

Project Update: September 2022

ACTIVITIES DEVELOPMENT

- From August to October 2021, we published the first scientific paper entitled "*Climate warming affects spatio-temporal biodiversity patterns of a highly vulnerable Neotropical avifauna*", to promote the results, including the identification of priority units of conservation for biodiversity (including taxonomic, phylogenetic and functional information levels). This is critical because results of this research suggest a potential scenario of biotic homogenisation process across the dry forest at Zulia state by the future climate change. This manuscript was published in Climatic Change Journal and is available to interested readers in: <https://link.springer.com/article/10.1007/s10584-021-03091-3>.

- From August 2021 to January 2022, we updated the species list and the database of presence records for these species across the study area. It is important to note that this historical database has been compiled from different sources: a) national ornithological collections of Venezuela (including the Ornithological Collection Phelps, Museo de Historia Natural Fundación La Salle, Estación Biológica Rancho Grande, and Museo de Biología de la Universidad del Zulia), b) information databases online (including the GBIF, ORNIS, and e-Birds), and c) fieldwork during the current and previous research projects. This database is using to reconstruct the potential distributional patterns of species in the region (based on species distribution modelling). But also, with this information, we reviewed the already established conservation areas for birds, detecting coverage and gaps that allowed us to identify high species richness areas requiring immediate conservation actions in the context of anthropic pressures (i.e., areas with >50% cover loss and high human influence).

- From August 2021 to January 2022, we also downloaded and updated the information about the phylogeny (obtained directly from A GLOBAL PHYLOGENY OF BIRDS' website [<https://birdtree.org/>]), and functional attributes (i.e., IUCN's categories, distributional ranges, habitat specificity, weight, size, trophic level; see Stotz et al. 1996) for each species. This information was complemented with the bird sounds characteristics (from Xeno-canto' website). All this information has been used to perform the computational analyses about the potential impacts of global changes into spatio-temporal biodiversity patterns (taxonomic, phylogenetic and functional) of avifauna.

- From October 2021 to August 2022, we developed the reconstructions of distributional patterns of species in the current and future scenarios (years 2050 and 2070). We are obtaining these species potential distribution models (for current and future scenarios) based on the ecological niche approach. This information allows us to provide evidence of potential impacts by climatic fluctuation in the geographic patterns of species richness and to compute how many current protected areas matched with zones of great biodiversity (including taxonomic, phylogenetic and functional levels).

- In November 2021, we performed the international symposium "*El estudio y conservación del Bosque Seco Tropical en Latinoamérica*" (In English: "*Study and conservation of Tropical Dry Forests in Latin America*"), where the historical results obtained from our Rufford projects were shared. These talks showed the need to

address the problems about the biodiversity loss and conservation goals, mainly considering the increasing evidence that the distribution and survival of species, and the ecosystems they inhabit, are affected by climate change. This activity is available in the link: <https://fb.watch/fL04BjQh49/>.

- From February to March 2022, we developed (in México) the training courses of undergraduates and postgraduate students, titled "*Estudios en Sistemática y Biogeografía de la Biodiversidad: Una guía para análisis integrativo*" (In English: "*Studies in Systematics and Biogeography: A guide for integrative analysis of Biodiversity*"). This course was carried out in both online and in-person ways in order to guarantee the participation for a greater number of students and interested parties. In this course, the students were trained in the uses of GPS, the development of spatial analysis of maps as well as the need of integrate the social, ecological/evolutionary and biological components in the development of future conservation projects. All these components are important to address problems relating to the local and national distribution of species, ecosystems and biodiversity. Moreover, it is important to highlight that this training course provided the tools and skills necessary for those six students (three undergraduates and three postgraduates) to finish their thesis projects in the respective university and, subsequently, joined to my laboratory. These students are:

1) Andrés José Pineda Carrillo (Venezuela): He is student from Universidad del Zulia (LUZ) (In English: Zulia's University), and in fact finished his thesis entitled "Distribución espacial y estado poblacional del caimán de la costa (*Crocodylus acutus*) y el caimán de anteojos (*Caiman crocodylus*) en el embalse Pueblo Viejo, Estado Zulia, Venezuela".

2) Jennifer Vargas Neri (Mexico): She already graduated from Iztacala (UNAM). Right now, she is working in the first draft of her research manuscript intitled "Estimating the extinction risk for an endemic and understudied hummingbird (Trochilidae: *Lophornis brachylophus*) in the face of global changes". This work will be submitted to Journal of Ornithology before the end of the 2022.

3) Andrea Michelle Gama-Rodríguez (Mexico): She is student from Instituto Nacional Politécnico (INP), and in fact finished her thesis, but is waiting for the graduation process. Michell is working in the draft of her first research paper, entitled "Breeding sites, a key element for the conservation of Golden Eagle (*Aquila chrysaetos Linnaeus, 1758*) in Mexico under global changes scenarios". This work will be also submitted to Journal of Ornithology (first option).

4) Daniela Remolina Figueroa (Mexico): She already graduated from the postgraduate program (master) at UNAM. As result from her master's thesis, we produced a very interesting research paper, entitled "Together forever? Hummingbird-plant relationships in the face of climate warming". This work was submitted to Climatic Change Journal and is under review process (in second round).

5) María Lourdes Núñez Landa (Mexico): She already graduated from Postgraduate program at Universidad Michoacana de San Nicolás de Hidalgo (UMSNH). From her master thesis, we produced a research paper entitled "Predicting co-distribution patterns of parrots and woody plants under global changes: The case of the Lilac-crowned Amazon and Neotropical dry forests".

This work was submitted to Journal for Nature Conservation and is under review process (in first round).

6) Sonia Patricia Muñoz Pérez (Colombia): She is student from Postgraduate programme at Universidad de Nariño, and in fact finished her thesis, but is waiting for the graduation process. As result from this master' thesis, we submitted a research manuscript, entitled "*Avifauna endémica de los ecosistemas andinos colombianos: Perspectivas de conservación a largo plazo ante escenarios de cambio global*", to the Journal "Ornitología Neotropical". This work is also under review process.

- From April-May 2022, we performed, in collaboration with the local communities, rangers of national parks and students, the fieldwork activities across the Zulia state. Specifically, we focused in target areas (with limited biological information) to sample the bird communities and to improve the estimation of species richness patterns throughout the state. During these activities rangers of national parks were trained in the uses of GPS. Also, it is important to note that fieldwork also included the participation into the Global Big Day (May 14th, 2022), where several activities were performed together with the NGO "MANGLE" and academic personal from Zulia's University promoting the social participation in this international and important day for biodiversity.

- In June and July 2022, we sent a research/diffusion work entitled "*Bird conservation in the Neotropics: Gaps and challenges in the face of Anthropocene threats*", in which results obtained from this and previous Rufford projects were shown/discussed. This work corresponds to a chapter for the book "New Perspectives in Ornithology" that will be published in 2023. The work stays in review and evaluation process by the book's Editors.

- From June-July 2022, I participated as professor/instructor into the "*III Curso de Verano online: 'Ornitología en el Museo de Zoología'*" (In English: "III Online summer course: The ornithology in the Zoology Museum", organised by the Universidad Nacional Autónoma de México (UNAM; Science Faculty). This international/free workshop is performed to provide to the new generation of students a general picture about the (new) research topics and techniques into ornithology and how this information could be used to future conservation actions.

- From August-September 2022, we performed a second fieldwork campaign in target areas (with limited biological information) to sample the bird communities and to improve the estimation of species richness patterns throughout the state. At same time, we performed the educational talks "*Las aves del Zulia: bellas, importantes y amenazadas*" (In English: "*The Birds of Zulia state: Beautiful, important but threatened*"). These talks and activities have as main goal to promote a positive vision towards the birds as indicators of diversity and ecosystem integrity. This represents an important step to encourage a new perspective about their conservation. It is important to note that these activities were developed together with local NGOs (e.g., MANGLE, AvesZona, AKEHÉ, Fundación Jardín Botánico de Maracaibo), private empress (e.g., AgroBananas La Chinita), and the academic personnel from Zulia University. But also, several members of the Venezuelan Environmental Ministry, the National Parks Institute of Venezuela (Zulia Regional Office) and Regional Secretary of Tourism have participated (even with their children) in the activities.