Review

Mgr. Anna Lampei Bucharová: Dynamics of rare and threatened species on local and regional scale – from theory to practice

The whole study consists of four manuscripts, from which two of them were accepted in reviewed international journals. Their topics are mainly focused on a study of spatial and temporal population dynamics of three endangered species – *Asplenium adulterinum, A. cuneifolium* (3 papers) and *Gentianella praecox* subsp. *bohemica* (1 paper). This PhD thesis is a nice example of connection between scientific research and nature conservation. Conclusions of all papers are at least partly useful for preparing conservation management plans for these species, which will have a real chance to be successful. There are my comments and questions:

Paper I:

The definition of sample plots is rather weak ('To relocate individuals easily and to be able to identify newly appearing plants, we marked all individuals in a well-determined part of population'). What was the area of such plots with marked plants?

Were all marked plants relocated in each plot? If not, had they the same chance to be easily re-located during next year (even lower stages)? What was the percentage of lost nails?

Could be the population affected by trampling during its field sampling?

Can you explain an expected reason of population growth? Can have an episodic mortality - drought, frost (which was not reflected by this field research) an importance in balance of it?

Do you expect that the trend of population growth will continue? How long? Selected plots were probably rather saturated by high number of individuals even before the field study. Can we expect that there will be enough space for new plants?

Both species may probably be partially clonal. Can it influence a population structure?

Paper II:

In fact, Beals index (BI) can be calculated using not only species P/A data, but also for all other types of P/A data as explanatory variables. What about to use it such a way and compare environmental BI with BI obtained from species composition?

Suitability of localities for target species was estimated using vegetation type, Ellenberg indicator values and Beals index. However, these factors are not independent. They are derived from the same species composition. Their combination could overweight the importance of species composition against other environmental factors.

Ellenberg indicator values – the area of studied populations was around 100 km^2 and localities were probably ecologically rather similar. Do you really mean that e.g. continentality, soil reaction or

nutrients calculated from Ellenberg indicator values (with a short ecological gradient) may interpret something more than a noise, bias or something other what is included in composition of species co-occurring at these localities?

If the list of species was sampled from the whole local area of population distribution, the size of plots is not comparable. The different size might be important in case if some species occurs more in smaller patches. Even Ellenberg indicator values and Beals smoothing index (BI) are sensitive to the number of species per plot / frequency of species within the table. E.g. species occurring in N-1 plots of the N dataset size will have extremely high BI value due to generalist species.

The definition of suitable but unoccupied habitats will be every time problematic, because there is no possible evaluation of model results. Small change of parameters may highly affect results. There can be a set of localities, where the population decreases due to worse environmental conditions, but the species still occur there (together with a set of species of other successional stages). Such localities are probably a source of bias in prediction of suitable habitats.

What was the limit for suitable and unsuitable habitats in the model (explain me model parameters more in detail, please)?

Paper III

This is not my favorite paper, because I have never done similar investigation. Therefore, I have no experience with it and all questions I will ask will be probably rather stupid.

Nine enzymatic systems (ES) were studied. Is it enough? Can be some problem for comparison of two species when each of them has different number of ES providing interpretable pattern? And what about the variability of other (unmeasured) ES? Do you expect (and guarantee) that results will be the same? Is it possible to reduce the number of ES and e.g. test their significance by bootstrap selection of ES? (Has it a sense?)

p. 126, 127 – Same figure label as at previous page.

Fig. 2: The slope significance should be tested by data permutations, because geographic distance of points is not an independent variable (the distance BC depends on distances AB and AC) – see Baselga (2010) and Lenoir et al. (2010)

Paper IV

Management strategy is a crucial point of species protection. Of course, the best plan would be to increase number of individuals in all populations. However, it is usually not possible due to limited money, land ownership and other special conditions. In my opinion, the whole management strategy should also consider complex models of e.g. decreasing number of populations. What is the best plan in case of limited money? Should we focus on a limited number of dense populations? Or should we plan management according to density of individuals? Or should we manage all populations with lower intensity?

Fig. 5 is rather interesting. Did you test a maximum time interval between last year with flowering individual and proper management of the locality, in which the population can restore?

Sowing experiment – were the sown plots investigated longer time? How long? Is an average time of dormancy known for this species? The time of dormancy needn't have normal distribution in time (two or more peaks may occur).

Conclusion: The whole manuscript is well-written and brings important new information about all investigated species. It was a pleasure for me to review it.

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