

Interactive comment on “Questions of importance to the conservation of global biological diversity: answers from the past” by K. J. Willis and S. A. Bhagwat

Anonymous Referee #2

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General comments:

This manuscript is a valiant attempt to open an important line of communication between land managers and paleoecologists. The authors do a nice job of presenting several case studies that highlight the usefulness of paleoecological records in making conservation decisions and developing policy. The manuscript for the most part is well-written and makes good use of references and figures (see below for exceptions). I have a few major issues and numerous minor critiques that I feel should be addressed before the manuscript is published, but overall it is a good and necessary discussion of a very relevant topic.

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Although the authors include much discussion of “paleo-ecological” and “long-term” records, there is practically no discussion of what these are. I think the argument that paleorecords are useful in modern-day decision making would be better made if the readers had a better idea of the different types of records (especially the ones discussed, i.e., pollen records, macrofossil records, charcoal records). If there is not room in the manuscript to discuss the type of records you are talking about and the general benefits and drawbacks to them, then it would be good to include some references that lead the readers to this information. This would be good to include somewhere in the Introduction section (perhaps where you talk about the length of paleorecords).

The other key item that seems to be missing from the manuscript is a good definition of what is meant by “ecological processes”. This is really the crux of the paper, that ecological processes need to be considered when making management decisions (and that paleorecords can tell us something about them), but I was left wondering exactly what these are. The term “ecological processes” is used numerous times throughout the manuscript (in fact the authors switch back and forth between “ecological process” and “ecological processes”, so this should be consistent throughout), but it seems to me that maybe more specific terms could be used instead. For example, on page 1149 (line 4) the sentence reads, “The first approach is to restore ecological processes to these degraded landscapes.” What ecological processes are you referring to? It kind of sounds like you are saying that there are no ecological processes occurring at all in the degraded landscapes, which I don’t think is true. In general, I think that the phrases “conservation of ecological processes” and “restoration of ecological processes” are overused in the manuscript, and their usage detracts from the quality of the argument made by the authors. Please try to rework the discussion so it includes more specific information on what type of ecological processes you are referring to and why they are so important for the conservation of biological diversity.

Specific comments:

Page 1143, line 26: What kind of “paleoecological sequence”? Please be more spe-

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cific.

Page 1144, line 22: You need a citation after “grassland ecosystems”.

Page 1144, line 25: You need a citation after “anthropogenic activity”.

Page 1145, line 24: It's not clear what is meant by “to try to build the factors responsible for the resilience into regions”. I think it may be the word “factors”. Please clarify.

Page 1146, line 2: What kind of paleoecological techniques? Please be more specific.

Page 1146, line 5: This sentence says that the time period is the past 4000 years, but line 1 says the study covers the last 6000 years. Please clarify.

Page 1146, lines 11-13: In the sentence that starts out “Specifically, the diverse littoral forest. . .”, is this the first time you say “littoral forest”? I'm not sure it's clear what kind of forest that is. Coastal, but not mangrove forest, correct? It would be helpful if there was a comma after “triggering mechanisms”. Otherwise it sounds like the triggering mechanisms show greater resistance, not the littoral forest. I would take out the comma after “environmental perturbation” and change “and also in its ability to return” to “and a quicker return”.

Page 1146, 24-26: This sentence could use a citation.

Page 1146, line 26: What kind of “long-term ecological records”? Be more specific. If they are 6000-year long pollen records, then say so. Also, delete word “the” before “long-term ecological records”.

Page 1147, line 10-13: I'm not sure this information is necessary. Possibly delete or better explain why it matters.

Page 1148, lines 4-5: Some sort of definition of “population abundance” is needed (either in this sentence or earlier in the section).

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Page 1148, lines 24-25: I think I get what you mean by “novel ecosystems in anthropogenic landscapes”, but maybe you could describe it better.

Page 1149, line 4: Can you give some examples of what you mean by “ecological processes”? (maybe earlier in the paper).

Page 1149, line 5: Before when?

Page 1149, line 9: It is argued by whom? List researchers and change to active voice.

Page 1149, line 13: It is suggested by whom? List researchers and change to active voice.

Page 1149, 14-16: It isn't clear which time periods go with which locations. Please clarify.

Page 1149, line 17: Argued by whom? If it is Vera (2006), then say that and change the sentence to active voice.

Page 1149, lines 18-20: Same as above. State who is making the argument and change to active voice. Also in that sentence, I'm confused by what you mean by “functionality in ecosystems”. Please clarify (maybe with some examples).

Page 1149, line 23: Delete the word “certainly” and be more specific about how large of an increase in biodiversity you are talking about.

Page 1150, line 1: You repeatedly use the words “long-term ecology”. I think I would just say “paleoecology” since that is what paleoecologists call it. You could define it the first time you use it to avoid confusion.

Page 1150, line 13: What do you mean by “charred residues”? If you mean charcoal, then it would probably be better to just say charcoal.

Page 1150, 14-16: This sentence probably needs a few citations.

Page 1150, line 19: The part of the sentence that says “embedded in a landscape of

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infertile soils" sounds awkward. Maybe if you put a comma before "embedded" it would sound better.

Page 1150, 23-26: The last sentence of the paragraph doesn't really make sense. Change "that are" to "who" and that might help, but again I think it is the use of the word "processes" (which you use twice in the sentence) that is confusing. I still don't really know what you mean by processes yet.

Page 1151, lines 1-11: Overall I think I understand what the paragraph is saying, but the words "conservation", "processes" and "conserve" are repeated too many times. Try to come up with some different words that are maybe more descriptive and help drive your point home. Also, the last sentence should probably have a comma after "records" and "phylogenies". In addition, please explain what you mean by "these factors". What factors are you talking about?

Page 1151, line 14: Please explain what you mean by "adverse climatic perturbations". Adverse for the organisms?

Page 1151, lines 15-20: This is a really long sentence with a lot of breaks in it, and I'm not sure it makes sense. I guess I don't understand how the "spatial extent of genetic diversity" is known from pollen and microfossil records. Were genetic studies done, or are you just trying to make a general conclusion? Please clarify.

Page 1151, line 22: What are you referring to in terms of "species"? Number of species? Type of species? Please be more specific.

Page 1151, line 26: "Warm-stage refugia" probably needs some sort of description with it.

Page 1151, line 28: I would change the word "good" to something else like "appropriate" or "important". In fact, the sentence would be better if it read, "An important time interval to examine...".

Page 1152, line 11: The "spanning 2000-2005" doesn't make sense. What spans that

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interval? I thought you were talking about Pleistocene refugia? Please clarify.

Page 1152, lines 15-17: This sentence doesn't make sense, especially the part that says, "preserving areas important for persistence and ecological processes responsible for this...". I think it would be helpful if you put an adjective with persistence. Persistence of what? Also, the word "the" should come before "ecological processes". Make sure that the tense of the sentence is appropriate (it should probably be in past tense since the study has already been completed).

Page 1153, line 18-19: You may want to mention some of the global databases that do exist and how they can be accessed (e.g., the global charcoal database, the North American and European pollen databases, others).

Technical corrections:

Page 1140, line 2: Add a comma after word "impact".

Page 1140, line 18: "necessary in order" sounds redundant. I would leave out "in order".

Page 1140, line 18: Is there a word missing after the word "This"? Study? Review?

Page 1141, line 5: Add comma between "CBD 2010".

Page 1142, lines 1-6: This seems like a really long sentence. I would split it into two separate sentences.

Page 1141, line 20: Add period after "Hobbs et al".

Page 1144, line 7: Delete the word "the" after "reduced the dominance of".

Page 1144, line 17: Delete the word "the" after "processes responsible for".

Page 1144, line 26: Add the word "are" after the word "therefore". Also change the semicolon after "priority" to a period and make the rest of the sentence a new sentence. Probably best to change the word "Whereas" to "However".

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Page 1144, line 28: Add a comma after “e.g.”. Check these throughout the manuscript.

Page 1146, line 6: Change the word “a” before combined to “the”.

Page 1146, line 17-20: Change the semicolon to a comma after “priority” and change “also” to “as well as”.

Page 1146, line 21: Delete “long-term”.

Page 1146, line 23: The sentence would be better if it read “One example is the Madagascar endemic evergreen forest tree, *Symphonia*.”

Page 1147, line 1: “abundances” should be “abundance”. Also not sure what you mean by “the populations of *Erica* spp. and *Myrica*”. Maybe leave it out.

Page 1147, line 17-18: add commas before “but” and after “abundances” to set off that part of the sentence.

Page 1147, line 19: Change to active voice instead of passive. It should read “*Symphonia* and *Erica* spp. coexisted throughout the sequence.”

Page 1147, line 21: “In contrast *St. Luce*” should be the start of a new sentence.

Page 1147, 24-25: The last part of the sentence would be better if it read “driving *Symphonia* populations to local extinction.”

Page 1147, line 25: Delete the words “low/high”.

Page 1147, line 26: Change the word “this” to “thus”.

Page 1147, lines 28-29: “Under higher *Symphonia* abundances” doesn’t make much sense. “With” or “because of” might sound better.

Page 1148, lines 3-4: It would sound better if the sentence read “By examining ecological processes. . .through time, this study has important implications for conservation planning.”

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Page 1148, line 6: Delete the first “that”.

Page 1148, lines 11-13: The sentence would be better if it read “. . .since during climate perturbations littoral forests located on poorer soils will probably not be able to support many of the region’s important endemic taxa.”

Page 1148, lines 13-15: This sentence is really awkward. I would change it to read, “By prioritizing conservation of littoral forest situated on nutrient-rich soils it will be possible to preserve the ecological processes necessary for its persistence during climatic perturbations.”

Page 1148-9, line 1: I would change the sentence to read, “How then can we create conditions that will protect (?) native species beyond reserves and in novel ecosystems?”

Page 1149, line 2: Should it say “processes” instead of “process”?

Page 1149, line 6: Change “for the functioning of the ecosystem” to “for ecosystem function”.

Page 1149, line 6-9: Change sentence to active voice instead of passive voice.

Page 1150, line 2: Change “on” to “in”.

Page 1150, lines 4-5: The use of “in fact” in this sentence is awkward.

Page 1150, lines 9-10: Rephrase sentence to say “. . .in Mexico by using algae from wetlands to enrich upland garden plots, and by cultivating trees within their communities.”

Page 1151, line 22: Delete the word “are” and change “indicating” to “indicate”.

Page 1152, line 2: You use “kyr” here but not earlier in the manuscript. In fact, you use cal yr BP (not defined) in some places too. Please be consistent.

Page 1152, lines 4-5: Delete the words “in time”.

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Page 1152, lines 8-9: Change “are already starting to be incorporated into” to “are already being incorporated into”.

Page 1152, lines 9-12: This sentence is confusing. Probably best to rephrase it to say, “For example, in a recent attempt to identify important areas for conservation of ecological processes in Australia, refugia locations during previous intervals of . . .”.

Page 1152, line 13: Change sentence to active voice.

Page 1152, line: Change to past tense. “Although this approach predominately focused on. . .”.

Page 1152, line 24: Delete the words “a consideration of”.

Page 1153, line 15: Delete the word “being”.

Page 1153, line 16-18: I think it would be better if the sentence read, “We suggest that there are currently a number of barriers, not in the least is the ability for non-specialists to access and utilize paleoecological data.” The use of the word “presentation” is confusing.

Page 1153, line 21: Change “as to” to “of”.

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