A rede de pesquisa do PPBio: Filosofia e alguns Resultados

Dra Flávia Costa
Instituto Nacional de Pesquisas da Amazônia

PPBio
Programa de Pesquisa em Biodiversidade
Brazilian Biodiversity Research Programme

PPBio

- The Ministry of Science and Technology (MCT), understanding that studies of biodiversity need to be integrated and conducted over large areas by its Institutes and their partners, established in 2004 the Program for Planned Biodiversity Studies – PPBio

- The PPBio includes:
  (1) Surveys
  (2) Collections
  (3) Biodiversity commercial applications
  (4) Strengthening Regional Centers
  (5) Capacity building of human resources

Financing

- Initially PPBio was financed by MCT (Ministry of Science and Tecnology)
- Nowadays, MCT (through CNPq) finances especially the regional hubs and the coordination of the network
- Most of the financing comes from projects submited by individual or groups of researchers to many agencies

Partnerships

- Partnerships include not only Research Institutes and Universities, but the Environmental Agencies in states and the federal government
- IBAMA, ICMBio and SFB are important partners and have adopted PPBio as model for biodiversity research and monitoring in many of they areas
- Partnerships with other international efforts, such as RAINFOR
- International PPBio in Australia

O PPBio uses the RAPELD method, which integrates

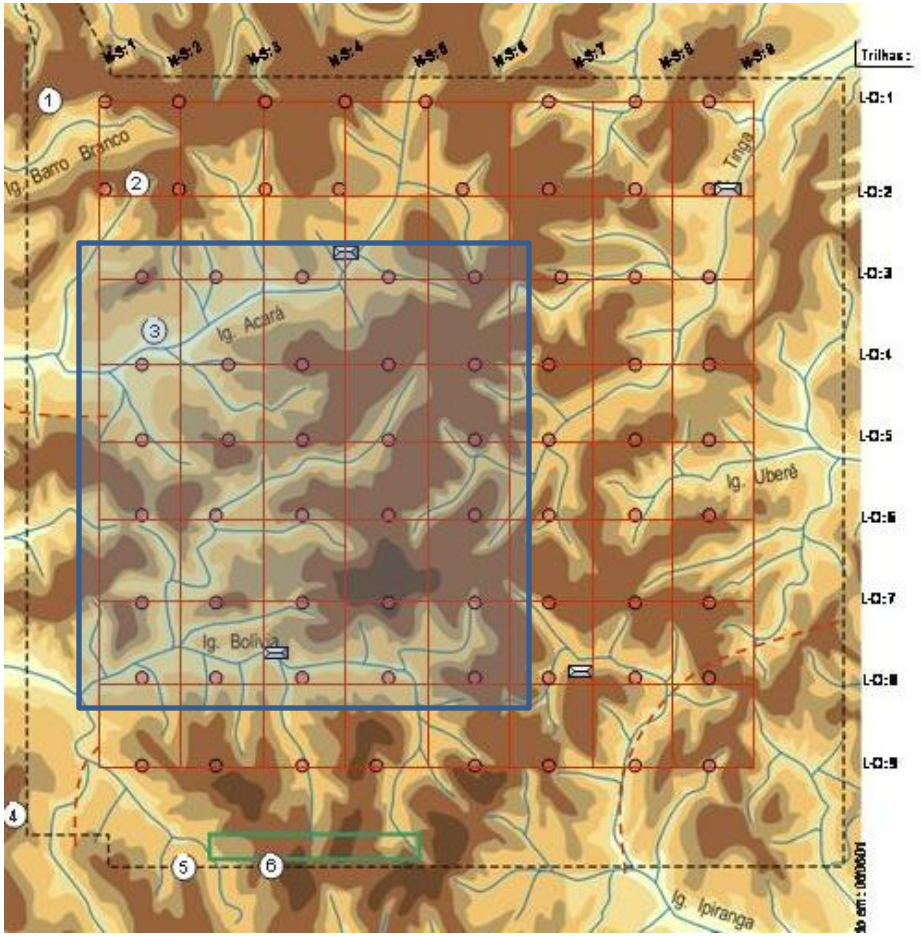
RAP – rapid inventories

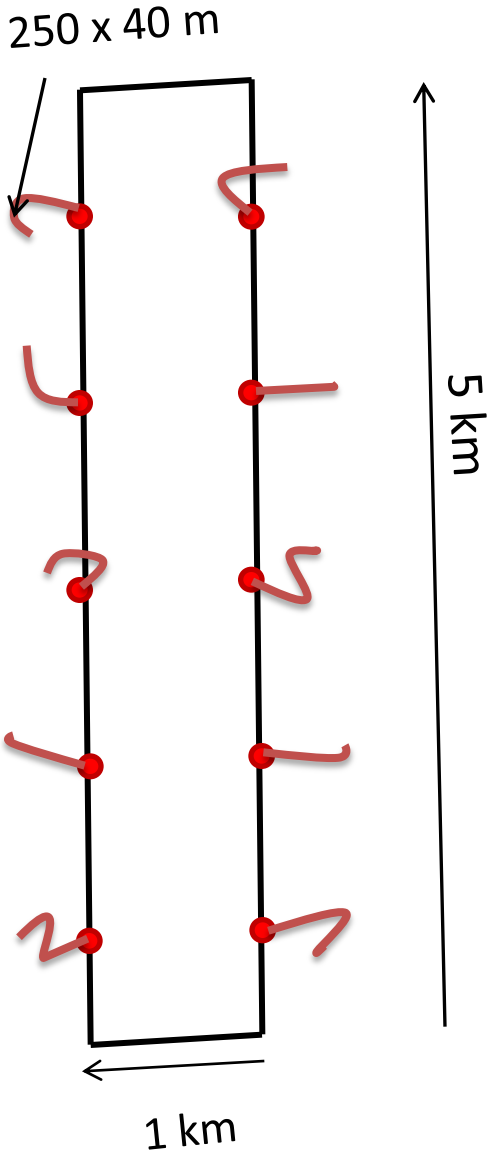
and

PELD (LTER) – long-term research

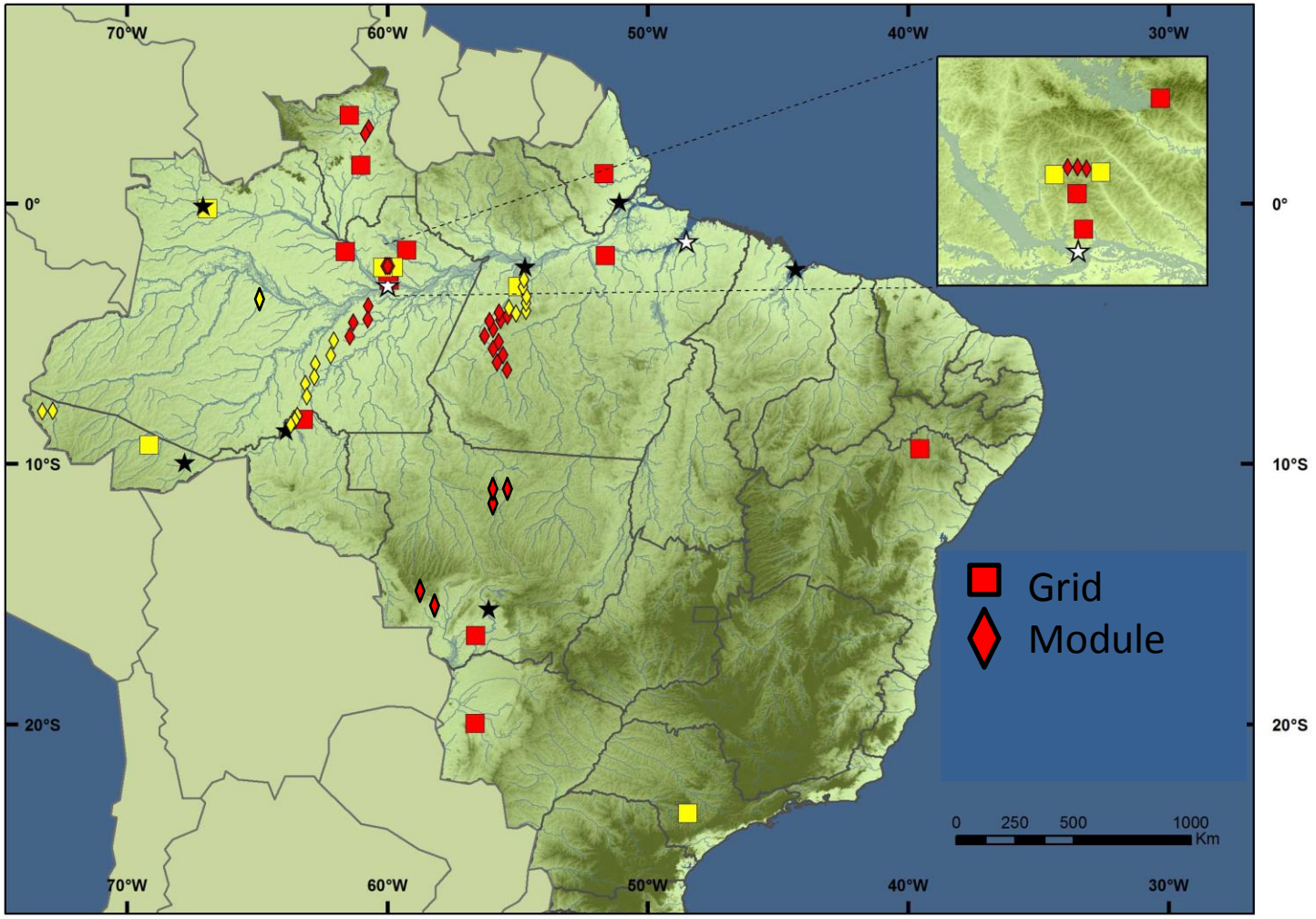
RAPELD Grids and modules

25 km^2 – 30 permanent plots





PPBio research sites in Brazil



An efficient system for studying biodiversity must:

(1) Be standardized.

(2) Permit integrated inventories.

(3) Be large, to permit inventory and monitoring of all elements of biodiversity and ecosystem processes

(4) Be modular, to permit comparisons with less intensive sampling over large study areas.

(5) Be compatible with other existing initiatives.

(6) Be implementable with the existing manpower.

(7) Make data available quickly and in a usable form to managers and other stakeholders

(1) Standardization

Data collected on different geographical scales generally cannot be compared (Urban 2005).

Biodiversity measures, such as species richness, community composition, genetic variability, biomass change, and productivity are all strongly scale dependent.

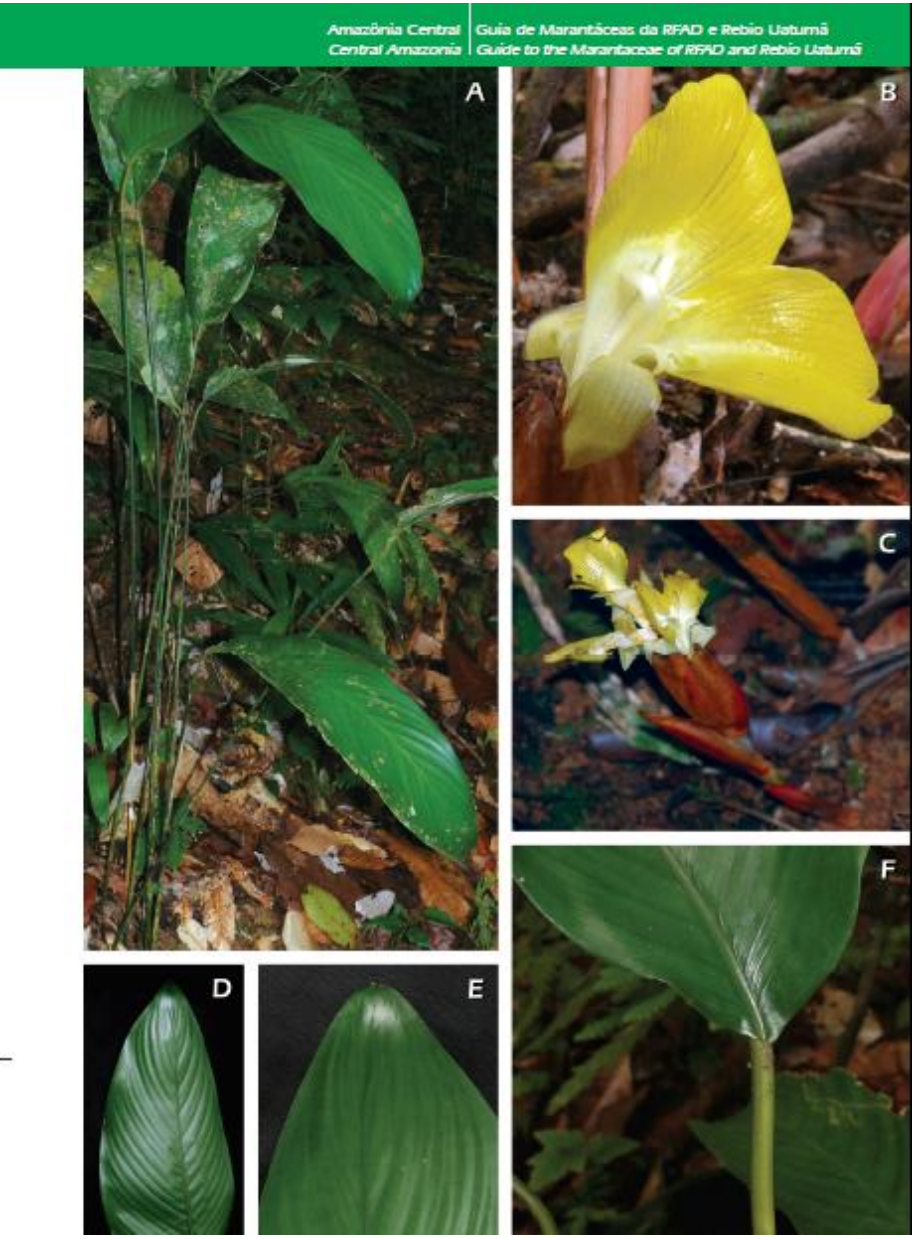
It is more important to standardize sampling design than collection methods.

Why do we need standardized plots and not only occurence points?

- Occurence points allow mapping species distributions
- And to calculate species richness

Why are they not enough?

Calathea zingiberina

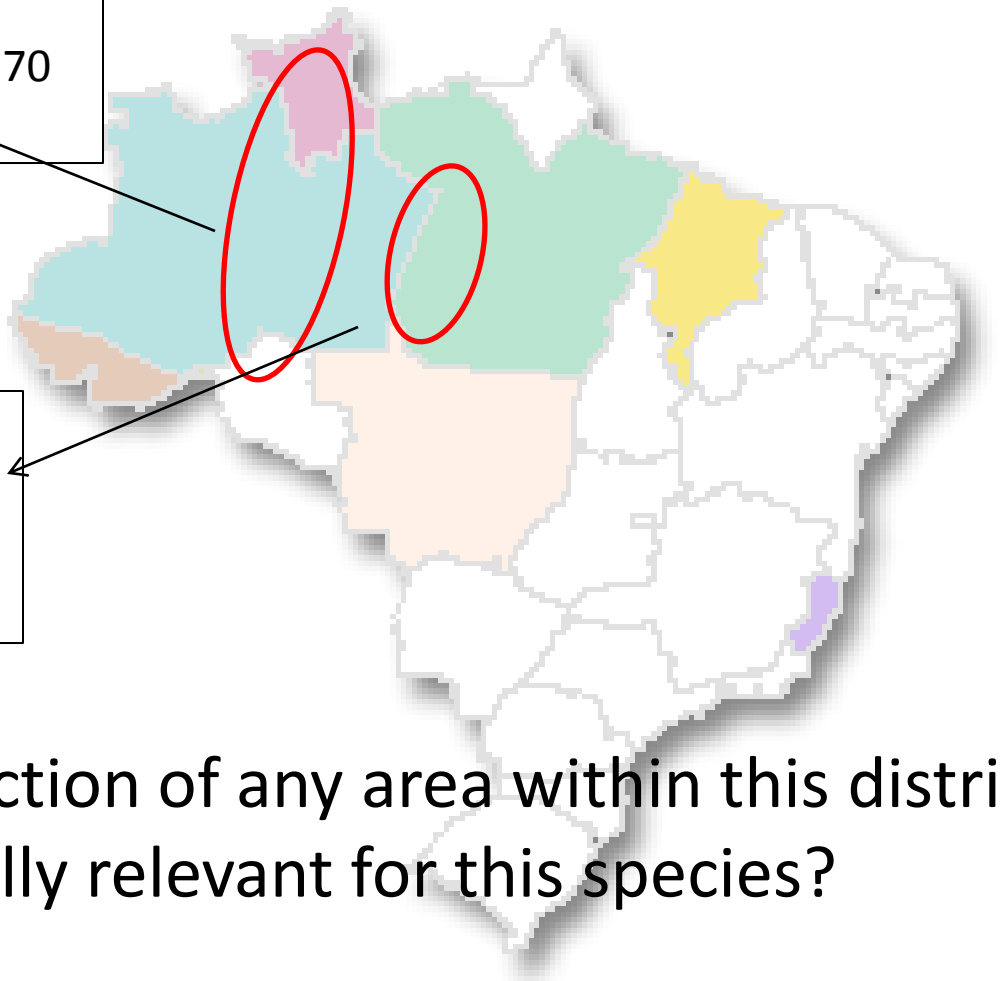


Let's see...

This is a widely distributed species, correct?

0 a 83 ind/parcela

509 individuos em 170 parcelas



0 a 477 ind/parcela

1750 ind em 105 parcelas

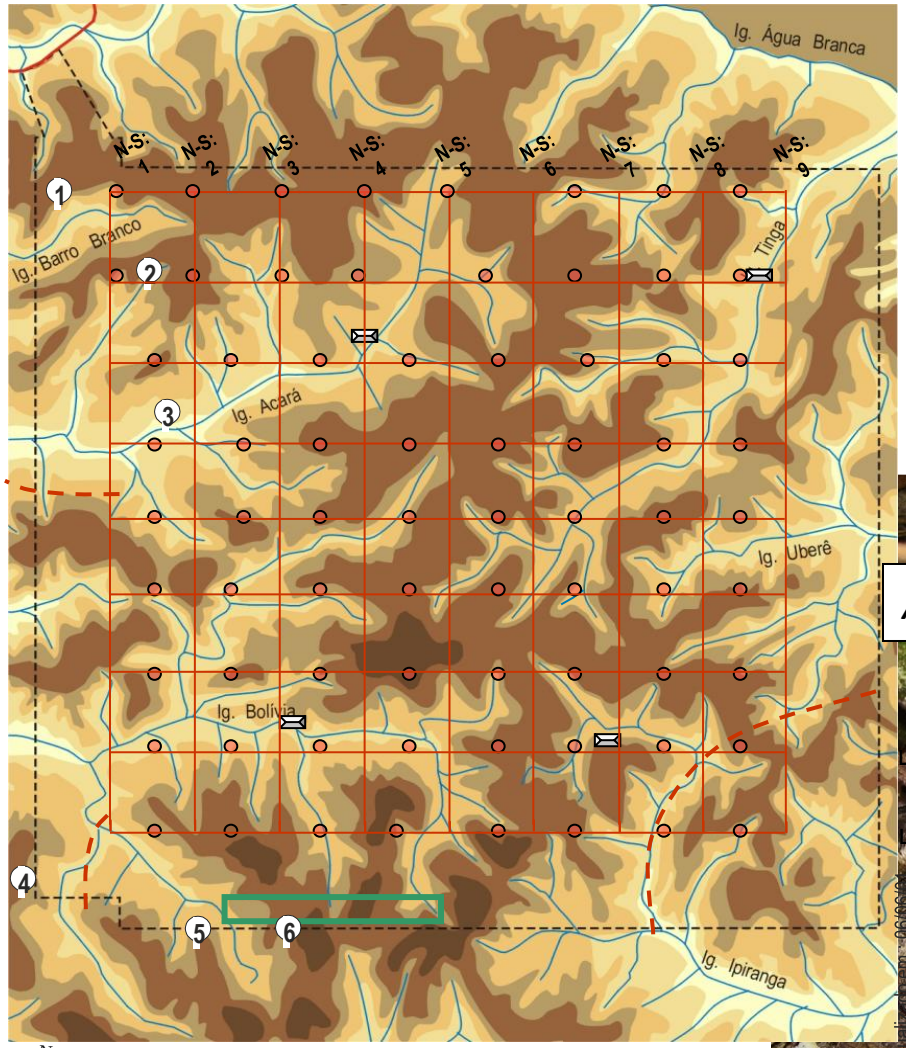
Destruction of any area within this distribution is equally relevant for this species?

Occurence x Abundance

- Occurence points do not provide abundance information, but conversely, from quantitative samples it is also possible to get occurence information

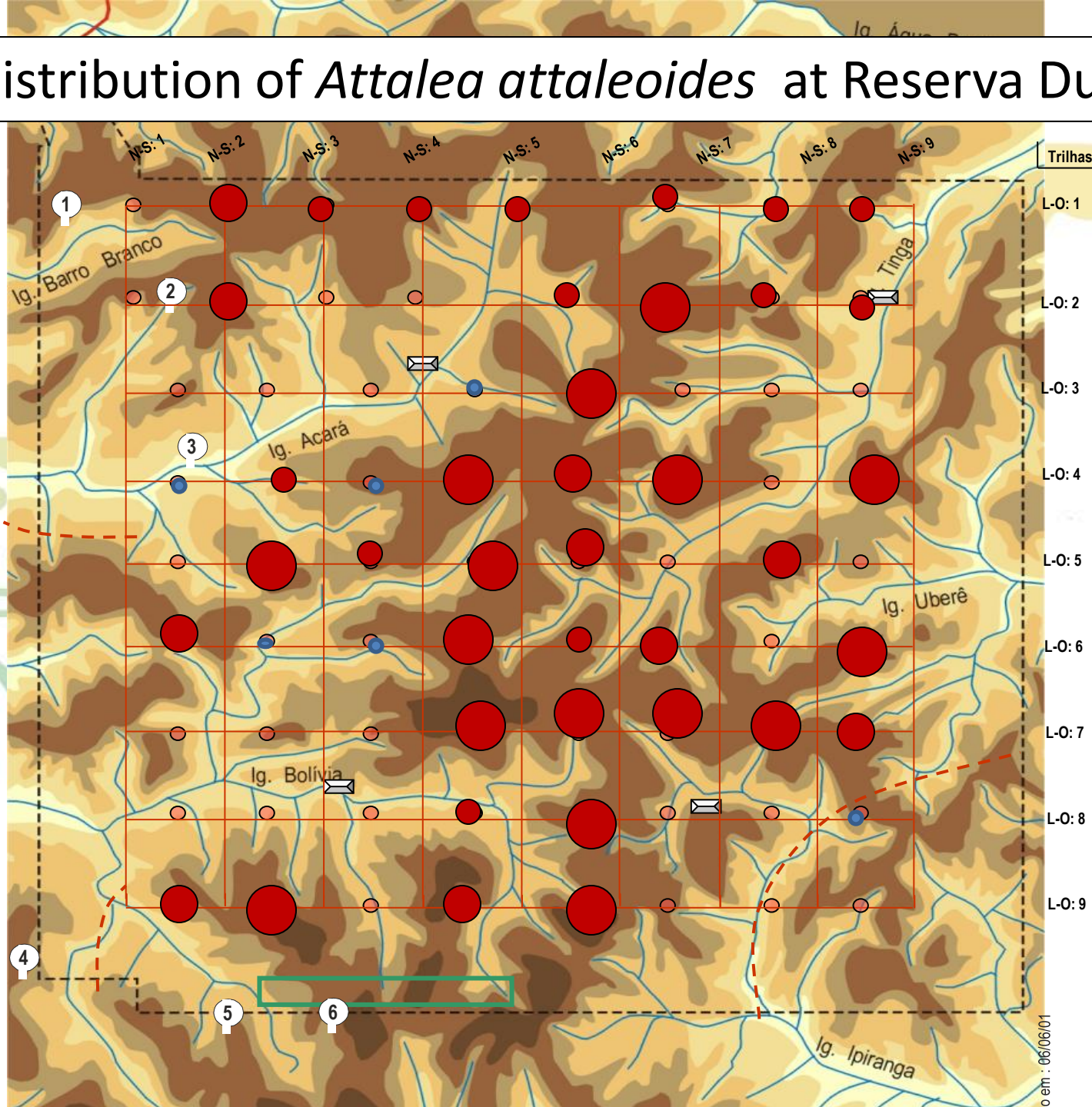
- The last example shows that abundance information is necessary for decision making

Occurence points allow mapping of species' habitats?



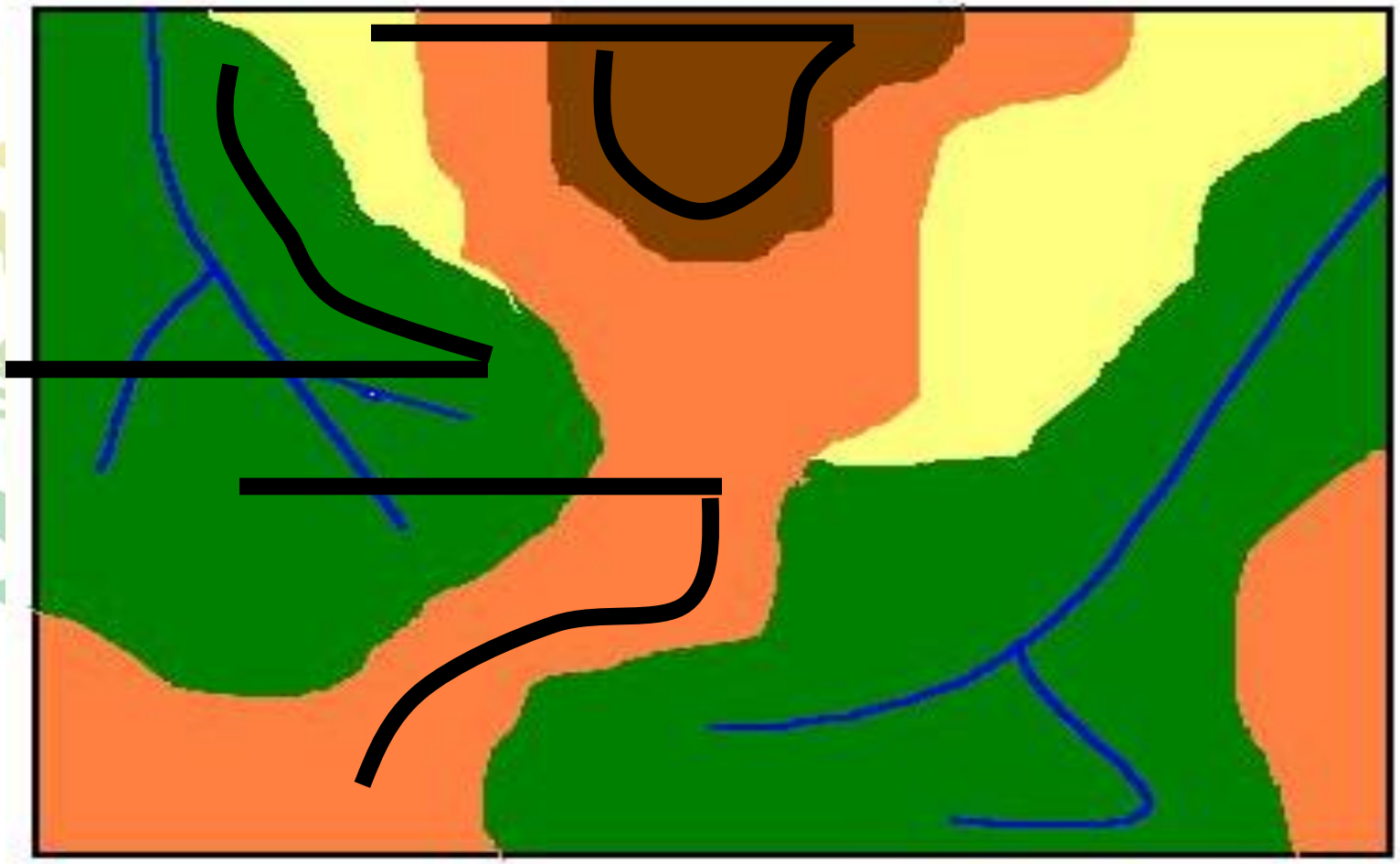
Attalea attaleoides (Barb. Rodr.) Wess. Boer

Distribution of *Attalea attaleoides* at Reserva Ducke



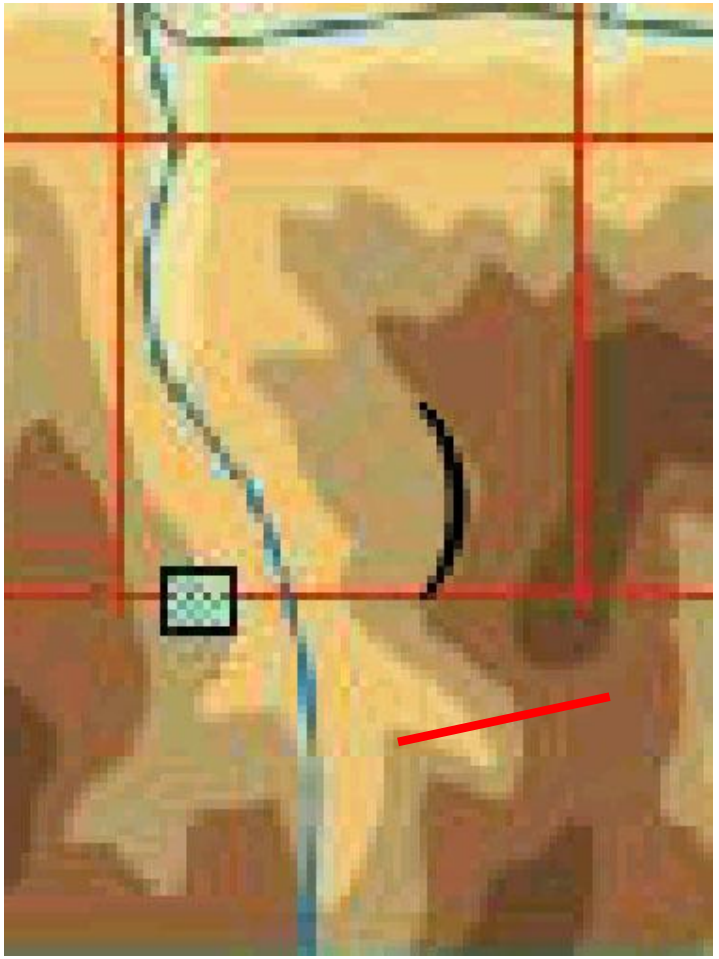
Occurence points are not always enough to understand the relationships between species and environment, and therefore to predict impacts of climate or other anthropogenic changes.

Why does PPBio uses plots following contour lines?



Permanent plots follow contour lines

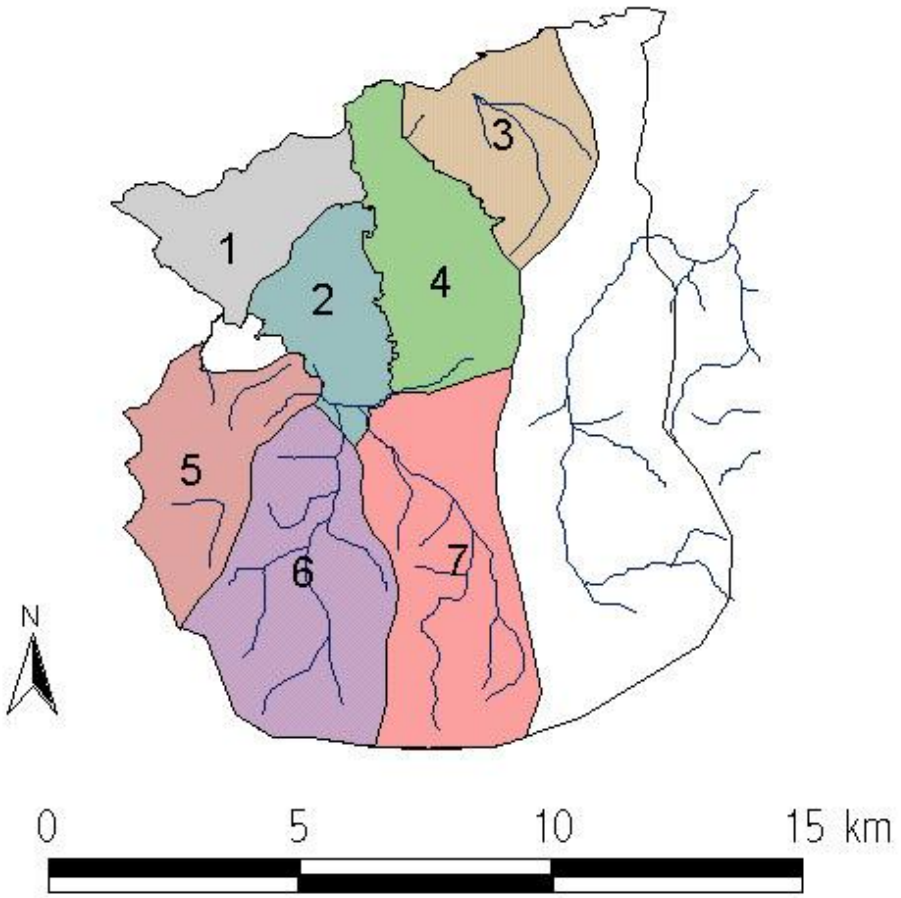
- Soil properties and distance to the watertable tend to change in accordance with altitude
- Therefore, plots following contour lines minimize internal soil variation.



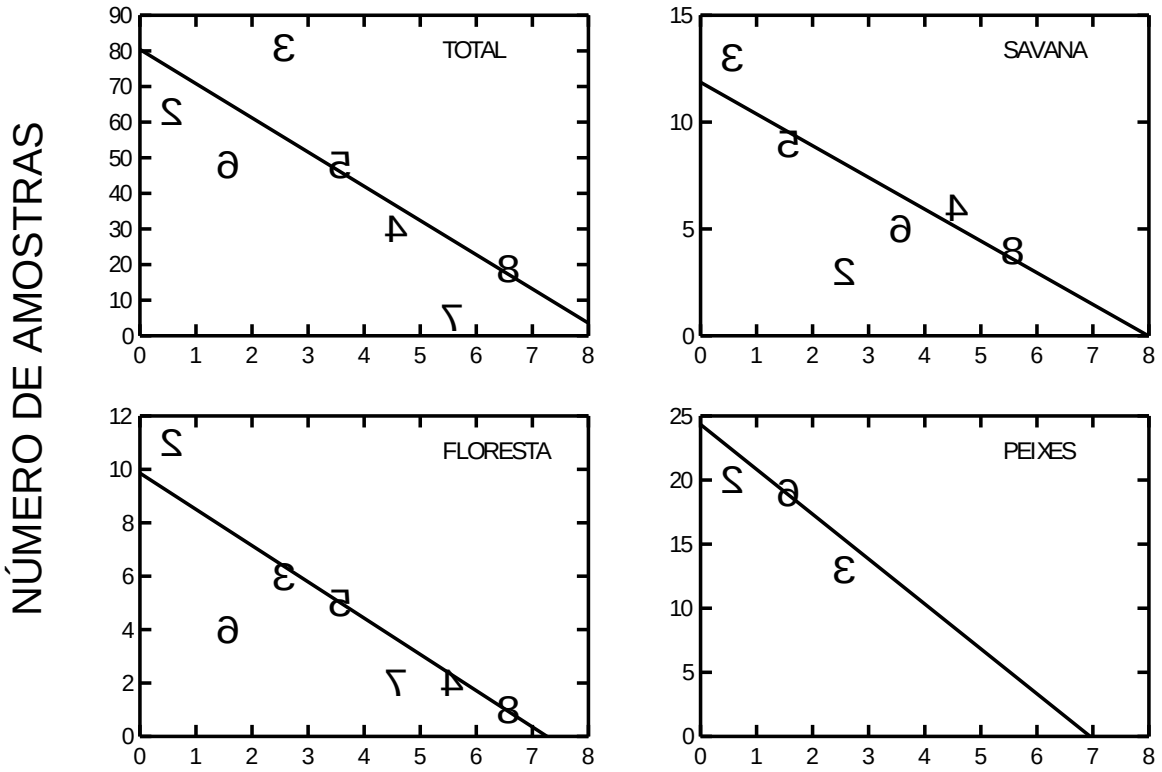
Permanent plots follow contour lines

- If each plot sample only one “environment”, it is possible to determine the relationships between species or ecosystem processes and these environments
- These relationships may be used to model species distributions or processes and make predictions for unsampled areas
- It is also possible to tease apart the environmental effect when the interest is to determine if some impact occured

Complementarity Studies need standardized designs
Example: Alter do Chão



Complementaridade studies only make sense when the number of samples is constant among the potential conservation areas



Tese Doutorado Ana Albernaz – INPA 2002

Who needs information on biodiversity?

Decision Makers

Conservation planning
Land-use planning
Impact evaluation
Natural resources management (wood, non-timber products, medicinal products, game animals)

Industry

Live collections for bioprospection

Modelers

Prediction of impacts from human disturbances

Academic Community

Studies on ecology and evolution

(2) Integration

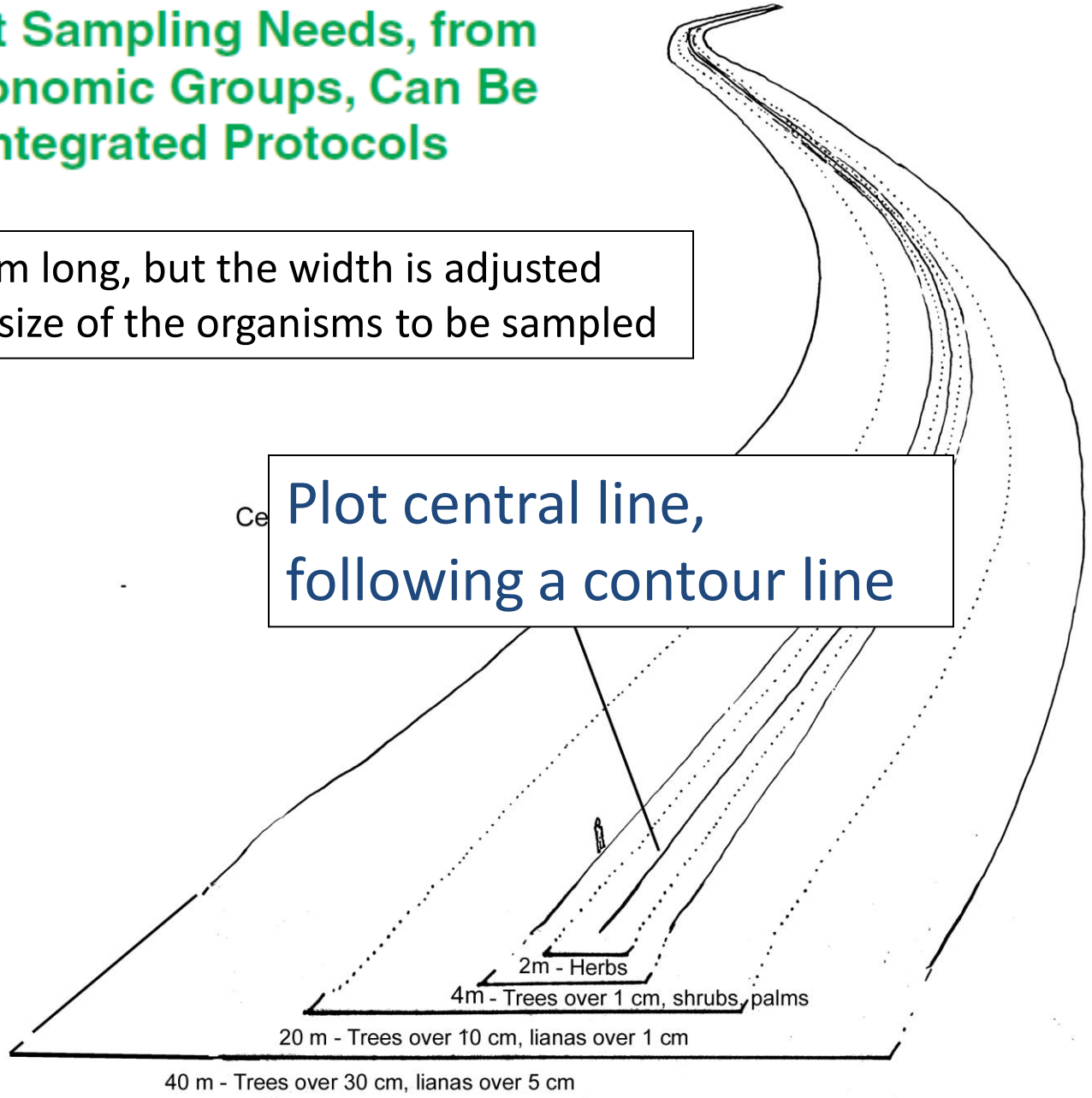
Since there are many potential biodiversity targets and users, integrated surveys are much more efficient than isolated studies.

Table 1. Often useless and Generally useful data for land-use or conservation planning. Detailed analyses can only be made with complete data sets.

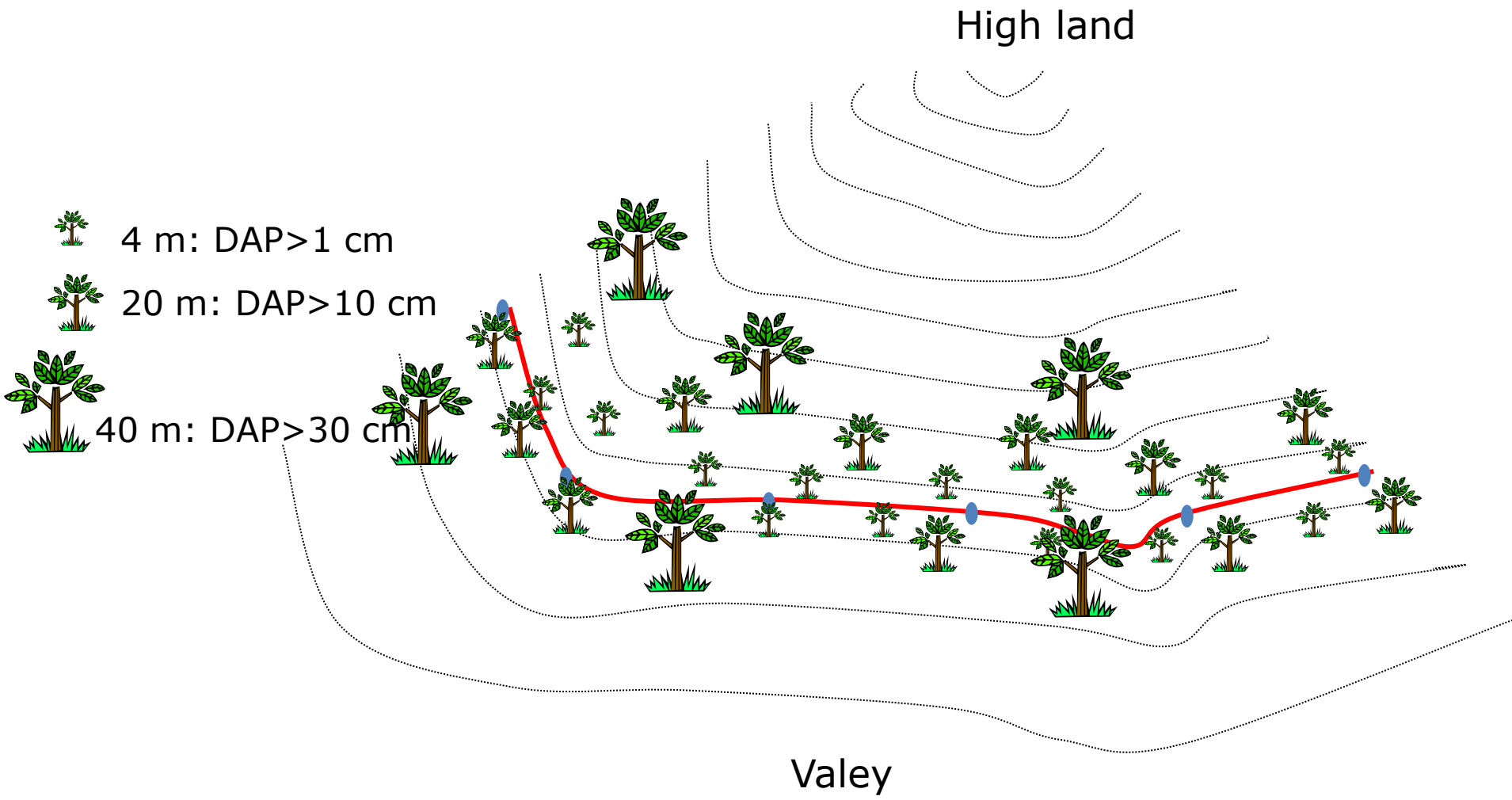
Site	Density of Sp1	Density of Sp2	Soil texture	Vegetation structure
Often useless				
A	45	-	30	1.5
B	68	7	-	-
C	1	-	-	2.3
D	32	-	-	-
E	9	-	21	-
Generally useful				
A	45	1	30	1.5
B	68	7	22	1.4
C	1	10	45	2.3
D	32	15	10	6.7
E	9	25	21	8.9

How Different Sampling Needs, from Different Taxonomic Groups, Can Be Adjusted in Integrated Protocols

Plots are 250 m long, but the width is adjusted according to the size of the organisms to be sampled



Plots have fixed lenght but variable width, which is inversely proportional to the abundance of the organisms.



Some examples of integrated studies at Reserva Ducke

Plant community composition x soil and topography

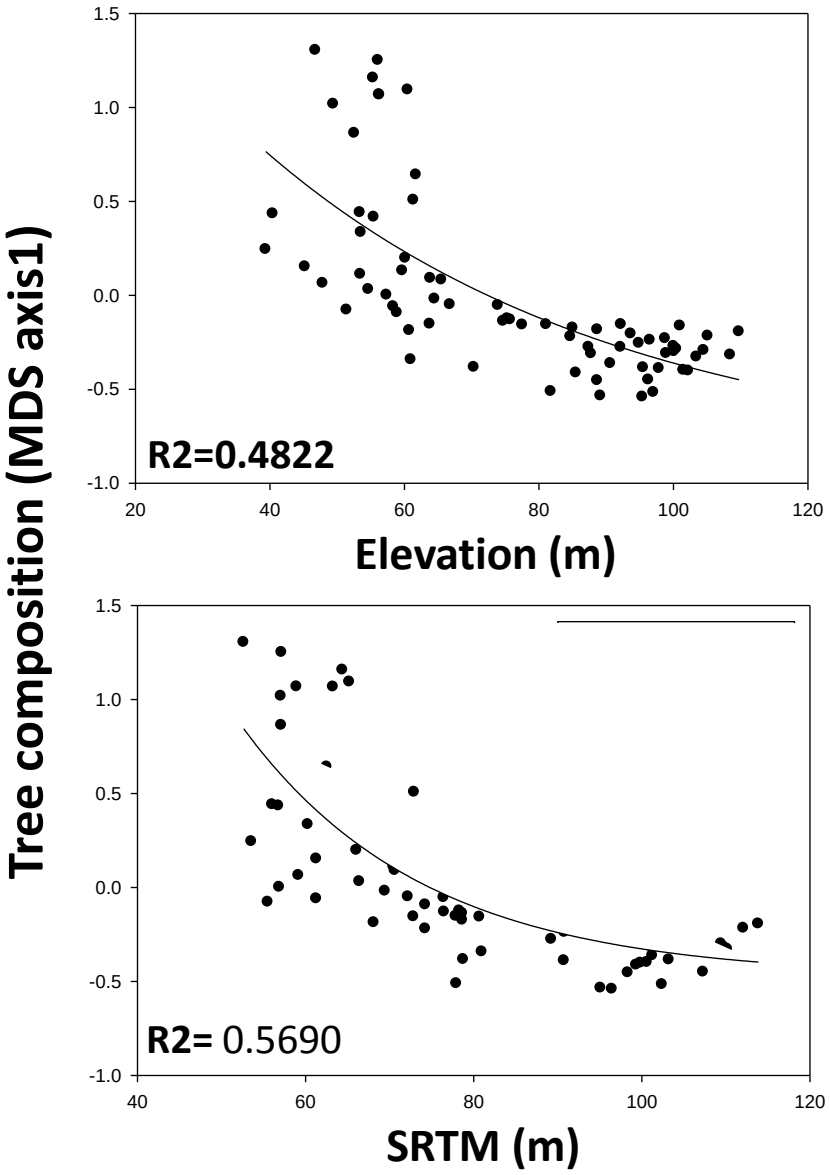
(~ 800 sp studied, 6 different researchers worked in the same 72 plots)

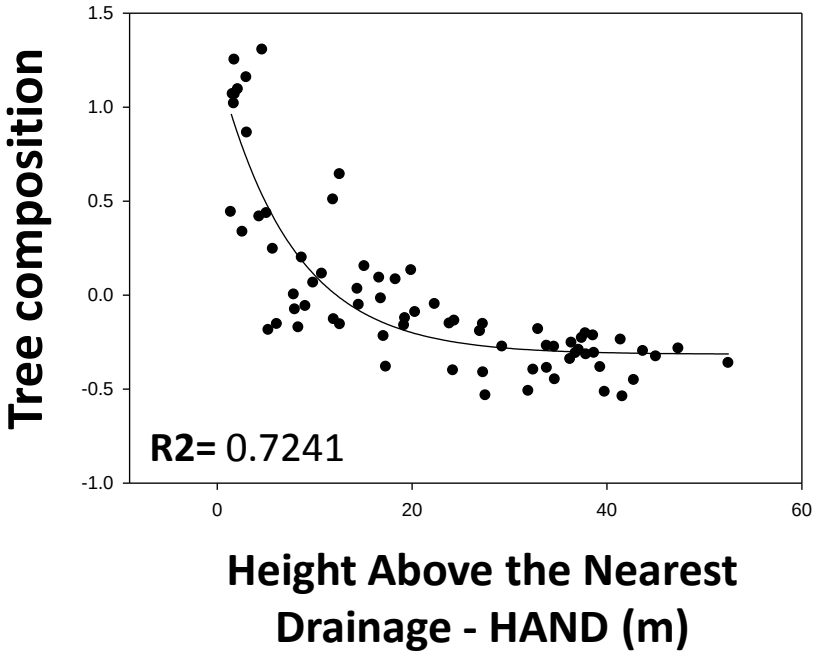
Habit	Taxon	Soil Fertility*	Soil Clay % = Altitude *	Slope*	r2
Herbs	Ferns	0.33	0.62	0.03	0.29
	Poales	0.06	0.19	0.07	0.32
	Zingiberales	0.03	0.27	0.03	0.31
Shrubs	Understory Palms	0.06	0.45	0.11	0.62
	Piper	0.03	0.04	0.18	0.26
	Psychotria	0.03	0.40	0.04	0.49
Lianas	Bignoniaceae	0.05	0.46	0.02	0.53
Trees	Burseraceae	0.04	0.43	0.09	0.58
	Chrysobalanaceae	0.05	0.32	0.03	0.41
	Euphorbiaceae	0.02	0.10	0.00	0.12
	Fabaceae	0.04	0.47	0.05	0.56
	Lauraceae	0.03	0.05	0.02	0.09
	Lecythidaceae	0.03	0.38	0.01	0.42
	Canopy Palms	0.05	0.46	0.05	0.56
	Sapotaceae	0.05	0.30	0.03	0.38

* Standardized b

Costa et al. *unpubl.*

Tree composition *vs* Topographical Descriptors in Central Amazonia





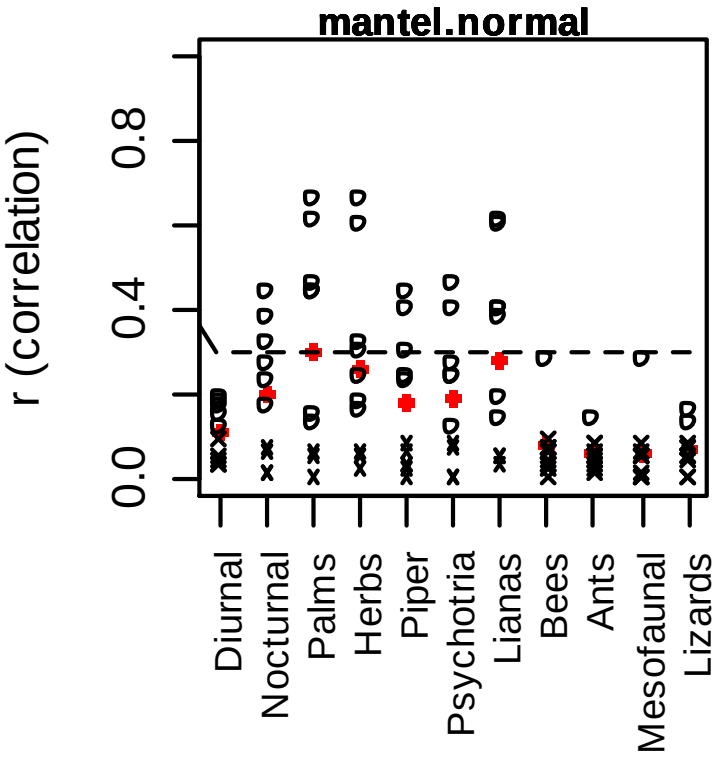
The same applies for Palms and Lianas

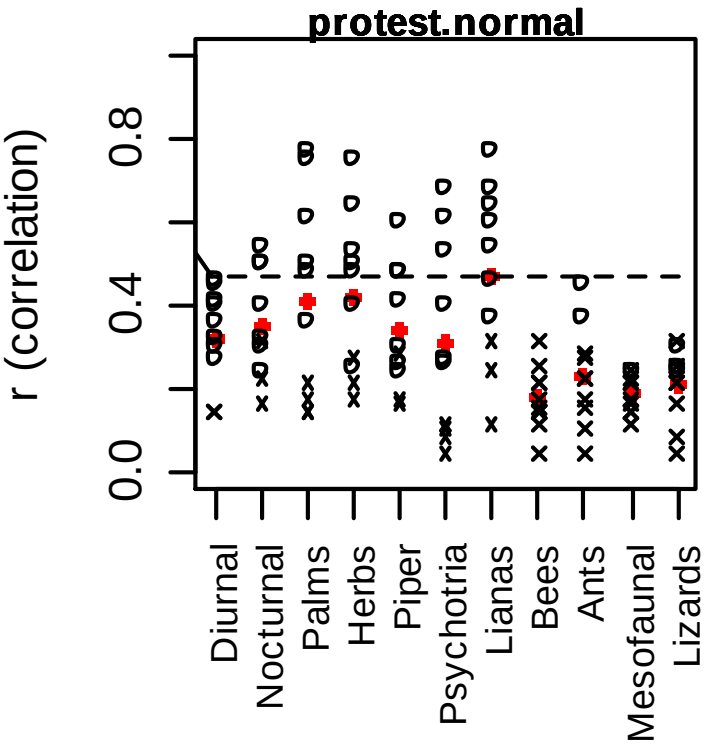
Plant Composition = y0+a*exp (-b*topographical descriptor)

Schietti *et al.*, in prep.

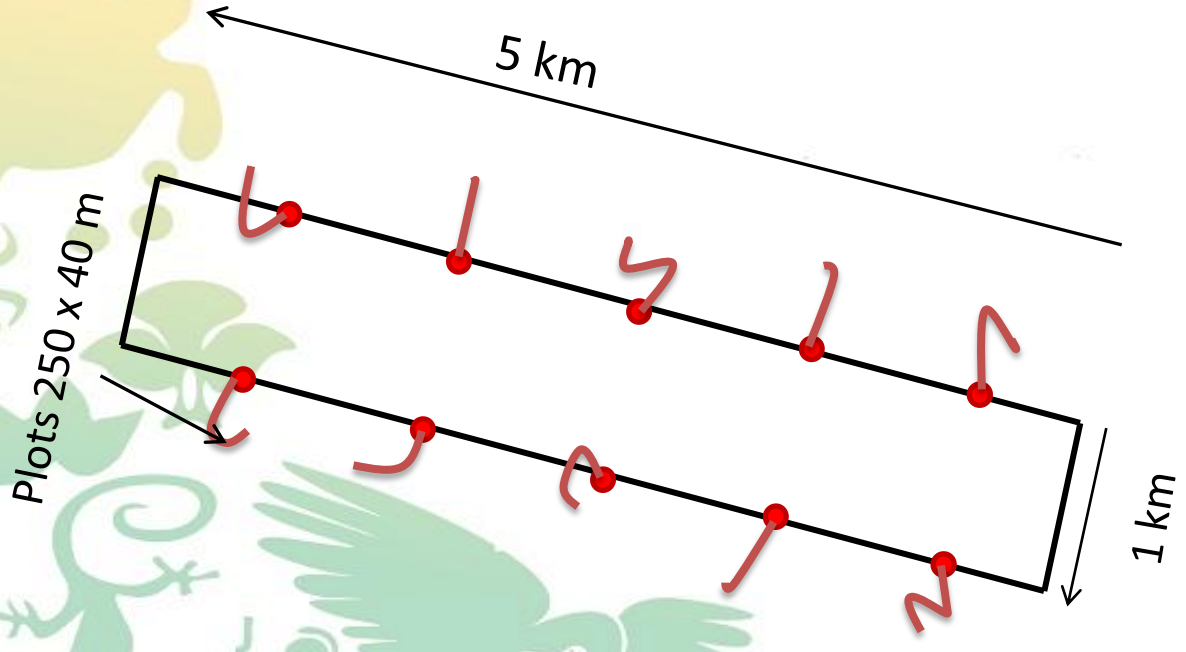
How far can we go in simplifying biomonitoring assessments? An integrated analysis of taxonomic surrogacy, taxonomic sufficiency and numerical resolution in a megadiverse region

Landeiro + 23 researchers at Reserva Ducke





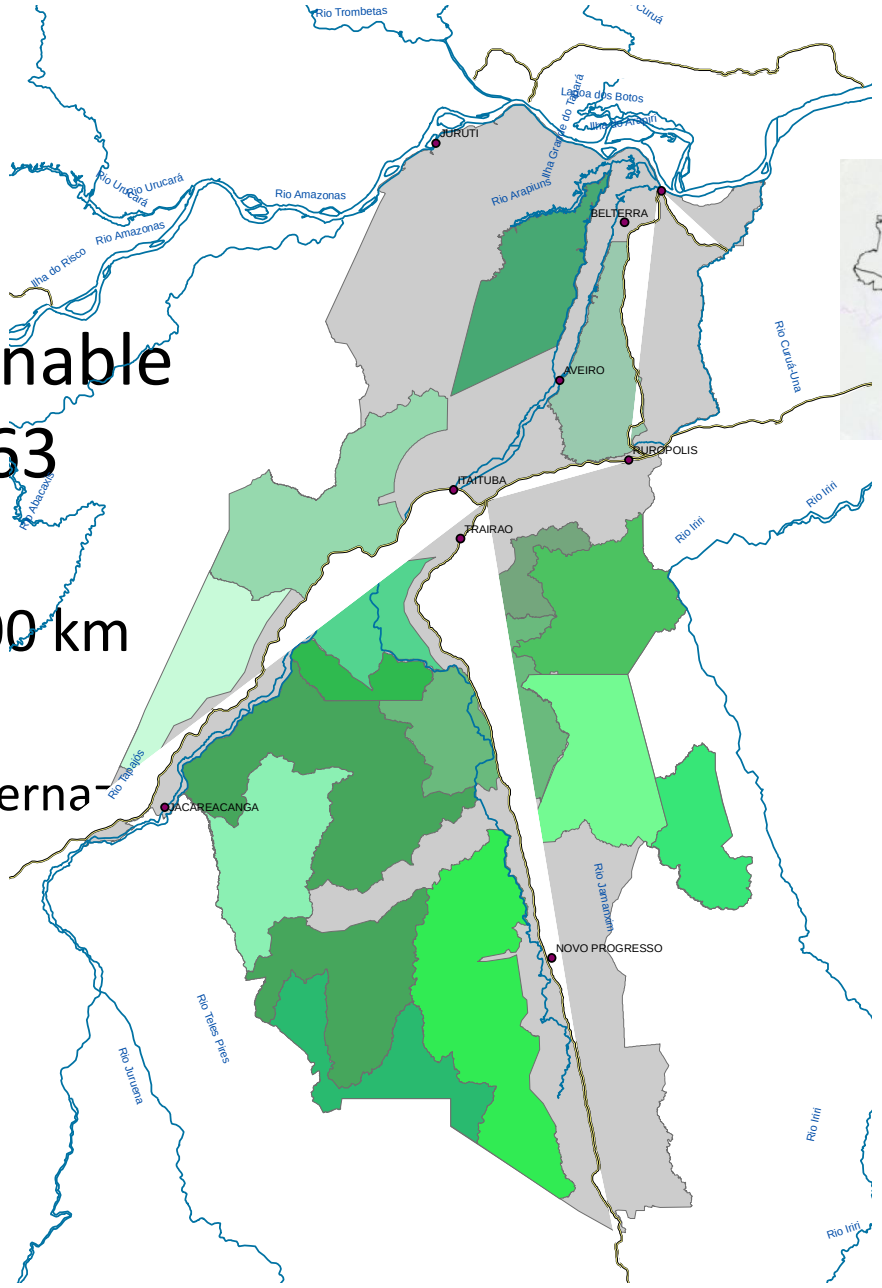
(4) Modularity



Evaluation of the Sustainable Forest District BR-163

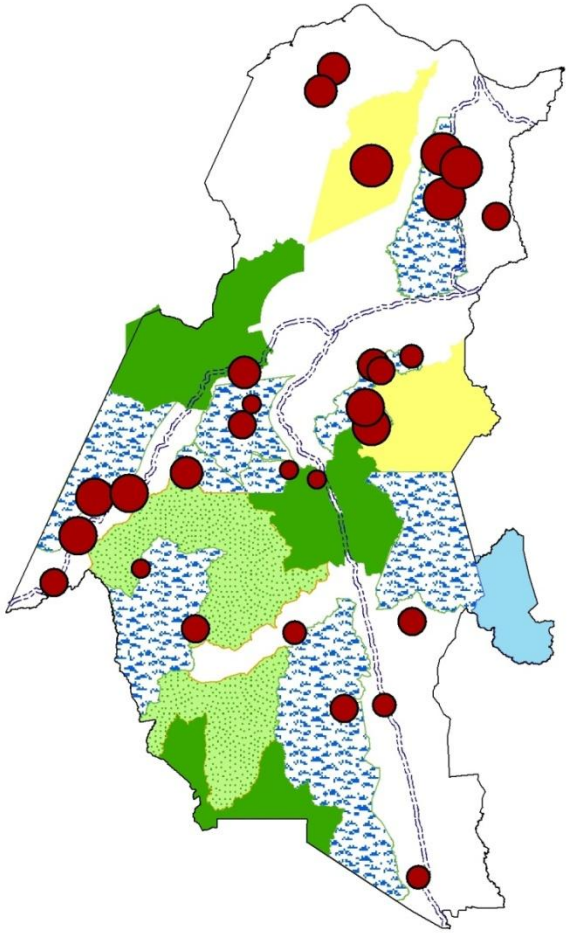
30 módulos sobre 600 x 200 km

Project coordinated by Ana Alberna

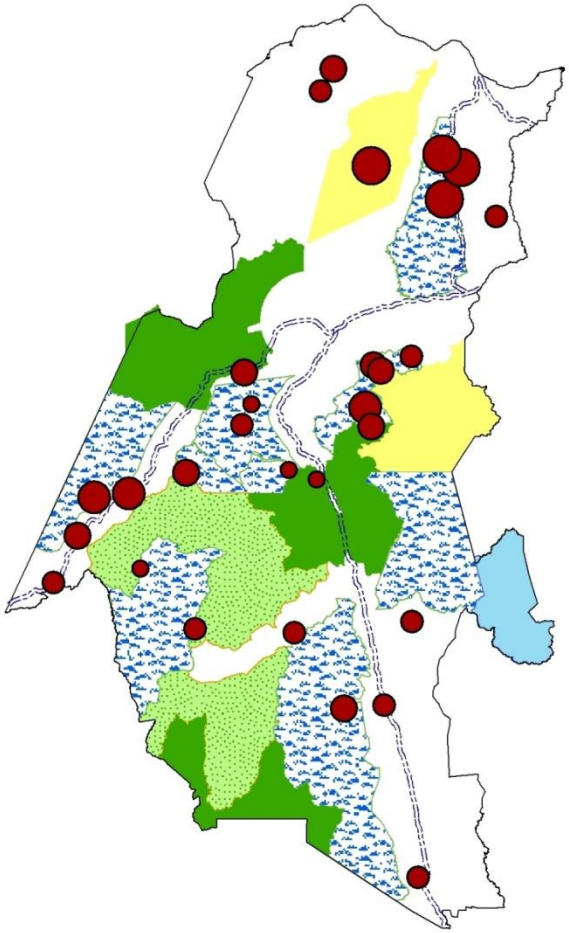


Wood Potential

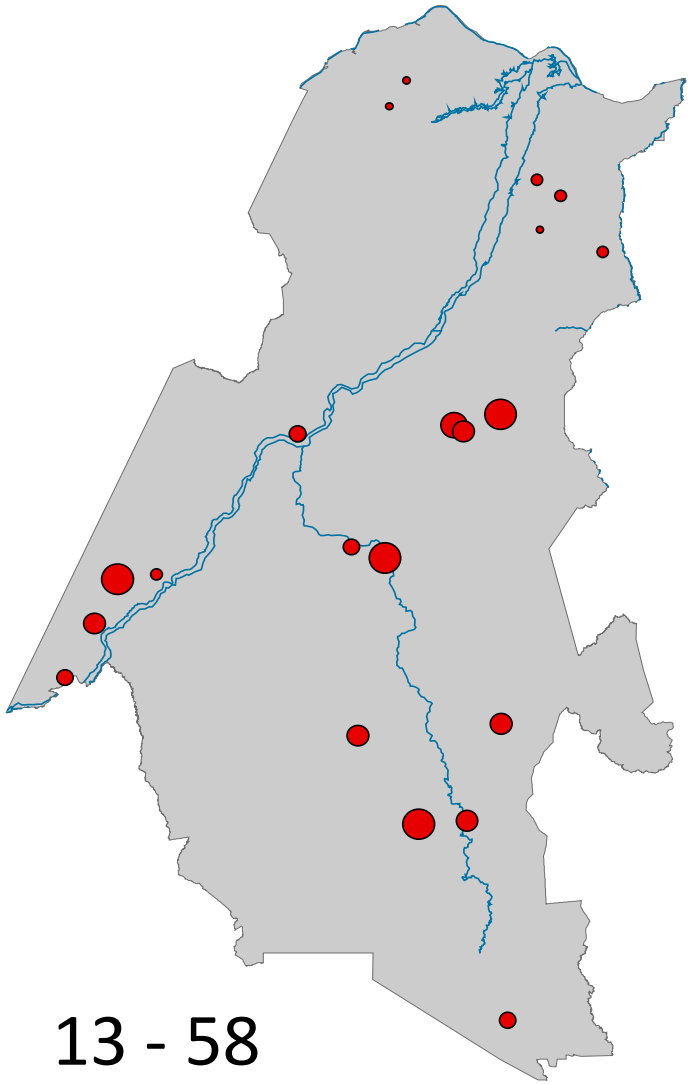
basal area (m^2/ha)



Wood Volume (m^3/ha)

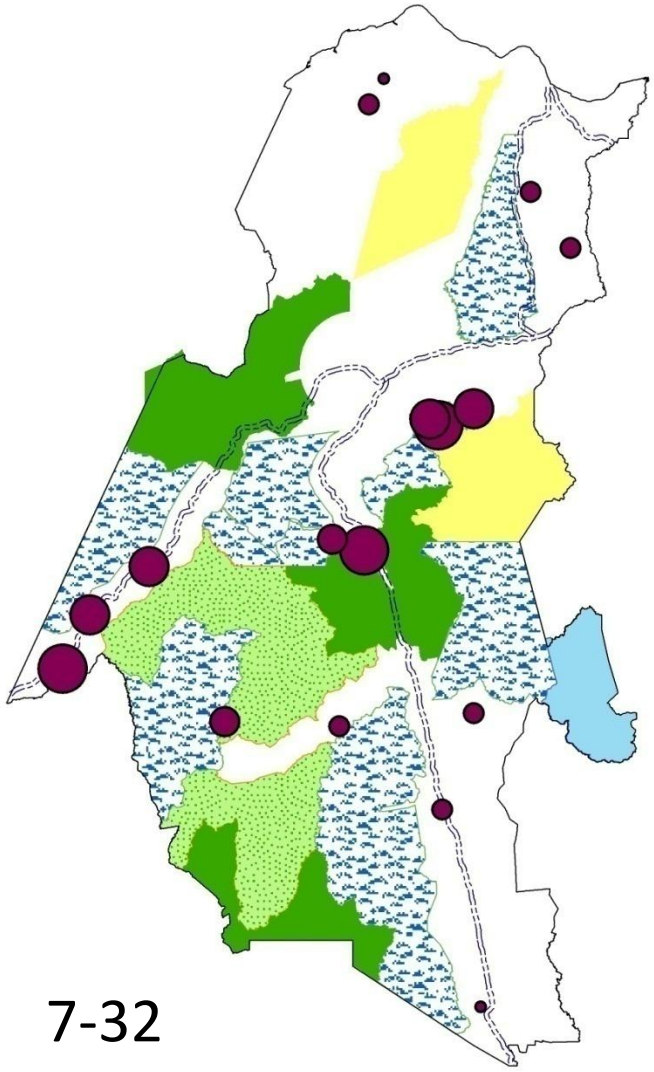


Herb Richness



13 - 58

Palm Richness



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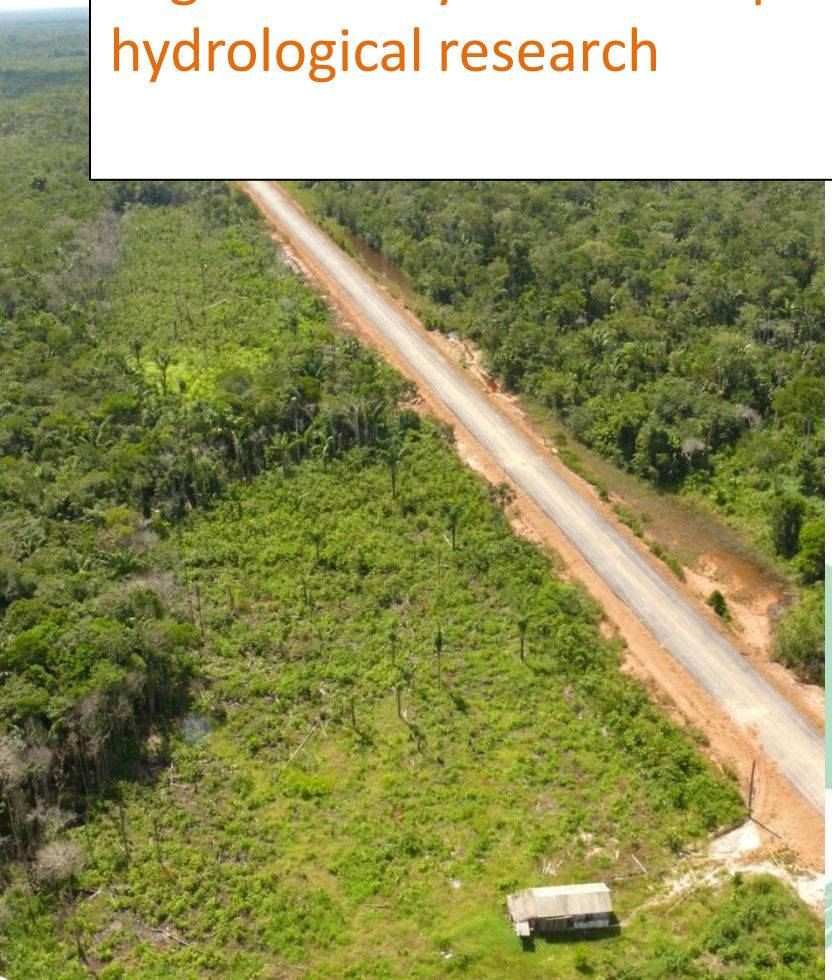
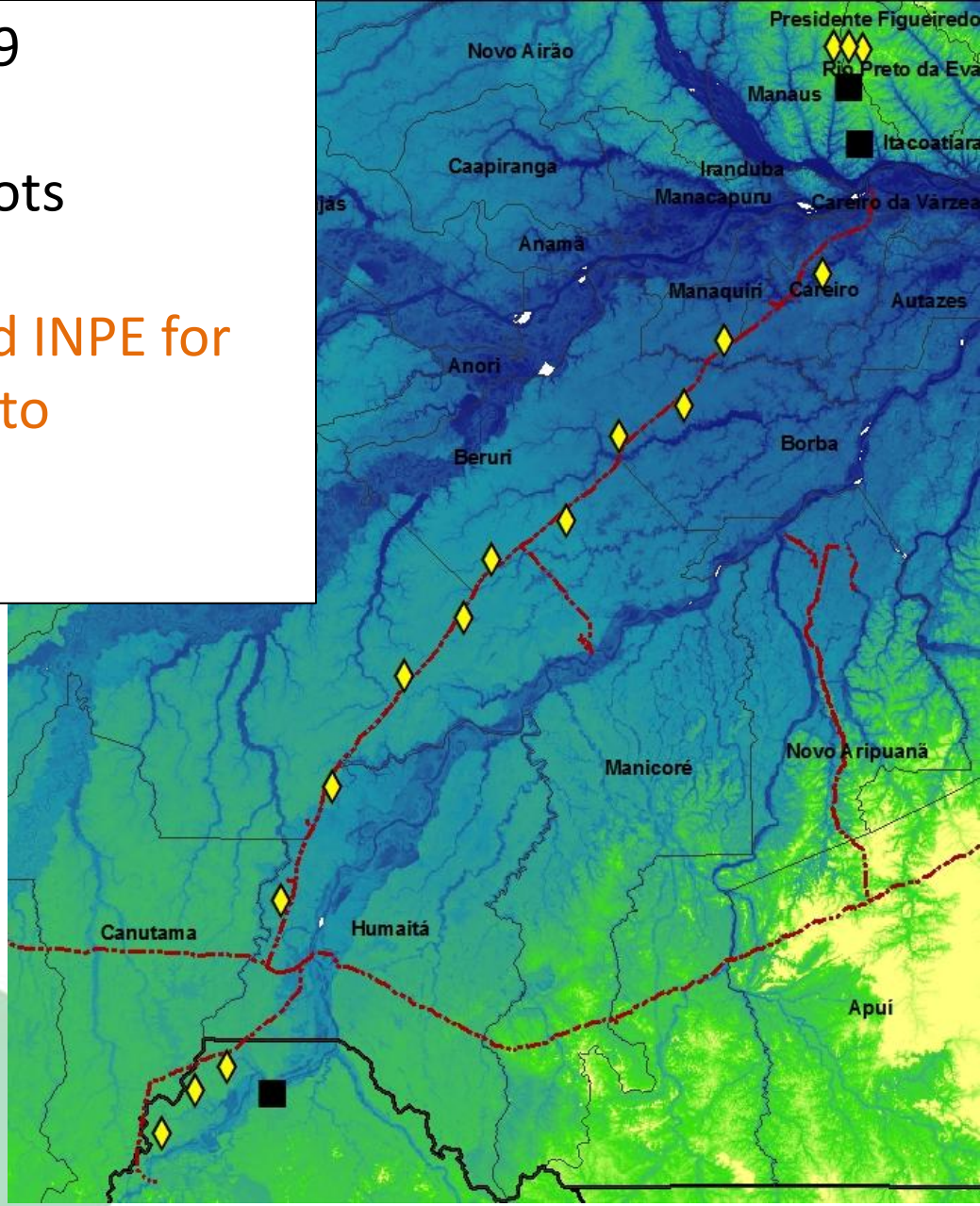
Ecohidrology project at BR 319

11 research modules – 110 plots

Partnership between INPA and INPE for vegetation dynamics coupled to hydrological research





(5) Compatibility with other iniciatives

TEAM:
Conservation International

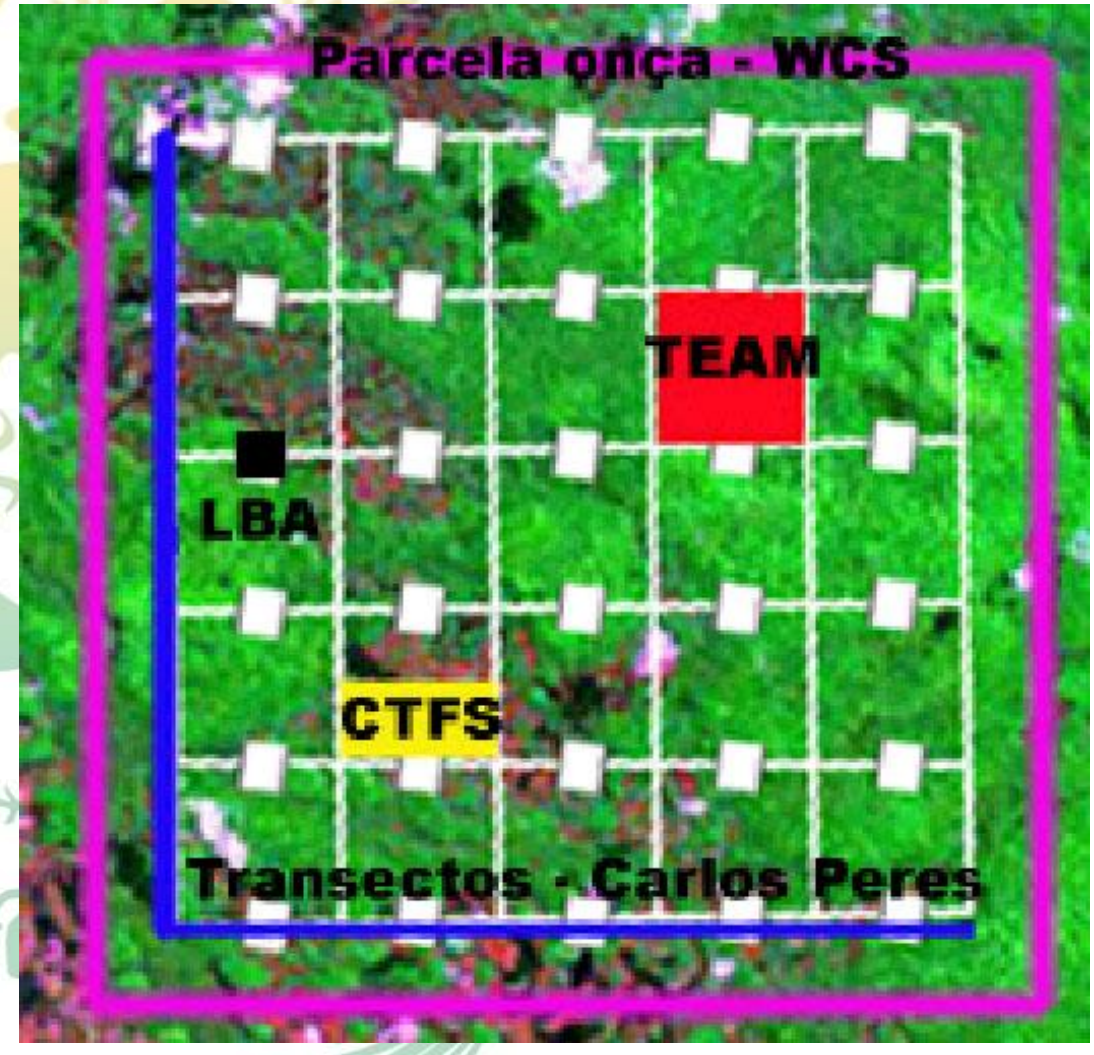
100 ha

CTFS:
Smithsonian

50 ha

LBA: NASA

<50 ha



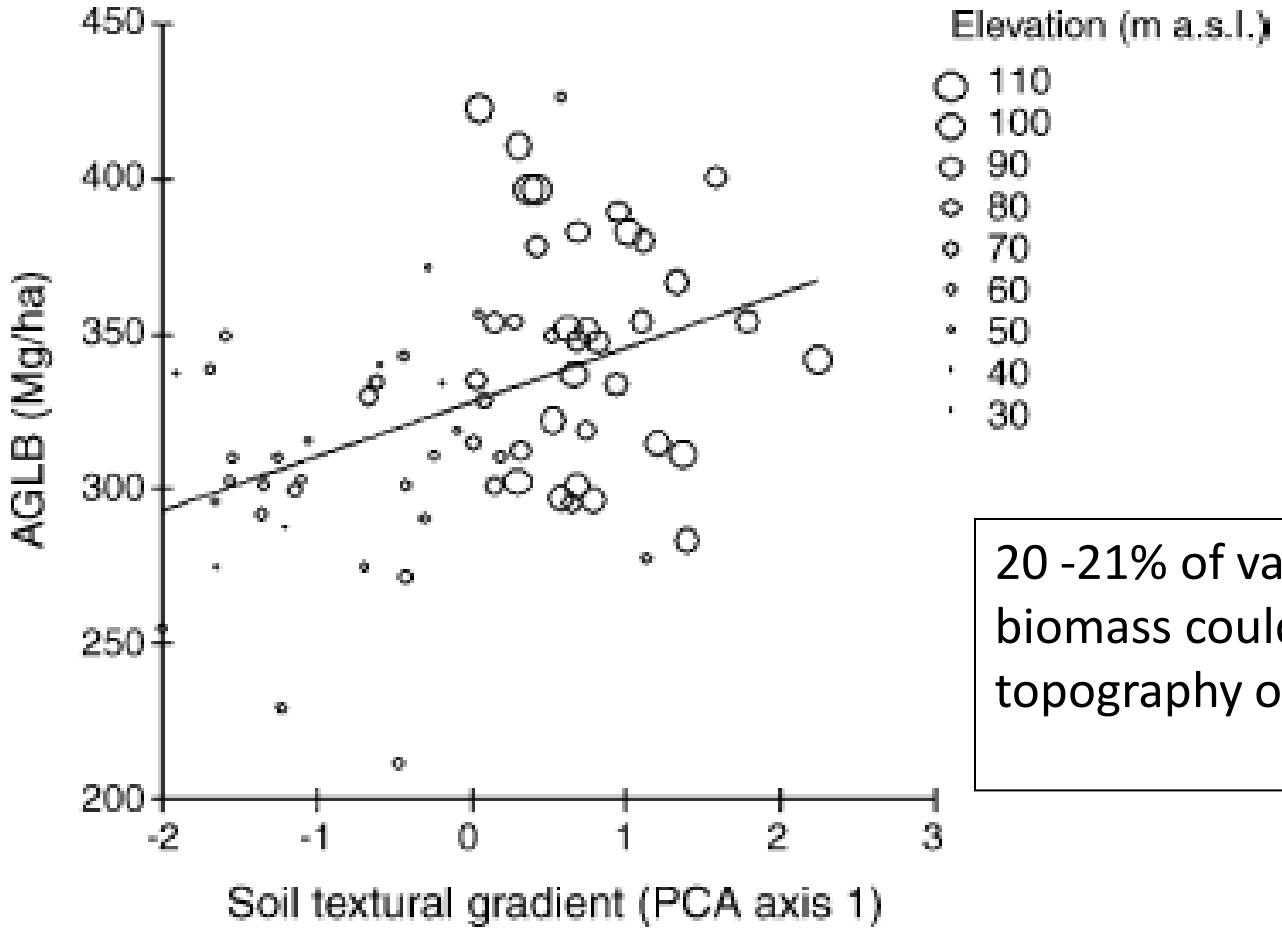
Mammal Transects:
Carlos Peres
UNIVERSITY OF EAST ANGLIA **UK**

WCS: Wildlife Conservation Society

Jaguars: 3,600 ha

Long- Term Studies

Biomass x soil/topography

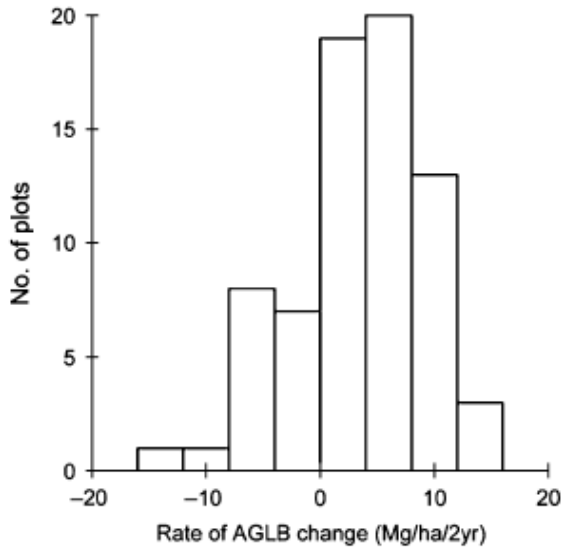


20 -21% of variation in biomass could be predicted by topography or soil

C.V. de Castilho et al. / Forest Ecology and Management 234 (2006) 85–96

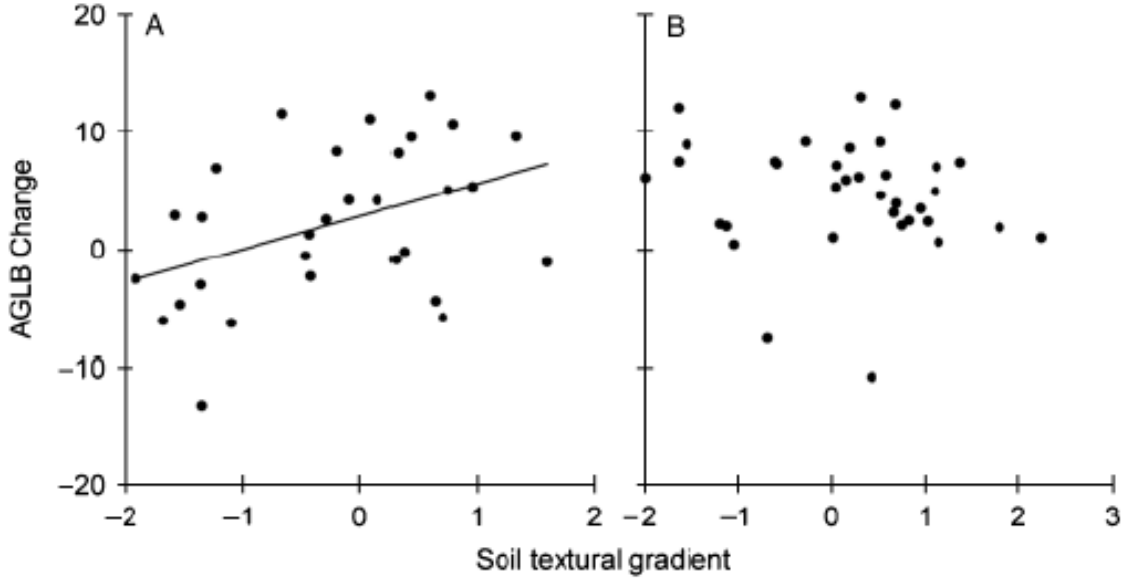
Biomass change

The relationship with soil depends on the time period



2001-2003

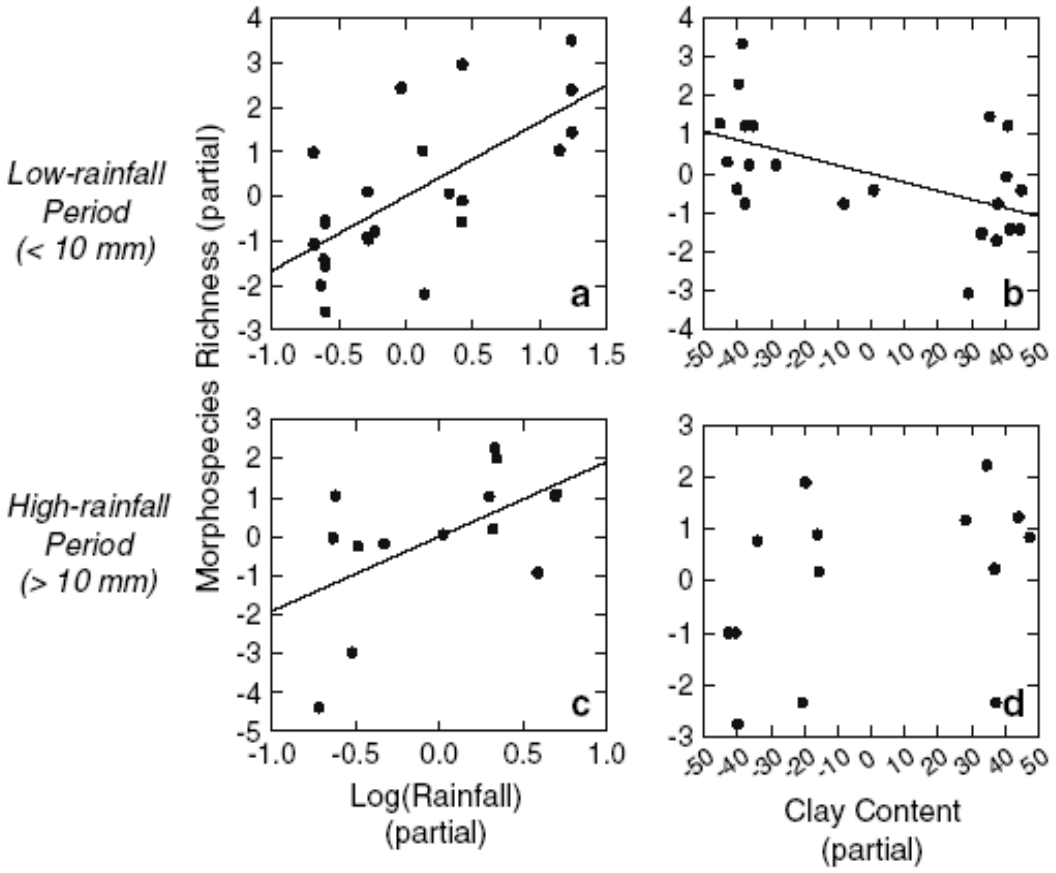
2002-2004



While, on average, plots gained around the same amount of biomass already shown in other studies, in rainy years sandy plots lost biomass while clayey plots gained.

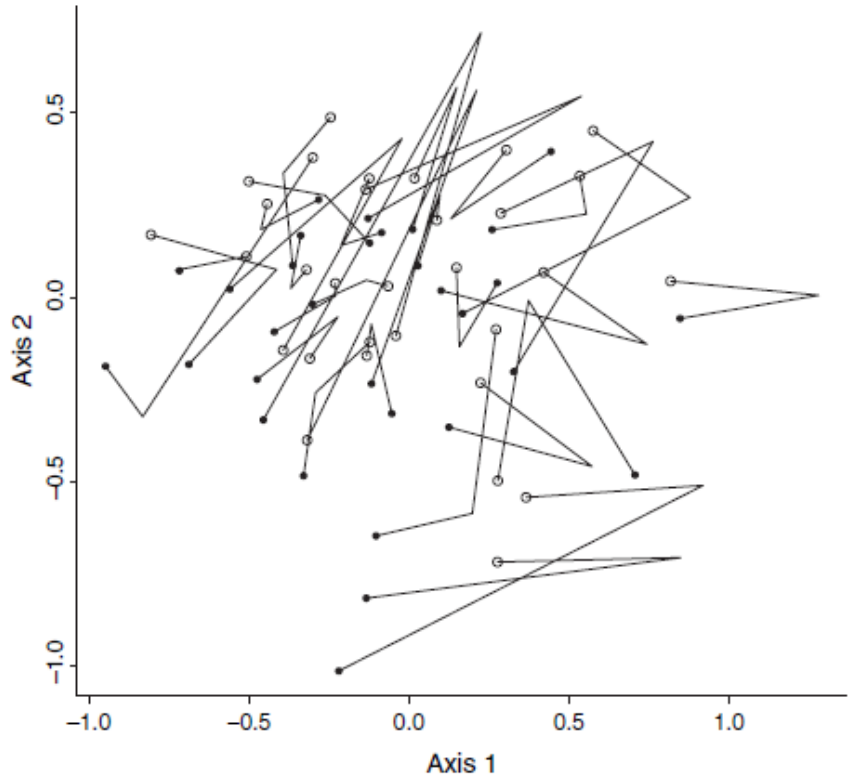
Castilho et al. Biotropica 2010

Temporal variation in the litter-fungi community at Reserva Ducke



The relationship between fungal richness and soil conditions changes seasonally

Seasonal Fish-community change in small streams

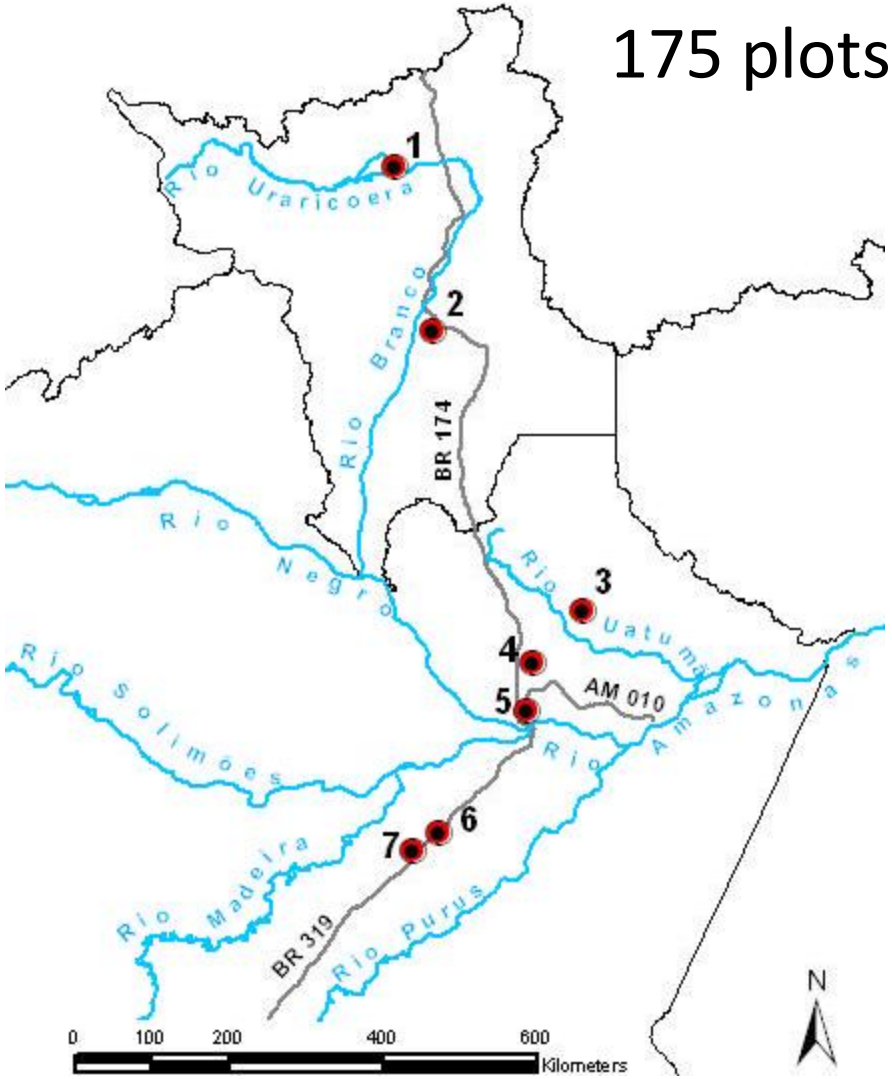


The fish community in the forest small streams changes seasonally in a predictable pattern, possibly due to the migrations between streams and marginal pools

Espírito-Santo et al. Freshwater Biology 2008

Large Scale Studies

Species X Environment Relationships at the large scale – Herbs (Zingiberales)

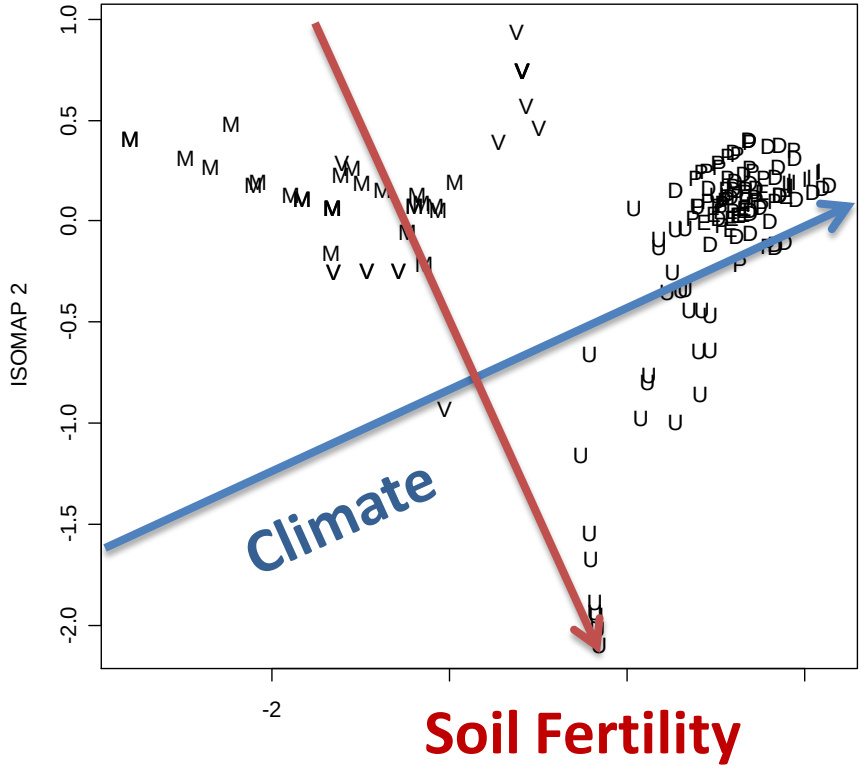


175 plots distributed over 800 km

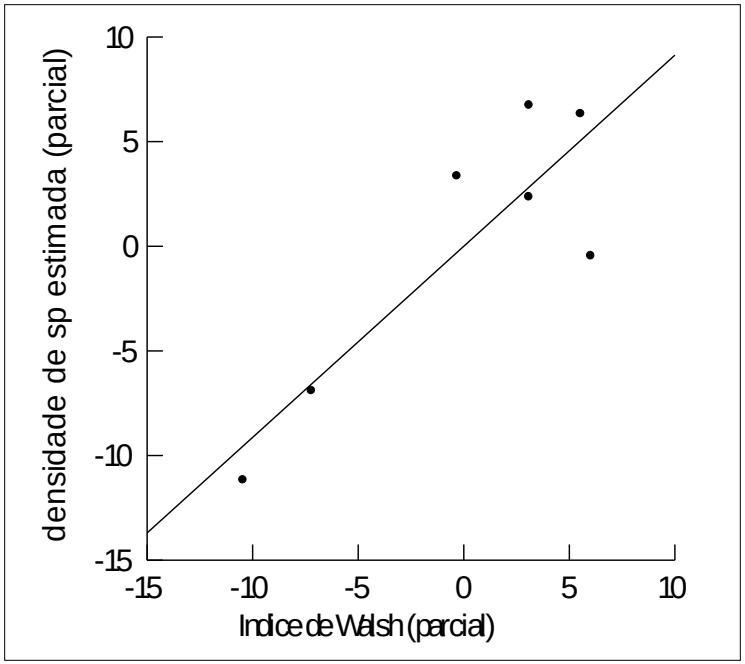
Dissertação de Fernando Figueiredo - INPA

Species X Environment Relationships at the large scale – Herbs (Zingiberales)

Composition

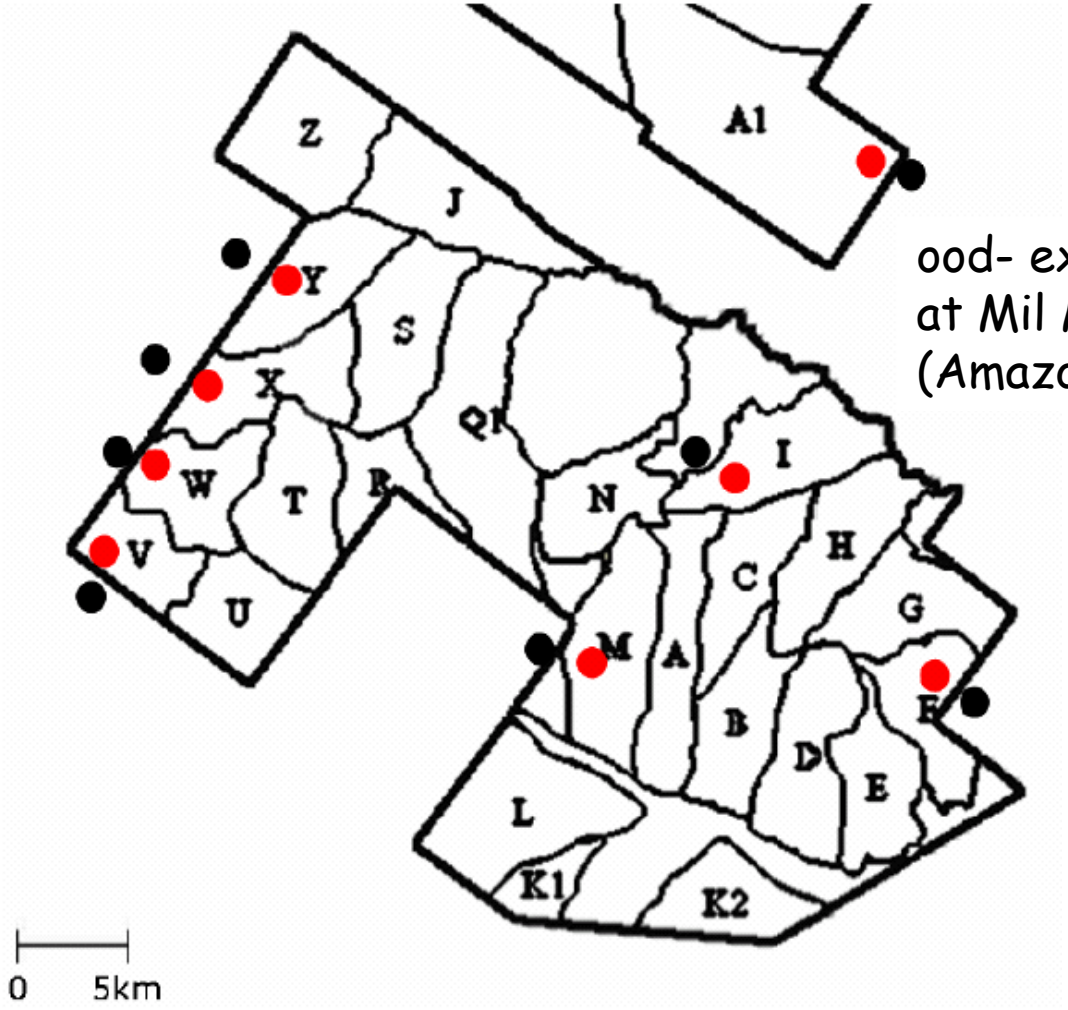


Richness



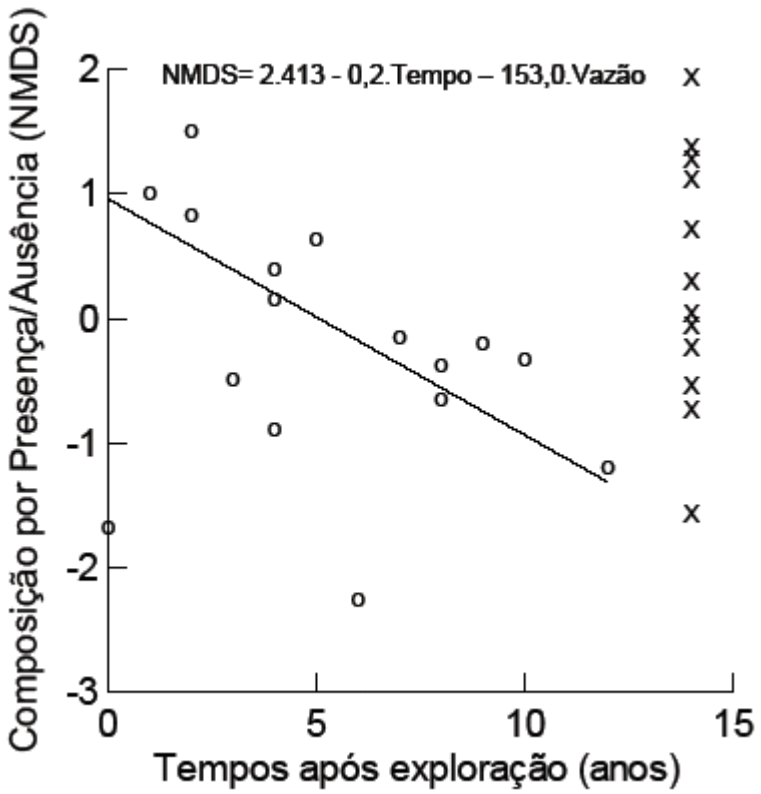
At the large-scale, Herb composition is related to climate and soil fertility, but alfa-diversity (richness) is only related to climate

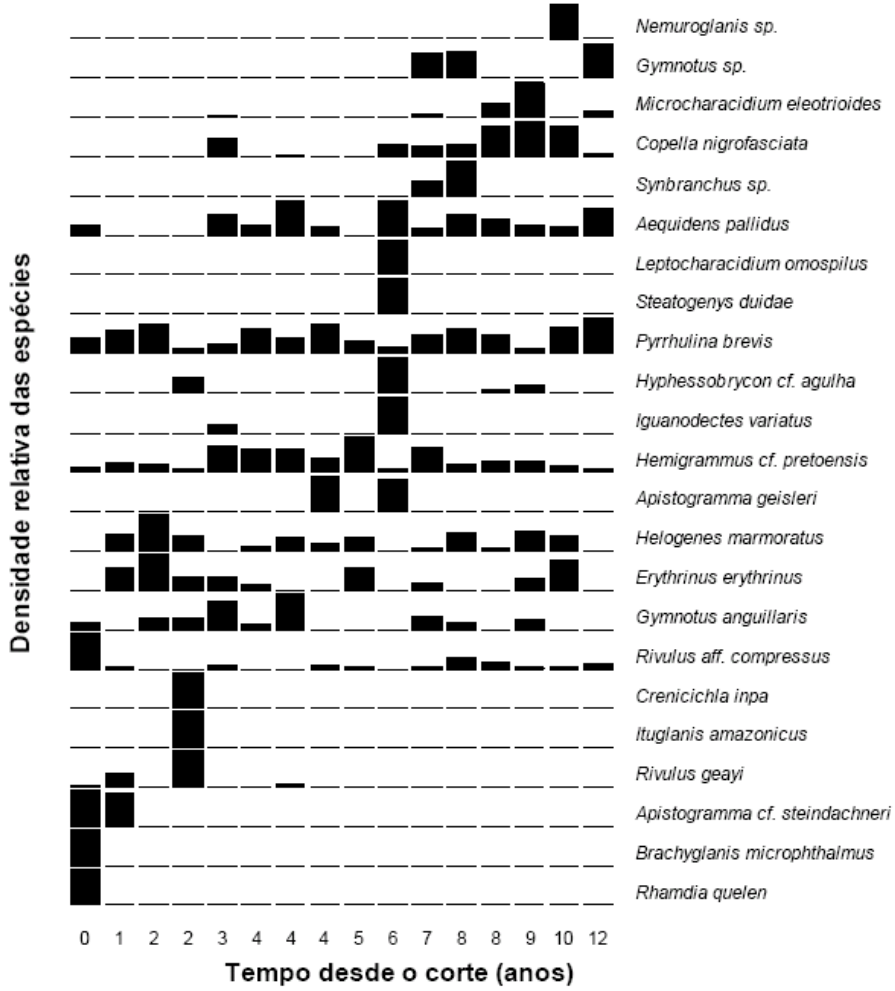
Environmental impact studies:
The impact of selective logging on fish-community



ood- exploitation areas
at Mil Madeireira
(Amazonas)

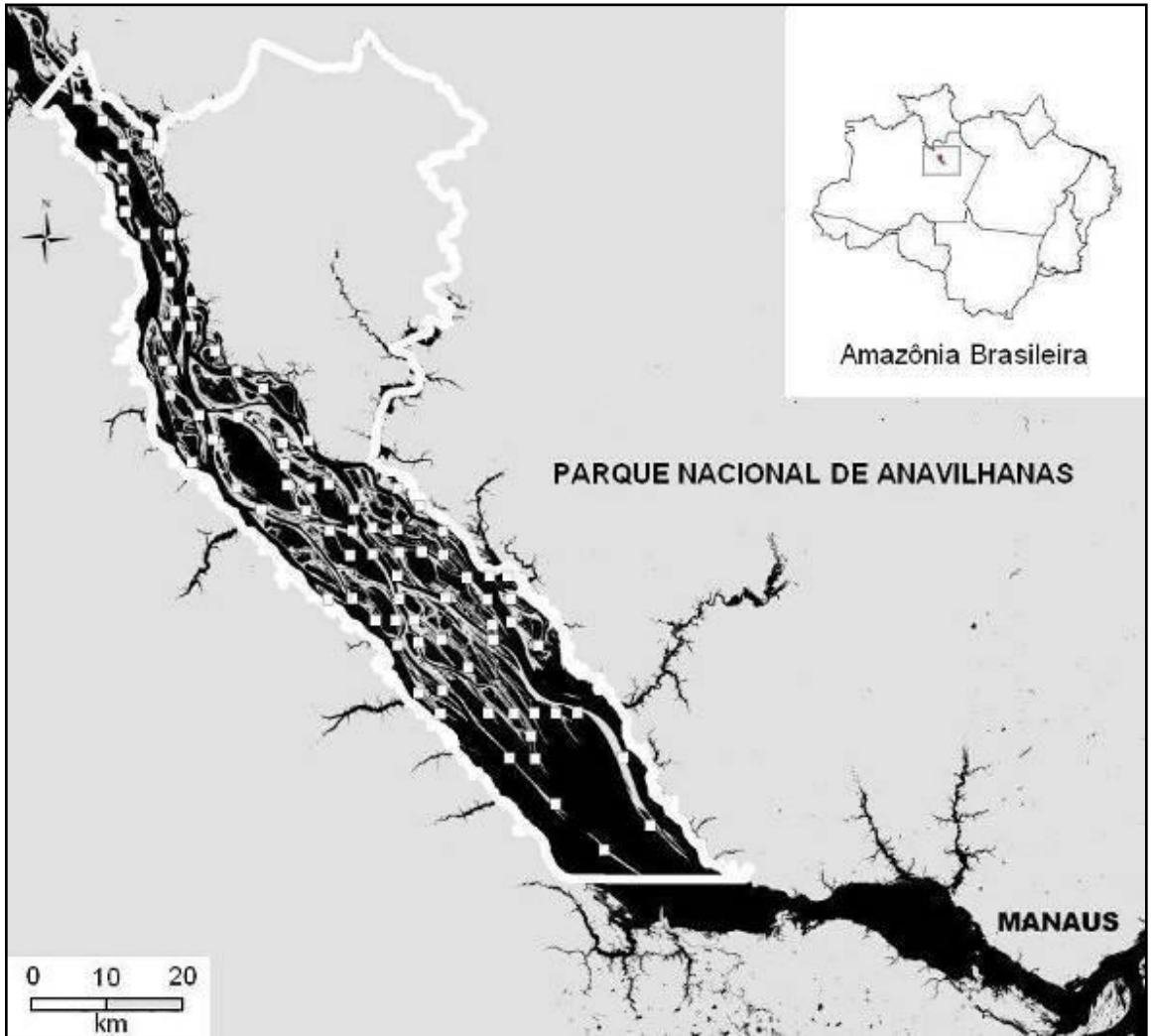
There was a continuous change of fish community along time after logging, with no tendency to return to the original composition.



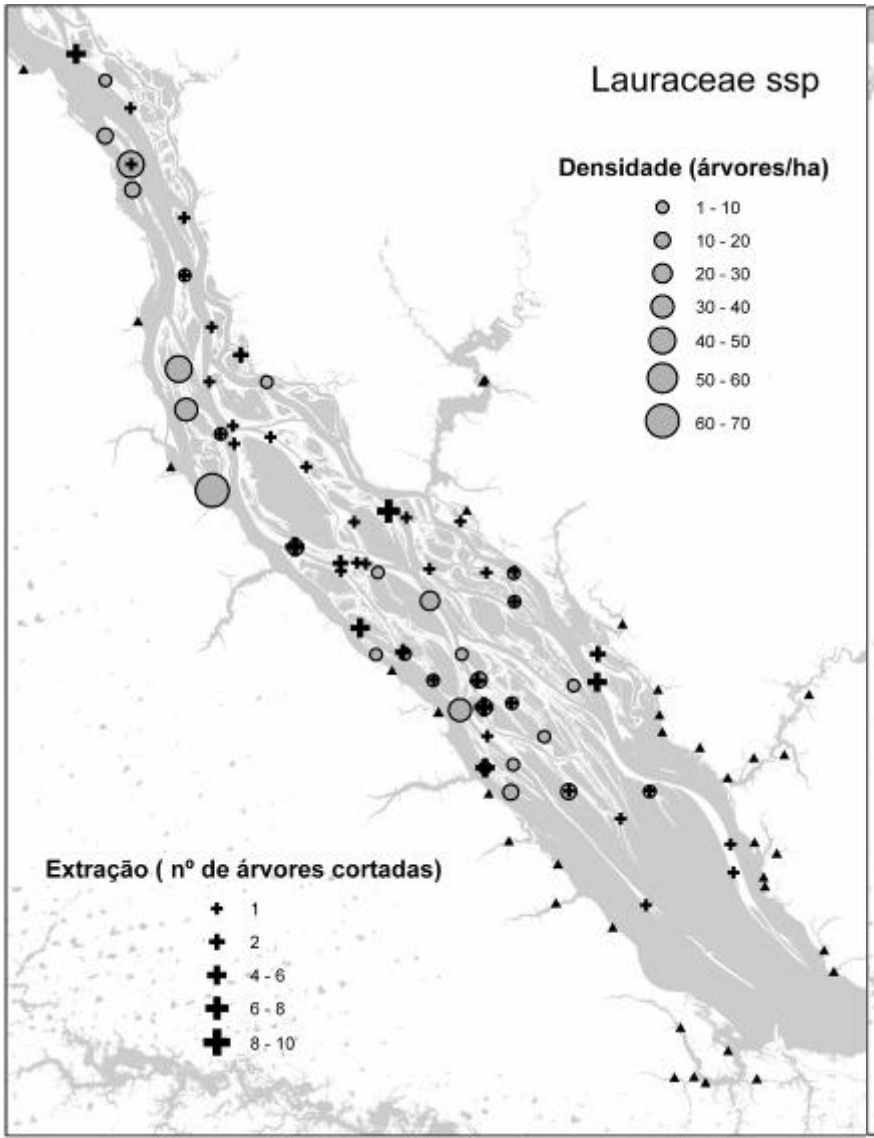


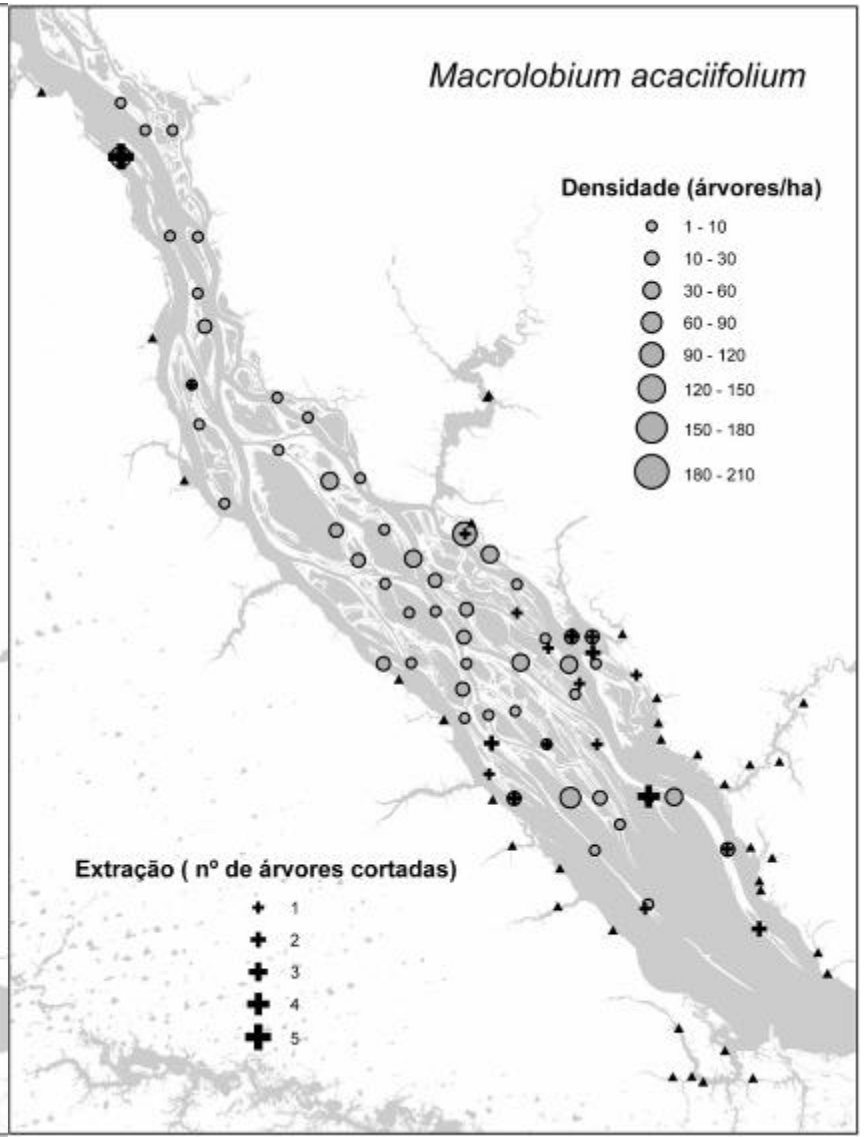
Environmental impact studies: Impact of ilegal wood extraction at the Anavilhanas Archipelago

Disertação de mestrado de Andressa Scabin - INPA



High-valued species are explored over the entire archipelago, while low-valued species are explored close to the human concentrations





(7) Make data available quickly

- Data collected under PPBio is public
- Data and metadata are freely assesible through internet

Metadata are essential to data management

Metadadta describe data and how they were collected.

They should be made available as soon as possible, to allow other researchers to know what is being studied and where.

PPBio uses the Ecological Metadata Language (EML), which is also used by LTER

Metadados Herpetofauna Esec Maracá

Título: Efeitos dos Fatores Bióticos e Abióticos nas Comunidades de Serpentes e Lagartos na Esec – Maracá

Responsáveis

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Endereço:
Coordenação de Pesquisas em Ecologia – CPEC
Instituto Nacional de Pesquisas da Amazônia – INPA

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Oportunidade no Programa de Monitoramento de Médios e Grandes Mamíferos - UNIR
2010-05-31

I Curso de Capacitação e Integração em Projetos de Biodiversidade - PPBio e CENBAM
2010-05-29

Núcleo Regional Angatuba realiza workshop interno
2010-05-21

Bolsista PPBio faz palestra em ciclo de seminários do PDBFF
2010-05-07

Seminário sobre o Monitoramento de Impactos sobre a Biodiversidade em áreas de Concessões Florestais

Metadados Herpetofauna Esec Maracá

Título: Efeitos dos Fatores Bióticos e Abióticos nas Comunidades de Serpentes e Lagartos na Esec – Maracá

Responsáveis

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Resumo:
O projeto em questão busca gerar informações sobre ecologia de comunidades de serpentes e lagartos, com o intuito de contribuir para o conhecimento sobre biodiversidade da Unidade de Conservação Estação Ecológica de Maracá, RR.

Coordenadas Geográficas:
Oeste: -61.4869
Leste: -61.4599
Norte: +3.4073
Sul: +3.3866

Abrangência Temporal:
Setembro de 2006 a setembro de 2007.

Métodos de Coleta dos Dados:

Foi realizada coleta de dados se nas parcelas presentes na grade do PPBio na ESEC Maracá, num total de 30 parcelas. Dois métodos principais foram aplicados para lagartos e serpentes: 1) Transecto de amostragem visual, uma combinação do método de levantamento por encontros visuais e do método de contagem pontual; e 2) Procura ativa (removendo liteira, procurando debaixo de troncos, etc.) nas parcelas em transectos de 1x250m. Também foram coletados dados através de encontros ocasionais. Para estimar a composição da comunidade de presas foram utilizadas armadilhas de queda com isca em cada uma das parcelas.Os dados referentes aos fatores bióticos e abióticos foram disponibilizados por outros pesquisadores através do Programa PPBio.

Arquivos de Dados:

- Herpetofauna Maracá.pdf (melhor para visualização)
- Herpetofauna Maracá.csv (melhor para importação em planilha de dados)
  número de registros: 30
- Disponibilidade de Presas.pdf (melhor para visualização)
- Disponibilidade de Presas.csv (melhor para importação em planilha de dados)
  número de registros: 30

Informações sobre as tabelas de atributos:

Herpetofauna Maracá

Nome do Atributo: TRILHA

Definição: Identificador da TRILHA na qual os dados foram coletados

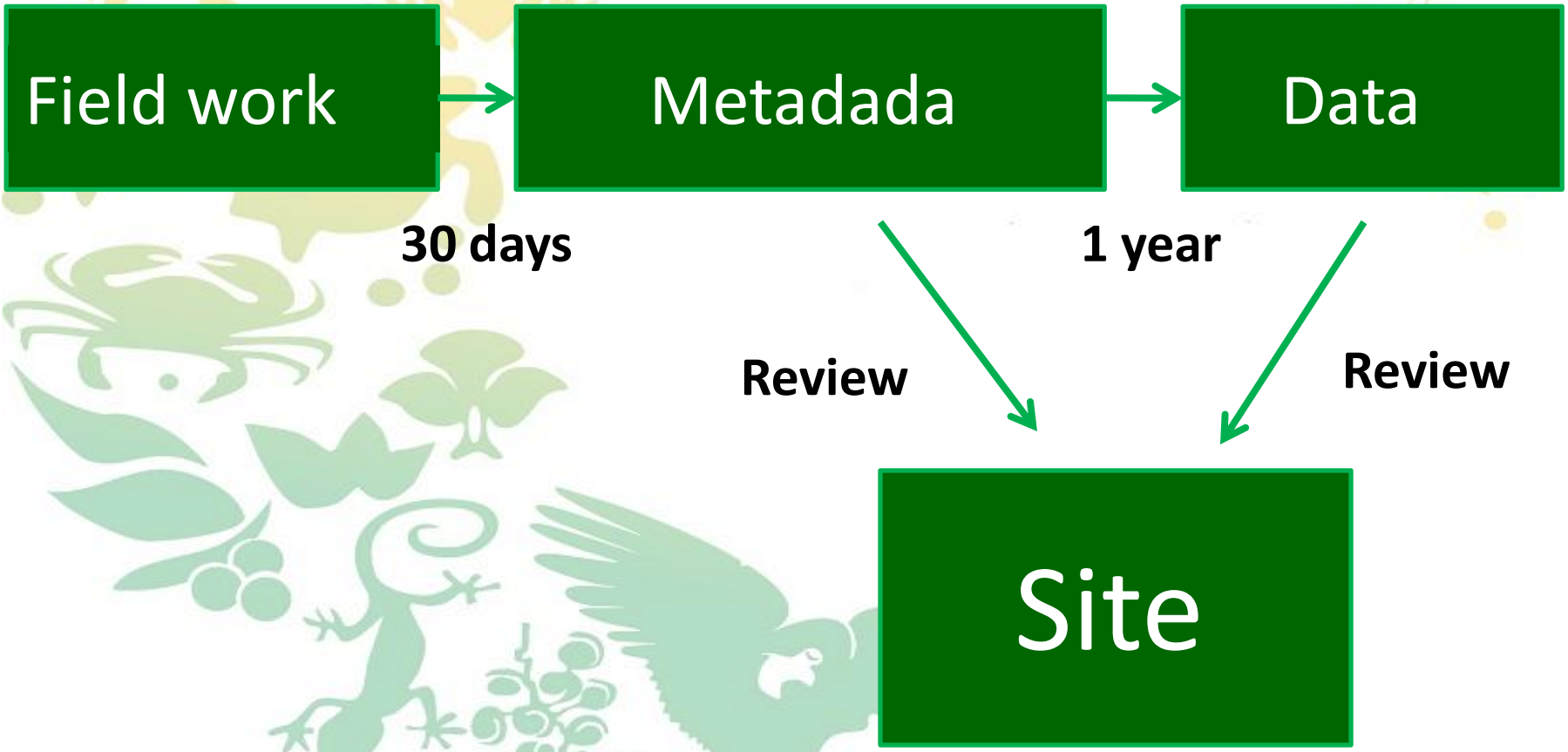
Nome do Atributo: PARCELA

Definição: Identificador da PARCELA na qual os dados foram coletados

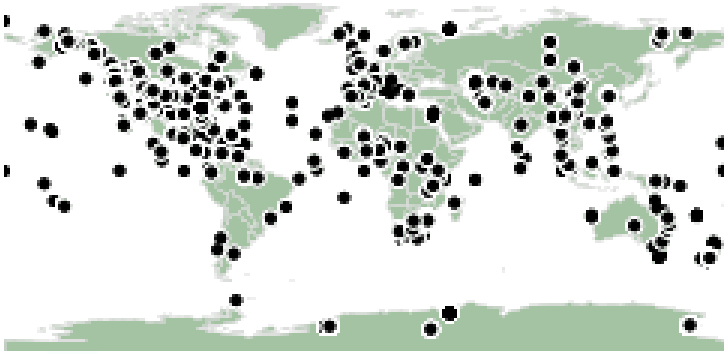
Nome do Atributo: A. ame

Definição: Número de indivíduos da espécie *Ameiva ameiva* amostrados na parcela

Data flow - How it works today



Knowledge Network for Biocomplexity (KNB) http://knb.ecoinformatics.org/



- Morpho: a tool to create, administrate and share metadata.

Meta Cat

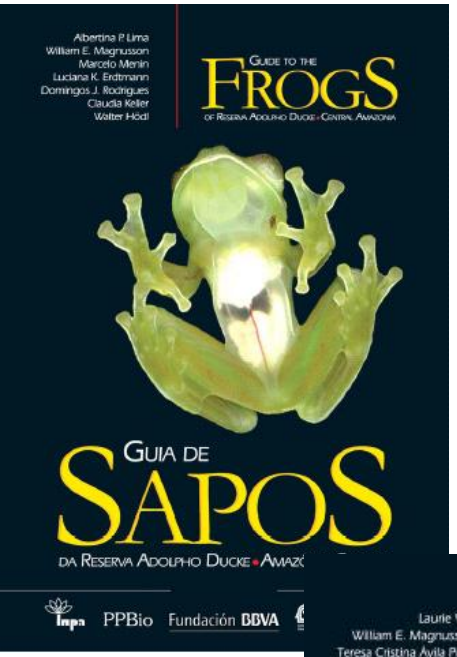
- Metacat : a tool to store, browse and recover data

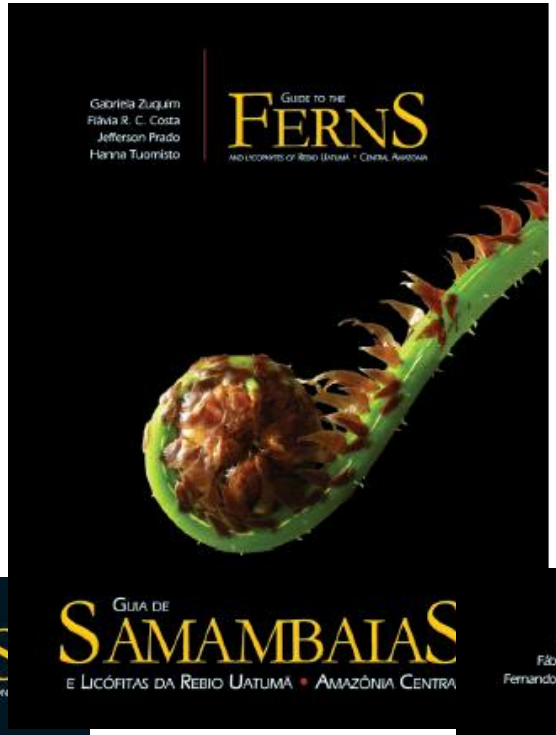
Integration & Synthesis

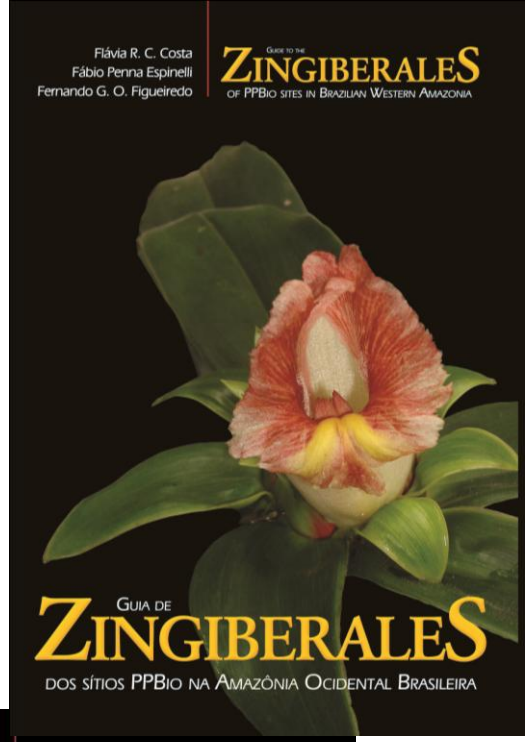
- Annual meetings to share results among regional hubs

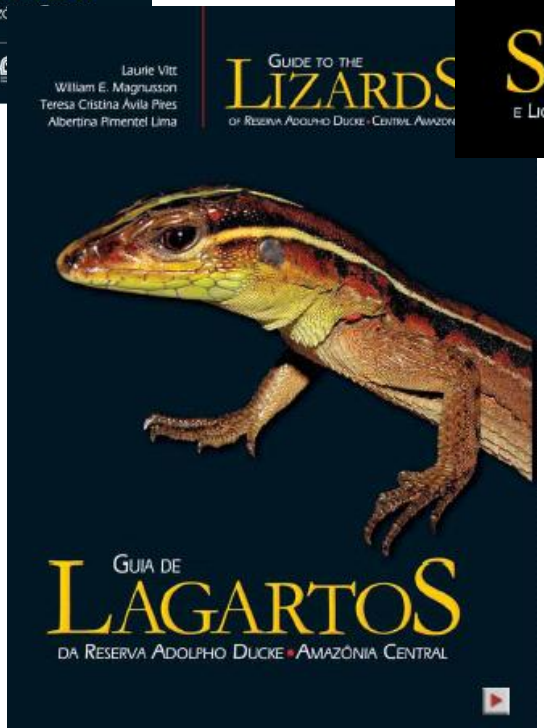
- Workshops for analysis & writing of papers
  - I workshop on vegetation studies in 2009 had 8 researchers and produced 3 papers
  - II workshop on vegetation studies in 2010 will have 18 researchers and the potential for 7 papers

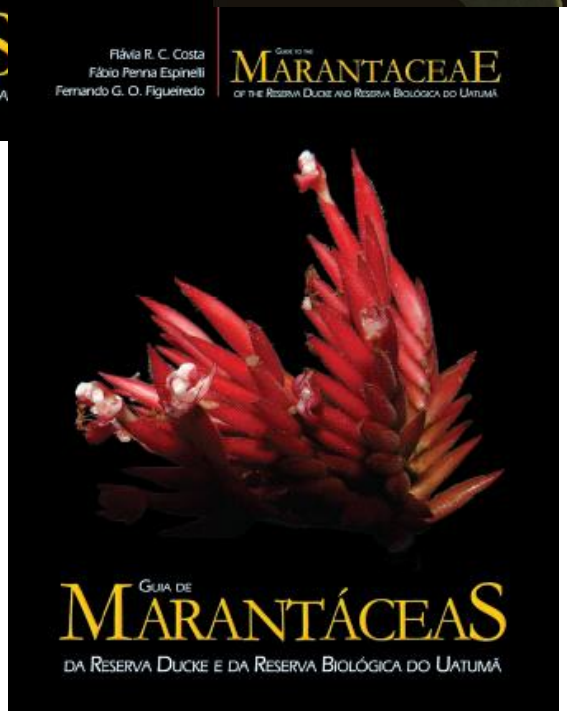
Field Guides











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The Need for Large-Scale, Integrated Studies of Biodiversity – the Experience of the Program for Biodiversity Research in Brazilian Amazonia

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Mais informações:

http://ppbio.inpa.gov.br