INTERNATIONAL CONFERENCE ON MOUNTAINS AND CLIMATE CHANGE

Biodiversity organisation and conservation in mountain ecosystems: challenges and opportunities from the LifeWatch virtual laboratory facilities ^{1,3}A. Basset, ^{2,3}G. Corriero, ^{1,3}N. Fiore ¹Salento University; ²University of Bari; ³LifeWatch-ITA

High mountain ecosystems:

Have characteristic environmental niches

Their environmental niche is characterised by severe and in some cases extreme physico-chemical conditions along limiting dimensions, determining very selective filters to species invasion and colonisation;

Are colonised by highly adapted species

High mountain ecosystems are colonised by species, which have adapted their niches to the characteristic environmental niches getting access to 'resource refugia';

O Are habitat islands

They share with oceanic islands habitat fragmentation but they have not a 'continental' habitat source. They are 'islands' and 'continent' at the same time.



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Biodiversity conservation in demanding ecosystems:

Speciation

Large-scale migration



Regional species pool

From Zobel, 1997 TREE

O Niche filtering

Species-specific responses along critical environmental niche dimensions - niche refugia;

O Niche partitioning

Resource exploitation: metabolic, behavioural and morphofunctional adaptation to optimise resource use within and between populations;

Changing environmental niches

Global change scenarios, including human activities expansion, species range adaptation and changing interspecific relationships.



Conservation scenarios in changing ecosystems:

Capra ibex –

Mountain habitat suitability map O



From Hirzel et al., 2002, Ecology

Data acquisition

In situ data collection, manipulative experiments, *remote sensing* data collection, literature/repository data mining;

Data integration

Data standardisation, quality assessment and data cleaning, data integration;

Data analysis

Statistical and mathematical modelling (requiring computational facilities), spatial analysis and mapping, data presentation/result dissemination.



The LifeWatch e-Science Research Infrastructure



LifeWatch 'virtual laboratories'



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The alien species 'show case'

- O The SHOW CASE has been launched on a LifeWatch virtual laboratory, which have been built customising for the specific purpose the Microsoft HYPERV package;
- O The SHOW CASE has involved tens of DATA PROVIDERS in Italy, organised into more than 30 nodes including LTER-ITALY and LifeWatch-ITA nodes.



The 'alien species' show case



KNOWLEDGE BASE Habitat level

32 EUNIS habitat (level 2) with 319 sites;

Species level

>12500 species (15% of overall species richness in Italy);

Alien species level

451 alien species (less than 4% of overall species).



The 'alien species' show case: data analysis





O Pressure-response Inference 9/10



Opportunities from the LifeWatch e-labs

- LifeWatch e-labs need to offer enhanced services for large data integration and computation;
- LifeWatch e-labs create a operational environments allowing large and cross scale speculative experiments/modelling, which are otherwise much more difficult, time-consuming and expensive to realise.