



## How to calibrate bio-proxies for assessing changes in Climate and Biodiversity

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**Abstract:** Humans and other organisms are directly affected by our tolerance to climate. Indirectly, we respond to climate through our usage of natural resources and our place in the food-chain. The tolerances of selected indicator-organisms are found useful as enhanced bio-proxies to predict future climate-scenarios and changes in biodiversity:

The Global Climate Model (GCM) behind Mann's hockey-stick figure were build on a multi-proxy reconstruction model including valuable biological proxies to indicate past temperature and shifts in seasons(1,2,3). Global climate belts' classification has been developed based on composition of plant-species and their climate tolerances back to Vahl, 1963(4) but few species are today regarded as inappropriate for classification(5). A lot of impact models and predictions are made, about how single species may adapt, migrate or die out 50 years from now using scenarios based on macro-climate change models(6). Biome models are recently used as bioclimatic indicators(7) while a full flora(5) or changes in bird composition are recommendable(8).

Local Climate Models (LCMs) are already in use to investigate the aspects of physical climatology likely to affect extreme weather incidence (e.g. forest fire)(9). However, few if any climate studies use local bio-indicators that takes into account local conditions, land-use and updated climate scenarios. Local calibrated indicators may mirror climate data of the past: The 'perceived' weather conditions in microscale are the 'de facto' living conditions for organisms(10). Some recent and local weather-data are available, if we choose a location in the immediate vicinity of weather stations and from data used for local impact models such as the Road weather modeling(11).

Simplified however, the composition of climate limited species with different tolerance may be reliable as climate indicators, when the local species correlate with the locale-scale meso- or micro-climate they inhabit. That seems true, only if the local climate correlate with species in a specified phenologic state such as pollinating plants or fungal fruiting(3,12). Calibration: When we carefully select a series of the most climate-dependent species in the right state and know that they coexist, locally, these species may narrow down precise estimates of climate data and will together act as reliable bio-proxies over time.

Knowing any local composition of calibrated species back in time will easily mirror the local climate from the past and make possible to better assess the future climate and biodiversity.

This study present examples of how to reliably calibrate the indicators to be useful in models and scenarios.

### MODERATIONS FOR THE ORAL PRESENTATION AND REFERENCES – may be removed:

This also benefits climatology, as bio-proxies, reproducing climate data, may supplement data for LCM and may even illustrate a need for reconstruction of the regional climate models (RCM). The resultant biology-verified but independent models ensures to take into account local footprints for the final scenarios. Non-climate related factors may lead to false interpretations(13). A control mechanism is also needed to prevent overestimation of climate changes(14). Land-use may violate the indications, too. Updated and reliable scenarios are urgently needed to reliable predict changes in climate and in biodiversity.

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ClimateWise<sup>®</sup>: Facilitating Locally Driven Adaptation to Climate Change . Marni Koopman<sup>1</sup> and Alan Journet<sup>2</sup> . Geos Institute, 84 Fourth St., Ashland, Oregon 97520 . 1 . [marni@geosinstitute.org](mailto:marni@geosinstitute.org); [2alan@geosinstitute.org](mailto:2alan@geosinstitute.org)  
[http://www.geosinstitute.org/images/stories/pdfs/Publications/ForestManagement/Icaruspaper\\_final%202011May16th.pdf](http://www.geosinstitute.org/images/stories/pdfs/Publications/ForestManagement/Icaruspaper_final%202011May16th.pdf)
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