

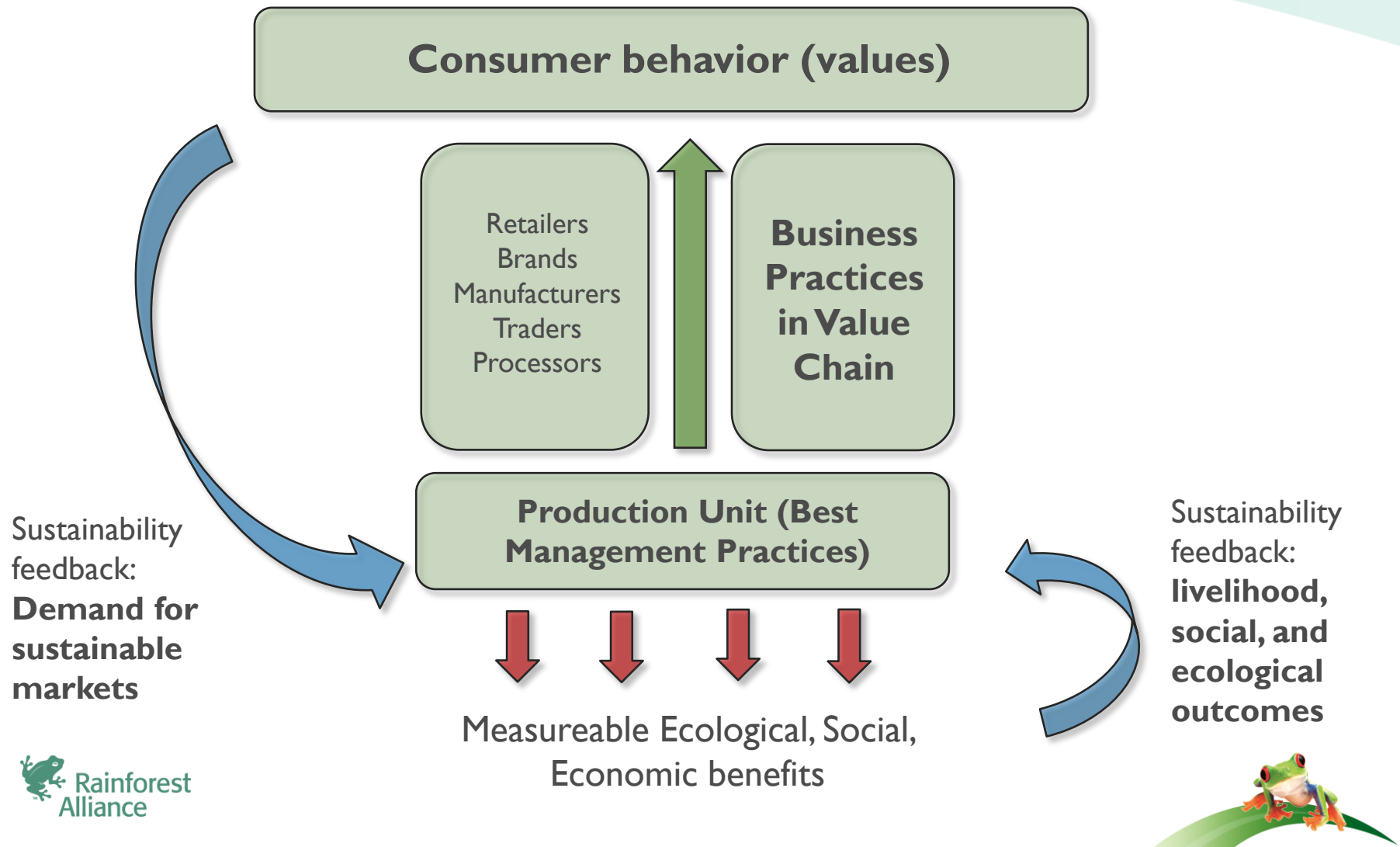
# Biodiversity Impacts of Improving Practices on Existing Production Areas: Methodological Considerations for Evaluating Eco-Certification

Elizabeth T. Kennedy, Rainforest Alliance

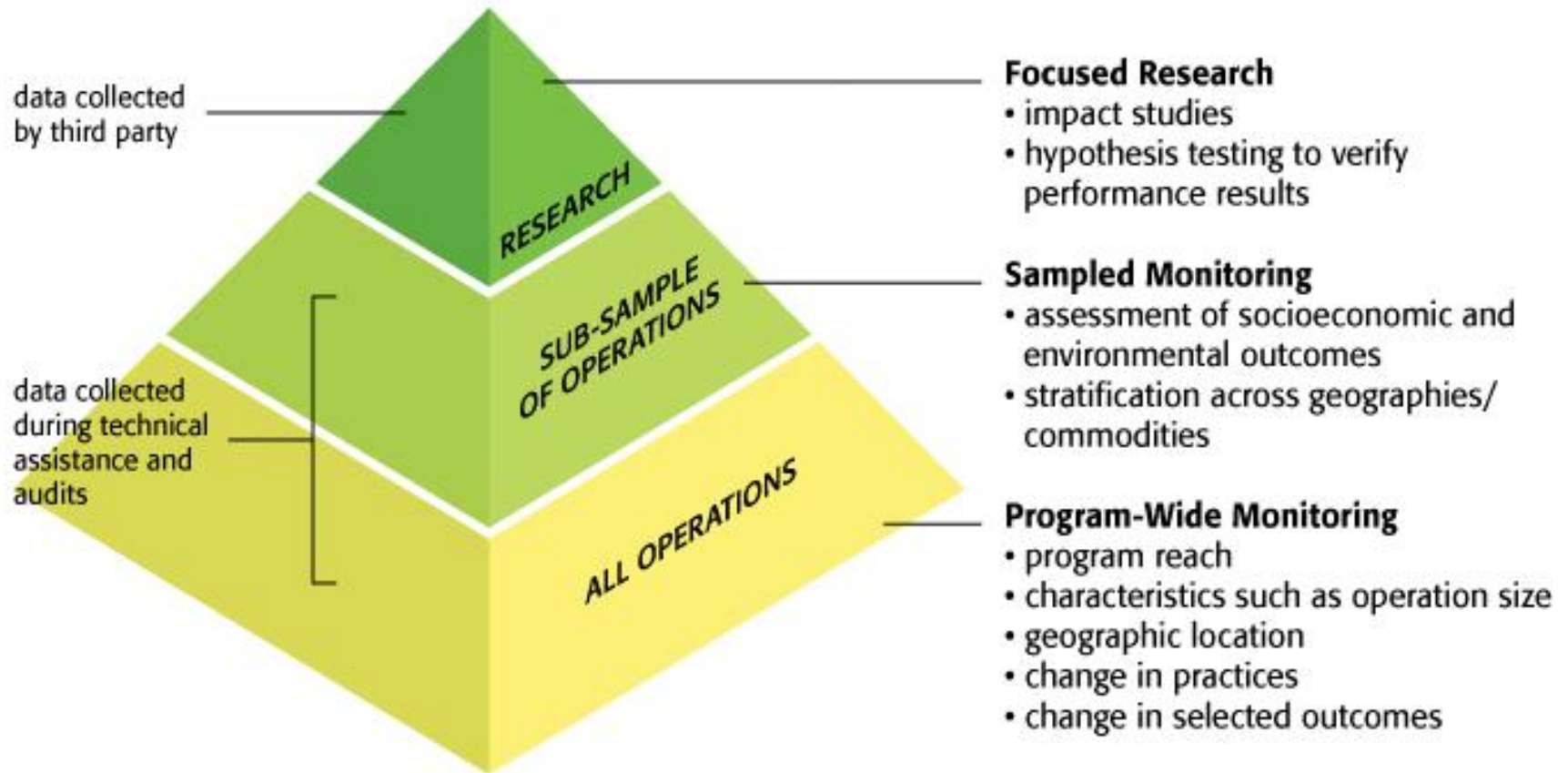
IAIA, February 7, 2013



# EVALUATION AND RESEARCH MODEL

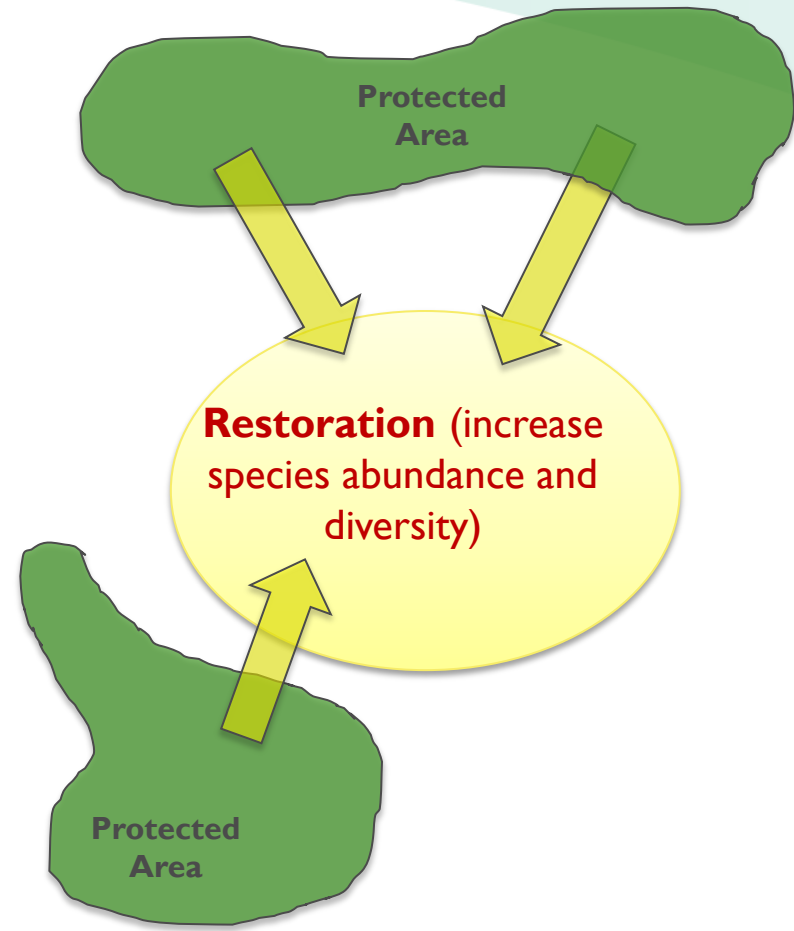


# APPROACH TO ASSESSING RESULTS



# ON-OPERATION IMPACTS

- Our programs minimize negative environmental impact through the requirements of our standards (FSC, SAN, Sustainable Tourism), for example:
  - agrochemical restrictions (Ag)
  - seed tree retention (Forestry)
  - ban on sale of wildlife products (Tourism)



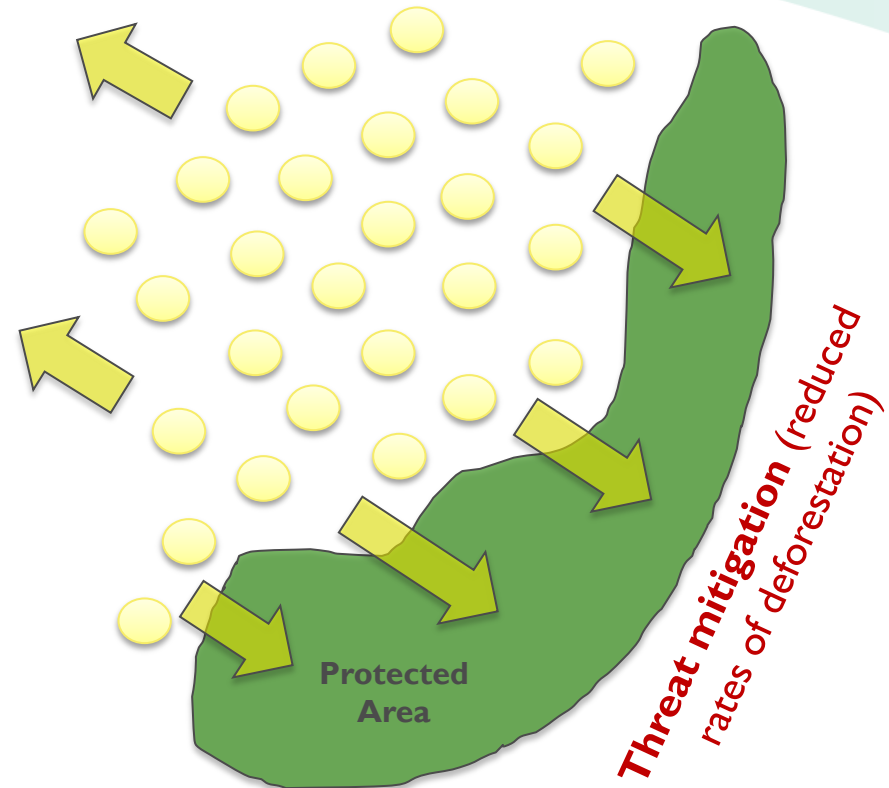
# A SAMPLE OF RESEARCH QUESTIONS

- What size farm will generate measureable biodiversity on-farm benefits? Does this differ for commodity / geographically?
- Do technical assistance and certification lead to the increased adoption of practices? (or is it just the ‘low hanging fruit’ – i.e. ‘good’ operations – who work with us?) Across large groups of smallholders is there variability in the adoption?
- How do our standards put in enabling conditions for REDD+ and other PES? Are there governance and benefit distribution models that will make REDD+ work for community forestry operations and smallholder farmers?
- Do improved productivity and household conditions help mitigate threats to biodiversity?



# OFF-OPERATION IMPACTS

- Our standards also minimize negative impact on neighbors, by, for example:
  - suppressing fires
  - preventing encroachment
  - monitoring invasive species



# SOME RESEARCH QUESTIONS

- Does technical assistance spread to neighboring farms/communities? (Colombian coffee studies – when we found no difference for some variables farmers were not surprised because they knew their non-certified neighbors were now implementing the same practices)
- Does improving livelihoods on small ownerships decrease encroachment into neighboring areas (and therefore contribute to off-farm biodiversity conservation on small farms where on-farm biodiversity conservation possibilities are minimal) (Tai National Park – seems to be the case)
- Are there spatial and temporal thresholds above which larger-scale landscape impacts on water quality, biodiversity, carbon, etc are possible? (we're using the Natural Ecosystem Assessment to look at this)



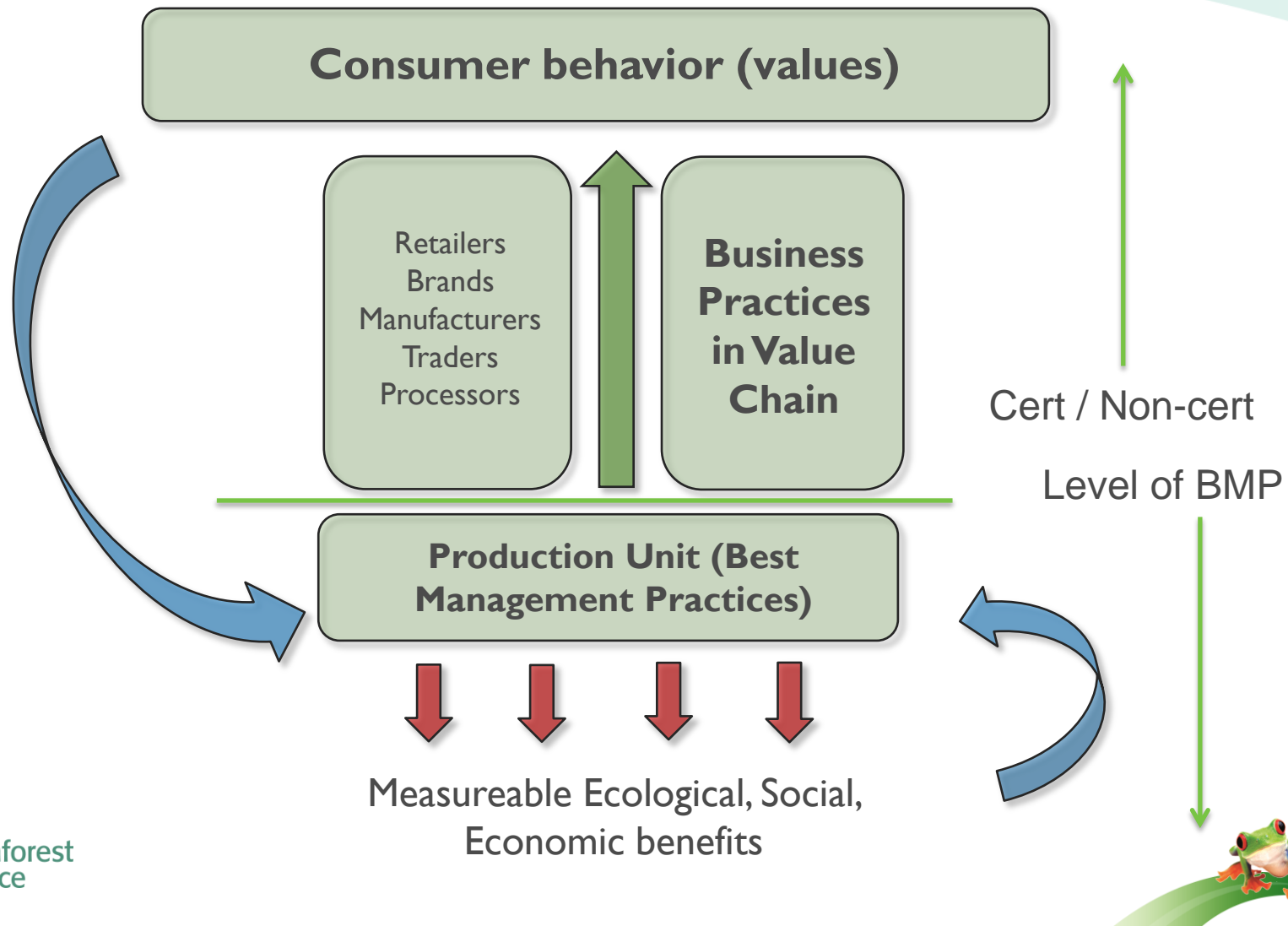
# METHODOLOGICAL CONSIDERATIONS

- Unbundling certification
- Constructing a credible counterfactual





# EVALUATION AND RESEARCH MODEL



# EVALUATION OF INTERVENTIONS NOT BUSINESS MODELS

Unbundling certification to measure adoption of best management practices (BMPs).



Gains us a more nuanced understanding of which management practices drive what economic, social or ecological outcomes, and under what conditions.

Informs learning and refinement of standards.

# CONSTRUCTING A CREDIBLE COUNTERFACTUAL

- A credible counterfactual must address **selection bias**, a problem that will violate assumptions when farms select themselves – or are selected by NGOs/traders – into certification.
- 2 approaches to eliminate selection bias
  - Experimental
  - Quasi-experimental.
- Each varies in feasibility, cost, the degree of clarity and scientific validity of results.

# EXPERIMENTAL DESIGN (OPTIMAL APPROACH)

- Involves gathering a set of farmers equally eligible and willing to participate in certification and randomly dividing them into two groups: those who receive the technical assistance (treatment group) and those from whom the intervention is withheld (control group).

Advantages	Challenges
Random assignment of farms serve as a perfect counterfactual, free from selection bias (assuming sufficient sample size).	Perhaps unethical and political owing to the denial of certification.
Simplicity in interpreting results as true impact — difference between the means of both groups.	Can be expensive and time consuming, particularly in the collection of longitudinal data points.  Farms in treatment or control groups may change certain identifying characteristics during the experiment that could invalidate or contaminate results.

# QUASI-EXPERIMENTAL DESIGN

- Consists of constructing a comparison group using matching comparisons. This involves identifying non-certified farms comparable in essential characteristics to certified farms. Both groups should be matched on the basis of very similar observable characteristics that plausibly affect outcomes
- Ideally matched comparison groups should be selected before project implementation, not afterwards.

Advantages	Disadvantages
Can draw on existing data sources and are thus often quicker and cheaper to implement	Reliability of the results is often reduced, as the methodology may not completely solve the problem of selection bias
	Matching methods can be statistically complex, thus requiring considerable expertise in the design of the evaluation and in analysis and interpretation of the results.





Rainforest  
Alliance 25 Years

# STUDIES CURRENTLY UNDERWAY



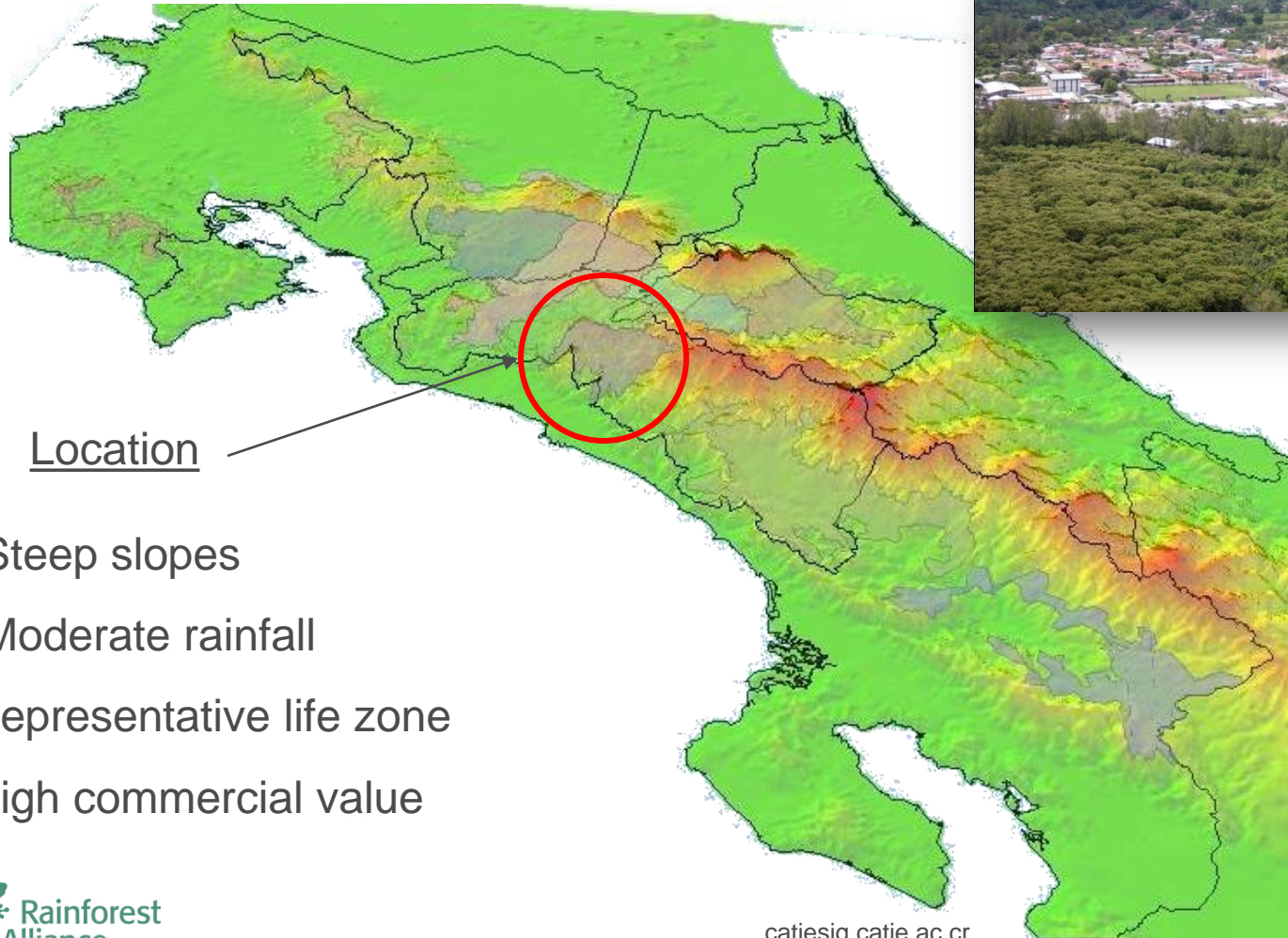
# SAN STANDARDS AND WATER QUALITY ON COFFEE FARMS

- Research question: How do streamside buffers and shade trees affect water quality on coffee farms, and how does this change on different slopes?





# STUDY SITE: LOS SANTOS, COSTA RICA



# ON-SITE ASSESSMENT OF STREAM INTEGRITY

1. Bio-Integrity: using macroinvertebrates as indicators
2. Physicochemistry: dissolved oxygen, pH, temperature and dissolved nutrients, among others.
3. Habitat condition :
  1. Hawaii Stream Visual Assessment Protocol (USDA 2001)
  2. Tropical Rapid Appraisal of Riparian Condition (Dixon et al 2001)



# RESEARCH WILL SHOW...

- How can the SAN standards better take slope into account
- What constitutes a healthy riparian buffer, not only in terms of width but also specific traits
- What are the environmental services provided by shade trees to stream integrity
- What density of shade trees optimizes these environmental services
- How is road impact related to water quality.



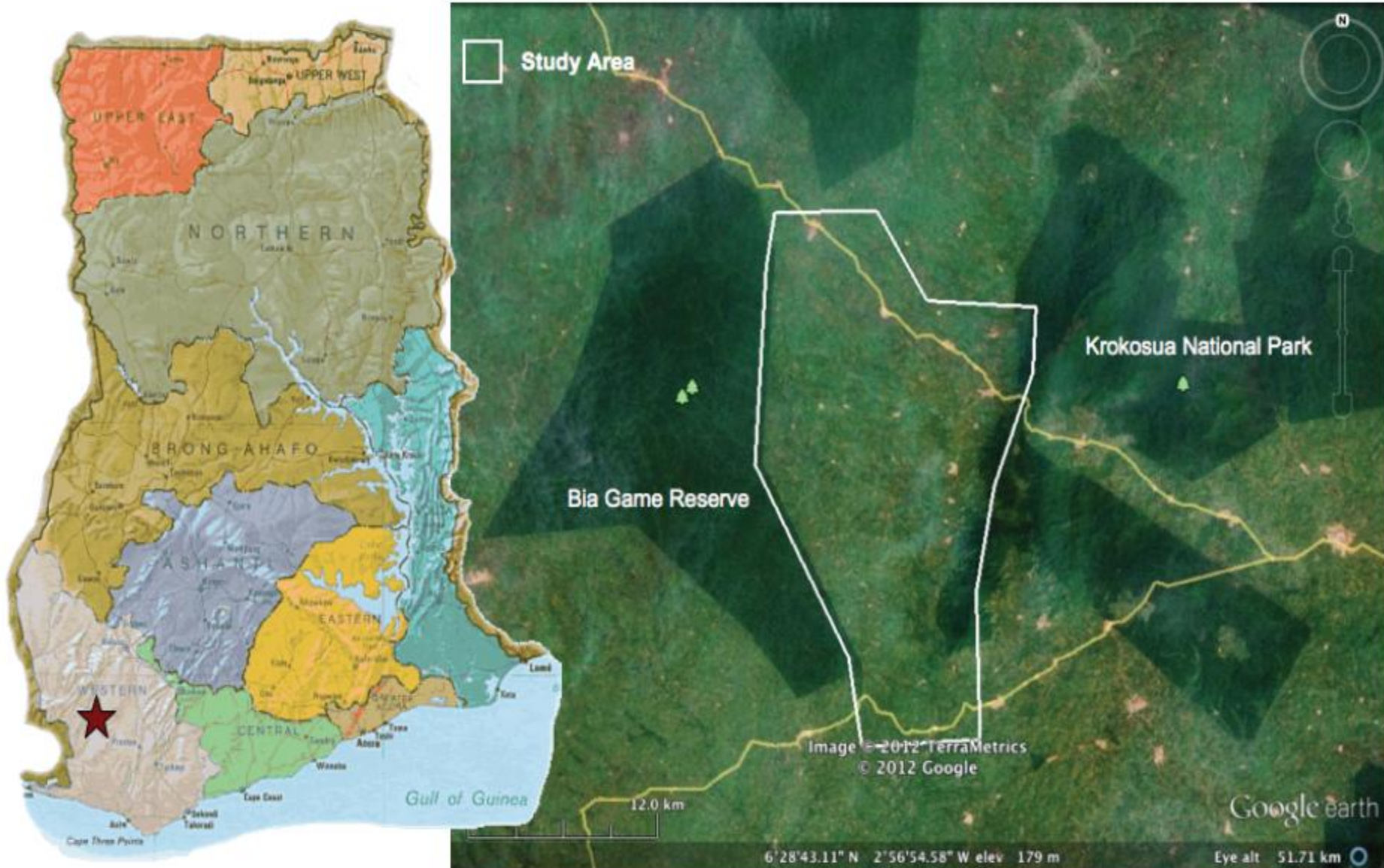
# NEW METHODOLOGY WATER QUALITY MONITORING

- Might be the next big PES currency
- On-farm water quality/quantity measurement is possible and being developed, though there are challenges





# STUDY SITE



# PILOTING A WATER METHODOLOGY IN GHANA

- Methods:
  - Collect water quality data using high- and low-tech methods and see if results are comparable.
  - Track the amount of training required and the calibration between trainee and experienced assessor
  - Interview farmers about their practices using a modified Performance Monitoring Tool

# PROTOCOL COMPONENTS

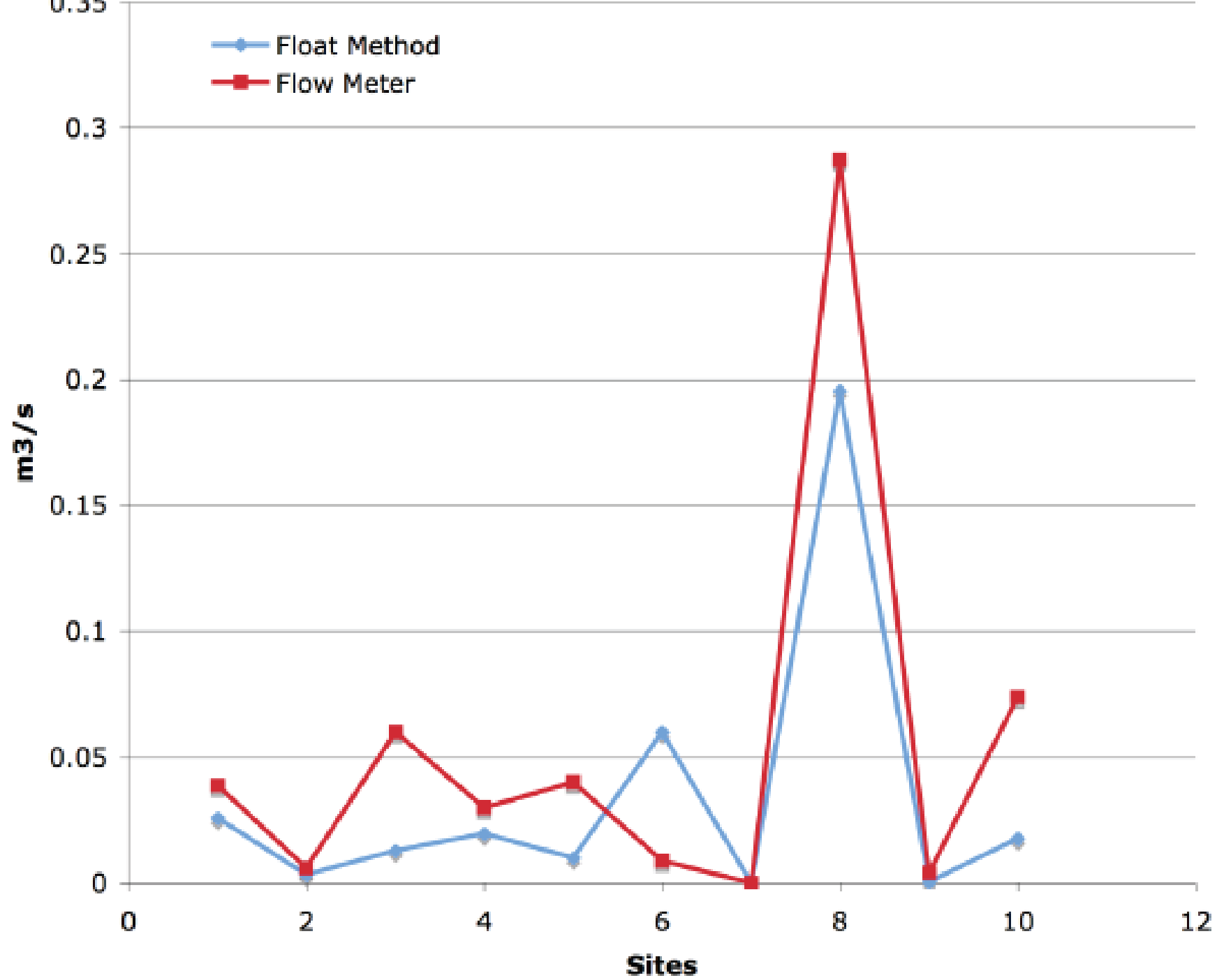
- SVAP
- Discharge
- Water Quality
- Riparian Vegetation
- Macroinvertebrate survey
- Farmer survey



# PRELIMINARY RESULTS

- A water clarity tube is an acceptable substitute for turbidity probes to conduct estimates of turbidity
- The float method is an acceptable substitute for velocity meters to conduct estimates of discharge volumes
- Nitrate and oxygen levels did not correlate well between methods
- The SVAP provides a good estimate of stream integrity, based on its correlation with bio-integrity indicators



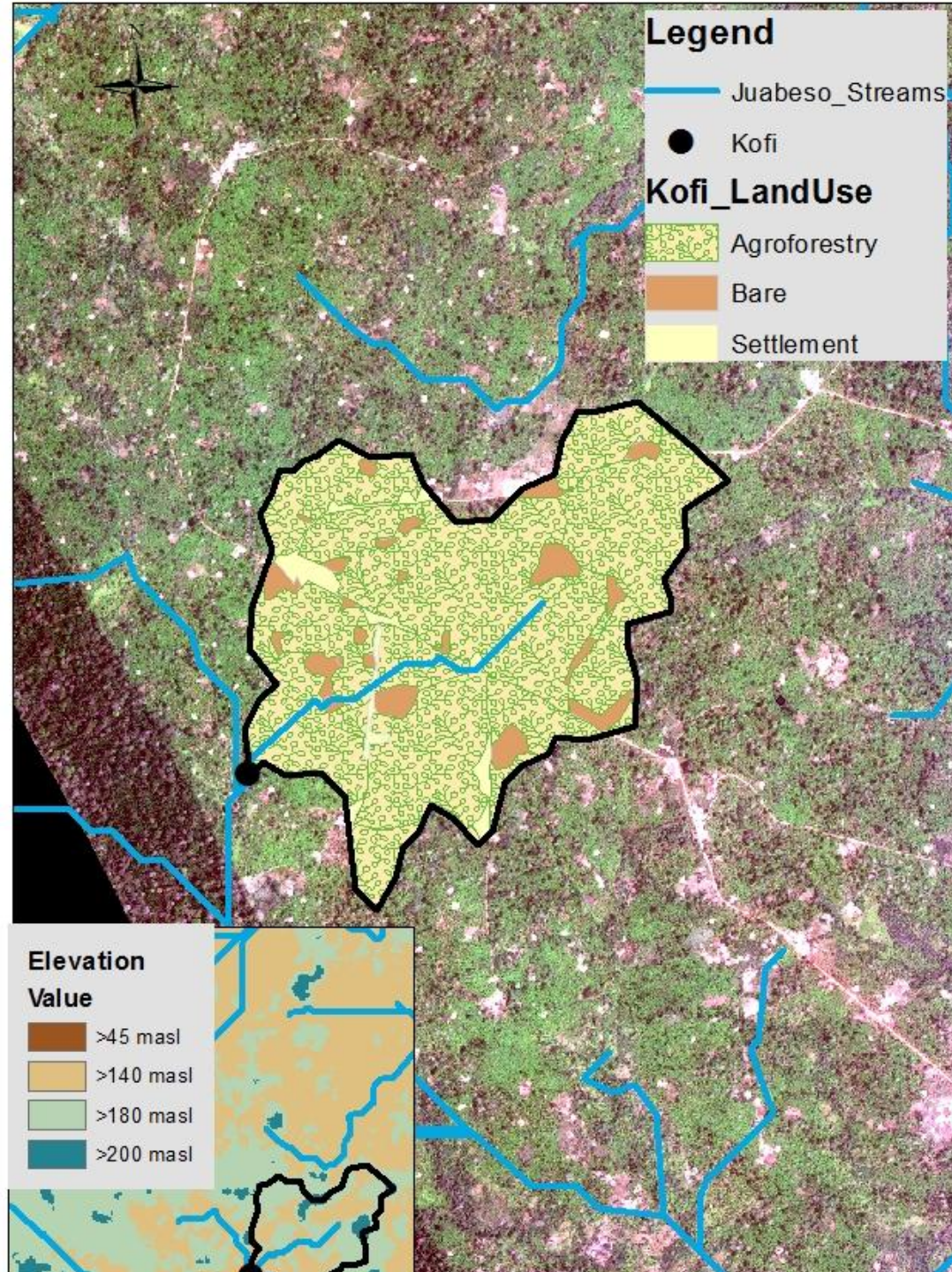


# PRELIMINARY RESULTS

- On average, it takes technicians 2 hours 20 minutes to complete entire protocol
- Technicians require more training than was provided and must practice the protocol several times before conducting assessments
- Streams in Juabeso show signs of negative impact. PCA analysis found that minimizing exposed soil and maximizing streamside vegetation was related to improved stream health.

# NEW METHODOLOGY: WATERSHED ASSESSMENTS

- We need to focus more on our contribution to water quality and quantity at the watershed level
- Could incorporate watershed boundaries into the NEA
- Could we eventually certify entire watersheds?





## Protecting Forests on Rainforest Alliance & FSC-Certified Land

**34 million** hectares (**84 million** acres) protected as set-asides or high-conservation value forests (HCVFs) on acreage of Rainforest Alliance and FSC-Certified forests

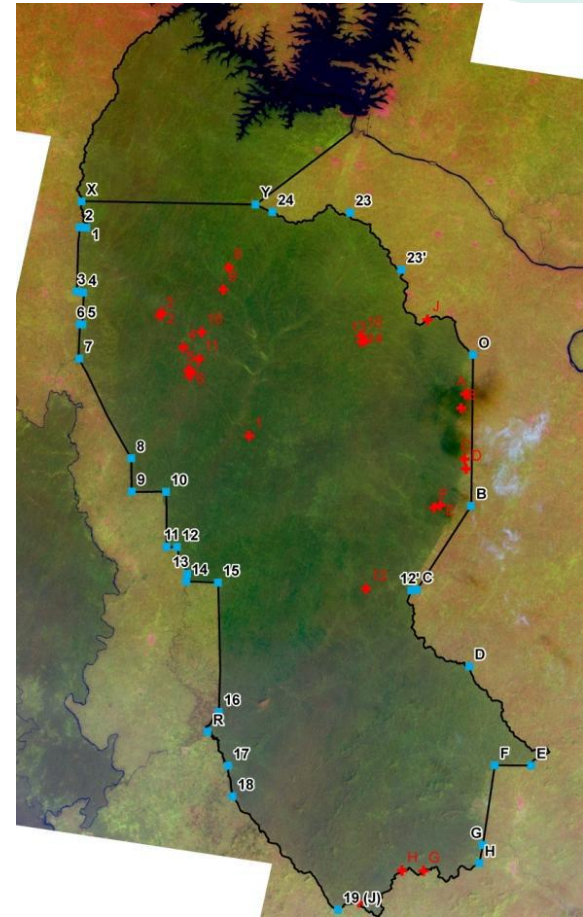


area of Finland:  
**33.8 million**  
**hectares**  
area of set-asides  
and HCVFs:  
**34 million**  
**hectares**



# NEW METHODOLOGY: NATURAL ECOSYSTEM ASSESSMENT

- A classification methodology that allows us to identify changes in different land use categories both on- and off-operation
- Currently testing in West Africa and Indonesia
- Using mobile technology to gather data



## Local News

Cocoa Gernas corruption case was the prosecution stage

2012-02-07  
[details...](#)

Business opportunities and raising sengon n jabon

2012-02-02  
[details...](#)

Cocoa prices in Pijay Slump

2012-01-29  
[details...](#)

30 000 Tons of Cocoa Export Target

2012-01-27  
[details...](#)

## Data

[People/Orang](#)

[Fields/Lapangan](#)

[Cooperatives/Farmer Groups](#)

[Crops/Species/Tanaman](#)

[Field Notes](#)

## Dates of Polygons (imagery):

--all--

[Go](#)



## Publication/ Publikasaun

[Documents/ Dokumentus](#)

[Projects/ Projetu](#)

[Partners/ Parseiru](#)

[Activities/Actividade](#)

## Current / Aktual

[Today Price/Presu ohin loron](#)

[Market Price/Presu Mercado](#)

# SOME RESULTS





# Colombia landcover analysis and connectivity analysis

University of the Andes, Colombia

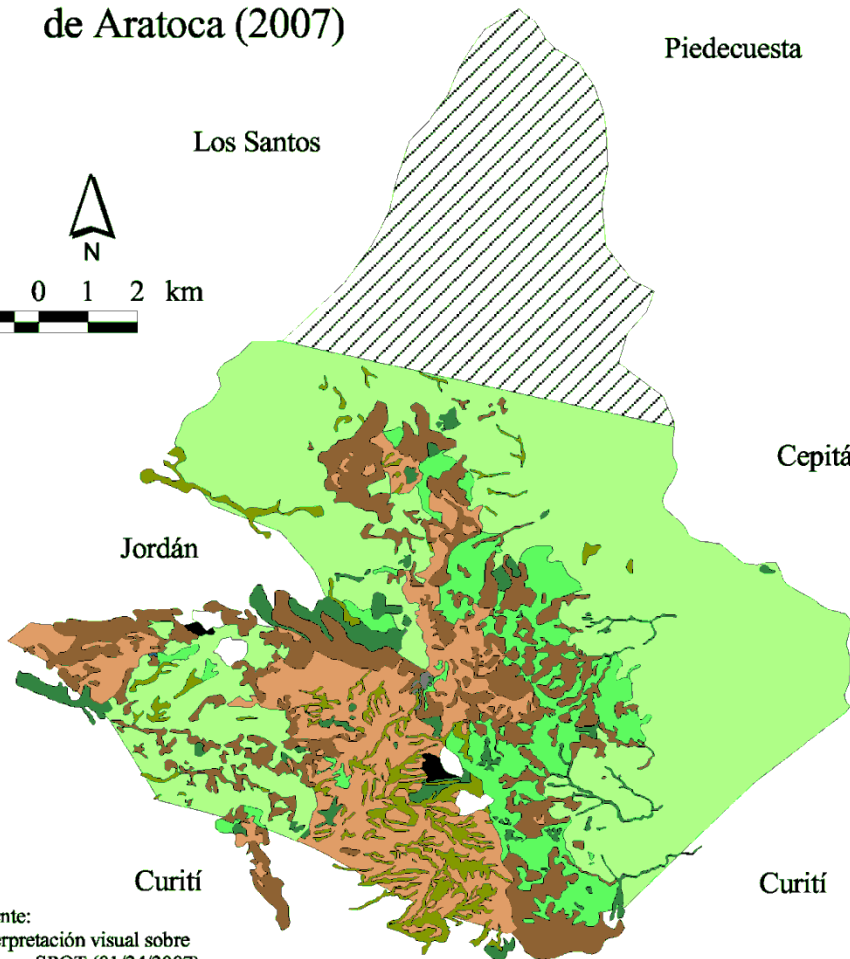
Coberturas del suelo de Aratoca (2007)

Piedecuesta












Los Santos



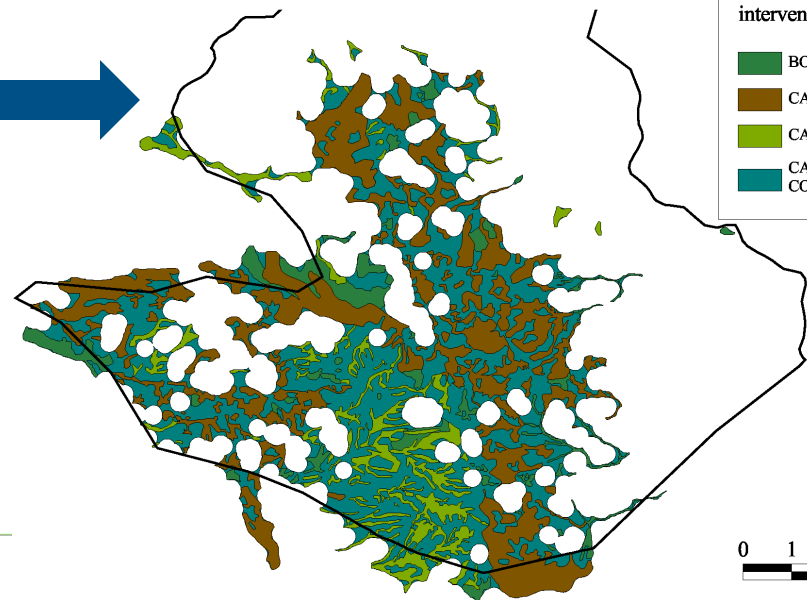
1 0 1 2 km



Fuente:  
Interpretación visual sobre  
imagen SPOT (01/24/2007)

Coberturas			
	AGUA	 CANADA	 SOMBRA NUBE
	BOSQUE	 NUBES	 SUELO Y POCA VEG.
	CAFE CON SOMBRIJO	 POTRERO Y CULTIVOS	 URBANO
		 RASTROJO	
		 SIN IMAGEN	

Cambios en la conectividad (distancia 200 m)



Coberturas menos intervenidas	
	BOSQUE
	CAFE CON SOMBRIJO
	CAÑADA
	CAMBIO CONECTIVIDAD

0 1 2 3 Km



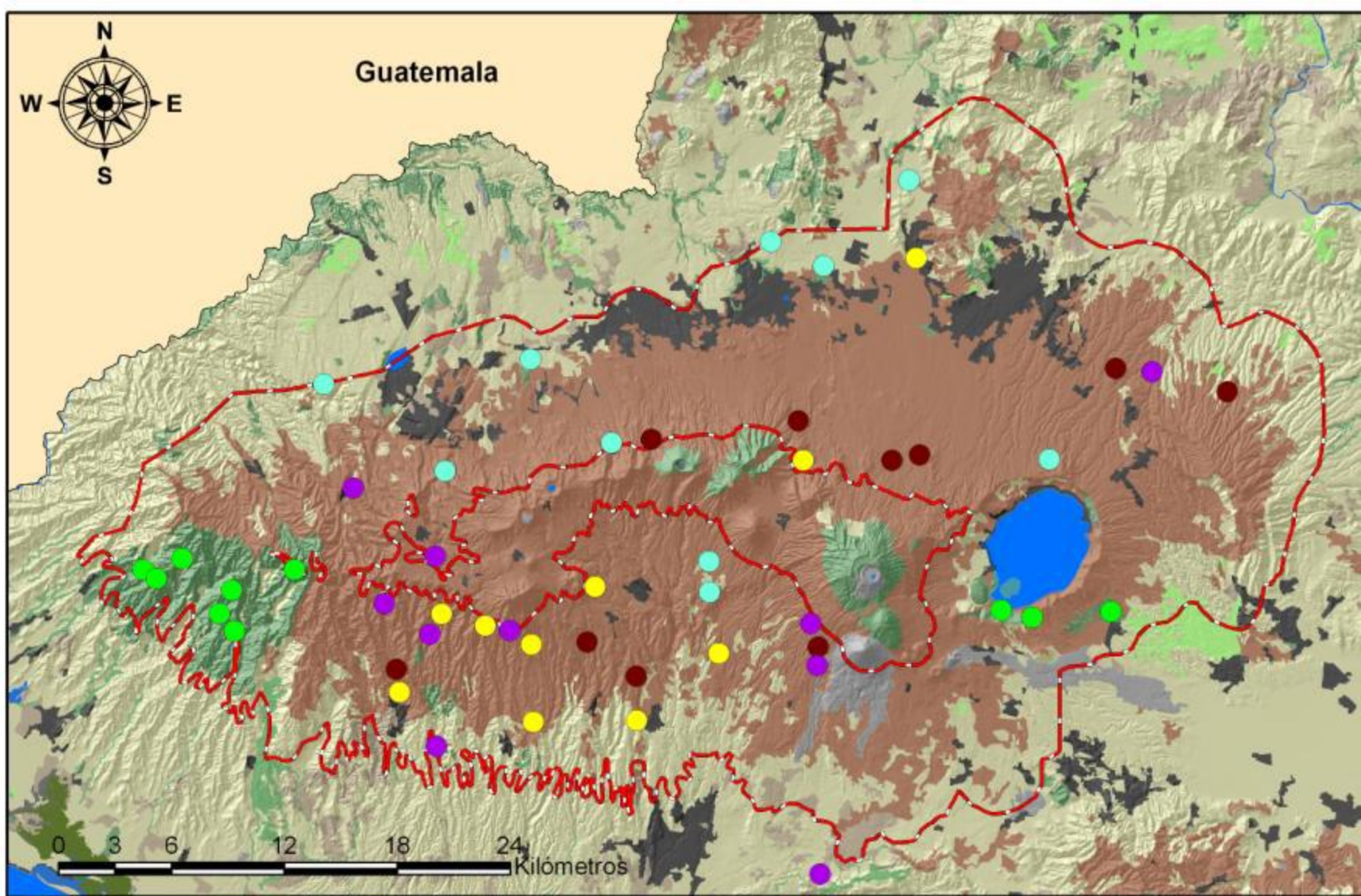
# COFFEE FARMS IN EL SALVADOR - AVIFAUNA

- Researchers in El Salvador compared bird density and use in five land uses:
  - Rainforest Alliance certified coffee farms
  - Technified (sun) coffee farms
  - Open farmland
  - Small forest fragments
  - Large, intact forest areas



Komar, Oliver. Are Rainforest Alliance Certified coffee plantations bird-friendly? Final Technical Report Study of Dispersing Forest Birds and Migratory Birds in El Salvador's Apaneca Biological Corridor 30 September 2010





### LEYENDA

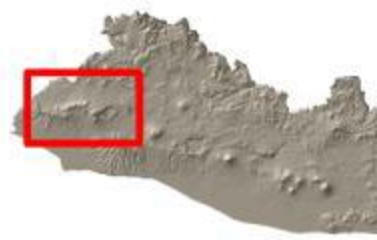
— Límites área de estudio

#### Tratamiento

- Bosques Naturales
- Fincas Certificadas
- Fincas No Certificadas
- Bosques de Bosque

#### Uso de Suelo

- Vegetación sobre Lava Volcánica
- Bosque de Mangle
- Bosque Natural
- Cuerpos de Agua
- Vegetación Arbustiva

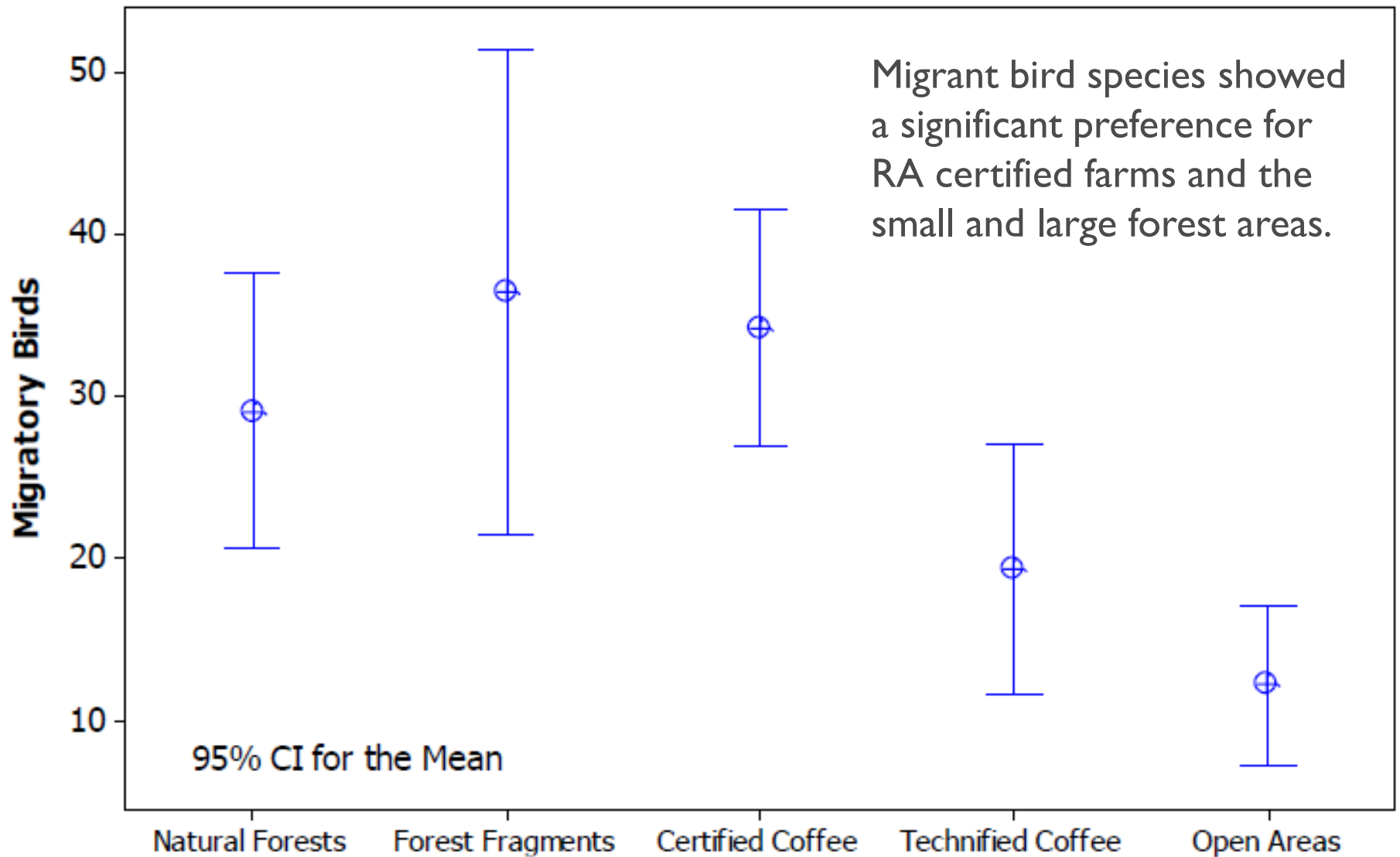


# AVIFAUNA - RESULTS

- The survivorship of dispersing birds in RA certified farms was the same as in the small and large forest areas, and significantly higher than in sun coffee farms:

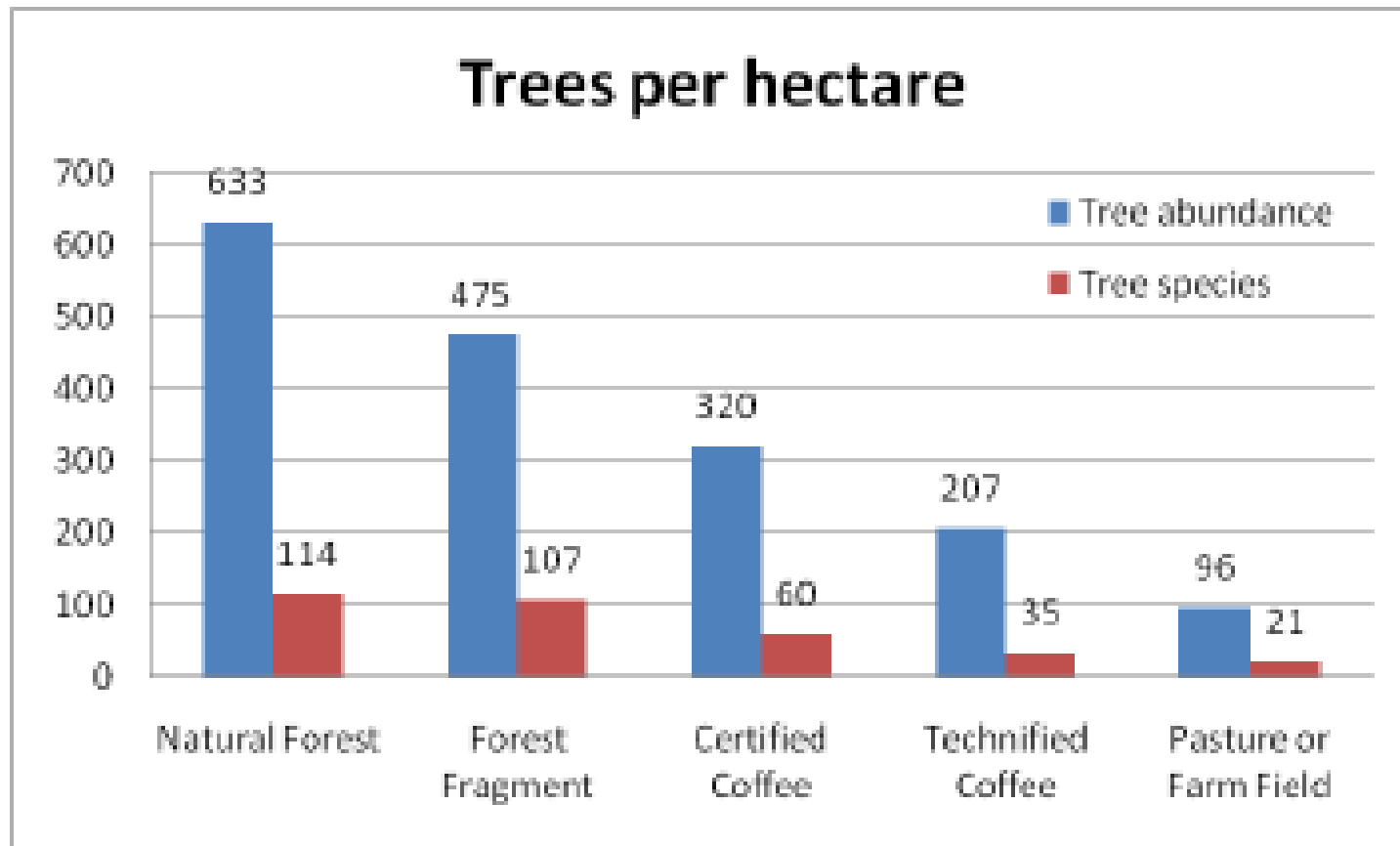
Habitat	Natural Forest	Forest Fragments	Certified Coffee	Technified Coffee	Open Areas
Bimonthly Survivorship mean ( $\pm$ SE)	0.864 $\pm$ 0.045	0.955 $\pm$ 0.055	0.854 $\pm$ 0.076	0.350 $\pm$ 0.215	0.853 $\pm$ 0.124
95% credible interval (%)	0.750, 0.930	0.636, 0.996	0.640, 0.951	0.078, 0.774	0.454, 0.976

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# AVIFAUNA - RESULTS



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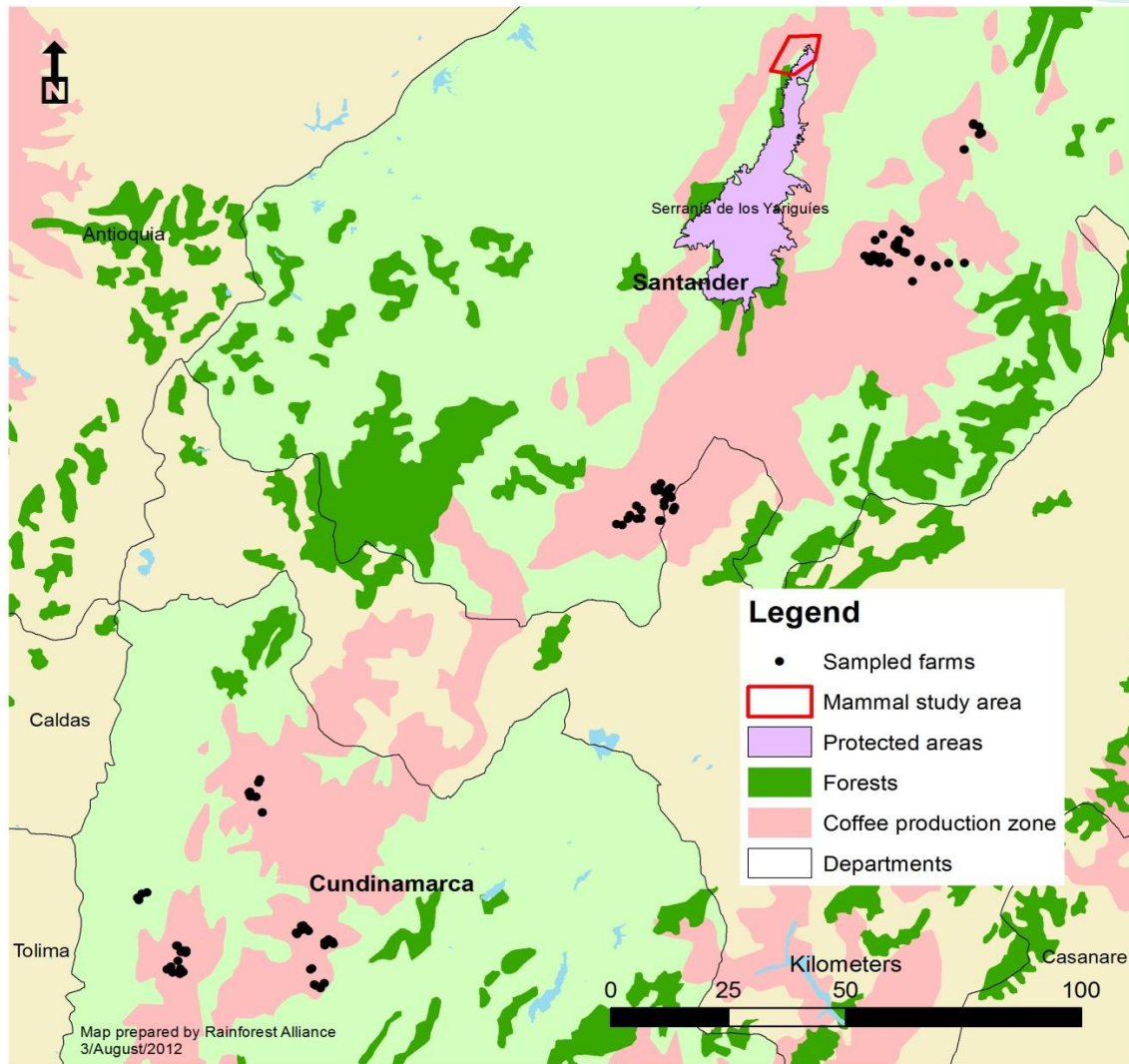


# COFFEE FARMS IN COLOMBIA – STREAM INTEGRITY

- Conducted a Stream Visual Assessment Protocol (SVAP) on streams originating in 27 RA-certified and 27 non-certified coffee farms.
- Protocol looks at the integrity of the aquatic ecosystem, alterations to the water body, vegetation, and evidence of contamination (among other things). They found that certified farms had a significantly higher SVAP score than non-certified farms. The SVAP can be considered an ‘index of stream health’ that ranges from 0 (worst conditions) to 10 (best conditions).



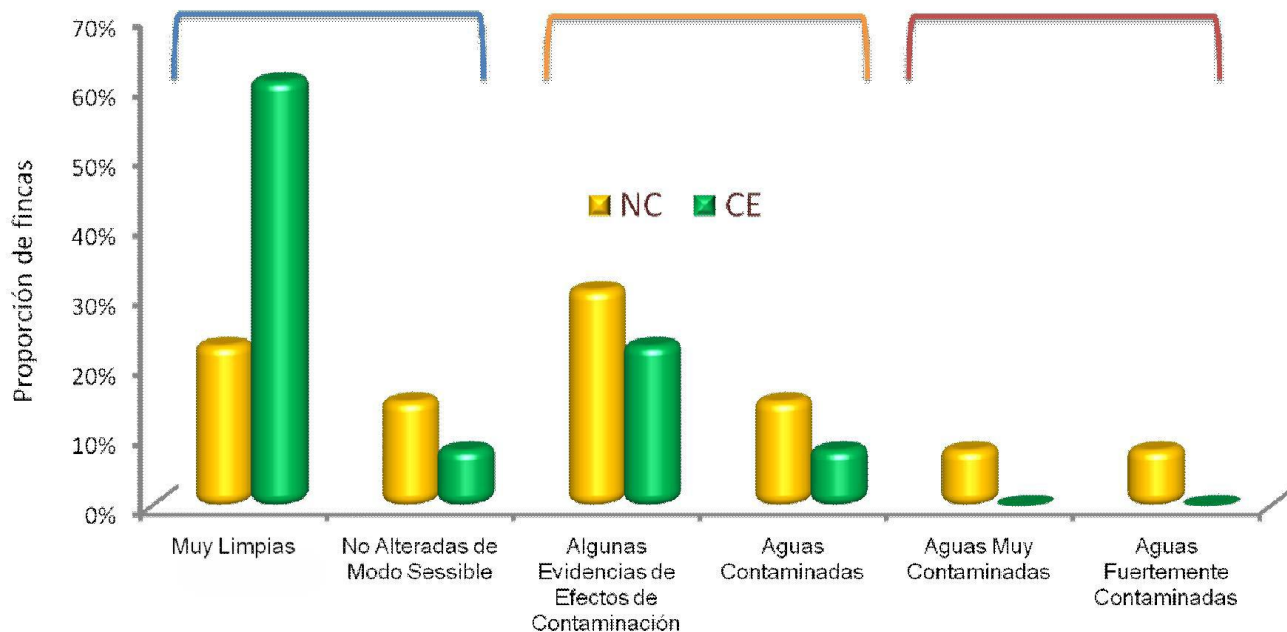
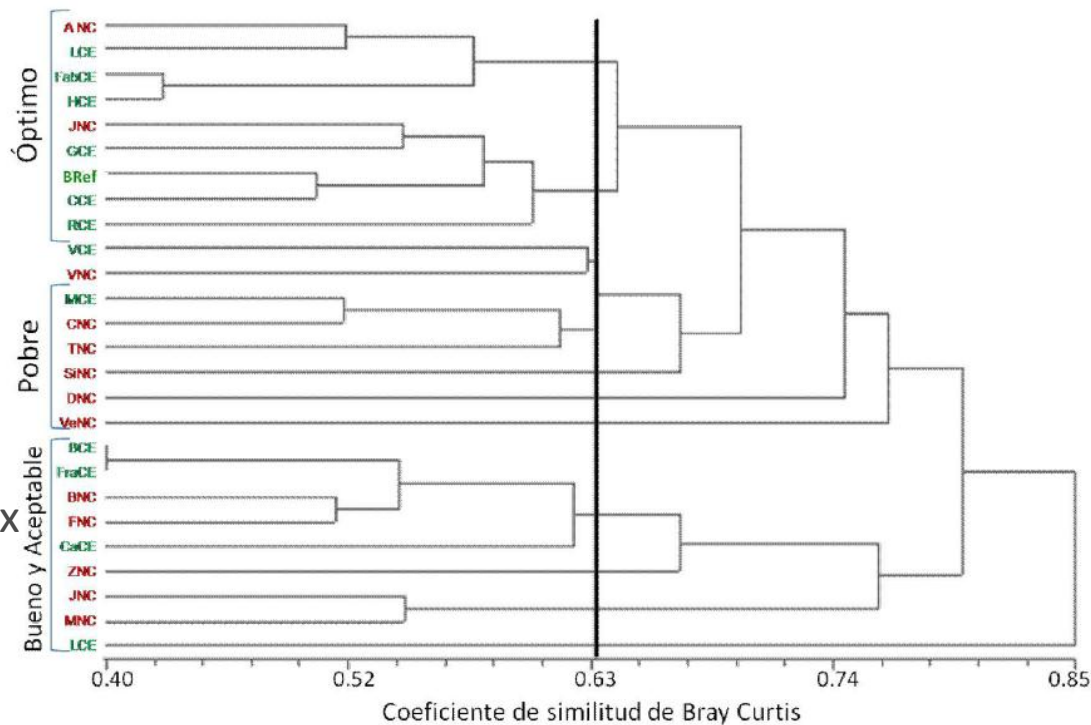
# COFFEE FARMS IN COLOMBIA – STUDY SITES





## Cenicafe water quality study

### Bray Curtis similarity index



BMWP water quality index based on indicator aquatic invertebrate groups

# COFFEE FARMS IN COLOMBIA – STREAM INTEGRITY

Cundinamarca sites:

	Certified average	Non-certified average	Probability
SVAP score	8.8	6.56	<0.001
Vegetation cover (%)	74	57	0.011

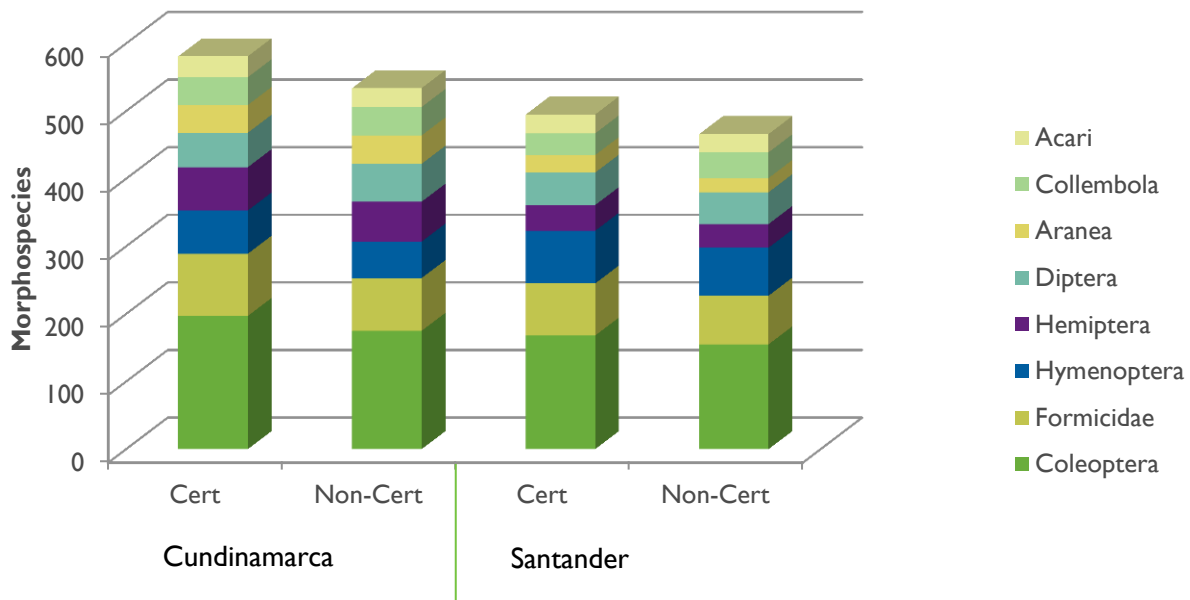
Santander sites:

	Certified average	Non-certified average	Probability
SVAP score	7.78	5.59	0.005
Vegetation cover (%)	76	57	0.011

Hughell, David and Deanna Newsom. 2012. Impacts of Rainforest Alliance Certified Coffee Farms in Colombia. Draft Document.

# COFFEE FARMS IN COLOMBIA – ARTHROPOD DIVERSITY

- Compared differences in arthropod diversity in 52 RA-certified and 52 non-certified coffee farms; found consistently higher soil arthropod richness and diversity in certified farms.



- Hughell, David and Deanna Newsom. 2012. Impacts of Rainforest Alliance Certified Coffee Farms in Colombia. Draft Document.

# ENVIRONMENTAL RISK ON BANANA FARMS

- In Ecuador, researchers compared 10 banana farms belonging to a producer association certified by Rainforest Alliance with 13 farms belonging to a producer association certified en mass by another certification program, and 24 uncertified control farms
- Using Likert-scale measures of environmental “risks” related to land management, water quality, agrochemical management, and waste management, the authors found that certified farms have lower risk indices than noncertified farms



Melo, C.J., and S.A. Wolf. 2007. Ecocertification of Ecuadorian bananas: Prospects for progressive North–South linkages. *Studies in Comparative International Development* 42: 256–278.



# IMPACT RESULTS FROM NON-CERTIFICATION STUDIES

- We unbundled sustainability standards into individual practices (BMPs), and looked for studies that tested whether such BMPs reduce biological impacts
- We relied on the rigor of the counterfactual but were not constrained to research that directly examines individual certification programs or approaches



# IMPACT RESULTS FROM NON-CERTIFICATION STUDIES

Agricultural BMPs included in scope of project	Number of studies examined
Creation and restoration of natural ecosystem set-asides	36
Creation of streamside management zones	22
Increased tree/canopy cover (in agroforestry systems)	12
Use of low-water irrigation and processing methods	0
Adequate treatment of residual waters from processing	0
Use of natural fertilizers (including compost)	15

Information	Definition/categories
Research framework	Choose one: <ul style="list-style-type: none"> <li>• Experimental/randomization</li> <li>• Matched design (quasi-experimental)</li> <li>• Matched ‘before-after’ design (quasi-experimental), including post-disturbance long term studies</li> <li>• Instrumental variables (quasi-experimental)</li> </ul>
Independent variable	Free form description of the independent variable
Dependent variable	Choose one: <ul style="list-style-type: none"> <li>• Species abundance/density</li> <li>• Species viability</li> <li>• Species fitness</li> <li>• Biodiversity</li> <li>• Water quality</li> <li>• Air quality</li> <li>• Soil quality</li> <li>• Structure (e.g. presence of downed wood or snags)</li> </ul>
Taxonomic group or environmental feature being examined	Drop down list
Significance of results	Choose one: 0 = no significant relationship + = significant result, positive direction - = significant result, negative direction

BMP: CREATION AND RESTORATION OF NATURAL ECOSYSTEM SET-ASIDES

Dependent Variable	No. Studies	+	0	-
Species/community health				
Abundance/ density	11	1 flora/fauna 4 birds 1 insects 1 microbes	1 insects 1 flora/fauna 1 inverts.	1 insects
Viability	3		2 flora/fauna 1 inverts.	
Fitness	2	1 birds	1 herps.	
Biodiversity	15	1 flora/fauna 1 birds 2 inverts. 3 insects 2 vegetation	1 flora/fauna 1 mammals 1 birds 2 vegetation	1 insects
Environmental Quality				
Water	-			
Air	2	2 GHG reduction		
Soil	1	1 soil chemistry		
Structure	2	1 flora/fauna	1 insects	
TOTAL	36	21 (58%)	13 (36%)	2 (6%) <sup>48</sup>



# IMPACT RESULTS FROM NON-CERTIFICATION STUDIES

- Huge number of studies that could be examined
- Much more potential for learning – we could dig deeper
  - Instead of:
    - ‘nine studies showed a positive relationship between set-asides and biodiversity’
  - We could go beyond directionality and get much more relevant detail:
    - ‘nine studies showed a positive relationship between set-asides and biodiversity, but only when the set-asides were over 50 hectares in size and were within 200 km of source populations’