I have completed my evaluation of your manuscript. The reviewers recommend reconsideration of your manuscript following major revision. I invite you to resubmit your manuscript after addressing the comments below. Please resubmit your revised manuscript by **Mar 13, 2021**.  
  
When revising your manuscript, please consider all issues mentioned in the reviewers' comments carefully: please outline every change made in response to their comments and provide suitable rebuttals for any comments not addressed. Please note that your revised submission may need to be re-reviewed.    
  
To submit your revised manuscript, please log in as an author at [https://www.editorialmanager.c](https://www.editorialmanager.com/gecco/), and navigate to the "Submissions Needing Revision" folder.    
  
Global Ecology and Conservation values your contribution and I look forward to receiving your revised manuscript.  
  
Kind regards,       
Richard Corlett     
Editor-in-Chief    
  
Global Ecology and Conservation   
  
Editor and Reviewer comments:   
  
Editor: I have nothing to add to the comments of the reviewers. except that 'conservation' is better than 'conversational' in the title.

***We changed the title to: ...***  
  
Reviewer #1  
  
The ms study how succession in sand quarries affects aculeate wasp fauna. Species number, divreisty, abundance and species composition are analysed against three successional stages. The wasps are divided into three trophic groups. The collected materiel consists of 272 species divided on 8230 individuals. There were 32 sites, 10-12 in each successional stage.

The study seem thus to be based on a thorough material of isneccts and sites. However, there is no description on how many species per site, no data on how many singletons, or how dominant the most common species were etc. Therefore it is a bit hard to evaluate this. A table of the species found and raw number on the no if individuals and/or occurrences would be very informative.

***We moved this information into the suplpement not to disrcatt from the main topic. Summaries can be found in*** ....  
  
Apparently a lot of valuable info, which should be visible to a reader is hidden in Appendices, which I seem not to be able to access at the moment of reading. On the other hand, a lot of info is doubled in Figures and table. So there is plenty room to move soem double info to Appendix, and some important info to the real article.

***It would be helpful if the reviewer pointed out which information he would like to see. I dont understand which inforamtion is doubled there on the plots except for RDA ...***

The only environmental variable analysed is the three categories of successional stages. It is a bit unfortunate since those kind of areas could be managed or prioritised to meet other environmental criteria ithat might maximise their benefit for the fauna. Successional stage is moreover something that all the quarries will go through deterministically. You might dig to take the site back to an earlier successional stage, but in which quarries will this do the best benefit, and how could the digging be done to best favour the fauna? Size, flora, soiltype etc coudl be important. I wonder at least how large the variation was within those three categories.

***We selected categories based on strong differences in plant community composition. Any descriptor would result in the same effect on insects. Thus the compound variable used here.***  
  
Overall the text lack scientific stringency. You cannot for exampole anlyse specis number by a chi-2 test. You can analyse different proportions in categories. I have noted many such points below.

***We didn’t analyze species number by chi square test but the proportions from a contingency table. This is not a mistake.***

Om the other hand analyses seem well performed, so it is not the anlayses themself which is the problem, it is that the text need to tell what they show. Further interpretations of results should be made in discussion.

***Good point***

Line 52 I suggest Just "influence of succession?" You seem not to have any data on the plants in this ms.

***Agree. However these categories are based on significant structural and compositional differences. We added table with some plant characteristics for better clarity of what each stage means.***

Line 55: Do not understand. Why is variation a criterion? Big variation is usually associated with increased exctinction risk? Or do you mena that a natural succession (with natural fluctuations of insects along with that) is a criterion?

**That is true. However, during succession we expect some species to extinct/vanish from a changing ecosystem. What we meant here was the variation between stages. i.e. species turnver. We made it more clear in the text.**

L 58, Here you need a reference!

...

L 100-, The aims and hypothesises are vEry long and commplex... Could be made much clearer! And if that is clearar you might have help of that when revising the text on results etc.

***We tried to make it more clear.***

L 108. Very unclear! Do you mean that differences between different sand quarries (=beta div) will change? Or larger differences within sand quarries? Or do you just mean that the chenges in species composition will mainly be caused by arrival of new species?

***Clarify.***

L 111: What is "the balanced component" of beta-div?

***It is explained in line...***

L 124 Very good with the pictures of the different stages of succession!  
  
L 137. You write years - I wonder years after what? And how were the sites selected and how were they cetagorised? In a database? Did you have data on when they were last mined? How large were they?

***Years since abandonment.***

L 144 This might be a problem, since many sand quarries are quite large, and therefore may include areas of different succesional stages. How have you treated that?

***We do not expect that variation within the quarry will be higher than between quarries assigned to different stages.***

L 158 How many persons were working? Was it the same persons on all sites?  
  
L 160 Do you mean "sites" here? It is not celar whether you visited each site only one time - or if you did different trensects on the same site at different occassions.  
  
L 177 isn´t "level" a better word?  
  
L 193 Do you mean that you used a negative binomial distribution for abundance-models? What did you use for diversity?  
  
L 193  like the term species number (used below) better. Species richness is often used in relation to the amount on individuals (cf rarefaction).  
  
L 200: Do you mean the commmunity of wasps, or the community of plants?  
  
L 206 But how could you only use statistical significanve vs no significance. If I under stand reault section it is very important of the relation is significantly positive vs significanltly negative. nThus you should have 3 categories if you should analyse it this way.   
  
L 212 Beta diversity can not describe the rate of change. It can describe how different different communities are in species composition.

***That is not true. Beta-diversity is a common measure of species turnover rate. That is exactly what it was used for. We evaluate how communities at different stages of succession differ.***  
  
L 245 You cannot write a sentence like this and refer to Appendix. You should help readers to interpret results by stating the most important findings. And if they are important they should not be in Appendix.  
  
L 246 level  
  
L 248 I assume this is a species list (I cannot see it while reading this). A species list is good o have as a real table, since it can be extremely informative to persons that are familiar with the species group. It is also good for a reader to know how dominant most common species was and how many singletons.  
  
L 252 This has to be wrong! You cannot test species numbers with chi-2 tests. After consulting material and methods I think you mean that the proportion of species that has sign positive reaction fo successional stage according to Indval?? increase. But I am certainly not sure - you have to be more clear!

***Noted!***

L 257 You have not defined any indices earliuer in the text! What does this mean?  
  
L 259 What indicators?  
  
Table 1 Sine the core question is how the successional stages differ, those should be iin the 3rd column, so you can more easily compare the stages for each trophic level.  
  
Fig 3 This is the same info as Table 1. Therefore it might be regarded as redundant. But the figure is much more easy to read so I prefer that. A problem is that you have presented the response variables in different order.

***I agree. We moved table 1 to appendix.***  
  
L 270 Good choice, but make it more clear in the figure.  
  
L 278 How did you calculate that?  
  
L 281 It is not shown i Fig 4 - there you only find abreviations of the names.  
  
L 283 Do not understand this sentence.  
  
L 314 I think I understand but it can be much more clearly explained.  
  
L 354 Do you mean that the values were low early in the succession but increased later?  
  
L 356 I have read the text above this and have not seen any analysis about complexity. What do you mean here?  
  
L 358 What indices? You have not calculated any index as far as I have understood?  
  
L 410 This continued use of the quarries would have been a good variable to include in the models. Then you could have made conclusions on how management may benefit those species.  
  
L 420 Or they are just generalists? This might be expected since you cannot be too choosy if you are one level up in the trophy.  
  
  
Reviewer #2: This survey brings an information on the succession of abandoned sandpits in east of Poland by several groups of bees and wasps. It is well-written with using modern evaluation methods, and the fieldwork was well-planed and done. In general, the MS can be suitable for publication in Global Ecology & Conservation **but several parts must be updated and / or clarified**.   
  
1. The Discussion is the weakest part of the MS. The authors use for the comparison usually their own similar previously published papers but there are many good surveys, some of them are cited in the text (usually the studies by the teams of Tropek, Heneberg, Bogusch, Tscharntke, etc.) but only in the Introduction. I put here some suggestions of studies, which are necessary to cite in the publication, but certainly more other could be included. If the Introduction, Methods, and Results are very good, the Discussion should be, too.   
  
2. The term "Kleptoparasites" is not appropriately used here. It is not true because most chrysidids are parasitoids. I would prefer to use "parasites" or better "parasitic species" throughout the text. These terms are not confusing.  
  
Other comments to a specific parts of the MS:  
22 - span to 15 years - this term has more meanings in English language, here should be written "from XX to 15 years".  
  
72-73 - there are not many studies concerning the changes of bees and wasps communities in time at newly preserved or much changed habitat. I know one - Bogusch et al. 2015: Forgotten role of forest fires... European Journal of Forest Research. The authors mapped the changes in communities of bees and wasps on freshly burned sandy sites, whereas they recorded the highest diversity and also proportion of species of conservation interest around 3-5 years after the fire. This study can be useful for you here and in several parts of the Discussion.  
73-74 - bees are good indicators - I think better is to cite the European Red List of Bees and its supplement, these two studies highly support your statement  
159-160 - why not Pompilidae, Vespidae, Mutillidae etc.? These groups were not found or were excluded from the survey? You have very good specialists in all these groups both in Poland and in the Czech Republic and there are many very good indicators of sandy habitats especially within the family Pompilidae  
184 - not only Nysson but also Brachystegus and some other  
Tab 3 - Tetraloniella salicariae - recently Eucera salicariae, Hedychrum niemelai, Tachytes panzeri, Cerceris ruficornis - divide the names (there is no space)  
364 - there is a new study by Czech team Bogusch, Blahova, Horak 2020: Pollen specialists... Arthropod-Plant Interactions, which deals with the pollen and habitat specialization of bees and their conservation value. Certainly useful for here. Also very nice study by Westerfelt et al. 2018: Population patterns ... Forest Ecology and Management, which deals with two bee species and their specialization on pollen and nesting site.  
  
References:   
Bogusch P, Blahova E, Horak J (2020) Pollen specialists are more endangered than non-specialised bees even though they collect pollen on flowers of non-endangered plants. Arthropod-Plant Interactions 14: 759-769. https ://[doi.org/10.1007/s11829-020-](http://doi.org/10.1007/s11829-020-09789-y)  
Bogusch P, Blažej L, Trýzna M, Heneberg P (2015b) Forgotten role of fires in Central European forests: critical importance of early post-fire successional stages for bees and wasps (Hymenoptera: Aculeata). Eur J For Res 134:154-166  
Nieto A, Roberts SPM, Kemp J, Rasmont P, Kuhlmann M, García Criado M et al (2014) European red list of bees. Publication Office of the European Union, Brussels  
Rasmont P, Devalez J, Pauly A, Michez D, Radchenko V (2017) Addition to the checklist of IUCN European wild bees (Hymenoptera: Apoidea). Ann Soc Entomol France 53(1):17-32. https ://doi. org/10.1080/00379 271.2017.13076 96  
Westerfelt P, Weslien J, Widenfalk O (2018) Population patterns in relation to food and nesting resource for two cavity-nesting bee species in young boreal forest stands. For Ecol Manag 430:629-638. https ://[doi.org/10.1016/j.forec](http://doi.org/10.1016/j.forec) o.2018.08.053  
  
  
Reviewer #3: This manuscript gives a comprehensive overview of Aculeata communities in sand quarries. The study is particularly interesting and novel as different trophic levels of Aculeata and different successional stages are evaluated. All three successional stages (0-5, 5-10, and 10-15 years after mining) were found to be relevant for conservation due to differing responses of each trophic group in each successional stage and due to differing community compositions at each stage. In the first successional stage, predators had, e.g., their highest proportion of indicator species (species characteristic for a successional stage). The second successional stage was marked by a high complexity of herbivores and kleptoparasites, and the third successional stage stood out with a high species turnover of predators. Overall, a high number of rare and threatened species (20% of all species) was sampled, highlighting the conservation value of these habitats further.  
  
The study is very well written and includes many different analyses, thereby showing different angles of the conservational value of quarries. **Therefore, I think it should be published. I have a few suggestions for improvements.**  
  
I was very impressed by the number of study sites (32; 10-12 per successional stage) and the time span (15 years). However, in the methods section I realized the study sites were not all evaluated throughout 15 years, but different study sites were sampled at different time points within 15 years. The exact set up was not entirely clear to me and I would like that to be explained a little more in detail. I also find the information provided in the abstract to be slightly misleading and would like to see that updated accordingly.  
  
Although the importance of nesting along with food resources is mentioned in the introduction, I think this aspect could be examined a little deeper throughout the manuscript.  
  
In my opinion the direct links of the results to specific conservation values, priorities and measures could be carved out a little more clearly. Overall, the discussion could be a little more concise with a clearer thread. This applies throughout the discussion, but I found the paragraph from L385 to 413 particularly difficult to follow.  
  
The recommendations in the conclusion could be a bit more straight forward. I was, e.g., unsure whether the stated importance of spontaneously colonized quarries speaks against quarry rehabilitation (completely unmanaged) or for a carefully managed rehabilitation? And is the maintenance of open quarry habitats (early successional stages) recommended? If yes should that be achieved by ongoing mining or by other means?   
  
Therefore, I would ask for a revision of the manuscript, but I think it will be an interesting addition to the literature.  
  
Line by line comments  
Abstract:  
L21-22 I am impressed by the large number of study sites and the time span of the study. However, please see my comments above and clarify the details of the study design.  
  
L25-27 This sentence reads a little difficult. Maybe rephrase to e.g., The arrival of new species significantly affected…, although dominance structure did not change.  
  
L27-31 I think the sentences could be connected a little better. Maybe use the same structure/word choice when comparing the ß-diversity of the different trophic levels.  
  
L31 Prevalent sounds a little odd to me here. Could it be left out?  
  
L33 "affect" conservational value sounds not exactly fitting in my opinion. Is it not rather that the different patterns generate/create different conservation values?  
  
L34 I am not sure whether it is appropriate to say that the different species "prefer" different stages of successional stages. Do they prefer them or can they simply not live in other successional stages? (I guess it depends on the species.)  
  
Introduction:  
L51-54 Could you be more specific or make a little more clear what exactly would change the conservational value?  
  
L55-57 Is the temporal variability of insect communities not measured in their abundance and diversity or how do you mean "along with their abundance and species diversity"?  
OK reading further I think I understand what you mean. Would it be appropriate to use variability of insect community compositions?  
  
L64-65 Could you provide a citation for the statement of predators strongly depending on structural complexity?  
  
L68-70 Please specify that you are talking about general predictions for hymenopterans (across different habitats or other habitats than sand quarries). I first understood that you were talking about successional theories for organisms in general (not just hymenopterans), but then the following sentence didn't make sense and it took me some time to understand.  
  
L70-71 In the case that you are providing information about the general predictions for hymenopterans in the previous sentence already, the first part of this sentence would be a repetition.  
  
L75-90 As you mention both the high nesting and food requirements, you should also detail the dependence on appropriate/available nesting substrate additional to the strong relationship with floral resources.  
  
L92 The meaning of "raw numbers" here is a little unclear to me. Do you mean the mere number?  
  
L100-114 Please specify how you expect the conservational value to change. You list some expected changes/developments, but what would they mean for the conservational value of the quarries?  
  
L113-114 Do you mean species that show up in high abundances in the beginning will stay and continue to be highly abundant throughout the successional stages?  
  
Materials and methods:  
L123-124 When/how often were the vegetational parameters and percentage of bare ground measured?  
  
L123-126 It would be nice if you could indicate the range of quarry size in the text.  
  
L125 I am unsure of what synanthropic means here. Was any vegetation seeded?  
  
L137-139 I guess there was no woody vegetation at the early succession stage, but maybe indicate this here to follow the same pattern in description as for the other successional stages.  
  
L140 Could you please indicate the range of bare soil for the middle succession quarries?  
  
L146-149 From the abstract I understood that 32 sites were observed/sampled over a time period of 15 years. Here, it looks like 17 sites were observed within 9 years (how often exactly during this time period?) and 15 different sites were observed a year later.  
I am also not sure if 2015-2016 means some sites were observed in 2015 and others in 2016 or if all of them were observed in both years. Maybe "in 2008, 2015, and 2016" would make more sense...?  
  
L153 Could you be a little more specific about what "most days" means here?  
  
L155-156 How often did you sample during this time period? Were all quarries sampled in one day or in one week? And was there a set order or random order for sampling sites?  
  
L156-158 When you mention some details on the transects here, I was wondering about more details on the study site/transect design and then found them later after the description of the survey methods. Could you maybe give all details on the transect/study site layout coherently? An additional question I had on the transects was: How did you lay them through the quarries? Were they e.g., centrally located, along edges, parallel, or diagonally going through the quarries?  
  
L158 How many different researchers conducted the survey?  
  
L161 I find the use of "delimited" a little confusing and maybe unnecessary here.  
  
L166-167 It would be useful to know whether you identified the specimens yourselves or who identified them.  
  
L169 I know there are different opinions on the spelling of bumblebee, but consider using "bumble bee".  
  
L169-170 Please specify whether B. lucorum and B. terrestris were the only species of the subgenus Bombus in your study.  
  
L183 Please make clear that you mean Crabronidae and Sphecidae by digger wasps.  
  
L192-193 Species richness is also a form of diversity assessment - please specify which species diversity index you are referring to in the beginning of the list here.  
  
L193 Consider using Aculeata abundance instead of community abundance.  
  
L195 Maybe substitute species number with species richness to be consistent.  
  
L212-218 Could you maybe explain early on in the manuscript in one place in detail how you use species exchange, ß-diversity, dominance structure, gradient component, new arrival of species, balanced component, and species turnover and which terms you use interchangeably? You drop the terms here and there and sometimes it is unclear which ones are referring to the same thing. For example, this paragraph speaks of the balanced component of ß-diversity only as the arrival of new species; in the results (L294 onward) you speak of the balanced component as species turnover and don't use the description arrival of new species.  
  
Results:  
L248 The word "simultaneously" doesn't seem to fit in here very well in my opinion.  
  
L254 Please indicate which diversity measure you used (Shannon index).  
  
L269, Fig. 3. Please be specific about the diversity measure you use.  
  
L271, Fig. 3. So solid points are means?  
  
L281 Consider inserting "displayed in": …listed in Suppl. Table A.4 and "displayed in" Figure 4…  
  
L300, Table 2 Please indicate in brackets that the estimated means are given in the column "Prediction".  
  
L304-305 If you mean species turnover by "balanced component of ß-diversity", please add this information in brackets.  
  
Discussion:  
L341-342 I don't exactly understand how you mean "occasionally used ... gradually colonized". I assume neighboring areas of the gradually colonized quarry habitats are still being mined?  
  
L347-349 Maybe you could relate this proportion of rare/threatened species to the proportion of other habitats.  
  
L351-355 Could you state a little more clearly how/when sand quarries have particularly high conservation values according to the level of rare/threatened species?  
  
L353-354 From what I understood in the results, the amount of rare species increased at the earlier stages (I to II). Therefore, I don't understand what you mean by a decrease at early stages of succession here.  
  
L376-377 I would invert the statements, first mention the fertile/moist soils and then the dry/sandy soils and insert "such as quarries".  
  
L385-388 You end the previous paragraph with a discussion of species turnover of herbivores and kleptoparasites. The reader now expects the discussion of species turnover of predators which you do get to in this paragraph - however, you describe it with different words and don't use the term species turnover here. I find this a little confusing and would suggest to follow the same pattern/phrasing when discussing the results for the different trophic levels. In other words, it is important to repeat key words such as species turnover.  
  
L385-386 Maybe use community characteristics instead of community indices? Or also add what exactly you are referring to here, because you calculated many measures.  
  
L385-413 This paragraph is very long and I cannot see a clear topic here.  
  
L414-428 Could you more specifically point out which trends/values indicate conservation value?  
  
L430-439 So which conservation measures exactly should be taken in order to protect Aculeata in the best way? What should be priorities?  
  
Table A.1. Could you provide the information in the table that says whether the quarry was periodically exploited or abandoned? Or is that what "managed/unmanaged" means?  
Please also indicate in the table which study sited were sampled in which years.  
  
Table A.2. Could you maybe add in the legend that "." means no individuals or no indication for conservation status?  
  
Table A.3. Legends for DF and CL are missing.  
  
Table A.4. This table provides interesting information. Could you maybe change the species code to species names in order to extract information from the table more easily?  
  
Fig. A.1. The figure legend says (S)est, but in the figure caption you say (Sest). It would be good if that was consistent. The caption also has some typos: "andestimated" and "methodin".