LBA-ECO LC-01 City, Community, and Road Maps, Northern Ecuadorian Amazon: 1990-2002

Summary:

This data set contains the boundaries of the four major cities in the Northern Ecuadorian Amazon, the locations of primary communities in the colonist settlement area, and the locations of the road network, circa 2002. This area in northeastern Ecuador, know as the northern Oriente of Ecuador, borders the Andes Mountains and contains the headwaters of the Amazon River.

The road network was originally digitized from 1:50,000 scale topographic maps from 1990. The surface attributes for the majority of the roads have been updated based on later remote sensing and field observations from 1999 and 2002. There are three compressed (*.zip) files with this data set.

Data Citation:

Cite this data set as follows:

Walsh, S.J., R.E. Billsborrow and B. Frizelle. 2012. LBA-ECO LC-01 City, Community, and Road Maps, Northern Ecuadorian Amazon: 1990-2002. Data set. Available on-line [http://daac.ornl.gov/]from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. http://dx.doi.org/10.3334/ORNLDAAC/1058

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The LBA Data and Publication Policy [http://daac.ornl.gov/LBA/lba_data_policy.html] is in effect for a period of five (5) years from the date of archiving and should be followed by data users who have obtained LBA data sets from the ORNL DAAC. Users who download LBA data in the five years after data have been archived must contact the investigators who collected the data, per provisions 6 and 7 in the Policy.

This data set was archived in January of 2012. Users who download the data between January 2012 and December 2016 must comply with the LBA Data and Publication Policy.

Data users should use the investigator contact information in this document to communicate with the data provider. Alternatively, the LBA Web Site [http://lba.inpa.gov.br/lba/] in Brazil will have current contact information.

Data users should use the Data Set Citation and other applicable references provided in this document to acknowledge use of the data.

Table of Contents:

1. Data Set Overview:

Project: LBA (Large-Scale Biosphere-Atmosphere Experiment in the Amazon)

Activity: LBA-ECO

LBA Science Component: Human Dimensions

Team ID: LC-01 (Bilsborrow / Walsh / Garcia)

The investigators were Bilsborrow, Richard E.; Walsh, Stephen J. and McGregor, Stephen J. You may contact Walsh, Stephen J. (swalsh@email.unc.edu); Bilsborrow, Richard E. (richard_bilsborrow@unc.edu) and Frizzelle, Brian (bgf@email.unc.edu).

LBA Data Set Inventory ID: LC01_Cities_Communities_Roads

This data set contains the boundaries of the four major cities in the Northern Ecuadorian Amazon, the locations of primary communities in the colonist settlement area, and the locations of the road network, circa 2002. This area in northeastern Ecuador, know as the northern Oriente of Ecuador, borders the Andes Mountains and contains the headwaters of the Amazon River. The road network was originally digitized from 1:50,000 scale topographic maps from 1990. The surface attributes for the majority of the roads have been updated based on later remote sensing and field observations from 1999 and 2002.

Related Data Sets:

- LBA-ECO LC-01 Hydrography, Morphology, Edaphology Maps, Northern Ecuadorian Amazon (Hydrographic, morphologic and edaphologic features in the northern Ecuadorian Amazon)
- LBA-ECO LC-01 Topographic Data for Intensive Study Areas, Northern Ecuadorian Amazon (Topographic data from the 4 intensive study areas located in the northern Ecuadorian Amazon region)
- LBA-ECO LC-01 National, Provincial, and Park Boundaries, Ecuador
- LBA-ECO LC-01 Landsat MSS, TM, ETM+ Imagery, Northern Ecuadorian Amazon: 1973-2002

2. Data Characteristics:

There are three data files with this data set. The filenames have the file extension ".zip". These are zipped ESRI ArcGIS shapefiles. When unzipped, each shape file contains six files (*.shx, *.bdf, *.prj, *sbn, *.sbx, and *.shp). Each shape file contains polygon geometry, with the following projection parameters:

Study Area: Northern Ecuadorian Amazon

- Projection: Universal Transverse Mercator 18S
- Horizontal_Datum_Name: D_WGS_1984
- Ellipsoid_Name: WGS_1984

1) **Oriente_cities_poly.zip:** This layer shows the major cities in the Northern Ecuadorian Amazon as polygons.

Spatial coordinates:

- West Bounding Coordinate: -76.992752
- East Bounding Coordinate: -76.635641
- North Bounding Coordinate: 0.100360
- South Bounding Coordinate: -0.477395

Attribute Information for major cities

oriente_cities_poly.xxx: where file extension is .shp, .dbf, .prj, or .shx.
1)FID: Internal feature number; Sequential unique whole numbers that are automatically generated.
2)Shape: Feature geometry.
3)ID: Sequential numbers identifying the polygons.
4)NAME: Name of the city.

2) **Communities_primary.zip:** This layer shows the primary communities as points.

Spatial coordinates:

- West Bounding Coordinate: -77.330462
- East Bounding Coordinate: -76.488150
- North Bounding Coordinate: 0.190454
- South Bounding Coordinate: -0.884598

Attribute Information for primary communities

communities_primary.xxx: where file extension is .shp, .dbf, .prj, or .shx.
1)FID: Internal feature number; Sequential unique whole numbers that are automatically generated.
2)Shape: Feature geometry.
3)COMM NAME: Name of each community.

3) **trn_oriente03.zip:** This layer shows the road network as lines.

Spatial coordinates:

- West Bounding Coordinate: -78.002470
- East Bounding Coordinate: -75.354332
- North Bounding Coordinate: 0.356240
- South Bounding Coordinate: -1.004539

Attribute Information for road network

trn_oriente03.xxx: where file extension is .shp, .dbf, .prj, or .shx. This data file delineates the road network in the study area.

1) FID: Internal feature number.
2) Shape: Feature geometry.
3) FNODE#: Internal node number for the beginning of an arc (from-node).
4) TNODE#: Internal node number for the end of an arc (to-node).
5) LPOLY#: Internal node number for the left polygon.

6) RPOLY#: Internal node number for the right polygon.
7) LENGTH: Length of feature in internal units. Represent the length of the arc in meters.
8) TRN_ORIENTE03#: Internal feature number.
9) TRN_ORIENTE03-ID: User-defined feature number.
10) OBJECTID: Internal feature number.
11) TYPE/ORIGTYPE: The original road type code based on the categories on the 1990 topographic maps.

Codes:

10=Bridge/Puente,
11=Path/Sendero,
20=Seasonal road/Camino temporal,
30=Narrow (one-lane) unpaved road/Carretera sin pavimentar angosto,
31=Narrow (one-lane) paved road/Carretera pavimentada angosto,
32=Unpaved road, 2 or more lanes/Carretera sin pavimentar dos o mas vias,
33=Paved road, 2 or more lanes/Carretera pavimentada dos o mas vias,
34=Highway, freeway, 2 or more lanes/Autopista, carretera pavimentada (dos o mas vias),
40=Ferry/Barco de pasaje

12) TRN_CODE: The current numeric road surface type code.

Codes:

10=Footpath/Sendero,
11=Unknown Footpath/Sendero Desconocido (Current surface believed to be Footpath),
20=Fair-Weather Dirt Road/Camino de Tierra Temporal,
21=Unknown Fair-Weather Dirt Road/Camino de Tierra Temporal Desconocido (Current surface believed to be Fair-Weather Dirt Road),
30=All-Weather Dirt Road/Camino de Tierra Todo El Tiempo,
31=Unknown All-Weather Dirt Road/Camino de Tierra Todo El Tiempo Desconocido (Current surface believed to be All-Weather Dirt Road), 40=Smooth-Stone Paved Road/Camino de Piedra Bola,
45=Smooth-Stone & Dirt Road/Camino de Piedra Bola y Tierra,
46=Smooth-Stone & Petroleum/Camino de Piedra Bola y Petroleo,
50=Cobblestone Hexagonal-Cement Block Road/Via Adoquinada,
60=All-Weather Paved Road/Via Pavimentada,
70=Unknown Hard-Surface Road/Camino de Superficie Dura Desconocido (Current surface known to be hardened. The exact surface type is unknown.),
80=Bridge/Puente,
85=Ferry/Barco de Pasaje,

13) TRN_TYPE: The current text road surface type code.

Codes:

S=Footpath/Sendero,
SD=Unknown Footpath/Sendero Desconocido (Current surface believed to be Footpath.),
TT=Fair-Weather Dirt Road/Camino de Tierra Temporal,
TTD=Unknown Fair-Weather Dirt Road/Camino de Tierra Temporal Desconocido (Current surface believed to be Fair-Weather Dirt Road.),
TTT= All-Weather Dirt Road/Camino de Tierra Todo El Tiempo,
TTTD=Unknown All-Weather Dirt Road/Camino de Tierra Todo El Tiempo Desconocido (Current surface believed to be All-Weather Dirt Road.),
PB=Smooth-Stone Paved Road/Camino de Piedra Bola, PBT=Smooth-Stone & Dirt Road/Camino de Piedra Bola y Tierra,
PBP=Smooth-Stone & Petroleum/Camino de Piedra Bola y Petroleo,
VA=Cobblestone Hexagonal-Cement Block Road/Via Adoquinada,
P=All Weather Paved Road, VP = Via Pavimentada, CSDD = Unknown Hard-Surface Road/Camino de Superficie Dura Desconocida (Current surface known to be hardened.),
P=Bridge/Puente,
F=Ferry/Barco de Pasaje

14) TRN_DESC: Description of the road surface type
15) MIN_SPEED: Minimum speed in kilometers per hour
16) MAX_SPEED: Maximum possible speed in kilometers per hour

17) AVG_SPEED: Average speed in kilometers per hour
18)ATTRB_YR: Year road segment was updated.
19) SHAPE_LENG: Length of segment

Site boundaries: (All latitude and longitude given in decimal degrees)

Site (Region)	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude	Geodetic Datum
Northern Ecuadorian Amazon (Ecuador)	-76.992752	-76.635641	0.10028	-0.477395	World Geodetic System, 1984 (WGS-84)

Time period:

- The data set covers the period: 1990/01/01 to 2002/12/31.
- Temporal Resolution: not applicable. Maps generated from data published in 1990, 1999, and 2002.

Platform/Sensor/Parameters measured include:

- TOPOGRAPHIC MAP / DIGITIZER / CULTURAL FEATURES

3. Data Application and Derivation:

Typical application of the data: This data set can be used for cartographic purposes, or for analyses that require known locations of large towns/cities, communities or road networks including network, proximity or other spatial analyses.

Derivation techniques and algorithms

Cities: Polygons were digitized and labeled. ARC/INFO coverage was converted to an ArcView shapefile.

Communities: Points were collected using Trimble GeoExplorer II and GeoExplorer 3 GPS receivers. The data were differentially corrected and exported to an ArcView shapefile. The points were attributed based on field forms.

Road Network: 1:50,000-scale topographic maps were digitized. The individual topographic map road coverages were edgematched and appended. Positions and surface attributes were updated for roads in the Northern ISA, using GPS. Road positions were altered to fit locations as seen in a 1999 Landsat TM image and a 2000 Landsat ETM image.

4. Quality Assessment:

Cities:
Users should recognize that these polygons represent the size of these 4 major cities at a single point in time and that the boundaries of these cities before or since the date they were mapped (1993) are likely different. Positional accuracy: Horizontal accuracy is assumed to be within the NMAS standards for a map of this scale (~250 m).
Data Usage Guidance: There are no use constraints.

Communities:
Attribution of the point locations with the community name is 100% accurate. However, it is important to note that the spelling of the community names may vary, and some communities may have alternate names. Points are within 10 meters of their true location. Each point represents the center of its community, the location of which was subjectively chosen by the field worker.

Road network:
Attribution for those arcs current to 1990 is based on the attribution from the topographic maps. The attributes for those arcs current to 1999 are based on field observations, and were set to the same categories as those on the maps. The 1990 map categories and 1999 categories were retrofitted to the more accurate 2002 categories. The 2002 categories in use are based on field observations and more accurately describe the range of surface types in the Oriente of Ecuador. The speed ranges applied to these roads are based on field observations. The average speed is simply the average of the minimum and maximum speeds. Horizontal accuracy is considered to be at least as accurate as what can be expected from NMAS standards on a 1:50,000-scale map (~25 m). Most roads have been updated using GPS and satellite imagery, making them accurate to within 5 m and 15 m, respectively. Positions and surface attributes were updated for roads in the Southern, Eastern and Southwestern ISAs, using GPS.

Data Usage Guidance:
There are no use constraints. However, potential users should be wary of using these three data types for analyses at scales larger than 1:50,000. Users should also keep in mind that only a portion of the road network has current surface type attribution.

5. Data Acquisition Materials and Methods:

Site description
The northern Ecuadorian Amazon is significant from social, biophysical, and geographical bases, with complex terrain and landuse/landchange variability. Settlers in the Napo and Sucumbios provinces, the two dominant Cantons or States, settled on 50 ha plots, clearing primary forest for pastureage and to grow subsistence crops and coffee. The western Amazon region, bordering the Andes and lying at the headwaters of the Amazon River basin, possesses several major centers of endemism, including the Napo. Despite the regions biodiversity and carbon sequestration significance, agricultural settlement and concurrent deforestation threaten the region. A comprehensive description of the Oriente can be found in Messina and Walsh (2001).

Cities:

- Map title: Mapa del Nororiente de Ecuador: Situacion Legal de las Tierras (scale=1:250,000) produced by Ecuadorian-German project PROFORS (Programa Forestal Sucumbios) and published by INEFAN - PROFORS in 1993 (INEFAN=(Instituto Ecuatoriano Forestal y de Areas Naturales y Vida Silvestre) was obtained from Instituto Geografico Militar de Ecuador (IGM).
- Title: Mapa del Nororiente del Ecuador: Situacion Legal de las Tierras Geospatial_Data_Presentation_Form: map Source_Scale_Denominator: 1:250,000 Type_of_Source_Media: paper.

Communities:

- Points were collected using Trimble GeoExplorer II and GeoExplorer 3 GPS receivers. The data were differentially corrected and are within 10 meters of their true location.

Road network:

- Data were digitized from 1:50,000-scale topographic maps obtained from the Instituto Geografico Militar de Ecuador in Quito, Ecuador.

6. Data Access:

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

Data Archive Center:

Contact for Data Center Access Information:
E-mail: uso@daac.ornl.gov
Telephone: +1 (865) 241-3952

7. References:

Messina, J.P. and S.J. Walsh. 2001. 2.5D Morphogenesis: Modeling Landuse and Landcover Dynamics in the Ecuadorian Amazon. Plant Ecology, 156 (1): 75-88.

Related Publications

- Pan, W.K.Y., S.J. Walsh, R.E. Bilsborrow, B.G. Frizzelle, C.M. Erlien, and F. Baquero. 2004. Farm-level models of spatial patterns of land use and land cover dynamics in the Ecuadorian Amazon. Agriculture Ecosystems & Environment 101(2-3):117-134.