SHI Species Habitat Indices

The Species Habitat Indices (SHIs) quantify changes in the suitable habitats of single species to provide aggregate estimates of potential population losses and extinction risk increases in a region or worldwide.

Purpose of the indices

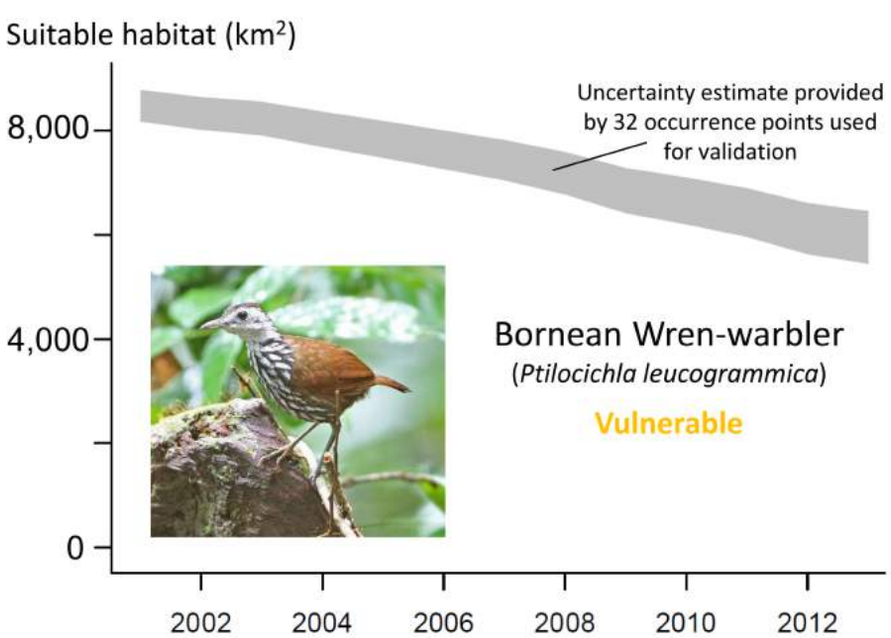
To provide annually updated biodiversity change metrics that transparently build on single species data and that can be reported regionally and globally. The indices address trends in the sizes of species potential distributions and populations for habitat –dependent and threatened species.
The Species Habitat Indices use remote sensing data, local observations, and models in a web-based informatics infrastructure. They are designed to measure and report on progress in relation to CBD Aichi Targets 5 and 12.

CBD Aichi Target 5
Habitat loss halved or reduced

CBD Aichi Target 12
Reducing risk of extinction

Coverage

The indices use environmental and species data addressing all terrestrial areas of the world at 1 km spatial resolution. They can be aggregated at spatial levels ranging from 1 km to small regions, countries, biomes, and the whole planet. The indices build on land cover information available annually from Landsat and MODIS satellites since 2001 onwards. With continuation of these remote sensing products, this enables annual update of indices, including reporting Aichi Target 5 and 12 achievements, for ten data points from 2011 to 2020.



Example of a species-level trend informing the SHIs. Remotely sensed land-cover change indicates significant decrease in forest habitat suitable for the Bornean Wren-warbler in its range in Southeast Asia. The indices are derived from these single-species estimates and aggregated for all species occurring in a reporting region or country.

Methods

Indicators addressing Aichi Targets 5 and 12 are typically constrained in their adequate geographic representation, the level of disaggregation they allow, their temporal resolution, and their scientific underpinning and transparency. The Species Habitat Indices are part of a new generation of indicators that address these limitations by utilizing ongoing, spatially and temporally highly resolved remote sensing at near global-extent, together with biodiversity observations, and adequate and transparent modeling frameworks.

The indices build on detailed, remote-sensing informed maps of suitable habitat for single species. Maps are modeled using literature- and expert-based data on habitat restrictions and published land-cover products from MODIS and Landsat satellites available annually at 30 m and 1 km resolution. These detailed maps of habitat suitable for a species are validated with field data on species locations from surveys and citizen science.

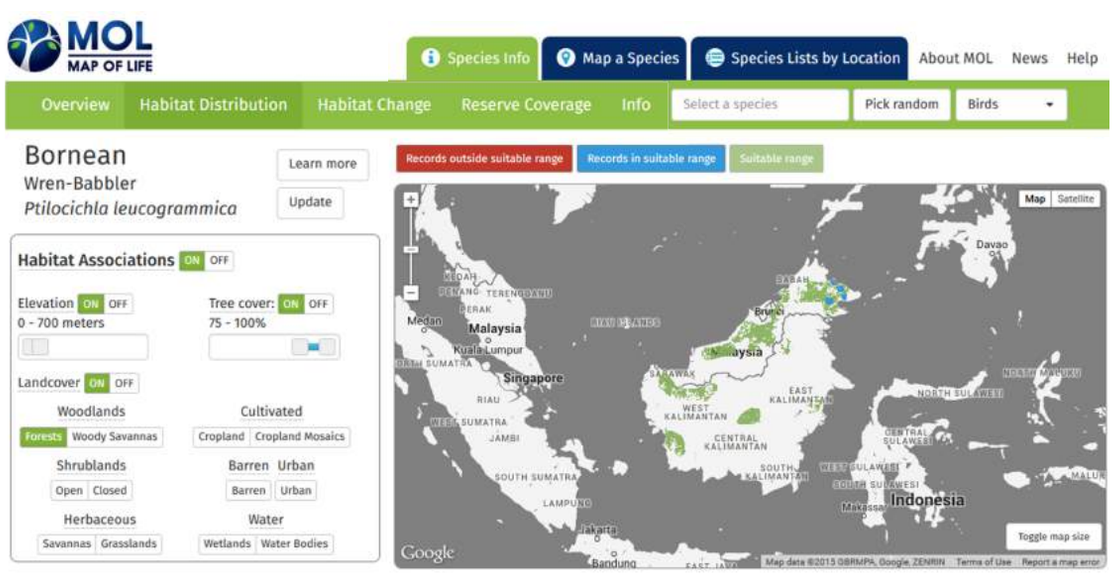
Modifications in the area and fragmentation of individual species' remaining habitat are quantified annually and changes in extinction risk are estimated. The species-level metrics are then aggregated and reported over user-defined regions, such as countries. Separate indices can be calculated for species dependent on certain habitats types (e.g. natural forests), and for threatened species. The indices can also be subset to species with particularly rapid recent habitat changes, and they can account for countries' stewardship of species (their portion of a species' global range).

All underlying data and metrics are available through a dedicated dashboard in the Map of Life web interface that has been developed with Google Earth Engine as technology partner. Currently, the Species Habitat Indices are based on > 20,000 species of terrestrial vertebrate and invertebrate, and plant species, and validated with > 300 million location records, a growing number.

Essential Biodiversity Variables:

Species populations class
Species distribution

Ecosystem structure class
Ecosystem extent and fragmentation



Modeled prediction of 1 km pixels with habitat suitable for the Bornean Wren-warbler. Where data exists (blue circles), the accuracy of this estimate is validated with recent observations. The loss (or gain) of suitable pixels is then assessed over time. This information is accessible and updated for all species through this online dashboard developed in partnership with Google.