Elucidating drivers of global reptile - tetrapod rarity, endemicity and threat

Uri Roll & Shai Meiri

What destines some species to ecological success, but deem others to failure and extinction risk?

To answer these questions and facilitate the development of informed conservation decisions we are looking for graduate students and postdocs to join our team in an Israeli Science Foundation sponsored project.

We focus on reptiles, and compare them to all terrestrial vertebrates. Using macroecological approaches and use state of the art comparative methods, machine learning techniques, and structural equation modelling we analyze datasets of unprecedented size and completeness to uncover the mechanistic underpinnings, biological, geographic and environmental drivers of rarity, endemism, and extinction risk. In doing so we aim to obtain a multi-faceted view of the ecological, biogeographic, physiological and anthropogenic drivers of variation in range size, abundance, and threat status for vertebrates in general, and reptiles in particular.

We use taxon specific data (including our own: see http://www.gardinitiative.org/) of species' geographic ranges, phylogenetic affinities, traits and known threat status. We aim to estimate the drivers of small range size, rarity (from its different aspects) and extinction risk using machine-learning tools. We explore the extent to which these attributes co-vary and interact with one another. This will allow better understanding of these key ecological concepts.

We will use machine learning tools and the abovementioned species attributes to model extinction risk for the thousands of vertebrate species that have no IUCN assessments, dated assessments, or are classified as data-deficient. Evaluating this model we will create a pipeline for rapid modelling of extinction risk for all the world's taxa (e.g., invertebrates, plants), and further assess the reliability of existing assessments. We aim to use unsupervised machine learning modelling approach together with present and future threats (e.g., human footprint, land use change, climate change, overlap with reserves etc.), with species biology and known population-size trends to produce automated, continuous categorizations of threat.

We are evaluating several advanced methods in depicting species distribution ranges, present and future, using extent of suitable habitats, point locality data and fine resolution spatial data – to depict reliable distributions, as these underlie all downstream spatially-based conservation assessments.

The project aims to push forward our knowledge and understanding of key ecological process, exploring these on scales never attempted both using cutting edge methods. Beyond contributing to theory, and a mechanistic understanding of nature, we will also produce results and tools that would be of paramount importance for the protection of biodiversity.

Our dynamic team includes MSc., PhD and postdoctoral researchers. Team members can choose to be based in the serene Sde Boker Campus of BGU at the heart of a wonderful desert biome, or in the dynamic (post Corona), vibrant and cosmopolitan center of Tel Aviv.