

## Final Evaluation Report

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Your Details	
<b>Full Name</b>	Jorge Adilson Pinedo Escatel
<b>Project Title</b>	Hidden inside the mountain: how threatened is leafhopper biodiversity within native forests of the Sierra Madre del Sur, Mexico?
<b>Application ID</b>	29982-2
<b>Date of this Report</b>	May 2022

**1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.**

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Evidence changes in habitat composition due to anthropogenic activities				Time spent in the field demonstrated ongoing changes in the structure of the habitats housed by the forests of the Sierra Madre del Sul, many of target areas were constantly suffering unregulated activities pressuring populations (native indigenous communities, leafhoppers, and forests). This compiled and generated evidence such as photography, biotics, quantitative and qualitative statistics of current damage, for example, deforestation, overgrazing, changes in land use without prior notice, and loss of leafhopper diversity.
Changes in fauna over past 8 decades				We demonstrate how human activities in the last 80 years within forests have dramatically changed the composition of biodiversity leafhoppers by using historic known data for the 1920-30s to those present today. We were able to identify threats and how it has been drastically declining due to these actions.
Species richness and abundance in areas endangered				For the first time in over 60 years there is not only a list of species but also provided abundance numbers and evaluations of all Mexican species under risk according to the criteria of the red list of threatened species. In addition, we know geographically all habitats used where species can be distributed and their distributional boundaries in such forests.
Habitat characterization				Major attributes of those habitats were fully diagnosed thanks to the participation of people taking us to all areas in the surrounding. Most species now have a habitat preference associated with the checklist.

Preliminary species evaluation of risk category				Few species appeared to be dominant in several regions which made it easier to evaluate their risk condition, but other many others only occur in very limited regions of the SMSr and the base information is still unclear for those rare species.
Educational workshops				Successfully all initially planned workshops were done, and other non-official talks were also conducted thanks to the invitation of communities involved over this time.
Develop a basis project for conservation within a community				This step needs a better framework and time to be fully archived. Our continuous work side to side with communities will eventually rise this need in the total region. We will continue working together to develop this initiative and strongly mitigate the promotion of lead conservation management in those remote areas with ancient forests and endangered arthropods.

**2. Describe the three most important outcomes of your project.**

**a).** Consolidation of a non-profit organisation due to our main result was to document solid data on the biodiversity of leafhoppers that occurs in the ancient forests of the Sierra Madre del Sur that historically had been unknown to Mexico, Central America, and the world to the benefit of indigenous communities inside forest. This outcome for the first time uncovered such relevant priority to take actions on insect-forest conservation and represents an important initial guideline for subsequent conservation leafhopper projects on endemic species whose importance is unknown or have never been evaluated. Thanks to this formidable discovery, I was invited on several occasions to present the results in universities, institutions, or social forums to different audiences, including children and academics specialised in ecology and conservation approaches. On the other hand, this information is the basis for future projects that hope to collaborate in multidisciplinary areas to generate information at very specific levels (populations, genomic, social work, etc.). The indigenous communities have encouraged me to the creation of a non-profit organisation to give continuity to projects and continue involving the communities working aside us. This, in turn, promoted the legality consolidation of the team and the volunteers of the communities to continue allowing stay longer in the region.

**b).** Evidence of non-regulated activities threatening all beings in the region. We have compiled compelling evidence of leafhopper specie loss, forest coverage in risk, and threats to cultural indigenous traditions due to ongoing industrialisation activities in these forests. During our fieldwork time we were able to identified risk

areas in the forest by gather evidence and reliable data on such threats to all type of populations (insects, plants, and indigenous communities) in the region such as deforestation, production of unregulated products, fortuitous hunting, livestock in non-permitted areas, etc., those actions are unfortunately increasing and eventually threaten the integrity of these environments along with the social, economic and cultural stability of the native communities that inhabit those ancient forests. Multiple sites where these actions occurred do not have access or adequate conditions for transporting services, which makes it very difficult for the authorities to reach these points, however, we do have geo-information that will be turned over them shortly to promote greater conservation actions, improvements structure of projection strategies in those areas, generate groups of native activists that alarm corresponding authorities and to eradicate non-permitted activities.

**c).** Assessing risk categories and biogeographical hotspots of leafhopper biodiversity. The field effort conducted has provided a unique significant opportunity through including large amount of innovative information on several species of which 80% exclusively only inhabit these forests (endemic) and are not distributed beyond such boundaries where occasionally only a single locality is known or historically is where the species was first reported more than 80-90 years ago. The teamwork was able unfortunately to identify up to 60% of all species are considered under the category of critically endangered, another 15% are threatened, 5% as least concern and the rest with deficient data according to the criteria of the red list. Likewise, team determined in whole mountain complex of the Sierra Madre del Sur seven main hotspots areas with high biodiversity levels on this sensitive and elusive insect group that should be a priority for conservation and promotion of protected areas through further constant mitigation. Regarding this matter, I was invited to participate in an open discussion with native leaders of communities to make changes in the future federal projects proposal to demand and promote well-structured management strategies for forests surrounding indigenous settlements.

### **3. Explain any unforeseen difficulties that arose during the project and how these were tackled.**

Volunteers' capacitation: was the main unforeseen activity due to the limitation of holding mass meetings due to the COVID-19 contingency. To solve this, we held remotely meetings in communities having internet access, however, a large percentage (85%) do not have availability or even power to use such service. To cover this inconvenient fact the team split giving simultaneously prescheduled visits through two team members working with four members of each community. All training courses followed very strictly all OMS protocols to reduce any possible contact while in-person meetings and this action for subsequent meetings was repeated on multiple occasions leaving a period of 14 days among communities. Satisfactory, our training was completed on time as planned and facilitate search volunteers.

Longer unforeseen stays: The second challenge was to establish effective communication channels since the fieldwork was focused to take actions only through small people groups, which we were subject to staying in the communities for more than 14 days to teach a total of eight volunteers (four per week) in each

community. Accommodation and food non-expected during time were kindly provided through local and non-related people who reached out throughout social media when heard about our project, most cases also facilitate open areas for training and develop workshops.

Shipping: Fresh materials from fieldwork safely arrive to the entomological lab. One of our fundamental activities when working in the field is to ship to the team at the entomological laboratory samples and data to be processed acquired from each locality already visited. Unfortunately, this process was one of the major barriers at beginning of the project because several small towns that offered shipping services during the pandemic were closed due to local law restrictions and we had undesirably driven to bigger urbanised places. To properly solve this unforeseen difficulty, we used to compile samples plus paperwork at least from three localities and stopped on our way to the next location within larger settlements with broad services to ship larger packages. These changes forced us to preschedule in advance every single location visited, and transportation roads (highways or freeways) taken.

#### **4. Describe the involvement of local communities and how they have benefited from the project.**

This project could never have been done without local native communities' support. Teamwork advocates always work closely with them because owned historically these lands were largely using forest resources under traditional care and protecting its integrity. Our premise was to encourage and empower native communities to take an active role and look forward to rising better practical uses of natural resources protecting the conservation of these forests through outreach, activism, and promoting reach federal subsidies.

We worked closely with three communities. The town Santa Maria Zoquitlan is the first having the strongest link where thanks to the proactivity of the population and head leaders extended us multiple invitations to hold meetings and attributed significantly to fieldwork throughout sampling time. In addition, volunteers taken us to large highly preserved areas in the vicinity of the community and in turn introduced other closer communities in the Oaxacan region. Most workshops were addressed to this community including children and adults.

Second involved community is La Reforma, a small farming town with very small population. Currently, in the vicinity over this area exist several ongoing activities driven by growing industrialisation which attempt to displace the native community and biodiversity. On this location, we, volunteers and team, generated knowledge about importance to preserved typical dry forest vegetation because is home to one endemic leafhoppers species which exclusively inhabits that area and feeds only on micro-endemic plants from that place. The region has been strongly attacked by constant disturbance from those unregulated actions. The activist group we worked with uses our project as clear evidence to promote urgent protection of such area and avoid further continuous damage to the habitat where this tiny critically threatened species lives with such strict climatic, orographic, and ecological conditions.

The third community El Chonco is located in central Guerrero state inside a cloud forest. In this remote place, we empower the community to continue protecting native lands they owned historically and taught them how to continue monitoring leafhoppers to promote more evidence of such risk and eventually send data to the federal authorities. This area has been presenting some irregulated activities like deforestation which has been increasing last years and local people are facing a reduction of natural resources drastically. We led, taught, and showed them their right to land, and encourage them to keep in contact to provide more evidence of how important these forests are to preserve unique species that only inhabit such areas. Some of the most endangered species found in this project were located within these forests, as unique habitats having them in the country.

### **5. Are there any plans to continue this work?**

Absolutely, the project is far to be complete and needs more eventual improvement, especially at individual species level, social assistance and educational teach.

Several if not all the communities have encouraged us to continue in communication and develop ideas promoting growth of the community knowledge by correct use of forest and insect resources, rapprochement with authorities, and teaching conservation at the different levels of education. Nowadays we have received invitations from other communities in the region studied to approach them and bring our project.

In addition, the project has had a significant rise in interest from various audiences ranging from local to international. Thanks to the scientific diffusion and the constant citizen science that I have been promoting lately, our efforts are becoming more and more noticeable regionally, locally, nationally, and internationally. We have been in touch with other local and international research conservationist groups who have approached us to collaborate in various lateral aspects of the project and provide knowledge, resources, and personnel to give greater impact and extension of results.

### **6. How do you plan to share the results of your work with others?**

Dissemination steps we opted were open publication of a series of scientific articles and social work: (1) demonstrating leafhopper biodiversity loss in the Mexican dry tropical forest over 75 years due to the constant increasing anthropogenic activities, (2) to document biogeographical hotspots areas in those forests, (3) exemplify how new species to science are unfortunately strongly threatened in such environment despite being recently discovered, (4) bring workshops to native communities, (5) generate conservation educational materials and (6) participate in international forums.

Although each of the dissemination objectives above has been satisfactorily achieved, my effort does not end here, but a series of subsequent disseminate notes and events will take place as listed below:

- a) Formal inclusion of species we evaluated to the Red List. Tons of information deserve be useful to justify and protect species we have found after 70 years of their unknown whereabouts. I will work closely with other arthropods experts eventually to assess these and disseminate their protection.
- b) Two additional scientific papers pointing out endangered status of species in Oaxacan and Guerreran forests are under process, both show how modern activities constantly push leafhoppers populations to move from their typical habitat and how these species cling to persist in the habitat due to strict specificity.
- c) Educational materials in native languages spoken by communities. During workshops conducted we distributed educational materials in Spanish, which is useful for population, but our studied region has on average five different languages spoken. I'm currently collaborating with bilingual natives to translate such educational materials to the mother tongue and be even more useful to communities.
- d) Presentation in the next International Congress of Leafhoppers. Giving a speech at this event will attract more attention to us and purpose of such action is to disseminate broadly our results and listen to feedback from expert people and conservation researchers about how to increase and improve conservation management in areas with high social and cultural native communities.
- e) Contribution to a chapter book on endangered ecosystems. I was invited to participate in this edition to share the biodiversity losses of insects strictly related to their forest habitats.
- f) Host two undergraduate students next July 2022 from southern Mexico very interested to participate with us and developing their dissertations using information from our project, I will take them to some areas in Michoacan and Jalisco, teach them how to run collecting methods and photographic procedures while fieldwork.
- g) Host and teach 1 month to a large activist group of Guadalajara city about keeping social contact with indigenous communities to attend to their demands of conservation traits.

## **7. Looking ahead, what do you feel are the important next steps?**

The next steps are to establish temporary monitor units and, if possible, a permanent one in the areas where we manage to identify as high priority to mitigate the protection of the area. Another important action is to maintain communication with the communities, many of which do not have communication services, which is why we must return periodically to continue collaborating and generating more convincing data about the region and the risk of threat that exists due to human activities without regulation.

Finish gathering all necessary criteria for all species known in the region to formalise their assessment to the Red List Species under the right categories of conservational status.

One of the main ideas for the future is to establish a non-profit organisation to generate a communication and participation link to disseminate comprehensive protocols between the organisation and the communities to encourage support for monitoring these forests and social support to guide them in environmental education.

**8. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?**

Yes, evidently all materials in virtual or physical meetings were inundated with the Rufford logo. Also, at all workshops and all trip team members wear a Rufford logo and gave didactic materials showing Rufford's involvement. Many people reached out asking about such an organisation and we kindly provided and invited them to review the website. Some others asked about our participation with the foundation, and we enrich minds by showing our proposed project on behalf of The Rufford Foundation. Lastly, we were reached by several people and requested feedback prior to their submitting their ideas to this and other foundations.

**9. Provide a full list of all the members of your team and their role in the project.**

**Adilson Pinedo, (University of Guadalajara).** Head of project, work planner, identification of specimens and analysis of data

**Diego Yassir Pinedo Escatel (University of Guadalajara).** Did interview to local people, established schedule programs with head leader of every community, most places he talked in native language (Aztec) to express our results, lead workshops when primary tongue is not Spanish.

**Juvenal Aragon (University of Guadalajara).** Design and evaluate risk categories using criteria of Red List Species

**Mildred Torres (University of Enrique Diaz de Leon).** Assistance in databasing, processing samples, archive information every trip, organize shipments, continues communication with communities, logistic of workshops.

**Bruno Rodriguez,** helped driving to all places target in Sierra Madre del Sur, took samples of plant and insects.

**Gustavo Moya Raygoza (University of Guadalajara).** Ran statistical analysis and evaluate ecological conditions.

**10. Any other comments?**

Two small donations were facilitated to us during the pandemic due to our team member Mildred Torres disseminating to local people at Guadalajara city our project objectives in a small forum, using this support we offered basic supplies to communities without basic health services during our visits (mask, hand sanitiser, etc.).