

The North American Environmental Atlas: Mapping the shared environment of Canada, Mexico and the United States

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Abstract:

As an initiative of the Commission for Environmental Cooperation (CEC), the North American Environmental Atlas (the “Atlas”) is a tool that was created to facilitate the dissemination of harmonized data for researchers, practitioners and decision-makers working towards the protection of the shared environment of Canada, Mexico and the United States.

With an increase of environmental events impacting people across political boundaries, there is a critical need for geospatial datasets which do not end at the borders and transcend them seamlessly. The ever-growing list of 50+ datasets available in the Atlas can be used to assess environmental issues crossing borders (e.g., in the Great Lakes area) or used when there is a need for comparing different regions across the three countries. Such datasets include, for example: the North American Land Cover and Land Cover Change, the North American Lakes and Rivers, the North American Climate Zones, the North American Protected Areas, and the North American Terrestrial Ecoregions. The Atlas datasets have been used by academic researchers and governmental experts alike to better inform environmental actions such as: evaluating the coexistence of migratory species and energy projects, understanding wildfire evacuation patterns, and strengthening fisheries management and conservation activities.

One of the main challenges with the creation of trinational datasets is a proper harmonization of data making sense at the North American scale, while retaining national relevance. In the case of the North American Land Cover datasets, the harmonization of data is done through a collaborative initiative called the North American Land Change Monitoring System (NALCMS), where governmental researchers from mapping agencies of the three countries participate in the harmonization process. This results in the most accurate harmonized land cover datasets for the North American scale (see figure 1 next page). Another challenge is ensuring that the information remains up to date and relevant to users. Some large datasets like the North American Land Cover can take up to three years to be created while others, like the North American Protected Areas are based on national databases which are regularly updated. As such, existing datasets in the Atlas are constantly revisited and updated. For example, the North American Land Cover series of 2010, 2015, 2020 and their respective Land Cover Change (2010-2015, 2015-2020) have all been updated in 2024 based on the latest advances in land cover characterization methodologies.

An important aspect of the North American Environmental Atlas is to ensure the accessibility of geospatial data to a large audience. As such, datasets are available in three languages (English, Spanish, and French) and in different file formats, compatible with both commercial and open-source GIS software. A visualization “map viewer” component allows users to preview datasets before downloading them. The Atlas is a geospatial reference for the region, but it is a tool that consistently needs to adapt to the evolving geospatial reality of the 21st century and of rapidly changing users’ expectations. Current challenges in maintaining the Atlas very high accuracy at the North American level while providing data in a timely manner will dictate how the Atlas tool will need to innovate in 2025 and beyond.

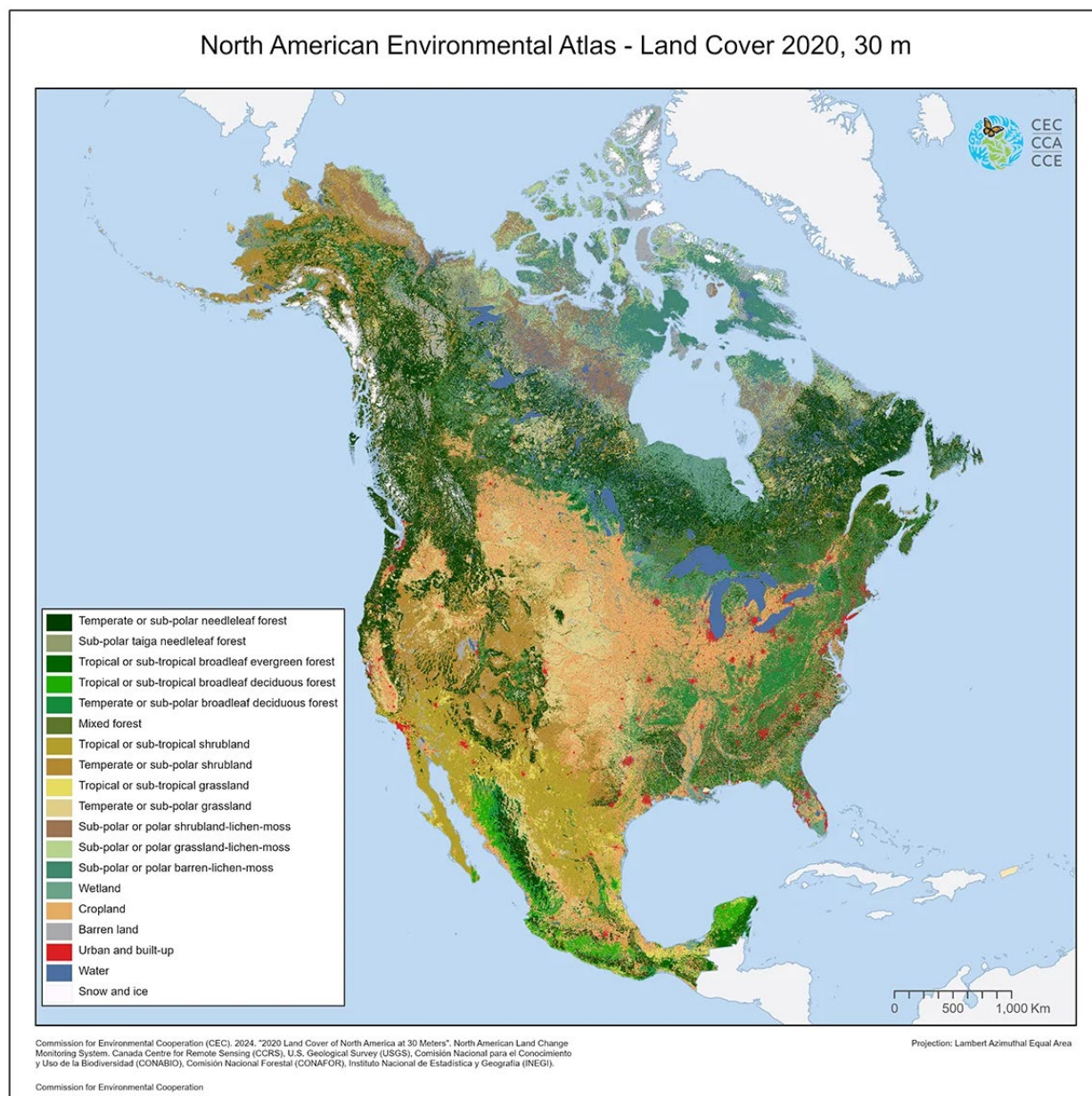


Figure 1. The 2020 North American Land Cover.

References

- Commission for Environmental Cooperation (CEC). North American Environmental Atlas. Available at <https://www.cec.org/north-american-environmental-atlas/>.
- Commission for Environmental Cooperation (CEC). 2021. "Climate Zones of North America". Beck, Hylke E.; E. Zimmermann, Niklaus; McVicar, Tim R.; Vergopolan, Noemi; Berg, Alexis; Wood, Eric F. (2018): Present and future Köppen-Geiger climate classification maps at 1-km resolution. Scientific Data 5:180214. Ed. 1.0, Vector digital data [1:10,000,000]. Available at <https://www.cec.org/north-american-environmental-atlas/climate-zones-of-north-america/>
- Commission for Environmental Cooperation (CEC). 2021. "Ecological Regions of North America, Level III". Ed. 2.0, Vector digital data [1:10,000,000]. Available at <https://www.cec.org/north-american-environmental-atlas/terrestrial-ecoregions-level-iii/>.
- Commission for Environmental Cooperation (CEC). 2023. "North American Atlas – Lakes and Rivers". Natural Resources Canada (NRCan), Instituto Nacional de Estadística y Geografía (INEGI), Comisión Nacional del Agua (CONAGUA), U.S. Geological Survey (USGS). Ed. 3.0, Vector digital data [1:1,000,000]. Available at <https://www.cec.org/north-american-environmental-atlas/lakes-and-rivers-2023/>

- Commission for Environmental Cooperation (CEC). 2024. "2020 Land Cover of North America at 30 meters". North American Land Change Monitoring System. Canada Centre for Remote Sensing (CCRS), U.S. Geological Survey (USGS), Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO), Comisión Nacional Forestal (CONAFOR), Instituto Nacional de Estadística y Geografía (INEGI). Ed. 2.0, Raster digital data [30-m]. Available at <https://www.cec.org/north-american-environmental-atlas/land-cover-30m-2020/>.
- Commission for Environmental Cooperation (CEC). 2025. "NALCMS. The North American Land Change Monitoring System — A trilateral collaboration of more than 21 million square kilometers". 50 pp. Available at <https://www.cec.org/publications/nalcms/>.
- Commission for Environmental Cooperation (CEC). 2025. "Protected Areas of North America, 2025". Environment and Climate Change Canada, U.S. Geological Survey (USGS) Gap Analysis Project (GAP), The UN Environment Programme World Conservation Monitoring Centre and the International Union for Conservation of Nature. Ed. 3.0, Vector digital data [1:10,000,000]. Available at <https://www.cec.org/north-american-environmental-atlas/north-american-protected-areas-2025/>.