Workshop Output WS 2.2.D

Title of workshop: Mountain biodiversity and ecosystems under global change

Prepared by

Moderators	**Davnah Payne, Eva Spehn, Harald Pauli, Aino Kulonen**
Participants*	**17 oral presentations:** **Lena Nicklas, Emma Sumner, Casey Gibson, Frank D'amico, Julia Seeber, Vera Margreiter, Francisco Pugnaire, Susanna Venn, Martha Apple, Brodie Verrall, Pau Carnicero Campmany, Himani Nautiyal, Davnah Payne, Claudine Egger, Sonya Geange, Stefan Haselberger, Andy Taylor,** **11 additional posters + listeners** **In total ca 70 people**

* Workshop participants that have submitted contributions to the workshop

General questions to please be answered in the workshop reporting

1) What was the focus of the workshop? Methodological issues and advancements or thematic issues (systems knowledge, transformation knowledge, target knowledge). Please check and fill in the matrix in the output section.

Methodological issues and advancements	**Thematic issues**		
	System knowledge	Transformation knowledge	Target Knowledge
Review current knowledge and knowledge gaps in mountain biodiversity and ecosystem sciences under global change	x		
Formulate research priorities toward advancing mountain ecosystem and global change science, notably in terms of identifying species and habitat of high conservation priority	x		x

1) Which key points were discussed in the workshop as a whole? (This should be more a synthesis and not simply a summary of the key points in each presentation)

After the presentations a discussion was organized in form of a written group exercise followed by a plenary discussion.

How can research tackle different environmental drivers of alpine biodiversity?

- experimental studies needed to identify and disentangle environmental drivers
- multisectoral studies needed for a more holistic view – clear call for more interdisciplinary work and collaborations within different fields of ecology to be able to tackle the challenges at systems level
- Addressing small and micro scale drivers have clearly gained momentum in the years. Still more research needed to address drivers across scales from micro to macro and their interactions

How to best maintain alpine ecosystems and their biodiversity for the future?

- Long-term monitoring is needed not only for identifying changes but also for calibration and evaluation of species distribution models and can also contribute to phylogenetic studies and understanding of ecosystem functioning – financing the long-term monitoring is still a challenge, how to convince the funders that we need biodiversity monitoring similar to weather monitoring? Success stories like Switzerland should be made examples for other countries.
- Conservation concepts and strategies across whole elevational gradients needed to ensure refugia function of mountains
- Disadvantages of cold-adapted species in warmer world need further attention
- The role of biodiversity in ecosystem functioning – which part of the diversity (which species) matter the most – is still only weakly understood. Also no clear methods for evaluation exist.
- Holistic approach needed to understand the ecosystem from each biodiversity component to functioning

2) What is your opinion on the current state of knowledge concerning your topic(s) (focusing on mountain regions)? *Please check and fill in the matrix on the following page.*

Overall assessment of the state of:

What is your personal opinion on the current state of knowledge concerning the topic(s) addressed in your workshop. Please tick the appropriate field. Brief explanations are appreciated.

State of knowledge	Very good	Good	Poor	Very poor	Not appropriate	*Comments*
Global			x			*No global datasets available/analysed*
Regional		x				*Which region? Very good understading and Strong focus in Europe and Australia*
Scattered case study-based knowledge		x				*Where? Case studies come from all mountain regions but strong focus in Europe and Australia*
Knowledge about past states/trends			x			*The long-term data exists only for Europe and Australia.*
Knowledge about current situation		x	x			*The long-term GLORIA data from mountain tops allows monitoring for biodiversity changes. Treeline monitoring possible based on EO data.*
Knowledge about future states/trends/thresholds				x		*There are still very strong controversies about the fate of alpine biodiversity. Models show high extinction rates, although those are not witnessed yet, despite of the decades of warming/land-use in mountain areas. Whether this is because of extinction depth or buffering effect of the topographic diversity is not clear.*
Knowledge about the system		x	x			
Knowledge about shaping pathways to more sustainable development (transformation knowledge)		x	x			*This workshop consisted mainly of talks and discussion the biodiversity per se and it's drivers whereas it's linkages to ecosystem services or SMD were addressed only in one talk.*
Knowledge about envisaged goals (target knowledge)		x	x			*Only addressed through conservation matters.*

Ideas for questions to potentially be answered by the moderators after the workshop in the reporting (please delete what is not useful):

1) Were there any new insights and/or findings presented? If yes, which ones?
    - To better prioritise conservation actions, expert opinion/elicitation can offer a tool to assess functional importance and adaptive capacity of the species
2) What was the main message/consensus of your workshop?
    - Several studies showed species specific responses to environmental change even among certain functional group or close relatives, which means that we should not generalize too much based on case studies and stresses the need for research to prioritise which species to study in more detail
    - We still lack knowledge to understand and assess what part of biodiversity is important for specific ecosystem services
    - We still don't know exactly which habitats should be prioritized in conservation of mountain areas
    - Funding for long-term monitoring should be guaranteed. In addition to assessing change it offers several benefits (e.g. calibrating models, data for studying other processes)
3) Were major uncertainty issues identified and discussed? If yes, which ones?
    - See above

Further Comments

- The in-depth discussion suffered from short time given to presentations – no time for conclusions from presentations