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Geocology: County-Level Environmental Data for the United States, 1964-1981

Get Data

Documentation Revision Date: 2017-08-16

Data Set Version: 1

Summary

The Geocology database is a compilation of environmental data for the period 1941 to 1981. The Geocology database contains selected data on terrain and soils, water resources, forestry, vegetation, agriculture, land use, wildlife, air quality, climate, natural areas, and endangered species. Data on selected human population characteristics are also included to complement the environmental files. Data represent the conterminous United States at the county level. These historical data are provided as a source of 1970s baseline environmental conditions for the United States.

The integrated database of diverse environmental resource information from extant sources was developed by the Environmental Sciences Division at Oak Ridge National Laboratory (Olson et al. 1980). Some data sets described in Olson et al. 1980 are no longer available. County data sets have Federal Information Processing Standards (FIPS) numeric state and county codes that allow merging of the separate files. Some files, such as species dictionaries or point data, do not have FIPS identifiers. Data are stored in metric-SI units. For more detailed descriptions of the Geocology database contents, users may refer to the Geocology Technical Memorandum, provided here as *Geocology_TM.pdf*. It serves as both documentation and a user's guide to the Geocology database, giving general information on the data set contents, sources of data, and specific variable descriptions.

The Geocology database is comprised of 61 individual data files in tab-delimited text file format (*.txt), 46 of which are also provided as shapefiles (*.shp compressed in *.zip format). Shapefile data are also provided as companion files in KMZ format for visualization in Google Earth.

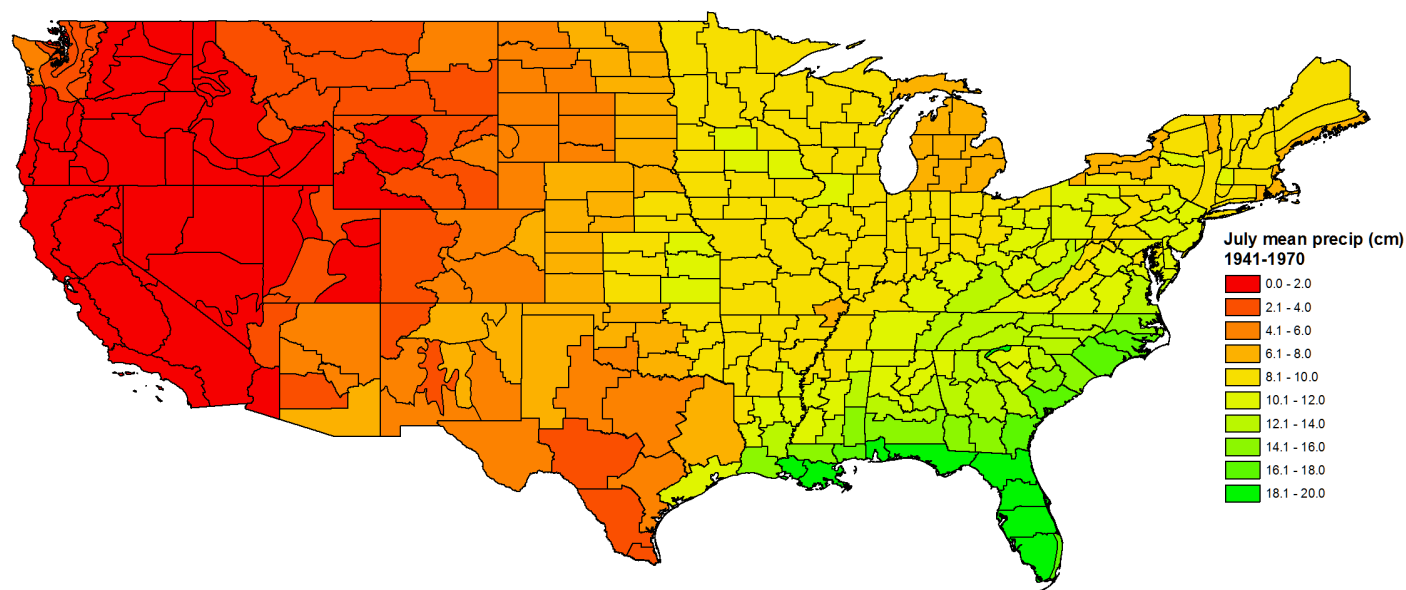


Figure 1. Data set C14: Monthly average precipitation by state climatic division 1941-1970

Citation

Olson, R.J., C.J. Emerson, and M.K. Nungesser. 2017. Geoecology: County-Level Environmental Data for the United States, 1964-1981. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAAC/656>

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1. Data Set Overview

The Geoecology database is a compilation of environmental data for conterminous US for the period 1941 to 1981. The Geoecology database contains selected data on terrain and soils, water resources, forestry, vegetation, agriculture, land use, wildlife, air quality, climate, natural areas, and endangered species. Data on selected human population characteristics are also included to complement the environmental files. Data represent the conterminous United States at the county level. These historical data are provided as a source of 1970s baseline environmental conditions for the United States.

Revision Note: This data set has been updated to also provide shapefiles and corresponding *.kmz files created from the original (*.txt) county-level data tables. Note that no changes have been made to the data values.

The integrated database of diverse environmental resource information from extant sources was developed by the Environmental Sciences Division at Oak Ridge National Laboratory (Olson et al. 1980). Some data sets described in Olson et al. 1980 are no longer available. County data sets have Federal Information Processing Standards (FIPS) numeric state and county codes that allow merging of the separate files. Some files, such as species dictionaries or point data, do not have FIPS identifiers. Data are stored in metric-SI units. For more detailed descriptions of the Geoecology database contents, users may refer to the Geoecology Technical Memorandum, provided here as *Geoecology_TM.pdf*. It serves as both documentation and a user's guide to the Geoecology database, giving general information on the data set contents, sources of data, and specific variable descriptions.

2. Data Characteristics

Spatial Coverage: United States

Spatial Resolution: County-level; state-level

Temporal Coverage: 1941-1981

Temporal Resolution: Single observation; monthly; annual

Study Area: (all latitudes and longitudes given in decimal degrees)

Site	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude
United States	-124.762578	-66.949894	49.384366	24.498135

Data File Information

There are 107 data files and 52 companion files included in this data set.

Of the 107 data files:

- 61 are tables in tab-delimited text (*.txt) file format (original files)
- 46 are shapefiles (*.shp files compressed into *.zip archives) created from the original data files

Of the 52 companion files:

- 46 are compressed Keyhole Markup Language (*.kmz) format files made from the corresponding shapefiles, for viewing in Google Earth.
- Five are additional tables containing coded variable definitions and other ancillary information in text file format (original files).
 - Specifically, *G01.txt*, provides a list of data set titles and characteristics in tabular format, and
 - *G02.txt*, provides a list of data table variables and definitions.
- The Geoecology Technical Memorandum, *Geoecology_TM.pdf*, provides general information about each of the data tables.

Please note that if a data table described in Olson et al. 1980 is listed in the documentation below, the data set is no longer available. Data sets with no *Geoecology_TM.pdf* page number in the tables below are not referenced in the technical memorandum and users should refer to companion files *G01.txt* and *G02.txt* for additional information.

Data processing notes regarding converting the *.txt data tables to shapefiles:

State and county-level data sets with multiple records per unique FIPS state and county code were merged to a single row in the corresponding shapefiles. For example:

D06.txt

FIPS_ST	FIPS_CO	VEG_CODE
06	001	029
06	001	040
06	001	042

D06.shp

FIPS_ST	FIPS_CO	VEG_CODE1	VEG_CODE2	VEG_CODE3
06	001	029	040	042

Spatial Reference Information

GCS_WGS_1984

WKID: 4326 Authority: EPSG

Angular Unit: Degree (0.0174532925199433)

Prime Meridian: Greenwich (0.0)

Datum: D_WGS_1984

Spheroid: WGS_1984

Semimajor Axis: 6378137.0

Semiminor Axis: 6356752.314245179

Inverse Flattening: 298.257223563

Data Tables

Files are categorized and named by sector as identified in companion files *Geoecology_TM.pdf* and *G01.txt*

- Sixteen of the original tables were not converted to shapefiles because they do not have a spatial component. These tables can be identified as those without a Geographic Unit in the sector tables below.
- Five files (*D11.txt*, *G01.txt*, *G02.txt*, *T07.txt*, and *T15.txt*) are now distributed as companion files because they are description tables.

Agriculture

Agricultural data sets included in the Geoecology database are listed in the table below. These data sets provide both crop and livestock data for counties based on state and federal inventories.

File	Contents	Year	Geographic Unit	Geoecology_TM.pdf page(s)
A01	Crop areas and yields, agriculture land use	1978	County	16
A04	Crop planted/harvested areas and yields	1975	County	20
A05	Index of Crop Reporting Districts	1975	County	21

Data set *A04.txt* and the corresponding shapefile (*A04.shp*) provide statistics for U.S. counties for major crops in 1975 obtained from the Economics, Statistics, and Cooperative Services (ESCS), USDA. Variables, variable descriptions, and units for *A04.txt* are detailed in Table 1. Crop details for each county were merged to a single row for inclusion in *A04.shp*: ..., CORN_YEAR, CORN_PLN, CORN_HRV, CORN_PRD, CORN_YLD, PEANUTS_YEAR, etc.

Table 1. Variables, variable descriptions, and units for *A04.txt*

Variable	Description	Units
FIPS_ST	FIPS state code	
FIPS_CO	FIPS county code	
CROP	Crop name	

YEAR	Year of ESCS estimate	
CROP_PLN	Planted area	ha
CROP_HRV	Harvested area	ha
CROP_PRD	Production	kg
CROP_YLD	Yield	kg/ha

Base Data

File	Contents	Year	Geographic Unit	Geoecology_TM.pdf page(s)
B01	County codes, names, and centroids	1970	County	23
B02	State names and indices (EPA, BBS, NOAA)	1970	State	24
B06	Air (ACQR) and Water (WRC-SA) Indices	1975	County	25
B08 *	General regional indices	1970-1975	County	27,28

* Note: B08 data is described under "003" in the **Climate** section of the Geoecology technical memorandum.

Climate

Climatic data sets included in the Geoecology database for county-subcounty units and State Climatic Divisions (SCDs) are listed in the table below. The SCD shapefile template to which the tabular data files were merged was obtained from NOAA's National Climatic Data Center website.

File	Contents	Year	Geographic Unit	Geoecology_TM.pdf page(s)
C07	Monthly average temperatures by county	1941-1970	County	29
C08	Monthly average precipitation by county	1941-1970	County	30
C09	Monthly potential evaporation by county	1941-1970	County	31
C10	Monthly moisture index by county	1941-1970	County	32, 33
C11	Monthly average temperatures by division	1941-1970	SCD	34
C12	Monthly maximum temperatures by division	1941-1970	SCD	35
C13	Monthly minimum temperatures by division	1941-1970	SCD	36
C14	Monthly average precipitation by division	1941-1970	SCD	37
C15	Monthly maximum precipitation by division	1941-1970	SCD	
C16	Monthly minimum precipitation by division	1941-1970	SCD	38
C17	Climatic division index	1970	County	39
C18	Growing season length, first/last frost	1978	County	40
C19	State climatic division names/weights	1975	SCD	41
C20	Rainfall pH and H-ion loadings	1974	County	42
C21	Inversion day probabilities		County	

Vegetation

The vegetation data sets provide national and county-level statistics of natural vegetation coverage for ecoregions (Bailey 1976, Bailey 1978). County-level data sets with multiple records per unique FIPS state and county code (D06, D08, D10, D13) were merged to a single row in the corresponding shapefiles.

File	Contents	Year	Geographic Unit	Geoecology_TM.pdf page(s)
D03	Potential and land use-adjusted vegetation national statistics	1966-1967		44, 45
D04	Potential and land use-adjusted vegetation by county	1966-	County	46, 47

		1967		
D05	Vegetation/land use change probabilities	1978		48
D06	Vegetation replacement by urban areas by county	1978	County	49
D07	Summary statistics (D08) for potential and land use-adjusted ecoregions	1976		50
D08	Potential and land use-adjusted areas for ecoregions by county	1976	County	51
D09	Potential and land use adjusted vegetation statistics for ecoregions	1978		52
D10	Potential and land use-adjusted vegetation statistics for ecoregions by county	1978	County	53
D13	Vegetation sensitivity to sulfur dioxide (SO ₂)	1979	County	54

The vegetation data includes one companion file (D11.txt) providing ecoregion code definitions.

Energy

The energy data set (E04) lists power generating facilities by county.

File	Contents	Year	Geographic Unit	Geoecology_TM.pdf page(s)
E04	Generating utility reference file	1981		

Forestry

The forestry data set (F08) provides forest area, volume, and growth statistics for hardwood and softwood forests at the county-level from data sets F01-07 (not included; see Geoecology technical memorandum).

File	Contents	Year	Geographic Unit	Geoecology_TM.pdf page(s)
F08	Forest area, volume, and growth	1965-1980	County	

Data set *F08.txt* and the corresponding shapefile (*F08.shp*) are not described in the Geoecology technical memorandum or companion files *G01.txt* and *G02.txt*. Variables, variable descriptions, and units are listed in Table 2.

Table 2. Variables, variable descriptions, and units for *F08.txt* and *F08.shp*

Variable	Description	Units
YEAR	CFI observation year	
FIPS_ST	FIPS state code	
FIPS_CO	FIPS county code	
FS_HWD_G	Hardwood growing stock volume	m ³ /ha
FS_HWD_V	Hardwood volume in commercial forest	m ³ /ha
FS_LND_A	Land area	ha
FS_SWD_G	Softwood growing stock volume	m ³ /ha
FS_SWD_V	Softwood volume in commercial forest	m ³ /ha
FS_TOT_A	Total forested area	ha
FS_TOT_G	Total growing stock volume	m ³ /ha
FS_TOT_V	Total volume in commercial forest	m ³ /ha

Air Quality

The air quality data set (K04) provides county-level air quality compliance with standards set forth by the Clean Air Act and other legislation.

File	Contents	Year	Geographic Unit	Geoecology_TM.pdf page(s)

K04	Air quality non-attainment areas (EPA)	1979	County	66
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Land

Land data sets provide county-level land use statistics from the 1967 Conservation Needs Inventory (USDA 1971).

File	Contents	Year	Geographic Unit	Geoecology_TM.pdf page(s)
L01	Land use statistics (CNI detailed)	1967	County	68,69
L02	Land capability classes (CNI)	1967	County	70,71
L05	Land surface mining	1975	County	72
L06	Land resource region index	1967	County	73
L07	Land use (CNI aggregated)	1967	County	74
L08	Land areas (rural, urban, roads, water, fed)	1979	County	75,76

Minerals

Minerals data sets provide county-level summaries of coal production and reserves.

File	Contents	Year	Geographic Unit	Geoecology_TM.pdf page(s)
M03	Coal reserves characteristics	1977	County	
M04	Coal production with projections	1975	County	

Natural Areas

Natural areas data sets list areas administered and protected to maintain natural ecological conditions including parks, wilderness areas, national forests and rangeland, wildlife refuges, ecological preserves, etc.

File	Contents	Year	Geographic Unit	Geoecology_TM.pdf page(s)
N01	Rare II tracts	1978	Points	78
N02	National Park Service areas	1979	County	79
N03	Wilderness areas	1978	County	80
N04	Rare II tracts by county	1978		
N05	Rare II tracts by ecoregion and vegetation	1978		
N06	Rare II tracts ORNL ranks	1979		
N07	Rare II tracts USFS data	1978		
N17	National forest areas	1980	County	
N18	National wildlife refuges	1980	County	

Population

Population data sets provide county-level population and housing statistics.

File	Contents	Year	Geographic Unit	Geoecology_TM.pdf page(s)
P01	Population by sex and 5-year age class	1970	County	81, 82
P03	Population and housing	1980	County	

Terrain

Terrain data sets provide soil characteristics such as moisture and organic matter content, temperature, and texture at the county level.

File	Contents	Year	Geographic Unit	Geoecology_TM.pdf page(s)
T03	Soils at map unit level	1967	County	84
T08	Great soil groups characteristics	1967		92

Feedback

T09	Great soil groups within map units	1967		93
T13	Soils at soil order level	1967	County	97
T14	Physical regions	1970	County	

Terrain data includes two companion files (*T07.txt* and *T15.txt*) providing soil map code and physical region code dictionaries.

Wildlife

Wildlife data sets list endangered species by county (W10) and for the U.S. (W09).

File	Contents	Year	Geographic Unit	Geoecology_TM.pdf page(s)
W09	Endangered species codes dictionary	1977		102
W10	Endangered species (BNL file)	1977	County	103

Companion File Information

Companion files are provided in tab-delimited text (*.txt) file format and contain coded variable definitions and other ancillary information. The information from these files have been merged with the data files where possible; e.g. ecoregion code definitions were added to data files D08, D09, and D10 based on the information in companion file D11.

File	Contents
Geoecology_TM.pdf	Geoecology Technical Memorandum - primary source of information regarding the Geoecology data set
D11.txt	Ecoregion codes dictionary (Geoecology_TM.pdf p.54)
G01.txt	Data set titles and characteristics
G02.txt	Data set variables and labels
T07.txt	Soil order, suborder, map unit dictionary (Geoecology_TM.pdf p.91)
T15.txt	Physical regions dictionary
<DATA_FILE>.kmz	One KMZ per data file in shapefile format for viewing in Google Earth

3. Application and Derivation

The Geoecology database data have been used for environmental assessment and planning for energy development requiring rapid access to data at appropriate spatial and temporal scales (Kitchings et al. 1976; Klopatek et al. 1979a, 1979b; Olson et al. 1982, 1983). These historical data are provided as a source of 1970s baseline environmental conditions for the United States.

4. Quality Assessment

Potential sources of error and other precautionary considerations are included in the comments section for each data set in the Geoecology technical memorandum.

5. Data Acquisition, Materials, and Methods

Agriculture

The agriculture data sets included in the Geoecology database are from state and federal inventories based on annual surveys conducted for each county. Data set A01 contains major crop areas, yields for selected crops, and major farmland-use statistics obtained from the 1969 Census of Agriculture (Breen 1972). Data set A04 contains statistics for land planted and harvested with associated crop yields and production from the Economics, Statistics, and Cooperative Service, USDA, for the years 1972-1977 (Barr 1979). Data set A05 contains Crop Reporting District codes for US counties (Barr 1979). Crop Reporting Districts are groupings of contiguous counties within states based on homogeneous agricultural practices.

Base Data

Data sets B01, B02, B06, and B08 provide the size and location of US counties and various index files for use with data from other Geoecology database categories. Data set B01 defines the 3701 county units used as the primary geographic units in the Geoecology database. Data set B02 provides various state codes and state-level regional indices from several agencies for regional aggregation of data sets from other Geoecology database categories. Data sets B06 and B08 contain indices for grouping counties by Air Quality Control Regions (Merrill 1977) and Water Resource Council sub-areas (Wilson 1978).

Note: B08 data is described under "003" in the **Climate** section of the Geoecology technical memorandum.

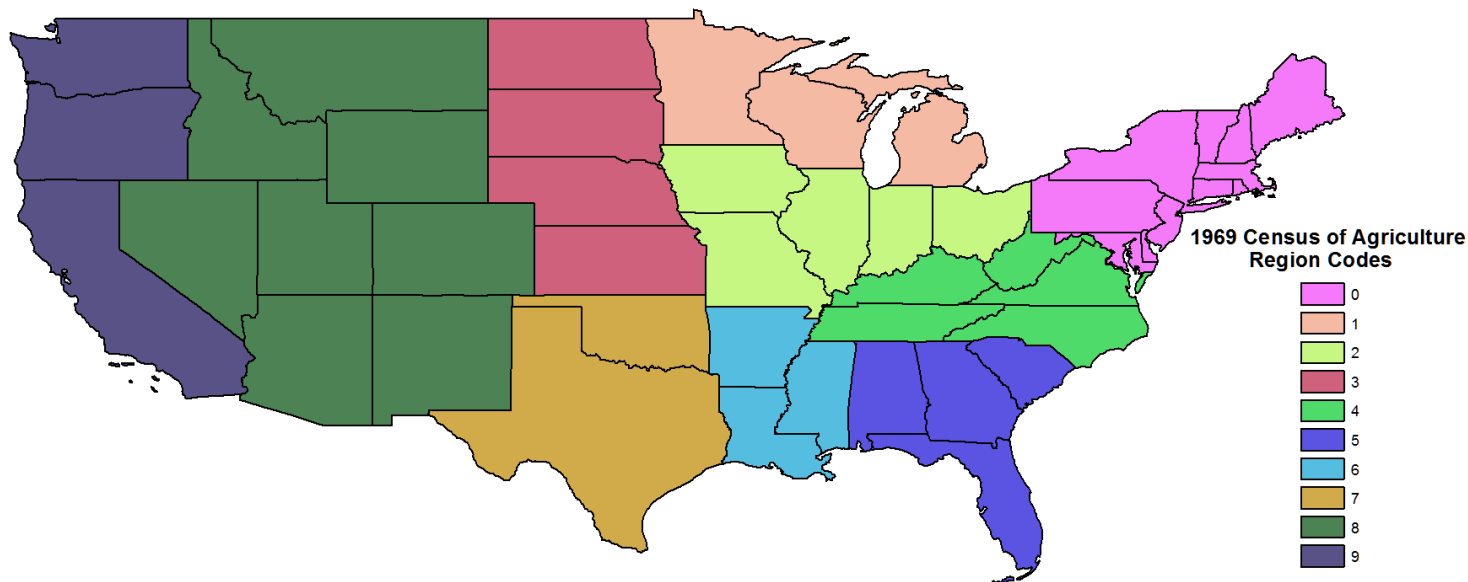


Figure 2. Data set B02: 1969 Census of Agriculture Region Codes (C_AG_RGN)

Climate

Climate data sets in the Geoecology database were calculated from weather station data for the 30-year period 1941-1970. The data include monthly temperature ranges and total rainfall as well as potential evapotranspiration, moisture index, growing season and frost data, rainfall pH, and several other indices at both the county level and within State Climatic Divisions (SCDs).

State Climatic Divisions (SCDs) are areas within states with similar climate. There are 353 SCDs in the United States defined by the National Weather Service. Most follow county boundaries, but some SCDs subdivide counties in mountainous areas. SCD names are listed in C19 and counties within each SCD are listed in C17.

Data sets C07-C10 were derived from the 1941-1970 monthly climatic norms for weather stations. Using the SYMAP program, station values were interpolated to determine county values for temperature and rainfall for counties without weather stations. No correction was made for elevation so caution is recommended when using data in mountainous areas. The resolution is adequate for regional studies. The county values were then used with the Thornthwaite (1948) equations to estimate potential evapotranspiration and moisture indices. C11-16 contain monthly average temperature and rainfall norms for SCDs. The average, minimum, and maximum values were calculated for the period 1941-1970 from a file obtained from the National Climatic Center.

Vegetation

Vegetation data sets in the Geoecology database are based on two interrelated maps of ecoregions and potential natural vegetation. Ecoregions represent a hierarchical landscape classification scheme based on climate, soils, and vegetation. There are 54 ecoregions at the section level in the conterminous United States. The vegetation aspect of the classification scheme is based on potential natural vegetation (Küchler 1964, USDI 1970). Data sets D03 and D04 provide national and county-level summary statistics for potential and land use-adjusted natural vegetation. Data set D05 provides probabilities of conversion from natural vegetation to cropland, pastureland, or inundation for each Küchler vegetation type (Klopatek 1979b). Data set D06 defines vegetation types within western counties that have been urbanized. The data were obtained by overlaying a map of urban areas with Küchler's vegetation map. Data sets D07 and D08 provide national and county-level summary statistics for potential and land use-adjusted ecoregion areas. Data sets D09 and D10 provide national and county-level natural vegetation statistics for each ecoregion. Data set D13 provides sensitivities of potential natural vegetation (Küchler 1964) to sulfur dioxide (SO₂), rated by Argonne National Laboratory (Ballou et al. 1979). Individual species' sensitivities were rated sensitive, intermediate, or resistant based on tolerances to SO₂ reported in literature. Vegetation communities were classified according to the most sensitive dominant species in the association.

Companion table D11 provides ecoregion codes and names at the province and section levels based on Bailey's 1976 ecoregion map. This table has been combined with other relevant vegetation data sets in the Geoecology database (D08, D09, D10).

Energy

The energy data set (E04) lists power generating facilities by county.

Forestry

The forestry data set (F08) was produced from data collected by the U.S. Forest Service's Continuous Forest Inventory (CFI) program. The CFI program conducts timber surveys on permanently established plots at ten-year intervals.

Air Quality

Air quality statistics were compiled by Lawrence Berkeley Laboratory as part of the Population At Risk to Air Pollution (PARAP) project (Merrill 1980).

County-level statistics included in data set K04 were estimated from EPA monitoring data collected to determine compliance with the Clean Air Act and other legislation. County estimates were calculated for the population centroid of the counties located within 60 km of a monitoring station. Air emissions from projected industrial activity were calculated by the Strategic Environmental Assessment System (SEAS) model.

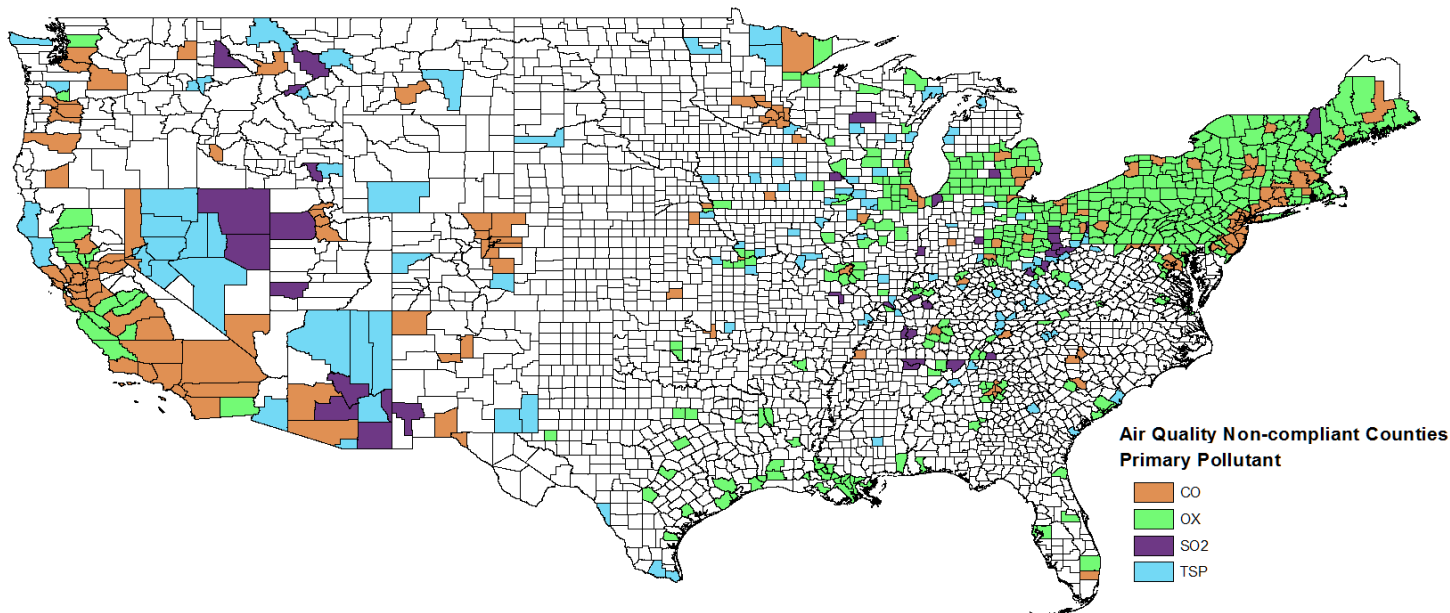


Figure 3. Data set K04: EPA Air Quality Non-Compliance 1979

Land

County-level statistics for land use, land capability, and land use restrictions from the 1967 Conservation Needs Inventory (USDA 1971) are included with the Geoecology database. The CNI is both out-of-date and subject to relatively high statistical sampling errors for individual counties. The inventory is also restricted to non-federal land. Data sets L01, L02, L03, and L07 are based on the CNI. Land Resource Regions (L06) are defined in terms of the agricultural practices and capabilities of the region.

Natural Areas

Natural Areas data sets include parks, wilderness areas, national forests and rangelands, wildlife refuges, ecological preserves, and others. Data sets N01, N04, N05, N06, and N07 pertain to the Roadless Area Review and Evaluation II (RARE II) program in 1978 to inventory existing roadless areas within the National Forests and to determine their management strategies. Data sets N04-07 may be merged with N01 to give complete name and location data.

Population

Data set P01 provides county-level summary population counts for 5-year age groups by sex. Data set P03 provides county-level population and household counts for 1970 and 1980.

Terrain

County-level maps of land form and soils from the National Atlas (USDI 1970) are included in the Terrain data sets of the Geoecology database. Data set T03 provides soil codes for U.S. counties. Data set T07 provides soils map unit codes, soils order codes, and soils suborder codes and their definitions. Data sets T08 and T09 provide summaries of soil classification data within Soil Map Units from USDI 1970. T09 may be used to merge the Great Soil Group Characteristics data set (T08) with the soils distribution data set (T03). Data set T13 contains soil map unit data (T03) aggregated to the soil order level for U.S. counties. Data set T14 provides physiographic region codes within U.S. counties and their definitions are provided in companion file T15. Definitions from companion file T15 are merged with the T14 data set in shapefile format.

Wildlife

Endangered species (animals and plants) codes for U.S. counties obtained from Brookhaven National Laboratory (Nagy and Calef, 1979) are provided in data set W10. Code definitions for all U.S. endangered species are provided in data set W09. Definitions from data set W09 are merged with data set W10 in shapefile format. These data reflect federally designated endangered and threatened species at the time of the data compilation in 1978 and are likely out-of-date.

6. Data Access

These data are available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

[Geoecology: County-Level Environmental Data for the United States, 1964-1981](https://daac.ornl.gov/VEGETATION/guides/geoecology_R1.html)

Contact for Data Center Access Information:

- E-mail: uso@daac.ornl.gov
- Telephone: +1 (865) 241-3952

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8. Data Set Revisions

Revision Summary:

- This data set has been revised to include county-level data tables from the Geoecology database in shapefile format. No changes have been made to the data values.
- Five files (*D11.txt*, *G01.txt*, *G02.txt*, *T07.txt*, *T15.txt*) from the original Geoecology database (cited below) are now distributed as companion files.
- Coded variables were decoded in adjacent columns within the data files where possible. E.g. Ecoregion code definitions within vegetation data tables D08, D09, and D10 were given in adjacent columns using the information in companion file D11.

Revision History:

Original Citation

Olson, R. J., C. J. Emerson, and M. K. Nungesser. 2003. GEOECOLOGY: County-Level Environmental Data for the United States, 1964-1979. Data set. Available on-line [<http://www.daac.ornl.gov>] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi:[10.3334/ORNLDAAC/656](https://doi.org/10.3334/ORNLDAAC/656).



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- Model Archive

Data Management

- Plan
- Manage
- Archive
- DAAC Curation
- Submit Data

Tools

- MODIS
- THREDDS
- SDAT
- Daymet
- CARVE Data Viewer
- Soil Moisture Visualizer
- Land - Water Checker

Help

- FAQs

Contact Us