stocking of grass carps, the formerly clear, macrophyte-dominated pond experienced an increasing deterioration of its condition with a concomitant threat to its bathing suitability. The grass carps ate large quantities of aquatic plants and destroyed the entire plant population within a very short time. The nutrients normally absorbed by aquatic plants were now exclusively available to unicellular algae and potentially toxin-producing cyanobacteria, a situation which favored algal blooms.
In the summer of 2019, the Biological Laboratory of the Agency for Environment and Climate Protection, in close cooperation with the Department of Nature, the Department of Hunting and Fishing, the Forest Station Kastelruth / Castelrotto, the Agency for Civil Protection, the Municipality of Völs, the company Systema GmbH, the company Limnological Solutions International and some volunteers, started to implement a series of restoration works. In a first step, the plant nutrients stored in the sediment were determined on the basis of several short cores taken from the sediment. An echo sounding provided information about the sediment distribution and the morphometry of the water body. After lowering the water level, a large part of the fish population was removed with the help of a draught net and stocked in a nearby pond. After a further lowering of the water level, the grass carps could finally be removed from the pond. Now the plant-available phosphates in the water and sediment are to be fixed with the product Phoslock, a lanthanum modified benthonite. This paves the way for the establishment of various native and local Characeae species. These are characterized by lowgrowing, lush growth and can therefore absorb a large amount of nutrients as they grow, without disturbing bathers.

Which environmental factors shape the aquatic bryophyte community in selected mountain streams of the Eastern Alps?

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Aquatic bryophytes are playing a crucial role in mountain stream ecology. They constitute a large portion of the aquatic autotrophic biomass, especially in smaller alpine streams. Hence, they form the base of the food web, provide shelter for other aquatic species, such as for example macrozoobenthos, and act as substrate for epiphytic algae. Despite their significance for freshwater ecosystems the environmental factors affecting the bryophyte communities of mountain streams of the Eastern Alps and their most common species are not well studied yet.
We selected five sampling sites at each of thirteen mountain streams in South Tyrol to measure abiotic factors potentially affecting the aquatic bryophyte communities. At each sampling site we recorded elevation, water temperature, electrolytic conductivity, pH, total phosphorus and total nitrogen content. Additionally, we aimed at inventorying all submerse and riparian bryophytes in the selected streams at segments centered around each sampling site. To determine the abiotic factor which best describes the species community composition we implemented a partial canonical

correspondence analysis (pCCA). Furthermore, we were interested to find out if the same factors which impact the species composition also determine the occurrence of single species. Therefore, we predicted the occurrence of the ten most dominant bryophyte species (i.e. *Amblystegium riparium, A. tenax, Brachythecium rivulare, Bryum pseudotriquetrum, Cratoneuron filicinum, Hygrohypnum duriusculum, H. luridum, Palustriella communtata* var. *falcata, Platyhypnidium riparioides and Schistidium rivulare)* by means of generalized linear mixed models (GLMMS). The models were computed with two sets of predictors: abiotic factors obtained by direct measurements and mean Ellenberg indicator values derived from the bryophyte species composition.
We recorded a total of 77 species. Fifteen species belong to Marchantiophyta and 62 to Bryophyta, respectively. Sixteen species were obligate aquatic bryophytes, among them were rare species such as *Hygrohypnum smithii* and *H. alpestre*. The elevation of the surveyed sites ranged from 312 to 2240 m.a.s.l., the electrolytic conductivity values ranged from 34.8 to 515 µS**,** the measured water temperature ranged from 2.9 to 18.3° C and the pH varied from 6.05 to 8.3. The observed nutrient values ranged from 109 to 741 µg/l for total nitrogen and from 1 to 59.6 µg/l for total phosphorus. We found that the species community is significantly correlated with elevation, electrolytic conductivity, water temperature and pH. However, the total variance of the species composition by the abiotic factors remained unexplained (19.6%). Moreover, the results of the models suggest that the environmental factors predicting the occurrence of single species are varying amongst the species. Furthermore, we found that the mean Ellenberg indicator values have been better applicable in predicting single species occurrence than the *in situ* measured environmental factors.

FREITAG / VENERDÌ / FRIDAY
04.09.2020

Posterpräsentation / Presentazione poster / Poster presentation – 14:00

Session chair: Thomas Wilhalm, Museum of Nature South Tyrol, Bozen/Bolzano (I)

Studio sugli uccelli nidificanti in ambienti prativi estensivi dell'Alto Adige

MATTEO ANDERLE[1, 2], GIULIA LIGAZZOALO[3], MICHELE CALDONAZZI[4], ANDREAS HILPOLD[1], ALESSANDRO MARSILLI[4], JOACHIM MULSER[3], CHIARA PANICCIA[1], CLAUDIO TORBOLI[4], STEFANIA VOLANI[1] & ULRIKE TAPPEINER[1, 2]
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Effects of abiotic factors on Carabid Beetles (Coleoptera: Carabidae) functional traits along altitudinal gradient.

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Un approccio metabarcoding e multi-marker per studiare la diversità del suolo nei siti di colture permanenti del BMS

GIULIO GENOVA[1,2], LUIGIMARIA BORRUSO[2], GEORG NIEDRIST[1], ANDREAS HILPOLD[1], MARCO SIGNORINI[2], MICHAEL MITTERER[2], STEFANO CESCO[2], TANJA MIMMO[2] & ULRIKE TAPPEINER[1,3]
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Citizen Science nel progetto "File Small Mammals": a caccia di gliridi

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Citizen Science nel progetto „File Small Mammals": combinazione vincente tra guardiacaccia e genetica per studi su *Talpa europaea* and *Arvicola* spp. in Alto Adige

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Zentrale Sammlung von Fischdaten Südtirols: Einblick in die Entwicklung der Fischfauna der Etschtalgräben

GEORG H. NIEDRIST[1], HANNES GRUND[2], ANDREAS HILPOLD[3], JOSEF WIESER[4] & PETRA KRANEBITTER[5]
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Vergleich von Obstbaustandorten und naturnahen Standorten in Bezug auf die Verbreitung von *Halyomorpha halys* und parasitoiden Wespen

LISA OBWEGS[1], ANDREAS HILPOLD[1], MARTINA FALAGIARDA[2], STEFANIE FISCHNALLER[2] & ULRIKE TAPPEINER[1,3]
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Biodiversity in the post-windthrow areas at the northern foot of Latemar massif (South Tyrol, Italy)

CHIARA PANICCIA[1], MATTEO ANDERLE[1], THOMAS FRIEß[2], ANDREAS HILPOLD[1], EVA LADURNER[3], VINCENZO MEOLA[1], CARSTEN MORKEL[4], MICHAEL STEINWANDTER[1], SIMON STIFTER[1], JULIA SEEBER[1,5] & ULRIKE TAPPEINER[1,5]
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First year of bat surveys in the Biodiversity Monitoring South Tyrol

FLORIAN REICHEGGER[1], EVA LADURNER[2], CHIARA PANICCIA[3], ERICH TASSER[3,4], ANDREAS HILPOLD[3] & ULRIKE TAPPEINER[3,4]
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Surveying the glacial relict *Carex maritima* Gunn. on the Sciliar (Bolzano Province, Italy).

FRANZISKA ZEMMER
Entiklar (I)

Zoologische und botanische Forschung in Südtirol
Ricerca zoologica e botanica in Alto Adige

Studio sugli uccelli nidificanti in ambienti prativi estensivi dell'Alto Adige

MATTEO ANDERLE[1, 2], GIULIA LIGAZZOALO[3], MICHELE CALDONAZZI[4], ANDREAS HILPOLD[1], ALESSANDRO MARSILLI[4], JOACHIM MULSER[3], CHIARA PANICCIA[1], CLAUDIO TORBOLI[4], STEFANIA VOLANI[1] & ULRIKE TAPPEINER[1,2]
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A partire dagli anni Cinquanta in tutt'Europa le pratiche agricole hanno subito grossi cambiamenti, portando forti ripercussioni sulla biodiversità. In particolare, causando la progressiva rarefazione o scomparsa di Uccelli legati agli ambienti aperti o semi-aperti, largamente originati e mantenuti dall'attività agricola tradizionale e dalla pastorizia. Le principali cause pare infatti siano dovute all'intensificazione ed alla meccanizzazione delle pratiche agricole ed all'abbandono delle aree rurali. All'interno del Monitoraggio della Biodiversità Alto Adige (BMS) nel corso del 2020 è stato instaurato un Progetto Speciale sugli uccelli nidificanti in ambienti prativi e in aree agricole aperte e semiaperte. Le specie focus del progetto speciale sono state quindi: il re di quaglie (*Crex crex*), rallide migratore e nidificante nelle Alpi orientali nei prati da sfalcio di mezza montagna gestiti in maniera estensiva, il succiacapre (*Caprimulgus europaeus*), l'averla piccola (*Lanius collurio*), la tottavilla (*Lullula arborea*), la bigia padovana (*Sylvia nisoria*), l'ortolano (*Emberiza hortulana*), ma anche altre specie di piccoli Passeriformi di rilevante interesse conservazionistico, come l'allodola (*Alauda arvensis*), lo stiaccino (*Saxicola rubetra*), il saltimpalo (*Saxicola torquatus*) e diversi zigoli come lo zigolo nero (*Emberiza cirlus*) e lo zigolo giallo (*Emberiza citrinella*), un tempo presenze diffuse, le cui popolazioni alpine risultano fortemente legate al tipo di coltivazione e alle modalità di sfalcio nelle praterie montane.
Il principale obiettivo di tale progetto è stato quello di approfondire lo stato di conoscenza sull'odierna distribuzione e sull'attuale stato di conservazione dell'avifauna nidificante in ambienti prativi e in aree agricole in Provincia di Bolzano. Un ulteriore scopo del progetto speciale è stato quello di definire una rete di aree campione per avviare un monitoraggio standardizzato e a lungo termine che permetta di seguire i *trends* delle popolazioni avifaunistiche che dipendono da questi habitat rurali. Gli sviluppi futuri ed il risvolto conservazionistico concreto di questa importante raccolta di dati sono l'individuare ed il suggerire pratiche agricole applicabili e compatibili con la conservazione degli uccelli, grazie anche al coinvolgimento dei più importanti stakeholder.

Study of the bird fauna of extensive grasslands in South Tyrol

Since the 1950s, agricultural practices throughout Europe have undergone major changes, with major impacts on biodiversity. In particular, these changes cause the progressive rarefaction or disappearance of birds dependent on open or semi-open environments. These specific habitats are largely originated and maintained by traditional farming and grazing. The main causes seem to be intensification and mechanization of agricultural practices and the abandonment of rural areas. As part of the Biodiversity Monitoring South Tyrol (BMS), in 2020 a special project on nesting birds in grassland and in open and semi-open agricultural areas was established. The target species of the Special Project were therefore: the Corn crake (*Crex crex*), a migrating rail nesting in the Eastern Alps in extensively managed hay meadows, the Nightjar (*Caprimulgus europaeus*), the Red-backed shrike (*Lanius collurium*), the Woodlark (*Lullula arborea*), the Barred warbler (*Sylvia nisoria*), the Ortolan bunting (*Emberiza hortulana*), but also other species of small Passeriformes of high conservation interest, such as Skylark (*Alauda arvensis*), Whinchat (*Saxicola rubetra*), Stonechat (*Saxicola torquatus*), Cirl bunting (*Emberiza cirlus*) and Yellowhammer (*Emberiza citrinella*). Most Alpine populations of these species are strongly linked to traditional methods of mowing and pasturing and were once widespread in Alpine grasslands. The main objective of this project was to deepen the knowledge on the current distribution and conservation status of nesting birds in grassland and agricultural areas in South Tyrol. A further aim of this special project was to define a network of areas for the installation of a standardized long-term monitoring. Finally, the data collection serves to identify and suggest applicable agricultural management practices compatible with bird conservation with the involvement of the most important stakeholders.

Effects of abiotic factors on Carabid Beetles (Coleoptera: Carabidae) functional traits along altitudinal gradient.

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Ground beetles (Coleopetera: Carabidae) also called Carabid Beetles, are a well-known family of Beetles and good ecological indicators since they are sensible to habitat heterogeneity and land use. Moreover, they are sufficiently abundant, easy to collect using pitfall traps and relatively easy to study.
Regarding Ground Beetles, two functional traits are considered in relation with the environmental factors: body size and wings development. The first trait, the body size, varies following the food availability in the environment and the length of larval development in general. A significative change in a body size of a natural population may indicate a certain type of environmental stress. Meanwhile, the wing development is depending on the species and Carabids are basically divided into three groups following the wing development:

1) Macropterous: fully developed hind wings.
2) Brachypterous: Undeveloped hind wings, also called short-winged species or wingless species.
3) Dimorphic: species with both macropterous and brachypterous individuals.

The wing development is associated with the dispersal ability; thus, it may have an important role in terms of how the animal respond to environmental change. In this sense, the study of species traits along elevational gradient could represent an opportunity to assess the potential impact of an environmental change in mountain areas.
In this study, we collect Ground Beetles using pitfall traps in extensive grazed pastures located in the LTER Matsch/Mazia area of Muntatschinig/Monteschino. The study is performed along an elevational gradient considering four different elevations (1000 m, 1500 m, 2000 m, 2500 m) in order to understand whether the different abiotic factors that occurs at each elevation may have some association with Ground beetles´ functional traits.

Un approccio metabarcoding e multi-marker per studiare la diversità del suolo nei siti di colture permanenti del BMS

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Il suolo è un vasto mondo sotterrano con una moltitudine di specie batteriche e fungine. Si stima che 1 g di suolo contenga un numero di specie batteriche compreso fra 10^9 e 10^{10} e al suo interno esistano diverse micro-nicchie e numerosi ecotipi. Nonostante si conosca solo una piccola frazione della diversità microbica, è stato dimostrato che funghi e batteri giocano un ruolo fondamentale in diversi servizi ecosistemici, tra cui la regolazione del clima e il funzionamento dei cicli biogeochimici.
In uno "*special project*" all'interno del *Biodiversity Monitoring South Tyrol* (BMS), la biodiversità fungina e batterica di diversi suoli di meleto verrà studiata con un approccio di DNA *metabarcoding*. In particolare, i principali fattori che influenzano la diversità microbica verranno investigati campionando siti caratterizzati da diverse condizioni ambientali e gestione agronomica (es. agricoltura biologica vs. agricoltura integrata).
Questo studio si prefigge di (1) analizzare gli effetti delle diverse caratteristiche del suolo (concentrazione di metalli, sostanza organica del suolo, pH, storia della contaminazione del suolo) sulla comunità microbica e (2) identificare le reti ecologiche al fine di individuare potenziali specie di microorganismi chiave.
Utilizzeremo l'approccio di "*Next Generation Biomonitoring*" per quantificare la diversità microbiologica del suolo e la complessa rete di interazioni che influisce su di essa, comprese le "interazioni fantasma" (i.e., interazioni passate non facilmente visibili) ricostruendo delle reti ecologiche della biodiversità del suolo.
Questo approccio è già stato dimostrato essere uno strumento affidabile per studiare l'organizzazione multilivello delle comunità e le interazioni interregno all'interno di un ecosistema.
L'integrazione delle tecniche di *meta-barcoding* con i metodi tradizionali è un approccio promettente per lo studio degli agroecosistemi e il loro connubio potrà essere utile a sviluppare nuovi programmi di biomonitoraggio. Nel progetto si considereranno le interazioni specie-specie e specie-suolo al fine di comprendere meglio la vulnerabilità della biodiversità del suolo in funzione del suo uso. Infine, questo progetto aiuterà a porre le basi per l'uso dei metodi di eDNA all'interno del Biodiversity Monitoring South Tyrol.

Multi-marker metabarcoding approach to study soil diversity in BMS permanent crop sites

Soil is a vast underground world with a plethora of fungi and bacterial species. It is estimated that 1 g of soil contains a number of bacteria ranging between 100,000 to 1,000,000. Within this fraction exist different micro-niches with several ecotypes. Although only a small fraction of the microbial diversity is known, fungi and bacteria have been demonstrated to play a crucial role in several ecosystem services, including climate regulation and biogeochemical cycling.
In a special project within the Biodiversity Monitoring South Tyrol (BMS) we will use the DNA metabarcoding approach to investigate the main drivers of bacteria and fungi soil biodiversity in intensive apple orchards from plot to landscape level and in different environmental conditions and agricultural practices (e.g. organic vs. integrated pest management).
The two main aims of the project are (1) to study the effect of various soil characteristics (concentration of trace metals, Soil Organic Matter, pH, soil contamination history) on the microbial community and (2) to identify ecological networks, potential indicators, and key microorganisms.
We will use Next Generation Biomonitoring approach to quantify the soil microbial diversity and the complex web of interactions influencing it, including the "ghost interactions" (i.e., past interactions not immediately visible) via reconstruction of ecological networks of soil biodiversity. Ecological networks have already been demonstrated to be a robust tool to investigate the multilevel community organization and inter-kingdom interaction within an ecosystem.
The project will unravel the species-species, species-soil interaction, and the "vulnerability" of the soil diversity associated with the different land use. The comparison and integration of the meta-barcoding technique and traditional methods is a promising approach for the study of agroecosystems and their combination can be useful to develop a new environmental biomonitoring. Finally, the project aims to establish the use of eDNA methods within the Biodiversity Monitoring South Tyrol.

Citizen Science nel progetto "File Small Mammals": a caccia di gliridi

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Tra il 2019 e il 2021 il Museo di Scienze Naturali dell'Alto Adige sta portando avanti un progetto di ricerca sui piccoli mammiferi, nel quale oltre ad altri aspetti indaga la presenza e la distribuzione di *Muscardinus avellanarius* e *Dryomys nitedula* in Alto Adige.
Una parte importante della ricerca è l'analisi dei dati ottenuti attraverso le azioni di Citizen Science, dati raccolti sul campo grazie a soggetti interessati come scuole elementari, guardiacaccia, guardie forestali ma anche privati. Per quanto riguarda *Muscardinus avellanarius*, sono stati avviati due progetti distinti, uno con le scuole, denominato "A caccia di nocciole", l'altro con i forestali o persone portatrici di interesse, denominato "Padrino del gliride".
Nel progetto "A caccia di nocciole" sono state coinvolte 22 scuole elementari nel territorio della Provincia Autonoma di Bolzano – Alto Adige, che avevano il compito di cercare le nocciole mangiate dagli animali e di determinare le specie che ne hanno lasciato le tracce. Le nocciole raccolte hanno permesso di confermare la presenza di *Muscardinus avellanarius* in 4 nuove aree, altre 2 aree sembrano avere tracce della specie ma sono ancora oggetto di verifica.
Per quanto riguarda il progetto "Padrino del gliride", tra il 2019 e il 2020 sono state seguite complessivamente 13, distribuite tra diverse tipologie forestali e altitudini. Ogni zona è stata allestita con 30 ausili per la nidificazione per *Muscardinus avellanarius* e/o *Dryomys nitedula* per 1 stagione tra marzo/aprile e settembre. Nel primo anno il moscardino è stato trovato solo in una delle 5 aree di ricerca, in un'altra è apparso il driomio. Ulteriori risultati sono attesi per l'autunno 2020.

Citizen Science in the project „File Small Mammals": in search of dormouse

Between 2019 and 2021, the Museum of Nature South Tyrol is carrying out a research project on small mammals, which in addition to other aspects investigates on the presence and distribution of *Muscardinus avellanarius* and *Dryomys nitedula* in South Tyrol.
An important part of the research are data obtained by means of Citizen Science actions, collected in the field thanks to stakeholders such as primary schools, gamekeepers, forest rangers but also private persons. As far as *Muscardinus avellanarius* is concerned, two separate projects have been launched, one with schools, called "Hunting for hazelnuts", the other with foresters or interested people, called "Godfather of the dormouse".

In the project "Hunting for hazelnuts" 22 schools were involved in 2019 in the territory of the Autonomous Province of Bolzano - Alto Adige, which had to look for hazelnuts eaten by animals and then determine the species that had left the traces. The hazelnuts collected gave the possibility to confirm the presence of *Muscardinus avellanarius* in 4 new areas, two additional sites seem to have traces of the species but are still to be verified.
As far as the "Godfather of the dormouse" project is concerned, between 2019 and 2020 a total of 13 areas have been followed, distributed over different forest types and altitudes. Each area was provided with 30 nesting aids for *Muscardinus avellanarius* and/or *Dryomys nitedula* for one season between March/April and September. In the first year the hazel dormouse could only be found in 1 of 5 sample areas, in another one the Forest dormouse appeared. Further results are expected for autumn 2020.

Citizen Science nel progetto „File Small Mammals": combinazione vincente tra guardiacaccia e genetica per studi su *Talpa europaea* and *Arvicola* spp. in Alto Adige

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Tra il 2019 e il 2021 il Museo di Scienze Naturali dell'Alto Adige sta portando avanti un progetto di ricerca sui piccoli mammiferi, che oltre ad altri aspetti indaga sulla presenza e sulla distribuzione delle due specie di piccoli mammiferi scavatori *Talpa europaea* e dell'*Arvicola* spp. in Alto Adige.
Sebbene queste specie siano facilmente identificabili, sono relativamente difficili da trovare perché vivono prevalentemente nel sottosuolo. Così, per ampliare le conoscenze sulla loro distribuzione sul territorio, sono stati coinvolti nella ricerca i 67 guardiacaccia dell'Associazione Venatoria Altoatesina - i cui compiti coprono l'intera provincia. Da un lato, i guardacaccia hanno compilato dei questionari sulla distribuzione delle due specie target nei loro distretti di caccia e, dall'altro, hanno consegnato gli animali trovati morti sul loro territorio per ulteriori analisi genetiche. Inoltre, il fegato delle talpe viene passato all'Istituto Zooprofilattico Sperimentale delle Venezie (IZSVe) per verificare fino a che punto questo roditore sia un ospite intermedio della tenia della volpe *Echinococcus multilocularis*.
Lo studio ha evidenziato una distribuzione quasi completa della *Talpa europaea* in habitat idonei di tutta la provincia. Fanno eccezione tre valli laterali della Val Venosta: Vallelunga, Val Monastero e Val Senales, dove manca la talpa. Per la *T. europaea* l'Alto Adige rappresenta sia geneticamente che morfologicamente una zona di contatto tra la linea europea e quello italiana. La specie centroeuropea *Arvicola amphibius* è presente solo nel nord-est dell'Alto Adige, mentre l'italiana *A. italicus* non è stata finora trovata. Gli studi su *Echinococcus multilocularis* non sono ancora stati completati.

Citizen Science in the project „File Small Mammals": Successful combination of gamekeepers and genetics for studies on *Talpa europaea* and *Arvicola* spp. in South Tyrol

Between 2019 and 2021, the Museum of Nature South Tyrol is carrying out a research project on small mammals, which in addition to other aspects investigates on the presence and distribution of the two burrowing small mammal species *Talpa europaea* and *Arvicola* spp. in South Tyrol.
Although these species are easy to identify, they are relatively difficult to find because they live mainly underground. So, in order to extend the knowledge about their distribution on the territory, the 67 gamekeepers of the South Tyrolean hunting association – whose fields of activity cover the entire province – were involved in the research. On the one hand, the gamekeepers filled out questionnaires on the distribution of the two target species in their hunting districts, and on the other hand, they hand in animals found dead in their territory for further genetic analyses. In addition, the liver of the water voles is passed on to the Istituto Zooprofilattico Sperimentale delle Venezie (IZSVe) to check to what extent this rodent is an intermediate host for the fox tapeworm *Echinococcus multilocularis*.
The study showed an almost complete distribution of *Talpa europaea* in suitable habitats of the whole province. An exception are three side valleys of the Venosta Valley: Vallelunga, Val Monastero and Val Senales, where the mole is missing. For *T. europaea* South Tyrol represents both genetically and morphologically a contact zone between the European and the Italian lineage. The central European species *Arvicola amphibius* occurs only in the northeast of South Tyrol, whereas the Italian *A. italicus* has not been found so far. The studies on *Echinococcus multilocularis* have not yet been completed.

Zentrale Sammlung von Fischdaten Südtirols: Einblick in die Entwicklung der Fischfauna der Etschtalgräben

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Stehende und fließende Gewässer in Südtirol werden seit geraumer Zeit als Fischgewässer bewirtschaftet und bereits seit 1768 besteht eine Verordnung zur Schonung der Bestände mit dem Ziel der nachhaltigen Fischerei. Aufgrund des Fortschritts und der wirtschaftlichen Entwicklung (insbesondere landwirtschaftliche und energietechnische Intensivierung) des Menschen sind die meisten Gewässer mittlerweile jedoch durch Eingriffskombinationen mehrfach belastet, welche die Gewässerlebewelt in verschiedenster Art und Weise beeinflussen. Da überblickende Arbeiten über Südtirols Fischfauna mehr als 25 Jahre alt sind und sich die Natur- und Kulturlandschaft in den letzten drei Jahrzehnten erheblich veränderte, sind Zwischenbilanzen und Neubeurteilungen, wie sie im Konzept der Roten Liste der IUCN vorgesehen sind, dringend durchzuführen.
Um möglichst alle Fisch-Daten auszuwerten, gilt es, alle vorhandenen Datensätze einzelner Projekte und Institutionen zusammenzufassen, um sie in einer zentralen Datenbank sichern und laufend abrufen zu können. Als Anschauungsbeispiel präsentieren wir das Ausmaß der Daten und erste Auswertungen bezüglich der Fischfauna der Etschtalgräben, da diese zu den Gewässern mit den meisten Fischarten in Südtirol zählen. Zusätzlich soll ein Vergleich mit früheren Aufnahmen auf zeitliche Entwicklungen hinweisen.

The new fish-database from South Tyrol: Insights into the fish assemblages of ditches in the Adige Valley

Standing and running waters in South Tyrol have been managed for fishery for centuries and a regulation to conserve stocks with the aim of sustainable fishing was released in 1768. However, due to the human progress and increasing economic development, most waters are now subject to multiple combinations of disturbances and pollutions, which influence the aquatic life in different ways. As the last status report about the fish fauna in South Tyrol has aged over 25 years and since the natural and cultural landscape and land-use has changed considerably over the past three decades, interim assessments and re-evaluations, as foreseen by the IUCN Red List concept, must be carried out urgently.
The evaluations of fish occurrence in all habitats firstly require the merging of all available data records of individual research projects in the past and available data collections of institutions. These are summarized in a central database, which allows standardized storage and access. As an exemplary evaluation, we present the extend of population surveys in the water ditches in the Adige Valley and evaluate spatial and temporal variation within this fish fauna.

Vergleich von Obstbaustandorten und naturnahen Standorten in Bezug auf die Verbreitung von *Halyomorpha halys* und parasitoiden Wespen

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Die Marmorierte Baumwanze *Halyomorpha halys* (Heteroptera: Pentatomidae) ist eine aus Ostasien stammende Baumwanzenart, die sich in den letzten Jahren weltweit ausgebreitet hat und als bedeutender landwirtschaftlicher Schädling gilt. In Südtirol wurde *H. halys* das erste Mal im Jahr 2016 beobachtet. Seitdem konnte sich die Art v.a. im Burggrafenamt, Überetsch-Unterland und im Eisacktal ausbreiten. Im August 2018 wurden erstmals relevante Schäden in Obstanlagen beobachtet. Die polyphage Ernährungsweise und hohe Mobilität ermöglichen einen ständigen Wechsel der Wirtspflanzen über die gesamte Vegetationsperiode und erschweren dadurch die Entwicklung einer nachhaltigen Bekämpfungsstrategie. Darüber hinaus ist die natürliche Regulierung durch einheimische Antagonisten nicht ausreichend, um die Population von *H. halys* unter Kontrolle zu halten. Eine mögliche biologische Bekämpfungsstrategie ist die Aussetzung des exotischen Gegenspielers *Trissolcus japonicus* (Ashmead, 1904) (Hymenoptera: Scelionidae), der die Eier von *H. halys* erfolgreich parasitieren kann. Diese Maßnahme könnte jedoch einen Einfluss auf die einheimische Wanzen- und Hymenopterenfauna haben. Im Rahmen dieses Projektes soll anhand

von visuellen Kontrollen, Klopfproben, Farbschalen und Malaisefallen das aktuelle Vorkommen der verschiedenen Arten von Wanzen und parasitoiden Wespen in Obstbaustandorten und nahegelegenen naturnahen Standorten evaluiert werden, um eventuelle Auswirkungen einer Freisetzung exotischer Gegenspieler auf dieselben zu verstehen.

Comparison of apple orchards and semi-natural sites in order to estimate the distribution of *Halyomorpha halys* and parasitoid wasps

The brown marmorated stink bug *Halyomorpha halys* Stål, 1855 (Heteroptera: Pentatomidae) is a bug species originating from East Asia and is an important pest insect in fruit cultures. It has spread worldwide in recent years. In South Tyrol *H. halys* was observed for the first time in 2016. Since then, the species has spread mainly in Burggrafenamt, Überetsch-Unterland and in the Eisack valley. In August 2018 relevant damages in apple orchards were observed for the first time. The polyphagous lifestyle and high mobility allow a constant change of host plants throughout the entire vegetation period and thus complicate the development of a sustainable control strategy. Furthermore, natural regulation by native antagonists is not sufficient to keep the population of *H. halys* under control. A possible biological control is the release of the exotic antagonist *Trissolcus japonicus* (Ashmead, 1904) (Hymenoptera: Scelionidae), which can successfully parasitize the eggs of *H. halys*. However, this measure could have an impact on the native bug and hymenoptera fauna. In this project, visual inspections, tapping samples, yellow pan traps and Malaise traps will be used to evaluate the current occurrence of bugs and parasitoid wasps in apple orchard sites and in nearby semi-natural sites in order to understand possible effects of a release of exotic antagonists.

Biodiversity in the post-windthrow areas at the northern foot of Latemar massif (South Tyrol, Italy)

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In autumn 2018, parts of the South Tyrolean forests were badly affected by a large and single windstorm event named Vaia. A total of 6,000 hectares of forest in 86 South Tyrolean communities fell because of the hurricane-like storm. The surroundings of the Latemar massif (Western Dolomites) were particularly affected causing enormous economic losses and damaging some of the most beautiful Italian forests. In this context, a special project within the Biodiversity Monitoring South Tyrol (BMS) aims to understand how animal and plant species react to a wind-throw event and how different management practices affect them.
We selected 15 sampling plots in the windfall area west of Karerpass/Passo Carezza. The sampling plots are equally distributed in three different habitat types: (1) forest areas not affected by windthrow; (2) forest areas affected by windthrow with dead trunks left on the ground; (3) forest areas affected by windthrow without dead trunks on the ground.
The study areas are located at a similar elevation (between 1500 and 1800 m a.s.l.), with a similar exposition and are situated on the same geological substrate (i.e. limestone). The potential natural vegetation in all sites consists of coniferous forests of mainly spruce and silver fir belonging to the class of Vaccinio-Piceetea.
We selected different groups of organisms with a special focus on those that are particularly sensitive to the presence of dead wood (e.g. saprophytic beetles and mycetophagous on dead wood living flat bugs, Aradidae). In order to ensure replicability, saprophytic insect surveys are carried out considering standardised methods (i.e. cross-window traps and time-standardized hand catch). Furthermore, we also carry out the standard surveying program of the BMS focusing on vascular plants and bryophytes, grasshoppers, butterflies, birds and bats, and soil fauna. Finally, we are surveying mouse-like terricolous mammals (rodents and insectivores) with a standardised square-grid of live traps.
We present preliminary results which provide insights on the effects of the Vaia large windthrow event and reflect the subsequent forest management practices on forest biodiversity. Future analyses aim to further improve the understanding of the specific effects of windthrows on animal and plant community composition, also with the aim to find optimal strategies for conservation and management and to increase the resilience of affected forest environments.

First year of bat surveys in the Biodiversity Monitoring South Tyrol

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In 2019, a permanent biodiversity monitoring system for South Tyrol has been started on the initiative of the South Tyrolean provincial government and under the direction of Eurac Research. Over five years, 320 sampling plots distributed within the entire area of South Tyrol including a vast selection of habitats are being sampled. The monitoring focusses on vascular plants, bryophytes, various insect groups such as grasshoppers and butterflies, birds, and bats. Bats are often threatened by human activities, 60% of the 25 in South Tyrol occurring species are on the Italian Red List indicated as endangered, vulnerable or near threatened. They are sensitive to environmental changes and respond in their population trends. This makes bats to a good indicator group for habitat quality and land use changes.
The bat assessments within the Biodiversity Monitoring are carried out using bat-detectors "Batlogger A+" from Elekon registering echolocating calls in every sampling plot for three consecutive nights from June to September. An identification for most bat calls was possible up to species level. In cases where this was not possible, species groups were assigned. This was the case for the genera *Myotis* and *Plecotus* and for the species pair *Pipistrellus kuhlii* and *P. nathusii*.
Within the first year of survey a series of 65 sampling plots were assessed. Considering the species groups as at least one species, 16 of the 25 bats species occurring in South Tyrol were detected. Among them two endangered (EN), three vulnerable (VU), five near threatened (NT) species. The most abundant species was *Pipistrellus pipistrellus*, followed by the species pair *P. kuhlii / nathusii*. The collected data of bat activity brings new knowledge on bat species distribution and their habitat preferences: The highest bat activity was observed next to open water surfaces followed by settlements, vineyards and pastures. Near wetlands, in apple orchards and in vineyards additionally the highest bat species richness was found. For the species *Rhinolophus hipposideros, R. ferrumequinum* and *Barbastella barbastellus*, listet in Annex II of the Habitat Directive, the understanding of distribution and ecology could be significantly improved. In future, with the growing number of sampled study sites, the knowledge of the South Tyrolean bat fauna will continue to deepen and give even more accurate results. These data for example, will be used for the conservation and status assessment requested by the Habitat Directive of the European Union and to develop conservation strategies for bats in South Tyrol.

Erste Ergebnisse der Fledermauserhebungen im Südtiroler Biodiversitätsmonitoring

Im Jahr 2019 startete auf Initiative der Südtiroler Landesregierung und unter der Leitung von Eurac Research ein permanentes Biodiversitätsmonitoring für Südtirol. In einem Zeitraum von fünf Jahren werden 320 Standorte im gesamten Land verteilt über verschiedene Lebensräume untersucht. Der Schwerpunkt der Untersuchungen wird dabei auf Vögel, Fledermäuse, Gefäßpflanzen und Moose sowie auf Wirbellose, wie etwa Tagfalter und Heuschrecken, gelegt. Besonders Fledermäuse sind oft durch den menschlichen Einfluss gefährdet, so finden sich 60% der 25 in Südtirol bekannten Arten auf der nationalen Rote Liste. Fledermauspopulationen reagieren sensibel auf Umweltveränderungen und sind daher eine gute Indikatorgruppe für die Habitatqualität sowie für Landnutzungsänderungen.
Die Fledermauserhebungen im Biodiversitätsmonitoring werden mit sogenannten Bat-Detektoren, dem "Batlogger A+" von Elekon, durchgeführt. Diese nehmen die verschiedenen Rufe der Fledermäuse an jedem Standort für drei aufeinanderfolgende Nächte im Zeitraum von Juni bis September auf. Die aufgenommenen Rufe können anschließend meist bis auf Artniveau bestimmt werden. In jenen Fällen, wo dies nicht möglich ist, werden die Rufe Artengruppen zugeordnet. Dies trifft bei unseren Aufnahmen für die Gattungen *Myotis* und *Plecotus* und für das Artenpaar *Pipistrellus kuhlii* und *P. nathusii* zu.
Im ersten Erhebungsjahr wurden 65 Standorte untersucht. Zählt man die Artengruppen als zumindest eine Art, so konnten 16 der 25 in Südtirol vorkommenden Arten festgestellt werden. Unter diesen befinden sich zwei stark gefährdete (EN), drei gefährdete (VU) und fünf Arten mit drohender Gefährdung (NT). Die häufigste Art war *Pipistrellus pipistrellus*, gefolgt vom Artenpaar *Pipistrellus kuhlii / nathusii*. Die gesammelten Daten der Fledermausaktivität geben Aufschluss über die Verbreitung und Habitatpräferenzen der verschiedenen Arten. Die höchste Rufaktivität wurde in Gewässernähe festgestellt, gefolgt vom Siedlungsraum, von Weinbergen und Weiden. In Feuchtgebieten, Obstanlagen und Weinbergen wurde zudem die höchste Artenzahl festgestellt. Schon jetzt konnten für die in Anhang II der Habitatrichtlinie gelisteten Arten *Rhinolophus hipposideros, R. ferrumequinum* und *Barbastella barbastellus* das Verständnis zu Verbreitung und Ökologie verbessert werden.

Mit der steigenden Anzahl von untersuchten Flächen werden sich die Kenntnisse der Südtiroler Fledermausfauna auch künftig weiter vertiefen. Die Ergebnisse können schließlich für die Zustandsbewertung im Rahmen der EU-Habitatrichtlinie sowie zur Entwicklung von Erhaltungsstrategien für Fledermäuse in Südtirol verwendet werden.

Surveying the glacial relict *Carex maritima* Gunn. on the Sciliar (Bolzano Province, Italy).

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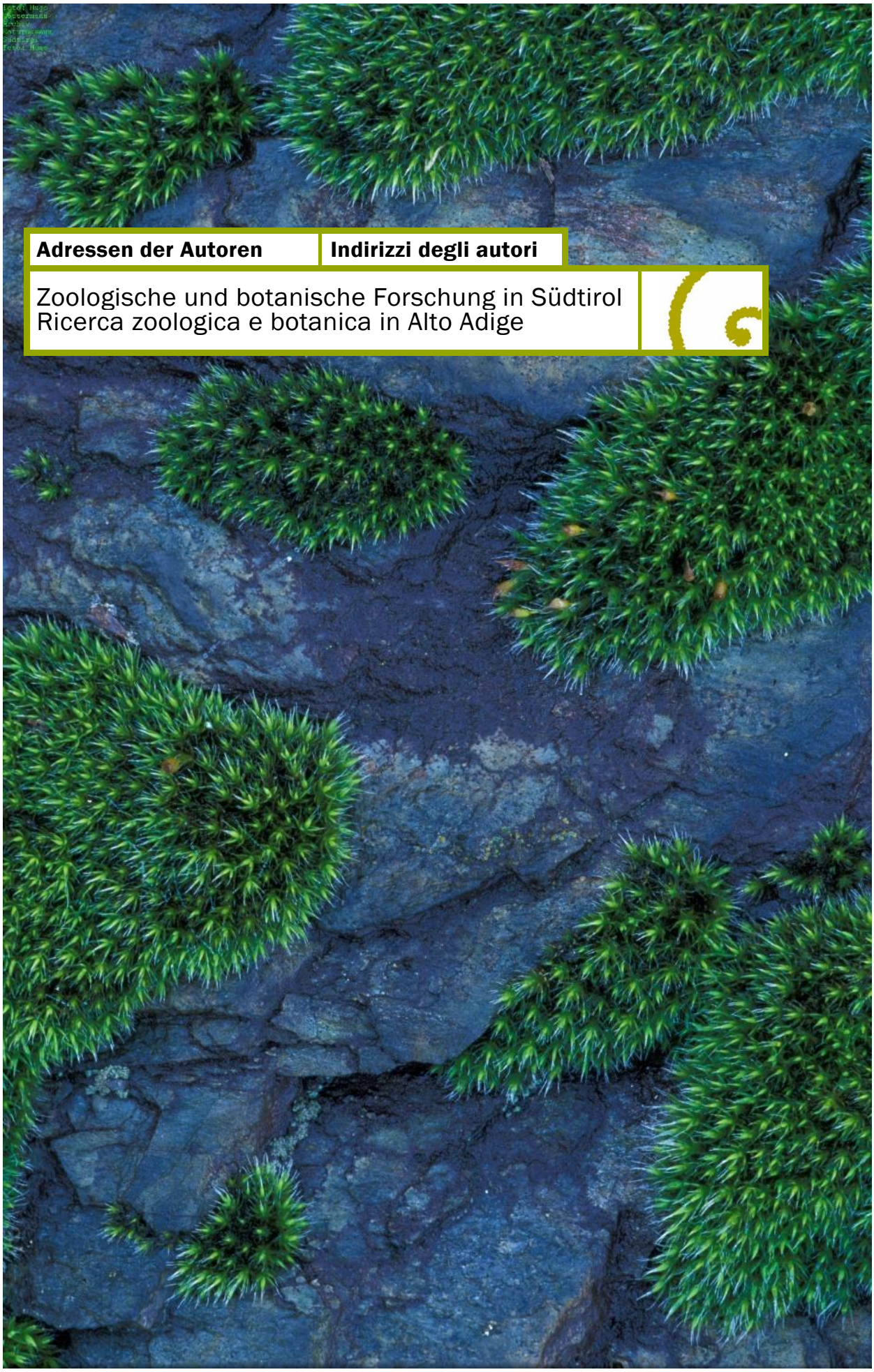
In the Bolzano Province, the Sciliar mountain within the Natura 2000 reserve Sciliar-Catinaccio hosts the main population of critically endangered glacial relict *Carex maritima*. In an assignment for the office of Nature of the Autonomous Province of Bolzano - Alto Adige growth places of selected glacial relict species on the Sciliar mountain were inventorized. The focus of this work is on *C. maritima*, which is a character species of the FFH habitat type 7240* *Alpine pioneer formations of Caricion bicoloris-atrofuscae*.
In field campaigns between 2016 and 2019, historic and known growth places were visited and the study area scrutinized for new ones. On representative sites phytosociological relevès of plant communities including *Carex maritima* were made. In a second step, the conservation status of a typical habitat 7240* with *C. maritima* was assessed by estimating the abundancy of diagnostic species and other indicators according to the Guideline of Habitat Mapping in South Tyrol (several authors, in prep.).
All historic sites of *Carex maritima* were confirmed and new ones detected. The curved sedge was sometimes associated with other glacial relicts including *C. capitata* (CR) and *Juncus arcticus* (VU). Sandy, at times stony alluvial soils can be considered as typical origins for 7240* *Alpine pioneer formations of Caricion bicoloris-atrofuscae.* On one respective site, where *C. maritima* was associated with *C. microglochin* (VU), *Juncus arcticus* (VU) and *Juncus triglumis* (VU), the conservation state of *7240 was assessed as favourable in terms of species composition. However, mountain farming poses an important impact on all potential habitat sites. Animals regularly use wet areas on the Sciliar as waterer leading to considerable trampling damage and eutrophication. Nevertheless, on suitable substrates the curved sedge can reach abundancies between 500 and 1000 individuals. The species was also found in stony and trampled grounds on alpine pasture.
As a species of pioneer habitats, the sedge seems rather resilient to trampling damage. To date the population of *Carex maritima* on the Sciliar mountain can be considered as stable but its habitats suffer from degradation due to the effects of alpine farming.

Erhebungen zum Eiszeitrelikt *Carex maritima* Gunn. auf dem Schlern (Südtirol, Italien)

Carex maritima, die Simsen-Segge, ist ein stark gefährdetes (CR) Glazialrelikt mit arktisch-alpiner Verbreitung, das in Südtirol ihre Hauptpopulation am Schlernplateau hat. Bis vor Kurzem galten die Vorkommen im Natura 2000-Gebiet Naturpark Schlern-Rosengarten als die einzigen in der Region Trentino-Südtirol. Ziel dieser Arbeit war die Bestandserhebung von Eiszeitrelikten am Schlern mit Fokus auf *C. maritima.*
Die Arbeit gründet auf Erhebungen im Sommer 2016 für das Amt für Natur der Abteilung Natur, Landschaft und Raumentwicklung der Autonomen Provinz Bozen-Südtirol. Bekannte historische und rezente Fundstellen von *Carex maritima* wurden aufgesucht und das betreffende Gebiet systematisch nach weiteren Beständen abgesucht. Die Wuchsplätze von *C. maritima* wurden durch eine repräsentative Vegetationsaufnahme erfasst. Weitere Erhebungen erfolgten 2018 und 2019. Dabei wurde der Erhaltungszustand ihres typischen Habitats, dem prioritären Natura 2000-Lebensraum *7240 *Alpine Pionierformationen des Caricion bicoloris-atrofuscae* anhand der Artmächtigkeit diagnostischer Arten sowie anderer Indikatoren nach dem *Leitfaden für die Lebensraumkartierung Südtirols* (versch. Autoren, in Vorbereitung) bewertet.
Hinsichtlich der Bestandssituation konnten alle historischen Vorkommen bestätigt werden. Außerdem sind neue Fundpunkte dazugekommen. Dabei war *Carex maritima* z.T. mit anderen Eiszeitrelikten wie *C. capitata (CR)* und *Juncus arcticus* (VU) vergesellschaftet. Schwemmbereiche mit feinsandigen, steinigen, offenen feuchten Böden am Schlern können als typische Standorte der Simsen-Segge im Sinne von *7240 aufgefasst werden. Die Artenkombination von *C. maritima* mit *C. microglochin*, *Juncus arcticus* (VU) und *Juncus triglumis* an einer *7240 Fläche deutete auf potentiell optimale Standortbedingungen hin, wobei gleichzeitig ein ungünstiger Einfluss des Weidebetriebs auf den Erhaltungszustand diagnostiziert wurde. An einigen Wuchsplätzen konnte *C. maritima* Häufigkeiten zwischen 500 und 1000 Exemplaren erreichen. Sie scheint als Pionierpflanze Trittschäden relativ gut zu vertragen. Die Population von *C. maritima* am Schlern wird zum Stand dieser Arbeit als stabil eingeschätzt, wenngleich ihr Lebensraum durchwegs Degradierungserscheinungen aufweist.



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