

# LBA-ECO ND-02 Secondary Forest Small Stem, Non-woody Biomass, Para, Brazil: 1999-2005

## Summary:

This data set reports biomass from small stems and non-woody vegetation measured from 1999 to 2005 in plots of a secondary-growth forest fertilization experiment. The study location was Fazenda Vitoria, 6.5-km northwest of the town of Paragominas, Para, Brazil, in a 6-year old secondary-growth forest. Vegetation life-forms with diameters less than or equal to 2 cm (grasses, herbs, vines and dead material) were destructively sampled in November 1999, June 2000, June 2001, July 2003, July 2004, and July 2005. All data are provided in a single comma-separated file.

The site was divided into three blocks with four treatment plots (each 20m x 20m) located in each block (3 reps x 4 treatments = 12 plots). Three of the twelve plots were fertilized with nitrogen (100 kg N/ha as urea), three were fertilized with phosphorus (50 kg P/ha as superphosphate), three were fertilized with both nitrogen and phosphorus. The remaining three plots were not fertilized and served as the experimental control.



Figure 1. Photographs of (left) one of the control plots and (right) one of the plots fertilized with N and P in the secondary forest in May 2002, two years after the first fertilization treatment. Note the proliferation of remnant pasture grasses in the fertilized plot. The study plots are located at Fazenda Vitoria, near Paragominas, Para, Brazil. Photo credit: Ricardo Figueiredo (From Davidson et al., 2004).

## Data Citation:

Cite this data set as follows:

Davidson, E.A., C.J.R. de Carvalho, I.C.G. Vieira, R.D.O. Figueiredo, P.R. Moutinho, F.Y. Ishida, M.T.P. dos Santos, J.B. Guerrero, K. Kalif, R.T. Saba. 2012. LBA-ECO ND-02 Secondary Forest Small Stem, Non-woody Biomass, Para, Brazil: 1999-2005. 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/ORNLDAAAC/1115>

## Implementation of the LBA Data and Publication Policy by Data Users:

The LBA Data and Publication Policy [[http://daac.ornl.gov/LBA/lba\\_data\\_policy.html](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 Users who download LBA data in the five years after data have been archived must contact the investigators who collected the data, per provisions 6 and 7 in the Policy.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 September of 2012. Users who download the data between September 2012 and August 2017 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 website [<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.

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## 1. Data Set Overview:

**Project:** LBA-ECO

**Activity:** Biogeochemical Cycles in Degraded Lands

**LBA Science Component:** Nutrient Dynamics

**Team ID:** ND-02 (Davidson / Carvalho / Dias-Filho / Moutinho / Sa / Vieira)

The investigators were Davidson, Eric A.; Carvalho, Claudio Jose Reis de; Moutinho, Paulo Roberto de Souza; Vieira, Ima Celia G.; Figueiredo, Ricardo de Oliveira and Ishida, Françoise Yoko. You may contact Davidson, Eric A. (edavidson@whrc.org) and Vieira, Ima Celia G. (ima@museu-goeldi.br).

**LBA Data Set Inventory ID:** ND02\_Non\_Woody\_Biomass

This data set reports biomass from small stems and non-woody vegetation measured from 1999 to 2005 in plots of a secondary-growth forest fertilization experiment. The study location was Fazenda Vitoria, 6.5-km northwest of the town of Paragominas, Para, Brazil, in a 6-year old secondary-growth forest. Vegetation life-forms with diameters less than or equal to 2 cm (grasses, herbs, vines and dead material) were destructively sampled in November 1999, June 2000, June 2001, July 2003, July 2004, and July 2005.

The site was divided into three blocks with four treatment plots (each 20m x 20m) located in each block (3 reps x 4 treatments = 12 plots). Three of the twelve plots were fertilized with nitrogen (100 kg N/ha as urea), three were fertilized with phosphorus (50 kg P/ha as superphosphate), three were fertilized with both nitrogen and phosphorus. The remaining three plots were not fertilized and served as the experimental control.

**Related Data Sets**

- Davidson, E.A., C.J.R. de Carvalho, I.C.G. Vieira, R.O. Figueiredo, P.R. Moutinho, F.Y. Ishida, M.T.P. dos Santos, J.B. Guerrero, K. Kalif, R.T. Saba. 2009. LBA-ECO ND-02 Secondary Forest Tree Heights and Diameters, Para, Brazil: 1999-2005. Data set. Available on-line [http://daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi:[10.3334/ORNLDAAC/951](https://doi.org/10.3334/ORNLDAAC/951)
- Davidson, E.A., C.J.R. de Carvalho, I.C.G. Vieira, R.O. Figueiredo. 2009. LBA-ECO ND-02 Trace Gas Flux from Forest Soil, Para, Brazil : 1999-2001. Data set. Available on-line [http://daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi: [10.3334/ORNLDAAC/954](https://doi.org/10.3334/ORNLDAAC/954)

## 2. Data Characteristics:

These data are provided as a single comma-delimited ASCII file:

**ND02\_Biomass\_small\_stems\_nonwoody\_life\_forms\_1999\_2005.csv**

Column	Heading	Units/format	Description
1	Treatment		Experimental treatment: control, nitrogen addition, nitrogen and phosphorus addition, or phosphorus addition
2	Life_form		Biomass measurements were made for three non-woody life forms: grasses, vines and herbs, and woody stems with diameters less than 2 cm and dead material
3	Block		Sampling block identification
4	Plot		Plot identification each block had four plots
5	Biomass_Nov99	Mg biomass/ha	Biomass in the sampling location measured in Nov 1999 reported in megagrams biomass per hectare
6	Biomass_Jun00	Mg biomass/ha	Biomass in the sampling location measured in June 2000 reported in megagrams biomass per hectare
7	Biomass_Jun01	Mg biomass/ha	Biomass in the sampling location measured in June 2001 reported in megagrams biomass per hectare
8	Biomass_Jul03	Mg biomass/ha	Biomass in the sampling location measured in July 2003 reported in megagrams biomass per hectare

9	Biomass_Jul04	Mg biomass/ha	Biomass in the sampling location measured in July 2004 reported in megagrams biomass per hectare
10	Biomass_Jul05	Mg biomass/ha	Biomass in the sampling location measured in July 2005 reported in megagrams biomass per hectare
missing data are represented by -9999			

**Example data records:**

Control ,grass,B1,P3,0.23,1.06,0.55,1.3,0.31,0.57
Control ,grass,B2,P4,1.04,1.09,0.35,0.24,0.31,0.62
Control ,grass,B3,P4,0.52,0.33,0.98,0.16,0,0.29
Control ,vines,B1,P3,2.83,3.09,0.92,1.43,1.35,0.19
Control ,vines,B2,P4,0.16,0.08,1.29,0.56,0.83,0.84
Control ,vines,B3,P4,0.84,2.83,1.68,2.69,1.11,0.24
.....
N,small wood,B3,P3,2.46,0.7,0,3.94,1.09,0.1
N,dead,B1,P1,1.33,0.56,1.35,0.11,0.22,1.33
N,dead,B2,P2,0.9,0.17,0.71,1.3,0.49,2.07
N,dead,B3,P3,1.74,0.52,0.87,1.22,0.71,2.82
N+P,grass,B1,P4,0.94,2.62,4.35,3.19,2.51,1.42
N+P,grass,B2,P1,0.61,3.65,6.1,7.53,3.14,1.64
N+P,grass,B3,P1,0.19,1.27,3.45,7.19,1.01,0.6
N+P,vines,B1,P4,0.1,0.34,0.04,0,0.16,0.64

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

Site (Region)	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude	Geodetic Datum
Para Eastern (Belem) - Paragominas (Para Eastern (Belem))	-47.516	-47.516	-2.983	-2.983	World Geodetic System, 1984 (WGS-84)

**Time period**

- The data set covers the period 1999/11/01 to 2005/07/31.
- Temporal Resolution: Annual

**Platform/Sensor/Parameters measured include:**

- VEGETATION SURVEY / HUMAN OBSERVER / FOREST COMPOSITION/VEGETATION STRUCTURE
- VEGETATION SURVEY / STEEL MEASURING TAPE / BIOMASS

### 3. Data Application and Derivation:

Understanding secondary successional processes in Amazonian terrestrial ecosystems is becoming increasingly important as continued deforestation expands the area that has become secondary forest, or at least has been through a recent phase of secondary forest growth. Most Amazonian soils are highly weathered and relatively nutrient poor, but the role of nutrients as a factor determining

successional processes is unclear. Soils testing and chronosequence studies have yielded equivocal results regarding the possible role of nutrient limitation. The amount of biomass accumulating in non-woody vegetation and small stems (less than or equal to 2 cm dbh) has rarely been reported for a successional sequence in a tropical forest ecosystem.

## 4. Quality Assessment:

The data set was examined for outlier measurements that may have been due to clerical errors in data entry.

## 5. Data Acquisition Materials and Methods:

### Site description:

The study site, when the experiment began in 1999, was a 6-year old secondary forest growing on 7.25-ha area abandoned cattle pasture, on a clayey Oxisol, located 6.5-km northwest of the town of Paragominas, Para, Brazil. The pasture was originally planted in 1971 with the grass *Panicum maximum* and abandoned in 1984. Though there was still some remaining grass cover at the beginning of this experiment, herbs, shrub, and trees dominated the vegetation. Rainfall in the area is seasonal and averages 1,800 mm annually.

### Fertilizer treatments:

In November 1999, which was the end of the dry season, the site was divided into 3 blocks with four treatment plots (each 20 m x 20 m) located in each block (3 reps x 4 treatments = 12 plots), and the vegetation was inventoried. Fertilizer was applied to the plots in January 2000 and February 2001.

- Three of the twelve plots were fertilized with nitrogen (100 kg N/ha as urea)
- Three were fertilized with phosphorus (50 kg P/ha as superphosphate)
- Three were fertilized with both nitrogen (100 kg N/ha as urea) and phosphorus (50 kg P/ha as superphosphate).

The remaining three plots were not fertilized and served as the experimental control.

### Biomass measurements:

The biomass of plants less than 2 cm diameter at breast height (dbh) were measured destructively in two miniplots (2 by 1 m) in each plot. All aboveground plant parts were harvested and were separated by life-form (grass, herb, shrub, tree, and dead material). Samples were dried at 60 degrees C and weighed.

Biomass measurements were performed in November, 1999, and again in May 2000, June 2001, July 2002, July 2004, and July 2005.

## 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](mailto:uso@daac.ornl.gov)

Telephone: +1 (865) 241-3952

## 7. References:

Davidson, E.A., C.J.R. de Carvalho, I.C.G. Vieira, R.O. Figueiredo, P.R. Moutinho, F.Y. Ishida, M.T.P. dos Santos, J.B. Guerrero, K. Kalif, and R.T. Saba. 2004. Nitrogen and phosphorus limitation of biomass growth in a tropical secondary forest. *Ecological Applications* 14(4):S150-S163. doi:10.1890/01-6006.

### Related Publications

- Siddique, I., I.C.G. Vieira, S. Schmidt, D. Lamb, C.J.R. Carvalho, R.D. Figueiredo, S. Blomberg, and E.A. Davidson. 2010. Nitrogen and phosphorus additions negatively affect tree species diversity in tropical forest regrowth trajectories. *Ecology* 91(7):2121-2131.