Biodiversity

This web system provides biodiversity maps of vascular plants (woody, herbaceous and fern species) and stony corals, which serve as foundational taxa of ecosystems, and of vertebrates (mammal, bird, reptile, amphibian, and freshwater and coastal fish species) functioning as community umbrellas. Using distribution datasets of all individual species occurring in Japan, which we have been compiling for a decade, we visualize assorted profiles of biodiversity at the resolution of 1 km x 1 km※.

※ A few map layers currently have lower resolutions

Native species

Organisms expand species-specific geographic ranges from areas where they firstly originated as new species. In regard to dispersals and consequent expansions of distribution range, species are under constraints of geography (ocean and mountain boundaries), biotic and abiotic conditions (ex. harsh climates), and a geographic distribution of a certain species is, therefore, a manifestation of evolutionary and ecological trajectories of the species. Such distribution range is not merely a static property of the species, but it shifts the area dynamically responding to environmental changes. Importantly, such dynamic changes of the range by expansion and contraction do not follow the nation and administrative boundaries. Hence, definitions of natives and exotics rely partly on qualitative and/or subjective criteria. J-BMP follows definitions of exotic species by "Invasive species of Japan (National Institute for Environmental Studies)," which includes those which had naturalized before the human history as well. In J-BMP, we regard species as native to Japan only if it occurs in Japan and is not listed in the database of invasive species as exotics from abroad.

Species in Red Data Book

Rare species have been paid special attentions in biodiversity conservations, and species vulnerable to human activities and environmental changes are of particular importance known as endangered species. Ministry of environment Japan issues the red-list of endangered species of various taxonomic groups based on extinction risk assessments. Conservation planning must take endangered species into account. J-BMP vizualizes the subset diversity for endangered species listed in the Red Data Book. Beside J-BMP, we also collated the size of species distribution range with red data books issued by prefecture governments and evaluated the validity of red-list criteria.

Evolutionary distinctiveness

Organisms originate from various phylogenetic clades. An extinction of a particular species could be considered analogous to losing the entire history of millions of years that the species has spent for its speciation and the evolution. For J-BMP, we calculated the distinctiveness (uniqueness) of species evolution for all the individual native species of vascular plants and vertebrates using phylogenetic information (Isaac et al. 2007). Then, we visualized geographic patterns of the evolutionary distinctiveness for each taxonomic group by taking assemblage mean of the distinctiveness at 1 km x 1 km resolution across Japan. The maps exhibit evolutionarily unique areas where highly distinctive species occur. While species richness maps are regarded as a product of evolutions, the maps of evolutionary distinctiveness are the manifestation of the evolutionary histories which are equivalent to the processes of proliferating species richness.

Sampling coverage

For J-BMP, we have been collecting distribution records from various data sources (such as a variety of articles, specimen data, and electronic data), and developed the database by compiling species names and observation geolocations. Abundance of observation data highly varies among geographic regions and taxonomic groups. Because of the nature of contrasting detectability among organisms in the field and also difference in popularities among them as study materials, sufficiency of observation records (ie, sampling coverage) shows a remarkable variance. Likewise, there is a contrast in observation abundances among different geographic regions due to varying accessibilities to the regions. Such differences in data availabilities among regions and taxa associate with contrasting accuracies in predicting species distributions. Therefore, in further data compilations we intensively spend efforts in filling region and taxon specific shortfalls. For those regions and taxa which certainly lack information, however, further field surveys and descriptive studies are urgent tasks for conservation biodiversity.

Toward this end, J-BMP provides maps of sampling coverage (completeness of observations) based on the biodiversity estimation method that delineate where and which biodiversity information suffers severe shortfalls.

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