iDiv

**German Centre
for Integrative
Biodiversity Research**

sDiv Workshop
" Impact of invasive alien species: prediction and quantification"
1-4 July 2013
Workshop Summary

Summary

Participants

Name	Surname	Institution	Homepage
Bacher	Sven	University of Fribourg	http://www.unifr.ch/biol/ecology/bacher/
Blackburn	Tim	Institute of Zoology	http://www.zsl.org/science/ioz-staff-students/blackburn,1069,AR.html
Dick	Jaimie	Queens University	http://www.qub.ac.uk/schools/SchoolofBiologicalSciences/People/ProfessorJTADick/
Evans	Tom	Imperial College London	
Gaertner	Mirijam	Stellenbosch University	http://academic.sun.ac.za/cib/team/academic/mgaertner.asp
Jeschke	Jonathan	Technical University of Munich	http://www.jeschke.tk/
Kumschick	Sabrina	Stellenbosch University	http://academic.sun.ac.za/cib/team/academic/skumschick.asp
Kühn	Ingolf	Helmholtz Center for Environmental Research - UFZ	http://www.ufz.de/index.php?en=821
Mrugala	Agata	Charles University	https://www.natur.cuni.cz/biology/ecology/people/staff
Pergl	Jan	Academy of Sciences of the Czech Republic	http://www.ibot.cas.cz/invasions/pergl/
Pyšek	Petr	Academy of Sciences of the Czech Republic	http://www.ibot.cas.cz/personal/pysek/
Rabitsch	Wolfgang	Environment Agency Austria	http://homepage.univie.ac.at/wolfgang.rabitsch/

Ricciardi	Anthony	McGill University	http://redpath-staff.mcgill.ca/ricciardi/index.html
Richardson	David	Stellenbosch University	http://academic.sun.ac.za/cib/team/staff/dmrichardson/
Sendek	Agnieszka	Helmholtz Center for Environmental Research - UFZ	http://www.ufz.de/higrade/index.php?en=19478&ddt_person_lid=42330
Vilá	Montserrat	Estación Biológica de Doñana (EBD-CSIC)	http://www.montsevila.org/
Winter	Marten	German Center for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig	http://www.idiv-biodiversity.de/sdiv/coordinator/vcard_item_86429/detail

Focal areas of discussion
Three main topics were discussed at the workshop:

1 Defining impact
A fundamental issue when studying impacts of alien species is how the term "impact" is defined and understood. Many different definitions and measures are found in the literature, and we listed and discussed them. These myriad definitions of "impact" contribute to the "terminological morass" that the field of invasion biology faces. While recognizing that there is no single correct definition of impact, it is nevertheless of fundamental and applied importance for researchers, managers, and others who uses the term to define it unambiguously. This has been summarized in one of the outputs, which is now submitted to a suitable journal.

2 Prediction and quantification of impact
These two topics are included in one of the outputs, where we discuss 1) which information to collect at sites where an alien species is present, 2) how to plan and conduct experiments to understand impact, 3) ways to handle large amounts of data to draw general conclusions, and 4) how to get from conclusions and explanations to a predictive understanding of impact.

3 Developing a framework for impact
We intensely discussed this topic, with many potential ways to go at finding a solution to the problem that there is not impact framework available at the moment. However, this topic needs further discussion in order to be publishable, and we will further elaborate on this.

Presentations

We had ten presentations during the workshop, of which some were spontaneously integrated into the program.

What do we expect from this workshop? (S Kumschick)
This presentation gave a summary over the workshop topics, and over the discussions via email before the workshops. The aims of the workshop were highlighted, and important issues as well as potential misunderstandings discussed.

Generic impact scoring system (S Bacher)
Sven presented an impact scoring system which has been developed for mammals, and subsequently adapted and extended for birds, and alien species in general. It includes environmental and economic impact with six impact categories each. On the one hand, impact through competition, herbivory, predation, transmission of diseases, hybridization and through other meachanisms on ecosystems in general are included as environmental impact. On the other hand, the economic category consists of impact on agriculture, infrastructure, forestry, human health, animal production and human social life. The system has also been suggested as a management tool.

Standard method for impact quantification and meta-analyses (M Vilà)
On the one hand, Montse showed results of a study where they used the above scoring system on plants. Only minor changes were needed to make the system applicable to plants, and this group can now be compared with other taxa. On the other hand, she discussed meta-analyses and the usage for impact, while presenting results of some recent studies compiling data on plant impacts in the Mediterranean and globally.

A comparison of invasive species' impacts based on the GISD (J Jeschke)
Jonathan showed results from a study on impact where the species in the global invasive species database (GISD) were compared according to the amount of categories they are having impact in. The categories only slightly differed from the ones in the above mentioned scoring system, but instead of scoring the magnitude of impact, the amount of categories were compared.

Predicting invasion impacts: Caveats, challenges, and promising approaches (A Ricciardi)
Tony discussed promising ways to predict impact of alien species; One prominent example being impact history. By looking at the impact species have exerted in other places, we can see whether the species is likely to have impact in a certain new range.

Comparative functional responses can predict invader impact (J Dick)
Jaimie gave an overview over functional responses, which are based in classical ecology, Furthermore, he showed us why this is of interest to invasion biologists, and how functional responses have been used to explain and predict impacts of invaders. He also presented a general framework for the usage of this method in alien species impact prediction.

Regime shifts: identifying high impact invaders (M Gaertner)
Mirijam summarized why we should be more concerned about some alien species than others, especially if they are able to shift a certain invaded system to a new state, causing regime shifts. She presented results of a recent study where she looked at patters in the alien species involved related to such regime shifts.

Propagule pressure and impact (A Ricciardi)
This presentation was a spontaneous contribution on Tony, discussing what propagule pressure means exactly and why it matters for alien species impacts.

Unified framework for biological invasions (D Richardson)
Dave summarized frameworks which have been used to describe biological invasions, and discussed how impact has been, or rather can potentially be integrated within these systems.

Impact in risk assessments for alien species (S Kumschick)
This talk gave an overview on risk assessments for alien species in general, and how impact is incorporated (or not incorporated) within such systems. It showed that many risk assessments do not include impact, even though managing and preventing impact this is the main reason for the implementation of such systems.

Outputs and plan for near future

Several outputs have been discussed and planned during the workshop, some of which were finished in the meantime and under submission with suitable journals.

The main outputs are the following:

Jeschke JM, Bacher S, Blackburn TM, Dick JTA, Essl F, Evans T, Gaertner M, Hulme PE, Kühn I, Mrugała A, Pergl J, Pyšek P, Rabitsch W, Ricciardi A, Richardson DM, Sendek A, Vilà M, Winter M & Kumschick S (submitted) Defining the impact of non-native species: Resolving disparity through greater clarity

Blackburn TM, Essl F, Evans T, Hulme PE, Jeschke JM, Kühn I, Kumschick S, Mrugała A, Marková Z, Pergl J, Pyšek P, Rabitsch W, Ricciardi A, Richardson DM, Sendek A, Vilà M, Wilson JRU, Winter M, Genovesi P & Bacher S (submitted) A unified classification of alien species based on the magnitude of their environmental impacts
Kumschick S, Bacher S, Blackburn TM, Dick JTA, Essl F, Evans T, Gaertner M, Hulme PE, Jeschke JM, Kühn I, Mrugała A, Pergl J, Pyšek P, Rabitsch W, Ricciardi A, Richardson DM, Sendek A, Vilà M & Winter M (in preparation) Everything you always wanted to know about impact of biological invasions but were afraid to ask: Quantification, prioritization, methods and caveats

Furthermore, a symposium on "Impact in risk assessments for alien species" was organized at the EMAPi (Ecology and Management of Alien Plant invasions) conference, where many participants of the working group were present. At the same conference, several of the outputs were presented or incorporated in talks:
Impact in risk assessments for alien species (S Kumschick)
Defining the impact of non-native species: Resolving disparity through greater clarity (D Richardson)
Impacts of non-native plants on biodiversity and ecosystem services (M Vilà)

At the 2nd International Congress on Biological Invasions, the impact classification scheme was presented:
Towards a Global Classification of Non-Native Species in Terms of Environmental Impact (T Blackburn)

Balance
Presentations: 30%
Discussion of presentations: 10%
General brainstorming, some in smaller groups: 60%

On top of that, there were intense email discussions before and after the
workshop.

Collaborations
Several participations of the workshop started new collaborations, and
existing collaborations were strengthened and refreshed.

Working atmosphere and support
The general working atmosphere was pleasant, and the facilities suitable
for the kind of work we were doing. Also, the coffee breaks and the iDiv
representatives made sure we could keep going for the whole day, which
made this workshop a very productive one.