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Frontiers of Biogeography

Title

commentary: Diversity and uniformity of island floras

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Journal

Frontiers of Biogeography, 2(3)

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Publication Date

2010

DOI

10.21425/F5FBG12344

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commentary

Diversity and uniformity of island floras

Studies of the ecological, evolutionary and biogeographic patterns of island organisms have played an enormous role in concept shaping and theory forming in ecology, evolutionary science and biogeography. Numerous observations and descriptions of strange island beings, stunning evolutionary radiations and robust empirical formulae (e. g. on species–area relations) led to the insightful and influential syntheses of Mayr, Preston, Carlquist, Williams, MacArthur and Wilson and others. Such works have been seminal for thousands of descriptive, explorative, hypothesis-driven and even experimental papers on island peculiarities, island evolution, interaction webs, and dispersion and distribution of species. Excellent reviews and textbooks on these subjects have been published with focus on each of these approaches; today island ecology, evolution and biogeography are a very vital and diverse part of ecology.

The special issue “Comparative ecological research on oceanic islands”, edited by Christoph Kueffer and José-María Fernández-Palacios in *Perspectives in Plant Ecology, Evolution and Systematics* (Vol. 12 iss. 2, April 2010), follows the tradition of tackling the subject from a focussed viewpoint. This time the focus is on island floras, and for once the scale is genuinely macroecological. All the papers involve as many islands or archipelagos as possible and attempt to make truly comparative analyses between them – to recognize patterns, and in some cases even to suggest explanations for the revealed pattern. The papers demonstrate that island ecology has come a long way from when it was a matter of finding strange plants or animals on remote islands (e.g. dodos), or amazing pedigrees in archipelago lineages (e.g. finches), or odd organismal interactions (e.g. marine iguanas), or gross species numbers (“the holy S”).

The editorial prelude by Kueffer and Fernández-Palacios (2010), is a good introduction that tunes the ear to the harmonies and disharmonies of island floras, as performed for us in the

five subsequent articles. The main tune is that there are many ecological and biogeographical island and archipelago data and analyses available, but few attempts at global syntheses. So, they argue, we should push “towards a common research agenda among biogeographers and ecologists in oceanic island research”. I applaud that. I certainly also appreciate the minor-tuned finale: we should do it before it is too late!

The first two papers are truly island biogeographic papers, focusing on species diversities. Chiarucci et al. (2010) aim to compare the floras of six well-known oceanic archipelagos. They try to take the very important step from species richness (“the holy S”) to other measures of diversity. I find particularly interesting how they tackle beta diversity – so as to extract much more information from the species occurrence matrix than classic analyses of relations between island species number (S) and area, or isolation, or altitude. Their approach is to make additive partitions between the alpha, beta and gamma diversities. This is a step forward but no leap: in their calculations they actually only apply total diversity for the entire archipelago (gamma), the mean S of the islands (alpha) and the difference between S_{\max} (the S of the richest island) and S_i . In the species occurrence matrix there is a wealth of information on beta diversity in the number of common species for each pair of islands; this information is not incorporated in their approach. Whether step or leap, I find their paper stimulating and I am convinced that the last word on beta diversity in archipelagos has not yet been uttered.

Domínguez Lozano et al. (2010) compare the Canarian and Hawaiian archipelagos. Their comparisons concern both the entire floras and the floral composition of prominent habitat types. They consider taxonomic evenness, expressed as an index of the distribution the species within families and genera, and phylogenetic diversity (average taxonomic distinctness and the variance of the taxonomic distinctness). The authors convincingly show differences between the archipela-

gos, and how some habitats do not conform to expectations. They build up a new conceptual model of how habitat properties (stability and receptivity) and the diversification pattern are related. The authors also attempt to explain their results by considering immigration and evolutionary processes in relation to ecogeographical and habitat-related parameters. Here they do not mention the role of interactions with other groups of organisms (herbivores, pollinators and dispersers). I see that as a shortfall: to my knowledge, most species radiations in Hawaii are due to coevolution between bird-pollinated plants and their pollinators – birds that, because of isolation, diversified as much as the plants. In the Canaries the avifauna is basically a subset of the Palaearctic avifauna, with little endemism and no radiation – so the radiation in the plants must have been caused by other processes than coevolution with birds. Another feature that is not addressed in the paper, but which sets the two archipelagos apart, is that whereas the Hawaiian Islands constitute a distinct entity, the Canaries are a subset of the Macaronesian region. Because the Canaries are surrounded by Macaronesian islands on most sides, so part of the diversification may have occurred in other archipelagos. Overall, the paper is thought provoking and I hope the authors will have a serious discussion with the authors of the next paper I discuss (Kaiser-Bunbury et al. 2010).

The paper by Kaiser-Bunbury et al. (2010) is actually the fourth full paper in the special issue. The authors emphasize the importance of plant–animal interactions for the functioning of ecosystems, and they underline how species-poor island ecosystems are especially susceptible to changes. They advocate (with reason) that the network approach is very useful for pinpointing where the most severe dangers are for the breakdown of communities when species are removed from – or added to – islands. Even though the title focuses on conservation and restoration, there is much information on plant–animal mutualisms and reference to network approach studies. So the paper reaches further than the applied science approach. I agree with the authors in many ways but I feel it is worth mentioning that pollination and

dispersal networks are not the whole story. Abiotic media like wind, water and gravity are still the main dispersal and pollination pathways for a large proportion of plants and it is difficult to include them in pollination and dispersal networks. What is needed is a coupling to food web networks and mineral cycling – I am sure that the authors are aware of that, but it is not considered much in the paper. The comments on “rewilding” (reintroducing former participants into networks where they have been removed) are quite interesting. In that respect we should perhaps not be so purist in our biogeographic mind. Aldabra tortoises do a good job in Mauritius and would probably do so also in the Galápagos, on islands where the native species have disappeared. I fear it will be more difficult to find replacements for dodos and the flightless geese of Hawaii.

The paper by Caujapé-Castells et al. (2010) is also conservation orientated. I find this an extremely important paper that should be included in all courses of conservation ecology. Twelve outstanding experts have brought together their experience and knowledge on 13 isolated archipelagos, in an effort to circumscribe the extinction crisis (extinction debt?) for islands. The best way to characterize their contribution is to quote their own abstract’s final sentence: “this is the most up-to-date and comprehensive survey yet to review the threat factors to native plants on oceanic islands and define priority research questions”. The survey demonstrates that something like 10 % of island endemic plants may be highly threatened, and that island endemics constitute 70,000 species – close to 20% of global plant diversity. The paper is fortunately free from idiosyncratic pleas for “salvation actions”. Instead there is a sober analysis of the policies needed to counteract the threats, and even an evaluation of the present-day prospects for such policies to be put into action. High-brow theoreticians may grudge that this paper is “only descriptive” or even “just book-keeping”. But it should never be forgotten that explorative syntheses like this paper are absolutely necessary for providing background for rational conservation policy and sound hypothesis

formation.

In the last article, Kueffer et al. (2010) present an exhaustive review of our knowledge about which plants invade oceanic islands. In this they mine data from 30 island groups and identify which plants became the worst aliens on islands at a global scale. Again the scale and actuality are unsurpassed. The authors go further and make a serious attempt to relate invasive plant diversity to a series of biological, geographical, historical and socioeconomic factors. Even though they demonstrate that human development (measured as gross per capita production) and habitat diversity are both important predictors for the number of invasive plants, the overall picture is still rather blurred. So we cannot yet, with precision, predict which plants to expect to invade where. I believe that it is necessary to perform more detailed case studies of the invasibility of the insular communities, and of the invasiveness of the plants that get the chance to arrive to the islands, before we obtain predictive models. After all, what counts is the performance of the plant after it reaches the natural insular community. Long ago, Hooker pointed out that island floras are disharmonic in a taxonomic sense, and there is also much evidence that island vegetation is disharmonic in an ecological sense. Isn't that the reason why it is invulnerable? And are the invasive plants anything else than those that are able to fill the gaps? Still, this paper is important and ought to be read by conservation managers. Many years ago I witnessed *Leucaena* deliberately being introduced to Galapagos, and *Cinchona* to Réunion. A paper like the present one is one of the remedies against such careless foolishness.

All the papers have important messages, ranging from novel models and approaches to 'gold' from data mining, to practical lessons for conservation managers. Some of the papers are descriptive and explorative to a degree that some high-impact periodicals would probably reject. I think we should thank the editors of *Perspectives in Plant Ecology, Evolution and Systematics* for welcoming these papers anyway: they are as important to ecological science as cutting-edge theoretical works. In fact, without deep anchoring in

such solid documentation, fancy theories may seem no more than free fantasy.

Fifteen years ago I ventured to publish an essay (Adersen 1995) in which I expressed a hope to see more approaches from a biodiversity viewpoint (today I would say macroecological approaches): regard entire island floras and faunas and compare them to those of other islands and continental regions of comparable size and eco-geographical setting – and compare the endemic biota to the native, non-endemic biota. In other words, to take the leap from anecdotal stories on dodos, finches and marine iguanas to profound studies of complete island biodiversity. I am happy to observe that these five papers go along such lines – as have many other brilliant island papers in the first decade of the third millennium.

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news

A brand-new face for a Brazilian conservation journal

Natureza & Conservação (Brazilian Journal of Nature Conservation) is a peer-reviewed scientific journal devoted to improving theoretical, methodological and practical aspects of conservation science. The journal is edited by the Brazilian Association for Ecology and Conservation (ABECO, <http://www.abecol.org.br>) and sponsored by the Fundação Boticário de Conservação da Natureza (<http://www.fundacaoboticario.org.br>), a Brazilian NGO. *Natureza & Conservação* is currently indexed in JCR/Web of Science, Periodica, CABI International, Latindex and Hapi. It has just received its first impact factor (IF = 0.227), and the new team of editors, led by José Alexandre F. Diniz Filho and Rafael Dias Loyola, is working to improve this figure and give a more international profile to the journal.

Natureza & Conservação publishes papers from all fields of conservation biology and environmental sciences, but is seeking for papers focusing on theoretical and methodological developments in the field, so that case studies must be clearly inserted into these broader contexts. Papers in Conservation Biogeography and Spatial Conservation Prioritization are particularly welcome due to the integrative nature of these new fields and general potential interest for planners and ecologists. Papers are published in English, basically in two formats: *Essays & Perspectives*, which are longer essays and reviews, updating recent topics of general interest in conservation science and highlighting new conceptual, practical or methodological advances. Papers in this section are usually invited by the editors, but proposals

are welcome. Original scientific research papers will be evaluated in a fast-track decision process and published as *Research Letters*, which are concise manuscripts of about 3500 words (tied to an online supplementary material, if necessary). Other sections, in Portuguese, will comprise invited columns dealing with specific topics in conservation (a *Forum* section), as well as correspondence, book reviews and highlights from the literature.

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