Conservation Carbon Map

Data Dictionary
March 2022

Category	Type	Summarization	Data (Description, Date, Resolution)	Data Source
Carbon				
	Forest carbon storage, in metric tons (tonnes).	Total existing forest carbon stock within each state, county, watershed, and parcel.	National Forest Carbon Monitoring System (NFCMS), USA, 1990-2010, published 2021, 30 meters This national scale 30-m dataset provides estimates of forest carbon stocks in the form of aboveground woody biomass (AGB), total live biomass, total ecosystem carbon, aboveground coarse woody debris (CWD) and net ecosystem productivity (NEP), as a function of the number of years since the most recent disturbance (i.e., stand age) for forests of the conterminous USA at a 30-m resolution for the benchmark years 1990, 2000, and 2010. Estimates were derived from an inventory-constrained version of the Carnegie-Ames-Stanford Approach (CASA, Potter et al., 1993; Randerson et al., 1996) carbon cycle process model (Williams et al., 2012, 2014) that accounts for disturbance processes as a function of years since disturbance for each combination of forest type, site productivity, and pre-disturbance biomass (Gu et al., 2016; 2019). Also provided are the core CASA model data inputs including: the year of the most recent disturbance according to the North American Forest Dynamics (NAFD, Goward et al., 2015, Zhao et al., 2018) and the Monitoring Trends in Burn Severity (MTBS, Eidenshink et al., 2007) data products; the type of disturbance; biomass estimates from the year 2000 according to the National Biomass and Carbon Dataset (NBCD, Kellndorfer et al., 2013); forest-type group (Ruefenacht et al., 2008); a site productivity classification (Williams et al., 2014); and the number of years since stand-replacing disturbance, which is akin to forest stand age. TPL has projected this dataset to the year 2020, using the carbon sequestration rate data from Williams et. al.	Oak Ridge National Laboratory (ORNL) https://daac.ornl.gov/cgi-bin/dsviewer.pl?ds_id=1829
	Forest carbon sequestration rate, in metric tons (tonnes) per year.	Total forest carbon sequestration per year within each state, county, watershed, and parcel.	National Forest Carbon Monitoring System (NFCMS), USA, 1990-2010, published 2021, 30 meters This national scale 30-m dataset provides estimates of forest carbon fluxes in the form of aboveground woody biomass (AGB), total live biomass, total ecosystem carbon, aboveground coarse woody debris (CWD) and net ecosystem productivity (NEP), as a function of the number of years since the most recent disturbance (i.e., stand age) for forests of the conterminous USA at a 30-m resolution for the benchmark years 1990, 2000, and 2010. Estimates were derived from an inventory-constrained version of the Carnegie-Ames-Stanford Approach (CASA, Potter et al., 1993; Randerson et al., 1996) carbon cycle process model (Williams et al., 2012, 2014) that accounts for disturbance processes as a function of years since disturbance for each combination of forest type, site productivity, and pre-disturbance biomass (Gu et al., 2016; 2019). Also provided are the core CASA model data inputs including: the year of the most recent disturbance according to the North American Forest Dynamics (NAFD, Goward et al., 2015, Zhao et al., 2018) and the Monitoring Trends in Burn Severity (MTBS, Eidenshink et al., 2007) data products; the type of disturbance; biomass estimates from the year 2000 according to the National Biomass and Carbon Dataset (NBCD, Kellndorfer et al., 2013); forest-type group (Ruefenacht et al., 2008); a site productivity classification (Williams et al., 2014); and the number of years since stand-replacing disturbance, which is akin to forest stand age.	Oak Ridge National Laboratory (ORNL) https://daac.ornl.gov/cgi-bin/dsviewer.pl?ds_id=1829
Threats				
	Development Risk	Development risk index (0-low to 4-high) within each state, county, watershed, and parcel.	USA Development Risk, 2007, 1km Residential development impacts landscapes by altering hydrology, fragmenting wildlife habitat, and directly removing habitat. Residential development requires the building of roads, utilities, schools, and other associated infrastructure. Local governments use information about potential future development to plan for the future needs of their community. Conservation planners can use development risk to design conservation plans that minimize conflict and protect species.	Esri data source: https://www.arcgis.com/home/item.html?id=6d53dbb57c984e91a473a0c4b50c0714. BLM metadata: https://www.landscape.blm.gov/COP_2010_metadata/COP_Urban_Growth_2030.xml
	Insect and Disease Risk	Percent of area within each state, county, watershed, and parcel considered to be at high risk for mortality from insects and/or diseases.	USFS National Insect and Disease Risk Map, 2018, 240m "Since 2012, significant tree mortality events from fire, forest pest outbreaks, and broad scale forest harvesting operations have reduced or in some cases eliminated hazard. For the 2018 NIDRM update, we adjusted the composite 2012 NIDRM by subtracting major disturbance events, thus accounting for reductions in hazard due to previous and ongoing tree mortality. The update does not account for increases in hazard due to tree growth, which can make additional trees susceptible and vulnerable to new forest pest attacks. Also, the update does not account for new pests on the landscape such as the Flathead fir borer, a wood boring beetle that primarily attacks stressed or weakened Douglas-fir, true firs, and western larch in Region 6. The 2018 NIDRM update was generated by removing areas at risk if they experienced significant mortality according to data from the USDA Forest Service, Forest Health Protection Insect and Disease Survey database (https://www.fs.fed.us/foresthealth/applied-sciences/mapping-reporting/gis-spatial-analysis/detection-surveys.shtml); and the University of Maryland, Dr. Matt Hansen - Global Forest Change dataset (https://earthenginepartners.appspot.com/science-2013-global-forest/download_v1.6.html).	USFS https://www.fs.fed.us/foresthealth/applied-sciences/mapping-reporting/national-risk-maps.shtml
	Wildfire Hazard Potential	Wildfire hazard potential (1-low to 5-high) on lands within each state, county, watershed, and parcel.	Wildfire Hazard Potential, 2020, 270m This 2020 version of WHP was created as part of the Wildfire Risk to Communities project (https://wildfirerisk.org) and this dataset is a 270-meter (m) resolution companion to the WHP published in Scott et al. (2020). Vegetation and wildland fuels data from LANDFIRE 2014 (version 1.4.0) form the foundation for this version of the WHP. As such, the data presented here reflect landscape conditions as of the end of 2014. National wildfire hazard datasets of annual burn probability and fire intensity were generated from the LANDFIRE 2014 data by the USDA Forest Service, Rocky Mountain Research Station (Short et al. 2020) using the large fire simulation system (FSim). We also used LANDFIRE 2014 vegetation and fuels data directly in the WHP mapping process, as well as point locations of fire occurrence ca. 1992 - 2015 (Short 2017). With these datasets as inputs, we produced an index of WHP for all of the conterminous United States at 270-m resolution. We present the final WHP map in two forms: 1) continuous integer values, and 2) five WHP classes of very low, low, moderate, high, and very high. On its own, WHP is not an explicit map of wildfire threat or risk, but when paired with spatial data depicting highly valued resources and assets such as structures or powerlines, it can approximate relative wildfire risk to those specific resources and assets. WHP is also not a forecast or wildfire outlook for any particular season, as it does not include any information on current or forecasted weather or fuel moisture conditions. It is instead intended for long-term strategic fuels management.	USFS https://www.fs.usda.gov/rds/archive/Catalog/RDS-2015-0047-3
Co-Benefits				
	Rare Ecosystems	Average rare ecosystem value (0-not rare to 100-very rare) within each state, county, watershed, and parcel.	EPA Rare Ecosystems, 2013, 30m This EnviroAtlas dataset identifies rare ecosystems using base landcover data from the USGS GAP Analysis Program (Version 2, 2011) combined with landscape ecology principles. This raster dataset represents an index of rarity ranging from 0 (common) to 100 (rare). EnviroAtlas (https://www.epa.gov/enviroatlas) allows the user to interact with a web-based, easy-to-use, mapping application to view and analyze multiple ecosystem services for the contiguous United States.	EPA EnviroAtlas https://edg.epa.gov/metadata/catalog/search/resource/details.page?uuid=%7B53D0C152-12F3-4B1A-83A8-F0D7D98F3A8D%7D

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	Intact Habitat Cores	Percent of area within each state, county, watershed, and parcel with intact habitat cores.	Intact Habitat Cores, 2017 This layer represents modeled Intact Habitat Cores, or minimally disturbed natural areas at least 100 acres in size and greater than 200 meters wide. Esri created these data following a methodology outlined by the Green Infrastructure Center Inc. These data were generated using 2011 National Land Cover Data. Cores were derived from all “natural” land cover classes and excluded all “developed” and “agricultural” classes including crop, hay and pasture lands. The resulting cores were tested for size and width requirements (at least 100 acres in size and greater than 200 meters wide) and then converted into unique polygons. This process resulted in the generation of over 550,000 cores. Cores were then overlaid with a diverse assortment of physiographic, biologic and hydrographic layers to populate each core with attributes (53 in total) related to the landscape characteristics found within. These data were also compiled to compute a “core quality index”, or score related to the perceived ecological value of each core, to provide users with additional insight related to the importance of each core when compared to all others. See this map image layer for a version that includes popups and ability to query the data.	Esri https://www.arcgis.com/home/item.html?id=0d2f35395c3c43ecb7685df9be63dd84

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	Forests to Faucets	Relative importance of forests in this area to producing clean drinking water, summarized within each state, county, watershed, and parcel. Index scores range from 0-100, with higher numbers being more important for producing clean drinking water.	USFS Forests to Faucets, 2019, HUC12, rasterized to 30 meters The USDA Forest Service National Forests to Faucets 2.0 Assessment builds upon an earlier version of the project from 2011. The Assessment uses Geographic Information Systems (GIS) to determine the relative importance of small watersheds to surface drinking water. Imbedded in the data is the vital role forests play in protecting source water: the extent to which these forests are threatened by development, insects and disease, and wildland fire. The 2.0 Assessment updates and improves base data layers and adds climate change as another threat considered in the threat assessment. This Assessment provides information that can identify watersheds of interest for protecting or restoring forests to benefit surface drinking water supply. The spatial dataset can be incorporated into broad-scale planning, such as the State Forest Action Plans, and can help identify areas for further local analysis. In addition, it can be incorporated into existing decision support tools that currently lack spatial data on important areas for surface drinking water.	USFS: https://www.fs.fed.us/ecosystemservices/FS_Efforts/forests2faucets.shtml
Ownership				
	Public	Public ownership from the USGS Protected Areas Database of the United States (PADUS) using the following criteria: Category includes Fee, Other, and Unknown; Owner Type does not include Tribal or DOD, and Access is not closed.	USGS Protected Areas Database (PADUS) v2.1, 2020 The USGS Protected Areas Database of the United States (PAD-US) is the nation's inventory of protected areas, including public open space and voluntarily provided, private protected areas, identified as an A-16 National Geospatial Data Asset in the Cadastral Theme (http://www.fgdc.gov/ngda-reports/NGDA_Datasets.html). PAD-US is an ongoing project with several published versions of a spatial database of areas dedicated to the preservation of biological diversity, and other natural, recreational or cultural uses, managed for these purposes through legal or other effective means. The geodatabase maps and describes public open space and other protected areas.	US Geological Survey https://www.usgs.gov/programs/gap-analysis-project/science/pad-us-data-overview
	Private	Private lands are defined as those areas not included in the USGS Protected Areas Database of the United States (PADUS).	USGS Protected Areas Database (PADUS) v2.1, 2020 The USGS Protected Areas Database of the United States (PAD-US) is the nation's inventory of protected areas, including public open space and voluntarily provided, private protected areas, identified as an A-16 National Geospatial Data Asset in the Cadastral Theme (http://www.fgdc.gov/ngda-reports/NGDA_Datasets.html). PAD-US is an ongoing project with several published versions of a spatial database of areas dedicated to the preservation of biological diversity, and other natural, recreational or cultural uses, managed for these purposes through legal or other effective means. The geodatabase maps and describes public open space and other protected areas.	US Geological Survey https://www.usgs.gov/programs/gap-analysis-project/science/pad-us-data-overview
Reporting				
	Human Modification	Human Modification Index summarized to states, counties, watersheds, and parcels. Values are on a 0-1 scale, with 0 = no human modification, and 1 = complete human modification.	Human Modification for North America transboundary study area, 2013, 270 meters Human modification dataset for the transboundary study area (HM-T) of Canada, Mexico, and US. Much of the approach and technical details are described in: Theobald, DM. 2013. A general model to quantify ecological integrity for landscape assessments and US application. Landscape Ecology DOI 10.1007/s10980-013-9941-6. There are three important elements that define the HM approach: (a) the human modification stressors and their data sources (b) the measurement unit used for each stressor, and (c) the method used to combine the effects of multiple stressors into an overall score of human modification. Combining layers of stressors: The HMT model is designed to provide a comprehensive, but parsimonious approach, that uses several stressor/threats datasets to estimate level of human modification. The way in which these various data layers are combined into a single index is quite important. Because we have not tested in a rigorous way for collinearity between stressors, we use a method that minimizes bias associated with non-independence among several stressor/threats layers (Theobald 2013). The HMT model assumes the contribution of a given threat decreases as values from other threats overlap. Locations with multiple threats will have a higher human modification value that locations with just a single threat (assuming the same value), but the cumulative human modification score converges to 1.0 as multiple human impact data layers are added. Individual factors were combined across multiple data layers using an increasive function (Theobald 2013).	DataBasin https://databasin.org/datasets/110a8b7e238444e2ad95b7c17e889b66/
	Vegetation Disturbance	Private lands are defined as those areas not included in the USGS Protected Areas Database of the United States (PADUS).	USFS Landfire, 2016, 30 meters LANDFIRE's (LF) 2016 Remap (Remap) Annual Disturbance (Dist) product provides temporal and spatial information related to landscape change. Dist depicts areas that have experienced a disturbance within a given year of 4.5 hectares (11 acres) or larger, along with cause and severity. Information sources include national fire mapping programs such as Monitoring Trends in Burn Severity (MTBS), Burned Area Reflectance Classification (BARC), and Rapid Assessment of Vegetation Condition after Wildfire (RAVG), local user/agency contributed data (LF Events Geodatabase), and remotely sensed Landsat imagery. Composite Landsat image pairs from the current year, prior year, and following year are spectrally compared to determine where change occurred and its corresponding severity. Additionally, vegetation indices (Normalized Differenced Vegetation Index [NDVI] and Normalized Burn Ratio [NBR]) serve as inputs into the Multi-Index Integrated Change Algorithm (MIICA) (Jin et al. 2013); MIICA outputs and differenced products (e.g., dNDVI and dNBR) are used to locate change. Predictive modeling based on the previous 10 years of disturbance data provides an additional dataset useful for locating disturbance. Image analysts use the aforementioned datasets separately or in combination to isolate true change from false change (e.g., change caused by stark differences in phenology rather than a true disturbance event). The accuracy of the final product is often related to the quality of the Landsat image composite. Areas with persistent cloud cover are particularly challenging (e.g., the northeast US). Fire caused disturbances sourced from MTBS may contain data gaps where clouds, smoke, water or Landsat SLC-off stripes exist. Models trained from pre-fire and post-fire Landsat data are used to fill the gaps. The result is continuous severity and extent information for all MTBS fire disturbances. MTBS pixels derived from gap filling techniques, such as modeling, are noted as such in their corresponding attribute table. Smaller fires that do not meet the size criteria set forth by MTBS) may be attributed as a Burned Area Essential Climate Variable (BAECV), which are only produced for the lower 48 states. Causality and severity information assigned to a disturbance are prioritized by source, with the highest priorities reserved for fire mapping programs (MTBS, BARC and RAVG) followed by user-contributed events contained in the LF Events Geodatabase, and lastly, Landsat image based change.	USFS https://landfire.cr.usgs.gov/distmeta/servlet/gov.usgs.edc.MetaBuilder?TYPE=HTML&DATASET=FG5&YMAX=51.64968101623376&YMIN=22.765446426860603&XMIN=-127.98775263969655&XMAX=-65.25444546636928