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# The BIOLAC Project

## Toward Biodiversity Conservation, Sustainable Use and Benefit-Sharing in LAC: A Focus on Leatherback Turtles and Eco- Tourism in Grande Riviere, Trinidad

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BIOLAC



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# Outline

1. The BIOLAC Project
2. Why Turtles? Why Grande Riviere?
3. Some Empirical Results of the Community Survey
4. Ongoing, Parallel and Future Work
5. On-Site Photos

# The BIOLAC Project



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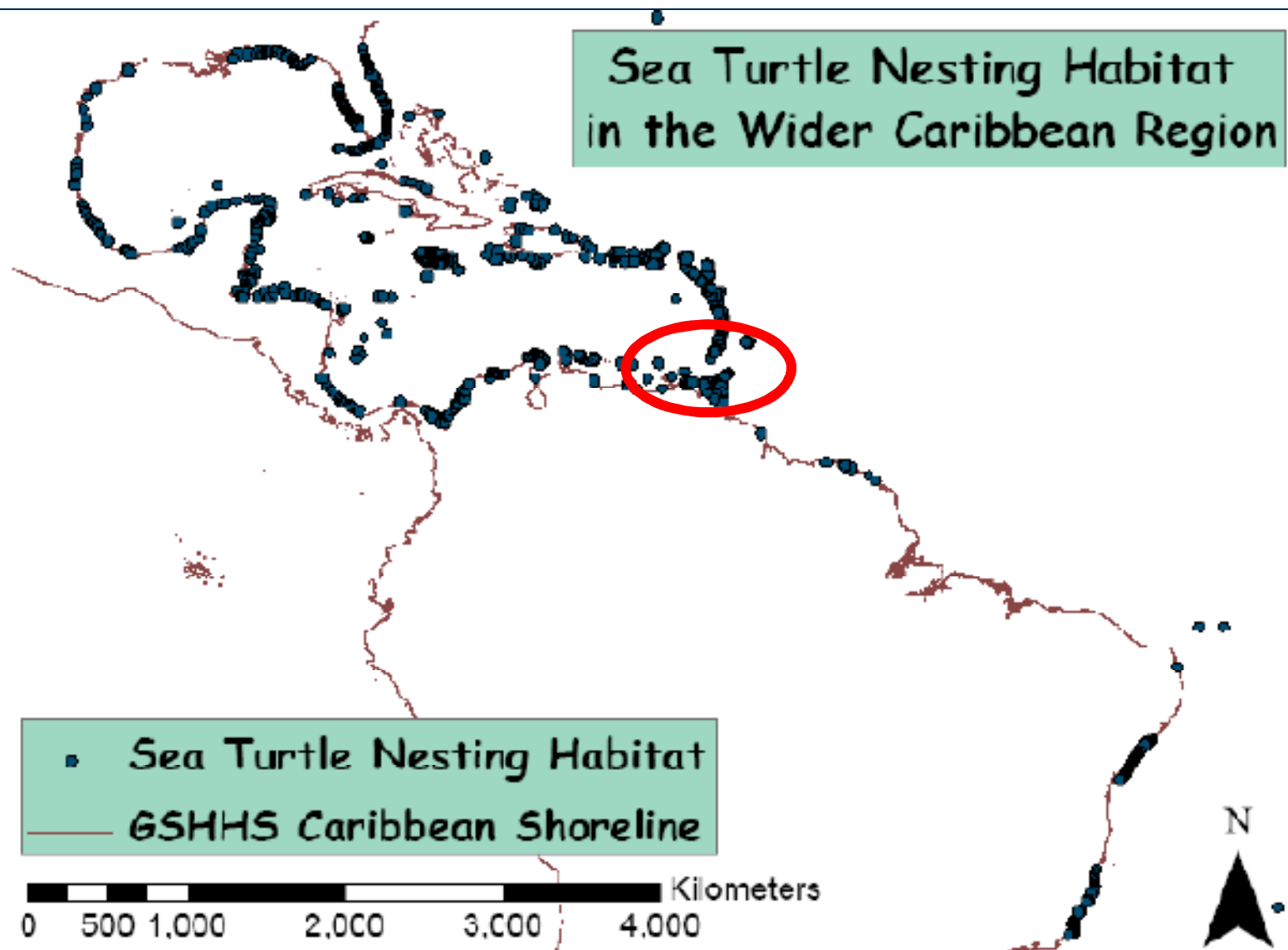
- Focus on Biodiversity Conservation in Latin America and the Caribbean: Perception, Use, Economic Potential
- Co-participatory conservation frameworks: biodiversity matters but people matter!
- Case Study: Leatherback Turtle Nesting in Grande Riviere, Trinidad



# Why Turtles?

- Help to sustain stability of marine ecosystems
- Close integration between species and environment (ecosystem engineers)
- Potentially economically important (role as a source of eco-tourism activities)
- Highly migratory, well distributed through the LAC

# Nesting Habitats in the LAC Region



# Marine Turtles in the LAC Region



Species	IUCN Status	Primary Nesting Location
Loggerhead	endangered	South Florida
Green	endangered	In the past, Cayman islands currently, Costa Rica
Leatherback	Critically endangered	Trinidad and the Guianas Costa Rica-Panama coast Insular Caribbean
Hawksbill	Critically endangered	Yucatan Peninsula, Mexico
Kemp's Ridley	Critically endangered	Most localised of all species, life cycle confined largely to Gulf of Mexico
Olive Ridley	endangered	Southern Caribbean, Guianas

# Identification of Threats

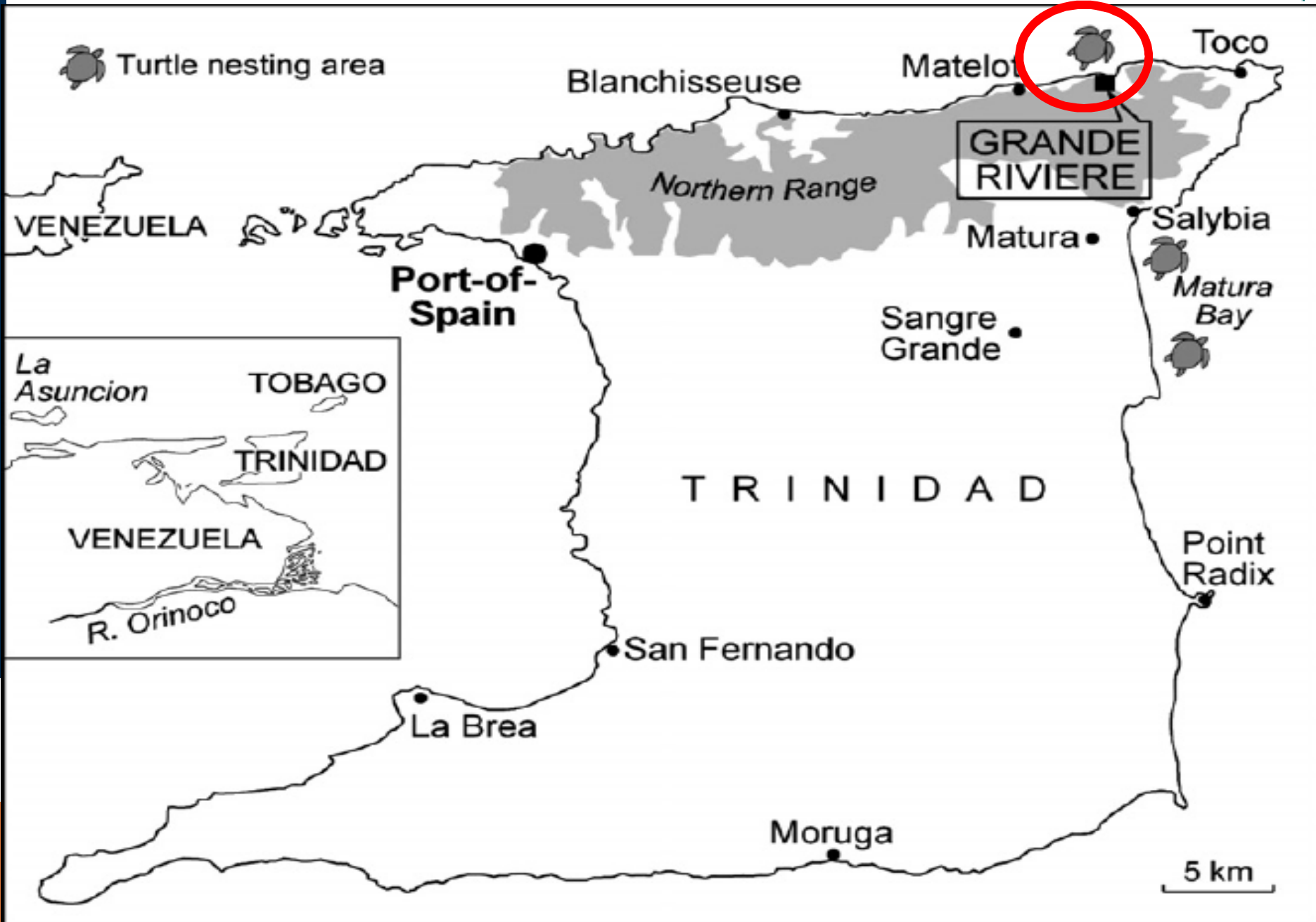
- threats to nesting (beaches)
- threats to foraging and migration (open waters)
- Threats to nesting can be dealt with at community and national level (beach patrols)
- Threats of open waters very difficult to manage
- Underlying threats of climate change
  - Sea level rise can swamp small nesting beaches
  - Warming temperatures can affect gender



# Turtle Nesting on the Coasts of Trinidad



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# Grande Riviere Basic Facts (2000 Census)



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- 298 individuals
- 147 households
- Population mainly of African descent (92%); remainder “Mixed”
- Income Levels:
  - More than \$2000 (230 euro) per month: less than 9%
  - \$1000-\$1999 (114 - 230 euro) per month: 18%
  - Less than \$999 (114 euro): over 68%
- Two distinct types of terrain: slopes of the Northern Range as well as a narrow Land strip on the coastline of less than 100m.

# Grande Riviere: Environmental Threats

- Hillside Deforestation
- Hunting of Turtles and Wildlife
- Reduction in Fish Stocks
- Oil Spills
- Waste Disposal from Beach Hotels
- Climate Change

# Grande Riviere: Economic Potential

- Rich in biodiversity and natural fauna
- A popular eco-destination despite its remote location (4000 on turtle tours estimated yearly)
- 4 small eco-resorts, 10 guesthouses
- The Grande Riviere Nature Tour Guide Association managed by local residents
- Community initiatives to protect the nesting turtles increasingly famous worldwide
- Recently identified by British Airways Magazine as one of the top 50 beaches in the world

# Data Collection

- Grande Riviere Community Survey (101 households)
- On-Site Tourist Surveys
  - Local (114 respondents)
  - International (107 respondents)
- National Airport Survey (254 respondents)

SORRY,  
I'M BUSY  
SAVING  
THE PLANET

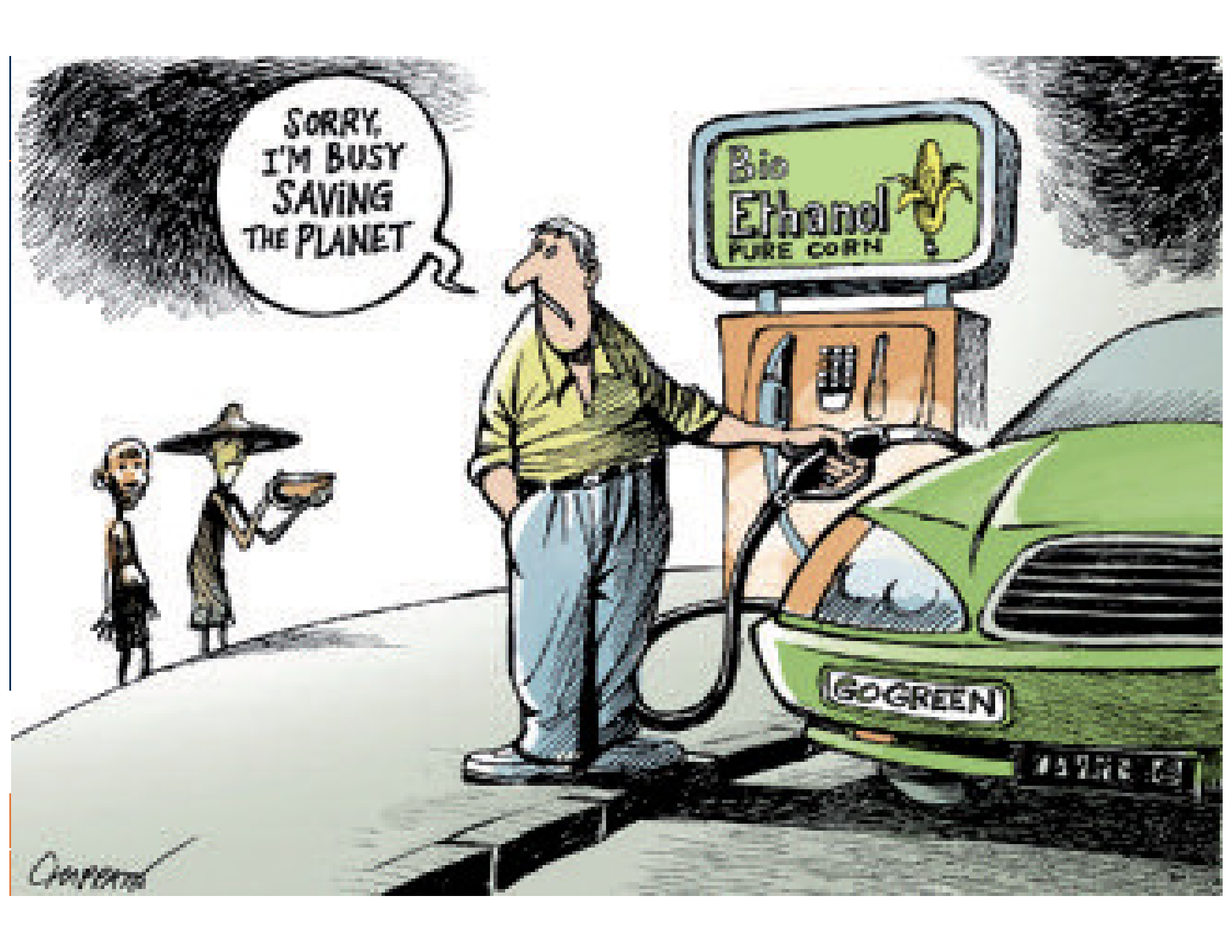
Bio  
Ethanol  
PURE CORN



GO GREEN

14786 DJ

*Chapman*



# Grande Riviere Community Survey



- to assess their attitudes and opinions on:
  - A. their interactions with nature
  - B. the eco-tourism surrounding the turtle nesting
  - C. climatic issues
  
- 5 sections consisting of:
  1. General
  2. Demographic
  3. Ecosystem Services
  4. Eco-Tourism and Leatherback Turtles
  5. Climate Change

<b>Variable</b>	<b>Descriptive Measure</b>
<b>Age</b>	<b>Mean = 48.2</b>
<b>Income</b>	<b>Modal Category = 350 – 680 Euro</b>
<b>Gender</b>	<b>51% Female 49% Male</b>
<b>Employer</b>	<b>29% “Private Enterprise” 21% “Self Employed”</b>
<b>Education</b>	<b>47% “Secondary School”, 47% “No Qualifications”</b>
<b>Ethnicity</b>	<b>75% “African” 25% “Mixed”</b>
<b>Farmers</b>	<b>43%</b>
<b>Fishermen</b>	<b>19%</b>
<b>Tour Guides</b>	<b>15%</b>



# Community Perceptions

“how much do you and your household benefit from nature in daily life?”



# Methodology: Two Steps

1. Constructing Indices for Ecosystem Services
  - Isolate questions relating to provisioning, regulating and cultural components of ecosystem services
  - Perform factor analysis using principal components
2. Determining what influences Perceptions of Nature
  - Construct variable set that includes the ecosystem indices
  - Regressions: Ordered Probit Models

# Factor Analysis

$$X_1 = L_{11}F_1 + L_{12}F_2 + \dots + L_{1m}F_m + e_1$$

•

•

$$X_P = L_{P1}F_1 + L_{P2}F_2 + \dots + L_{Pm}F_m + e_P$$

- a) Factor Extraction (Principal Components)
- b) Factor Rotation (Varimax Procedure)
- c) Factor Score Computation (Regression)

# Ecosystem Services

- Provisioning Services
  - How often do members of this household use the following natural resources? (herbs, fruits, fish etc.)
  - Does your household own any of the following? (fences, structures made from materials from the forest, etc.)
  
- Regulating Services
  - How important are the following benefits to you and your household? (nature's role in providing water, guarding against landslides, storm protection etc.)
  
- Cultural / Recreational Services
  - How often do you and/or members of your household engage in the following recreational activities? (hunting, swimming, fishing, liming by the river etc.)

# The Results : Factor Analysis

Rotated factor loadings (pattern matrix) and unique variances

Variable	Factor1	Factor2	Factor3	Uniqueness
use_herbs	0.4419	0.2122	0.4805	0.5288
use_fruit	-0.0934	0.3073	0.5722	0.5695
use_fish	0.0236	0.0793	0.1910	0.9567
use_wild_a~s	-0.0594	0.3801	0.2174	0.8047
use_medici~s	-0.4764	0.0755	0.3777	0.6246
resource_f~s	0.0079	-0.0022	0.5180	0.7316
resource~les	-0.0429	0.1705	0.2437	0.9097
resource_w~s	0.0884	-0.0808	0.7642	0.4017
resource~ts	0.0495	-0.0875	0.6904	0.5133
role_water	0.8541	0.1712	0.0478	0.2390
role_lands~n	0.9173	0.1118	0.0420	0.1443
role_crop~n	0.4896	0.1155	0.3352	0.6346
role_storm~n	0.8606	0.0414	-0.0135	0.2575
activiti~ting	0.2259	0.3076	0.1351	0.8361
activities~h	0.2024	0.8851	-0.0013	0.1757
activiti~ver	0.1341	0.8768	-0.0570	0.2099
activiti~hing	-0.0422	0.6478	0.1399	0.5590

## General to Specific Modelling

- **Ecosystem Services (Factors):**  
Provisioning, Regulating, Cultural / Recreational
- **Demographic Variables:**  
Age, Gender, Education, Occupation, Income, Length of residence in community, Land ownership, Work away from home, presence in the informal sector
- **“Turtle” Attitudes/Perceived “Turtle” Benefits:**  
Tour guides, benefits from turtles, meat, eggs, promise of future employment, pride in the turtles, the importance of turtles for the future generations

# The Results: An Ordered Probit Model

```

Ordered probit regression              Number of obs   -      57
                                      LR chi2(7)       -      37.26
                                      Prob > chi2      -      0.0000
Log likelihood = -62.735415           Pseudo R2       -      0.2290
  
```

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
benefits_f~e						
provision	.4281193	.175143	2.44	0.015	.0848453	.7713934
regulate	.9879321	.2943844	3.36	0.001	.4109492	1.564915
age_hh_1	-.0292972	.0111797	-2.62	0.009	-.0512091	-.0073853
gender_hh_1	1.298524	.34468	3.77	0.000	.622964	1.974085
income_ind~1	.4391931	.2142043	2.05	0.040	.0193605	.8590258
tour_guides	-.8525281	.4066345	-2.10	0.036	-1.649517	-.055539
benefits_f~s	.3851778	.2220066	1.73	0.083	-.0499471	.8203026

## The Results: Diagnostics

- Chi Square Test for overall validity of model ✓
- Significance of coefficients ✓
- Pseudo R-squared ✓



# The Results: What Mattered?

- Ecosystem Services (Factors)
  - Provisioning
  - Regulating
- Demographic Variables
  - Age
  - Gender
  - Income
- “Turtle” Variables
  - Tour Guides
  - Benefits to Future Generations

# Significant Empirical Findings I

## Ecosystem Services (Factors)

- Expectation: emphasis on provisioning
- Empirical: provisioning and regulating matter most; recreational does not play a role
- Positive coefficients to these factors

## Significant Empirical Findings II

### Demographic Variables

- The older an individual is, the less likely they are to value nature highly
- Men are more likely than women to value nature highly
- Those with higher income are more likely to value nature highly

## Significant Empirical Findings III

### “Turtle” Variables

- Tour Guides are less likely to value nature highly (surprising result, against expectations)
- Those who place importance on the benefits of turtles to future generations are more likely to value nature highly

## Biodiversity in the context of Rural Poverty

- Some interesting results! Debunking some myths.....
- Provisioning services matter, but so do regulating services
- Higher income is not reducing the perception of the importance of nature
- The youth rather than the mature perceive the importance of nature
- inter-generational equity plays a role in the perception of the importance of nature – an importance is attached to future generations

# Ongoing Research: Empirical Papers

1. The Importance of Nature to Rural Communities in Developing Countries: Community Perceptions of Biodiversity and Ecosystem Services in Grande Riviere, Trinidad
2. Biodiversity as a means to Conservation: A Community-Based Development of the Leatherback Turtle Tourism Industry in Grande Riviere, Trinidad
3. Biodiversity, Eco-Tourism and Sustainable Livelihoods: Empirical Linkages in Grande Riviere, Trinidad
4. Who Wins, Who Loses? An Analysis of Welfare Distributional Changes of Biodiversity Loss in Grande Riviere, Trinidad
5. A Rural Community Perspective of Climate Change in Developing Countries : State of Knowledge, Level of Concern and Perception of Risk
6. Raising Awareness of Climate Change in Rural Communities of Developing Countries: The Role of Social Media

# Parallel / Future Research



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- Collaboration with the Widecast Network – application of BIOLAC methodologies to
  - Other “turtle” villages of Trinidad and Tobago
  - Other coastal communities in the LAC region

<http://www.widecast.org>
  
- The ICURA project
  - Spatial Components, GIS applications to Grande Riviere
  - Georgetown, Bequia, Belize Barrier Reef
  - First ICURA Conference, Trinidad, July 2011

<http://www.coastalchange.ca>
  
- Annual SALISES conference, Jamaica, March 2011  
<http://sta.uwi.edu/media/documents/2008/CallforPapersSALISES2011.pdf>

# Keep in touch!

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