EDINA

Biomes

USER GUIDE

Biomes User Guide

Introduction

Biomes are a way of delineating large-scale ecological variations. They are characterised by broad vegetation groups, which in turn are dependent on the temperature and precipitation of the particular region[1]. It is common to see various areas share a common biome, but the difference in ecozone climate results in differing vegetational composition. Biomisation techniques carry unique interpretations and are not merely limited to vegetation zoning. For instance, Walter (1974) has taken bioclimatic classification and in turn further subdivided the zones based upon pedagogy[2]. Other work by Whittaker (1976) has classified biomes based on climatic and intertidal levels[3]. EDINA's biome products are based on the Olsen et al. (2001) bioclimatic classification scheme which was developed for the WWF Global 200 project[4]. The project aims to identify and classify terrestrial, marine, and freshwater units into biogeographical realms, biomes and ecoregions (areas hosting distinct biodiversity)[5]. In doing so, it allows organisations and academics to understand and assess conservation priorities. There are 30 biomes in total, of which 14 belong to the terrestrial realm. Only terrestrial biomes are used for our products due to the availability of data[5].

This user guide will take you through an overview of the data, the methods behind the creation of the geographical outputs, and their various potential uses.

Data

The biomes layer is sourced from the Project 200 website[4] as a shapefile. The native data is presented in vector format and projected in Geographic Coordinate System WGS 84. The integrated dataset was built such that it provided a comprehensive and large-scale overview of biogeographic variation, as made clear from the 12 attribute fields in the original file[6]. For mapping purposes, the following fields (indicated in brackets) were extracted and used:

>Biogeographic realm ('REALM')
>Biome number ('BIOME')
>Ecoregion name ('ECO_NAME')
>Global Status of Biomes over a 30-year period ('G200_STAT')
>Area ('area_km2).

Classifications of the biogeographic realms, biome numbers and global statuses are displayed in Table 1.

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[1] https://www.nature.com/scitable/knowledge/library/terrestrial-biomes-13236757/
[2] https://link.springer.com/article/10.1007/BF02111901
[3] https://www.cabdirect.org/cabdirect/abstract/19740615709

Biogeographic Realm	Realm classification
AA	Australasia
AN	Antarctic
AT	Afrotropics
IM	IndoMalay
NA	Nearctic
NT	Neotropics
OC	Oceania
PA	Palearctic

Biome number	Biome classification
1	Tropical & Subtropical Moist Broadleaf Forests
2	Tropical & Subtropical Dry Broadleaf Forests
3	Tropical & Subtropical Coniferous Forests
4	Temperate Broadleaf & Mixed Forests
5	Temperate Conifer Forests
6	Boreal Forests/Taiga
7	Tropical & Subtropical Grasslands, Savannas & Shrublands
8	Temperate Grasslands, Savannas & Shrublands
9	Flooded Grasslands & Savannas
10	Montane Grasslands & Savannas
11	Tundra
14	Mangroves
98	Lake
99	Rock & Ice

Global Status	Conservation status
1	Critical or Endangered
2	Vulnerable
3	Relatively Stable or Intact

Table 1 Classifications of the biogeographic realms, biome numbers and global statuses as adopted by WWF Project 200.

After an initial assessment of the geographical scope of the above-mentioned layer, the data were used to produce two sets of layers:
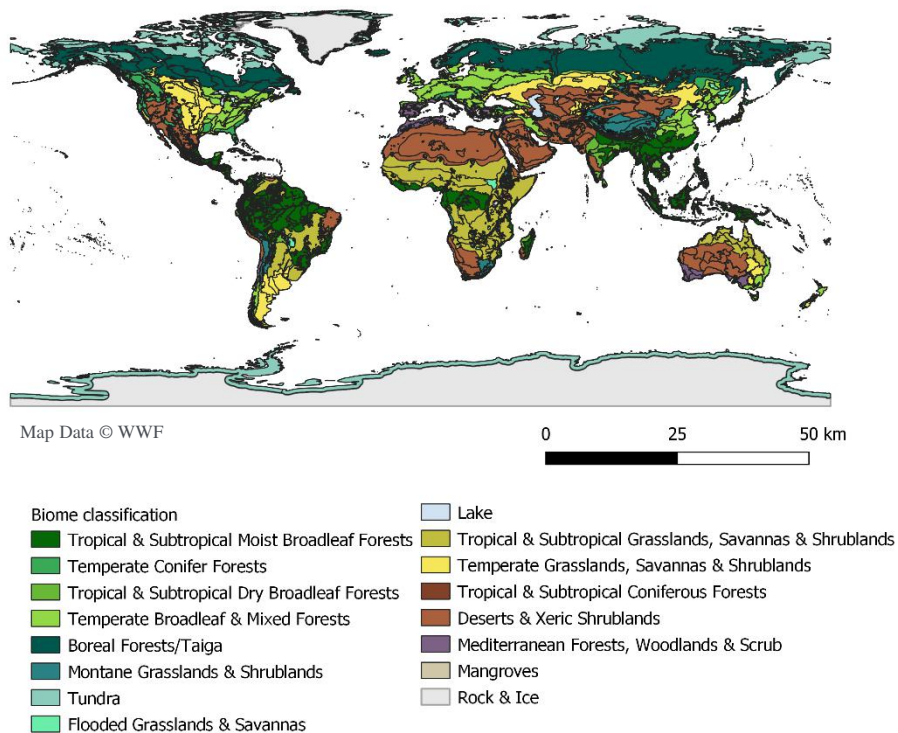
> A coarse terrestrial biome layer
> A fine-detailed terrestrial biome layer

The first of these layers shows a simple aggregated display of the 14 biome classifications, whilst the second shows details of each biome, its ecoregion name and conservation status projection.
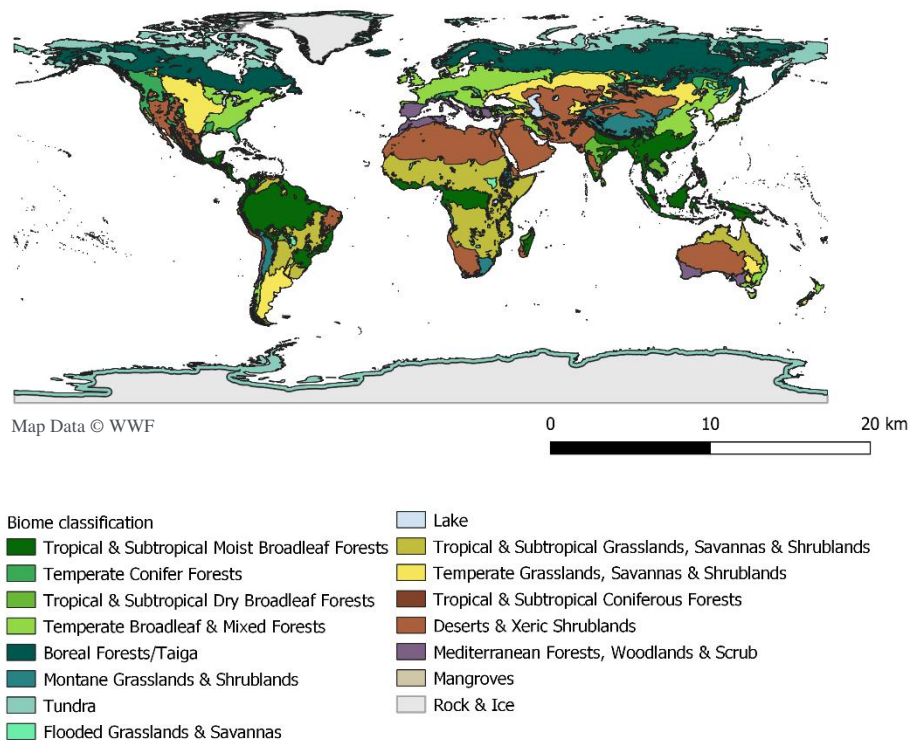
Creation

The layer was loaded into QGIS and styled by applying a categorised symbology to each biome number [Fig. 1]. Appropriate colours were chosen for each biome classification. For the coarser biome product, ecoregion boundaries were dissolved to show an aggregated display [Fig. 2]. In some cases, invalid geometries in the original shapefile were required to be fixed prior to boundary dissolve; this step took place using PostGIS by applying buffer geometry support.

Map Data © WWF

Biome classification

- Tropical & Subtropical Moist Broadleaf Forests
- Temperate Conifer Forests
- Tropical & Subtropical Dry Broadleaf Forests
- Temperate Broadleaf & Mixed Forests
- Boreal Forests/Taiga
- Montane Grasslands & Shrublands
- Tundra
- Flooded Grasslands & Savannas
- Lake
- Tropical & Subtropical Grasslands, Savannas & Shrublands
- Temperate Grasslands, Savannas & Shrublands
- Tropical & Subtropical Coniferous Forests
- Deserts & Xeric Shrublands
- Mediterranean Forests, Woodlands & Scrub
- Mangroves
- Rock & Ice

Figure 1
Global terrestrial biomes at the finer level. This product offers a more detailed view of the different ecoregions within the biomes.

Map Data © WWF

0   10   20 km

Biome classification
- ■ Tropical & Subtropical Moist Broadleaf Forests
- ■ Temperate Conifer Forests
- ■ Tropical & Subtropical Dry Broadleaf Forests
- ■ Temperate Broadleaf & Mixed Forests
- ■ Boreal Forests/Taiga
- ■ Montane Grasslands & Shrublands
- ■ Tundra
- ■ Flooded Grasslands & Savannas

- ■ Lake
- ■ Tropical & Subtropical Grasslands, Savannas & Shrublands
- ■ Temperate Grasslands, Savannas & Shrublands
- ■ Tropical & Subtropical Coniferous Forests
- ■ Deserts & Xeric Shrublands
- ■ Mediterranean Forests, Woodlands & Scrub
- ■ Mangroves
- ■ Rock & Ice

Figure 2
Global terrestrial biomes at the coarser level. This product is displayed in an aggregated view (no distinguishing of ecoregions).

Usage

The products are appropriate for a wide range of uses such as academic (biogeographical and macroecological) research, teaching and reuse for non-profit activities. The global view enables large-scale biogeographic variation and cross-biome comparisons to be made. It should be noted that regions which share a common biome may show contrasting vegetational compositions due to varying climate. For instance, the individual vegetation species inhabiting 'Tropical and Subtropical Moist Broadleaf Forests' in Brazil and China are dissimilar. For more in-depth analyses, we advise using the finer detail product which includes data on the various ecoregions and predicted future conservation status (over a 30-year period). These products can be linked to wider education on issues around conservation, wildlife, and climate[7].

Where these products are used especially for teaching, one should be mindful that we present only one biogeographic interpretation, and that students should be aware of the existence of other possible classifications.

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[7] https://www.worldwildlife.org/biomes

Conclusion

This guide provides an explanatory overview of EDINA's biome products, the map creation process, and its potential uses. The scope of the dataset allowed for a detailed global terrestrial biome layer to be produced, and a further coarser biome product. The nature of the former layer allows for a more detailed visualisation, whilst the latter is presented as an aggregated product. Cross-biome comparisons and biogeographic variation are enabled in the products for analyses.

Licences

All data were sourced under the Creative Commons Attribution 4.0 International Public License. Changes were made as noted above to derive the EDINA products.

References

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[7] WWF, n.d. *Ecoregions*. Retrieved from: https://www.worldwildlife.org/biomes