HABITAT AND BIODIVERSITY MAPPING,

FOR THE DETERMINATION OF ALGAL BIOMASS AQUACULTURE SITES IN THE COSTAL AREAS OF PUERTO RICO

By: J. Melendez, N. Quiñones-Vilches, A. Rodriguez, K. Ruiz, G. Gervais, L. Roberson

Center for Renewable Energy and Sustainability http://renewable.uprrp.edu/

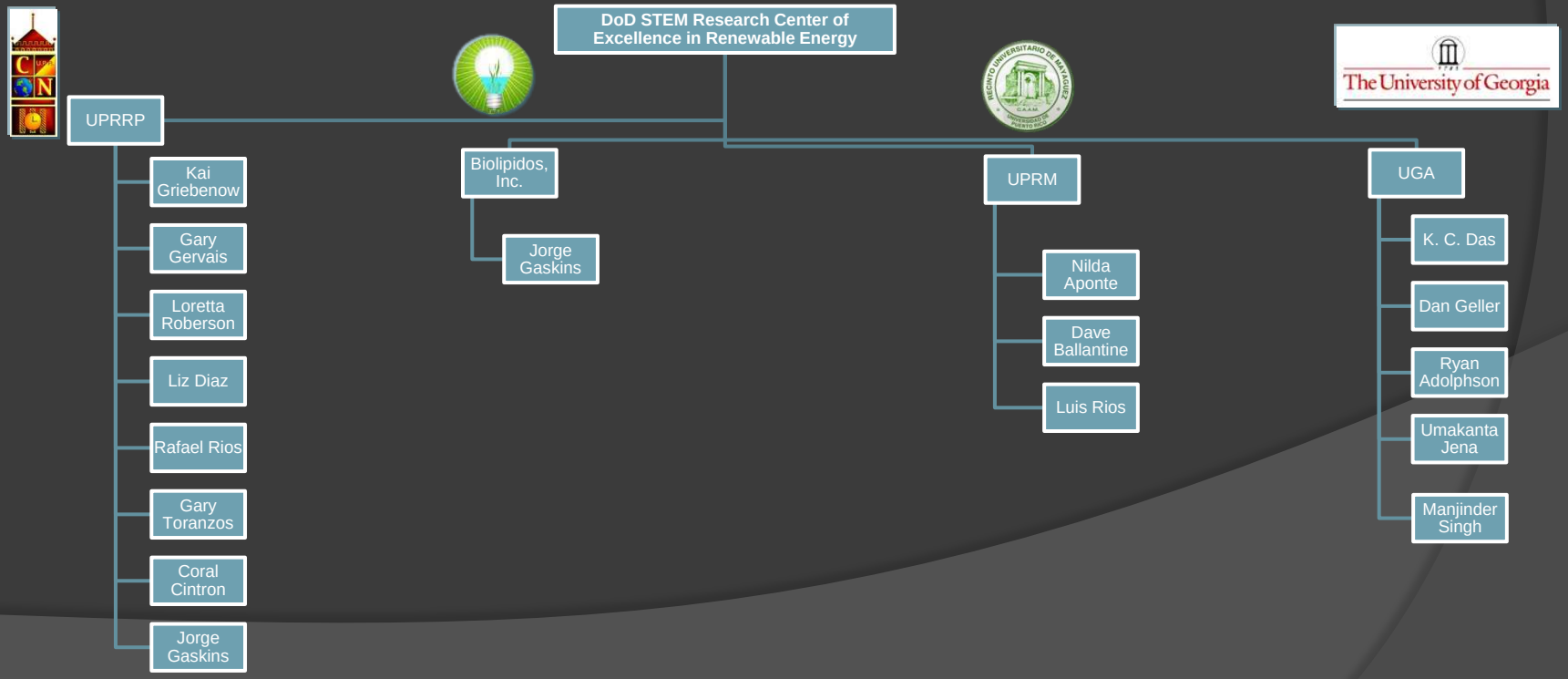
A UPR-UGA DoD STEM Research Center of Excellence in Renewable Energy

Center for Renewable Energy and Sustainability

College of Natural Sciences
University of Puerto Rico
Rio Piedras Campus

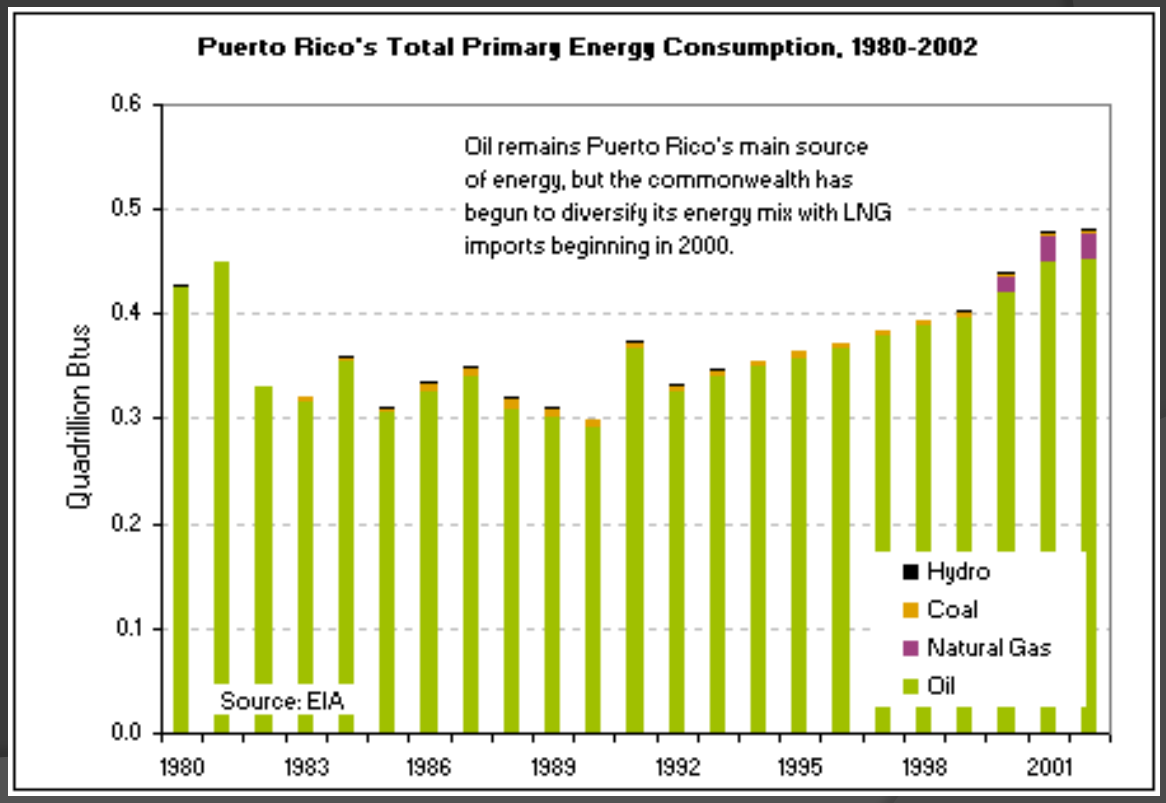
The Center for Renewable Energy has four broad research areas:

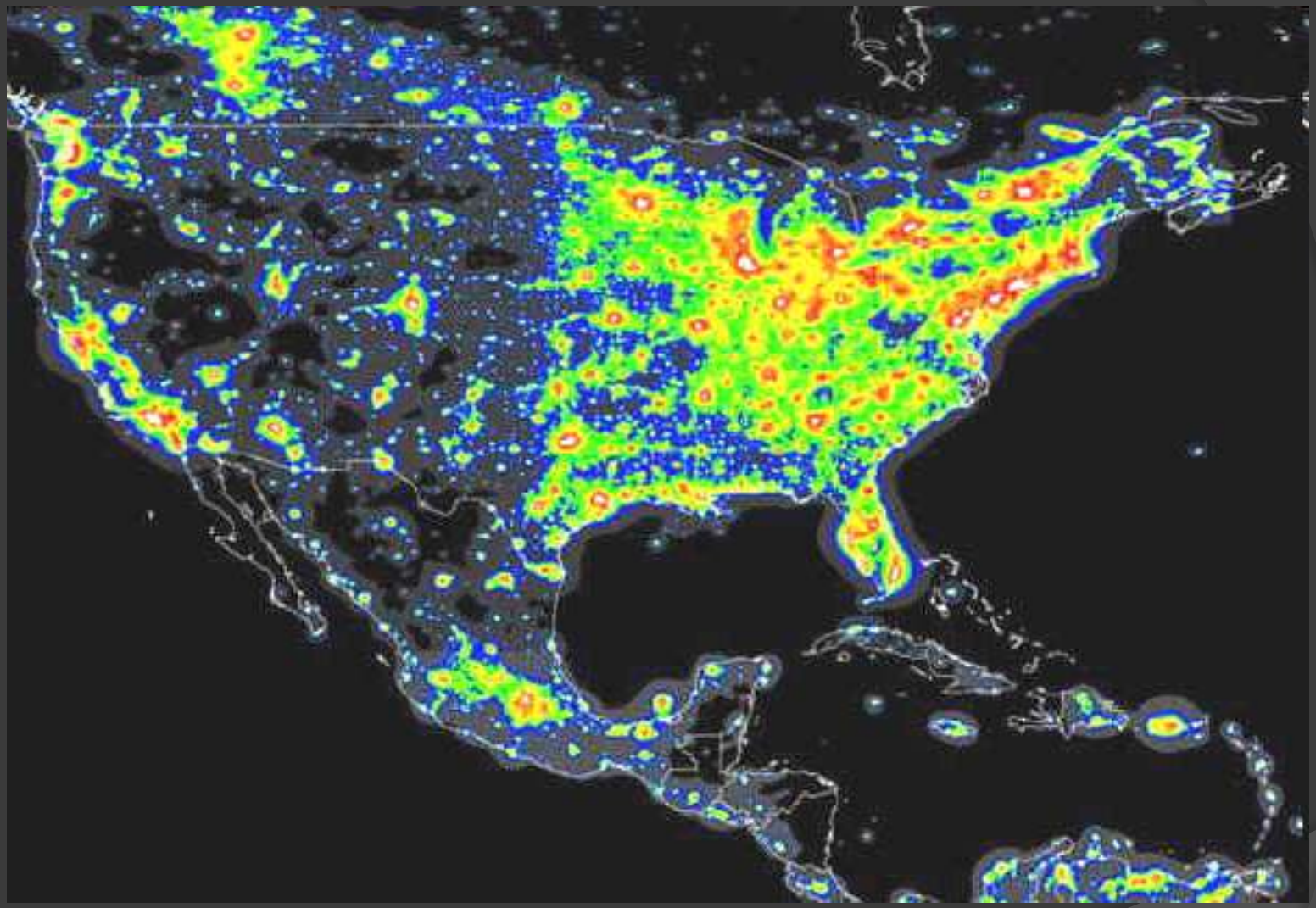
- Algal biomass production
- Conversion of algal biomass into biogas by anaerobic digestion
- Thermochemical conversion of algal biomass into a liquid fuel
- Analysis of the technology transfer potential and financial feasibility for each of the broad research areas



Problem

- Puerto Rico is dependent on energy from non-renewable resources.
- Approximately 98% of the energy consumed comes from thermoelectric plants that use 70% petroleum / 15% gas / 15% charcoal (López, 2006).
- For 2015 – 12% renewable energy
- For 2020 - 15% renewable energy





- http://www.businessweek.com/investing/green_business/archives/2008/03/lights_out_tonight_save_a_watt_save_a_ton_save_a_bird.html

Open Ocean Aquaculture

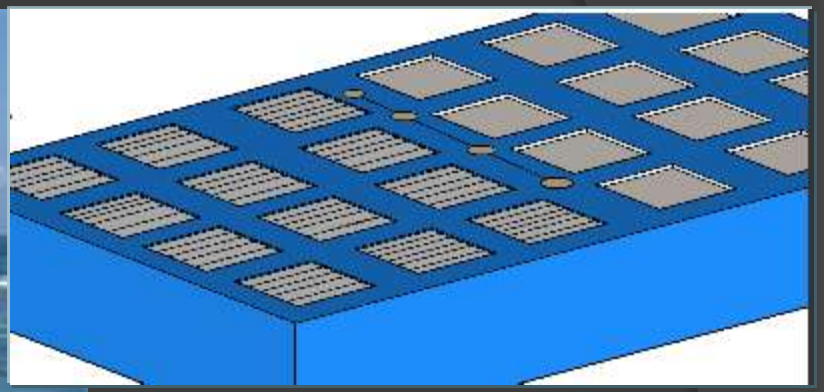
- "Blue Revolution"
- U.S. Exclusive Economic Zone (EEZ; generally 3 to 200 nautical miles from shore)
- Critics raise
  - environmental protection
  - potential impacts on existing commercial fisheries.

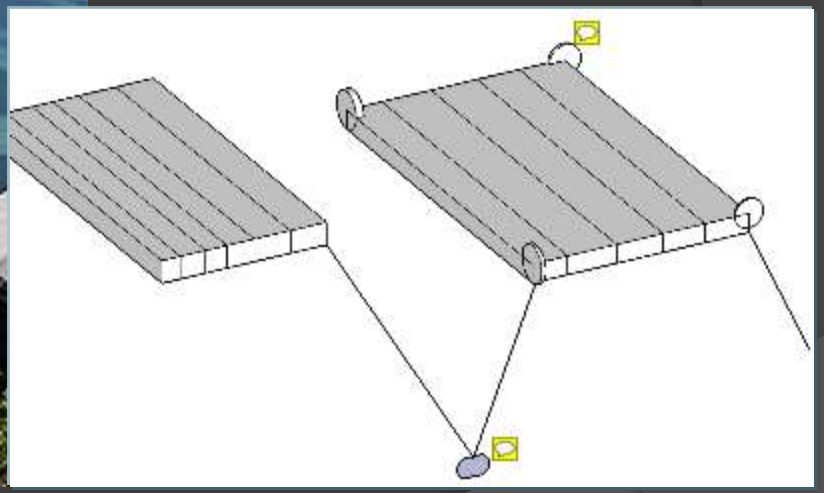
- January 28, 2009
  - Gulf of Mexico Fishery Management Council approve a plan to issue aquaculture permits and regulate aquaculture in federal waters of the Gulf of Mexico
  - September 3, 2009, the plan took effect

Open Ocean Aquaculture

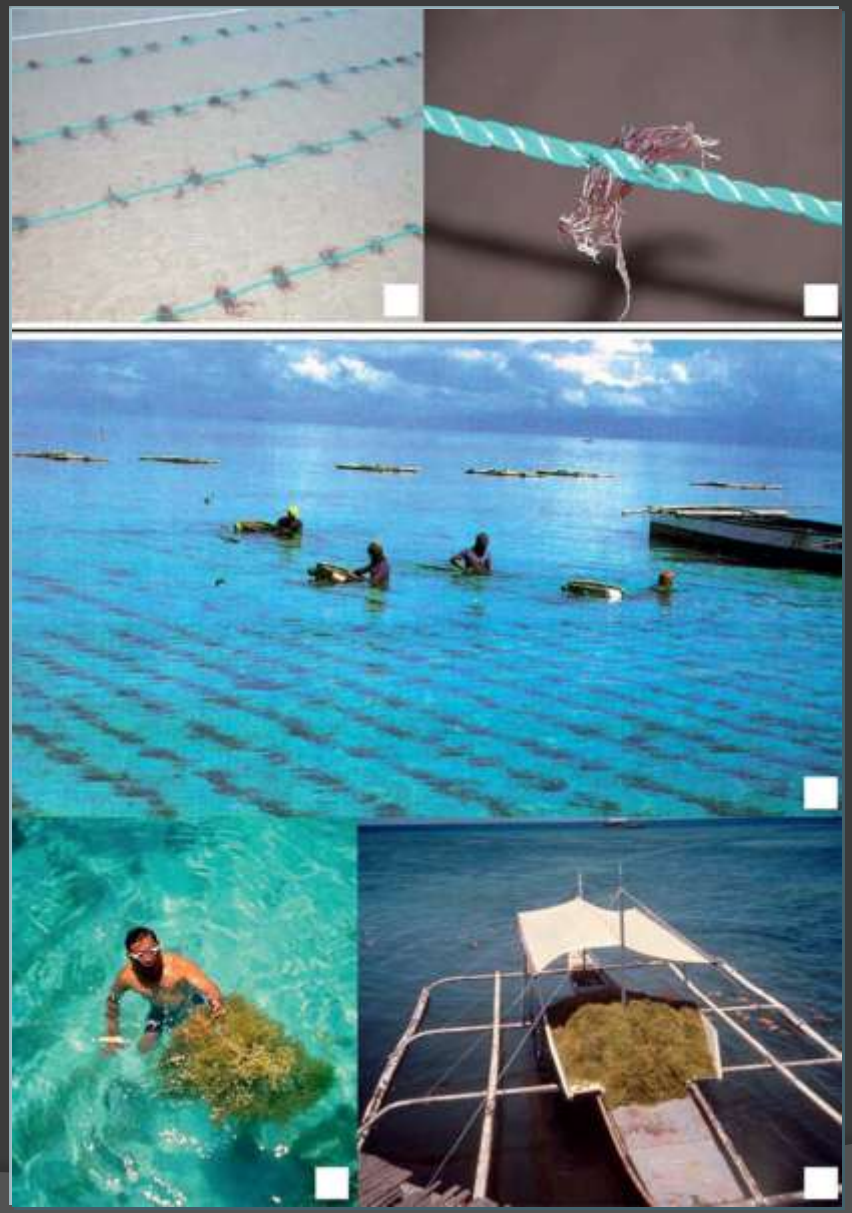
- September 8, 2009, H.R. 3534,the Consolidated Land, Energy, and Aquatic Resources Act of 2009. Section 704 - authority of the Secretary of Commerce to develop or approve fishery management plans to permit or regulate offshore aquaculture
- December 16, 2009 the National Sustainable Offshore Aquaculture Act of 2009 establish a regulatory system for offshore aquaculture in the U.S. Exclusive Economic Zone
- May 25, 2010 - the Research in Aquaculture Opportunity and Responsibility Act of 2010 prohibit offshore aquaculture until 3 years after the submission of a report on the impacts of offshore aquaculture.

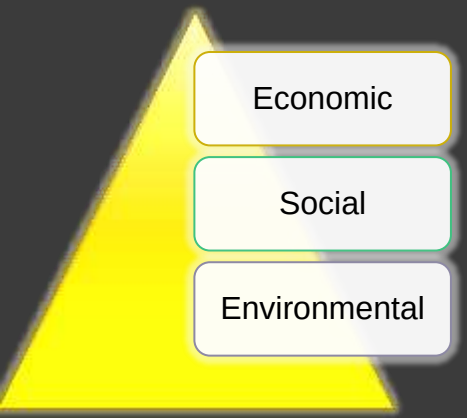
AQUACULTURE SITES

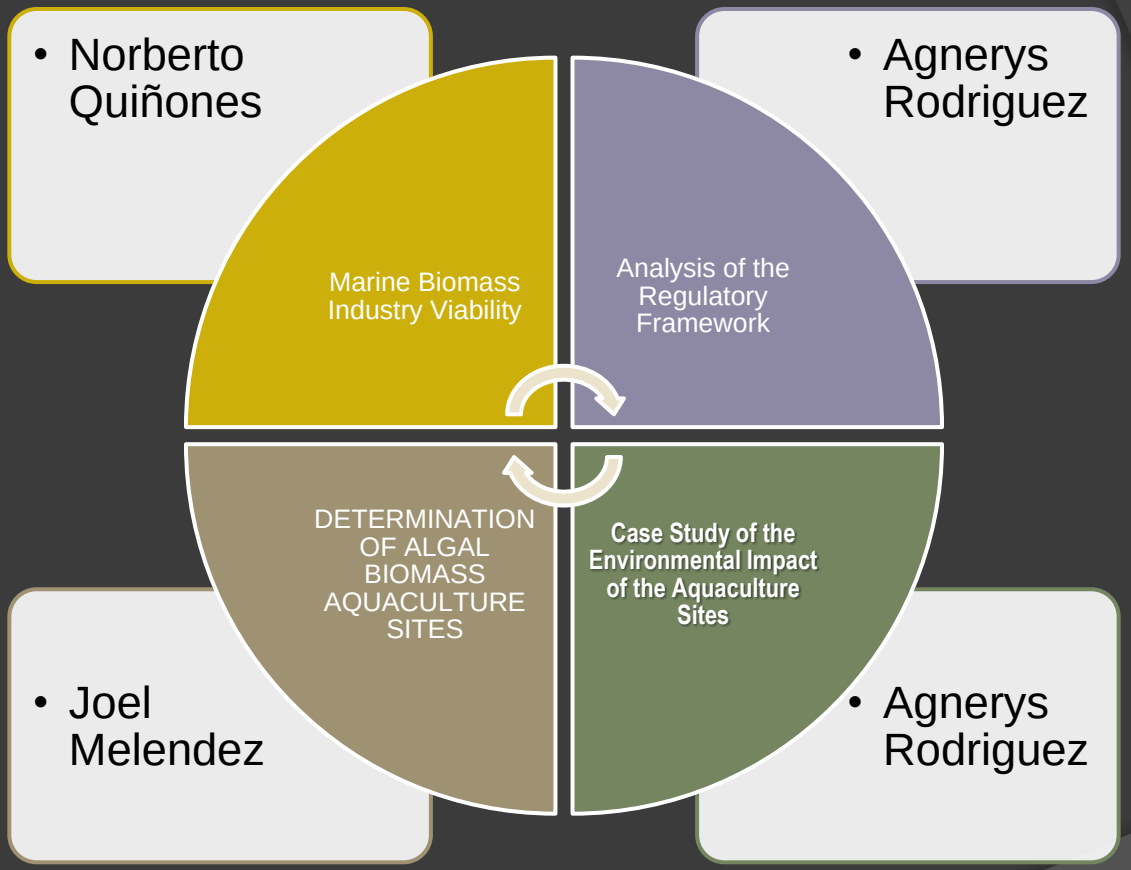




AQUACULTURE SITES




Economic
Social
Environmental


• Norberto Quiñones
• Agnerys Rodriguez
Marine Biomass Industry Viability
Analysis of the Regulatory Framework
DETERMINATION OF ALGAL BIOMASS AQUACULTURE SITES
Case Study of the Environmental Impact of the Aquaculture Sites
• Joel Melendez
• Agnerys Rodriguez

Geographic Data Base

Contrucction

Information Sharing

Documentation

UPR CRES

Analysis of possible sites

In Puerto Rico

Field Data Validation

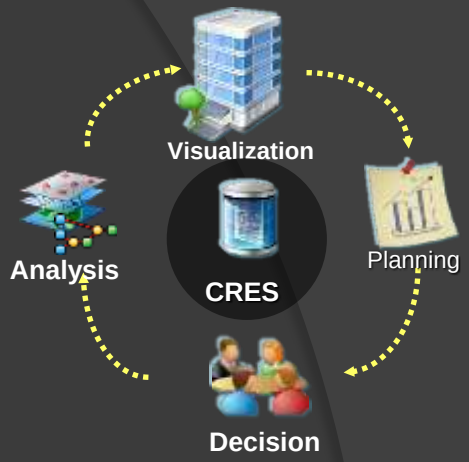
Analysis

Geographic Data Base

Construction

Geographic Data Base constructión

Support



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- SiembraAlgas.gdb
  - Algas
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  - Cuadriculas
  - AreaEstudio25M
  - areasbanistasconflicto
  - boyas_pr_2010conflicto
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  - submarineCables
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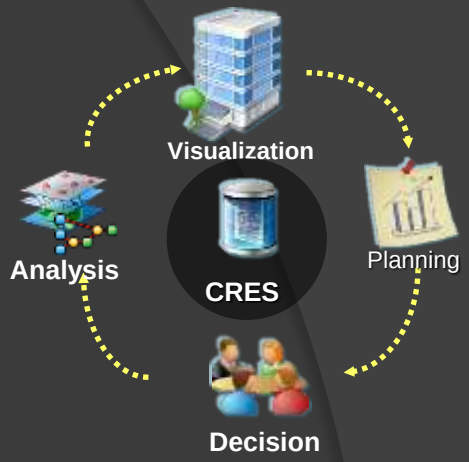
  - AreaEstudio25M
  - benticadrna
  - boyas&rutas
  - Conflictos

Geographic Data Base

Construction

Geographic Data Base construction

Support



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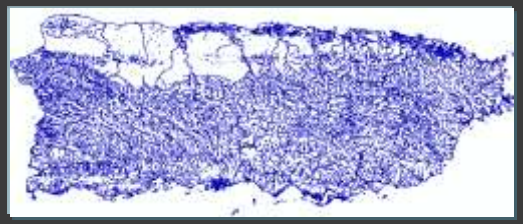
Cuencas_Hidrograficas_20k

Rios_Quebradas



Geographic Data Base

Construction

Geographic Data Base construction

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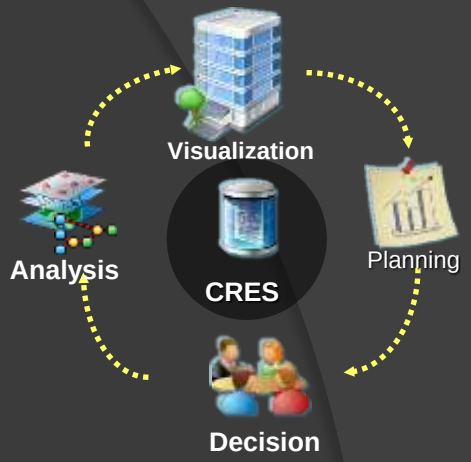

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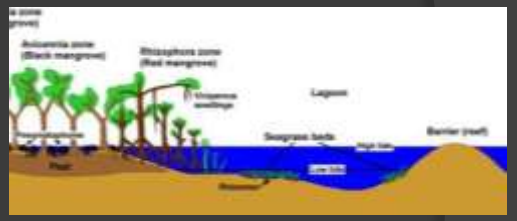

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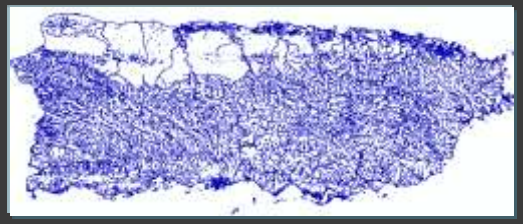

Support

Information Sharing
Documentation
&
Reports

Support

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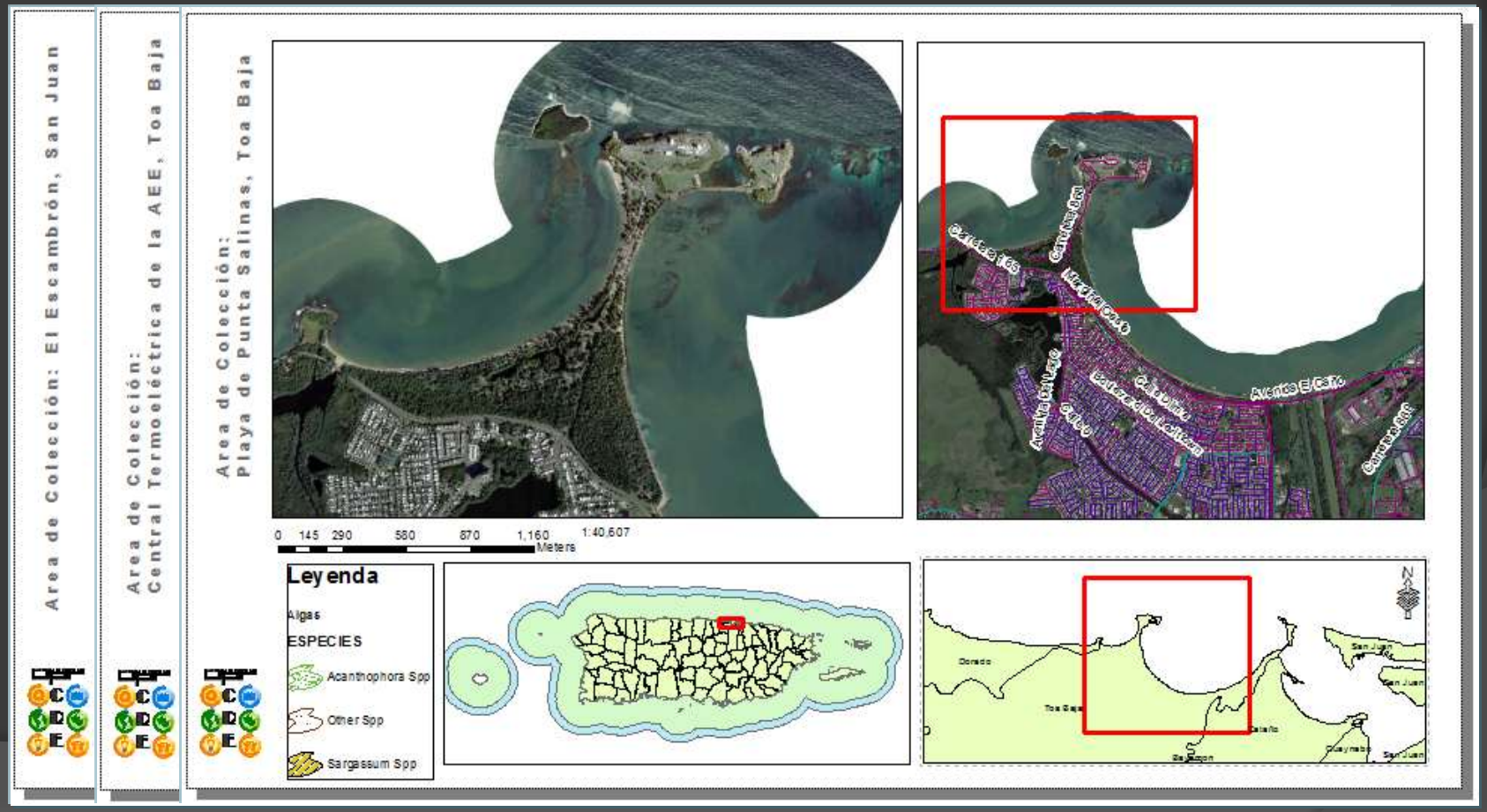
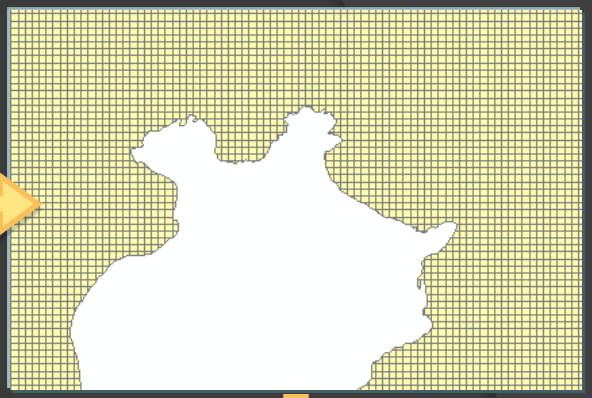
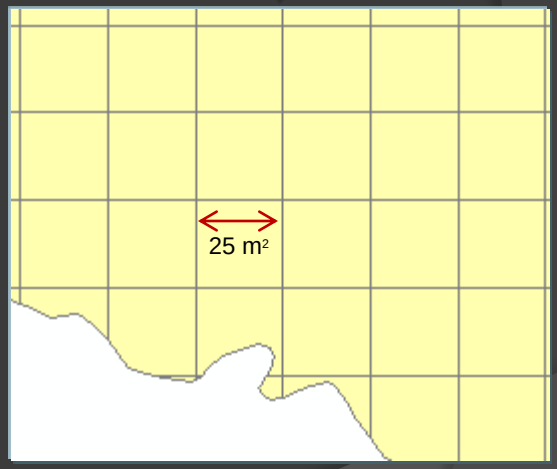


Analysis of possible sites

In Puerto Rico





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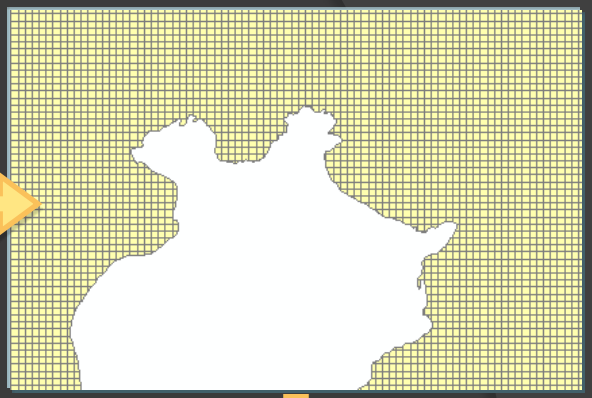
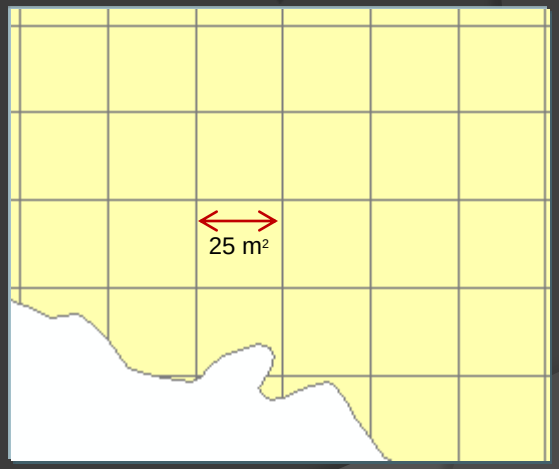
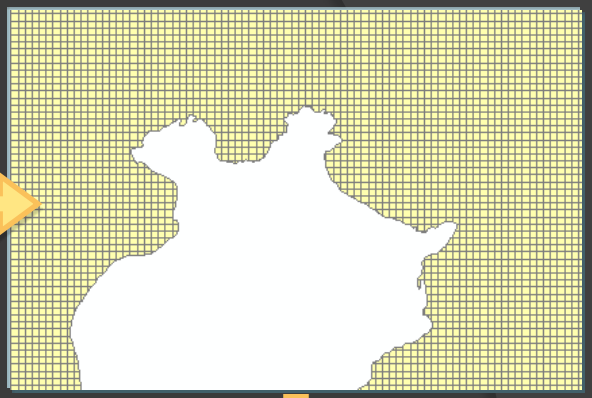


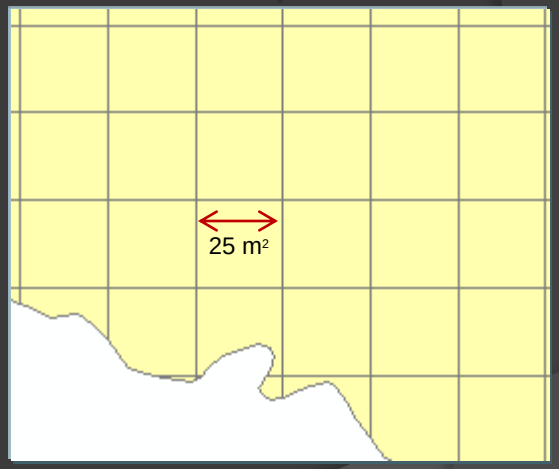


Conflict Areas

Analysis of possible sites

In Puerto Rico





Conflict Areas

Optimal Areas

Analysis of possible sites

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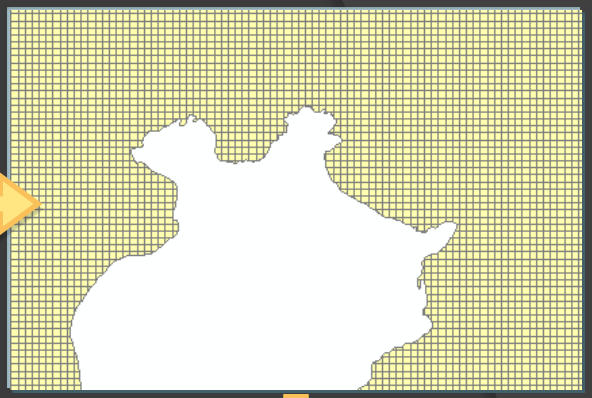
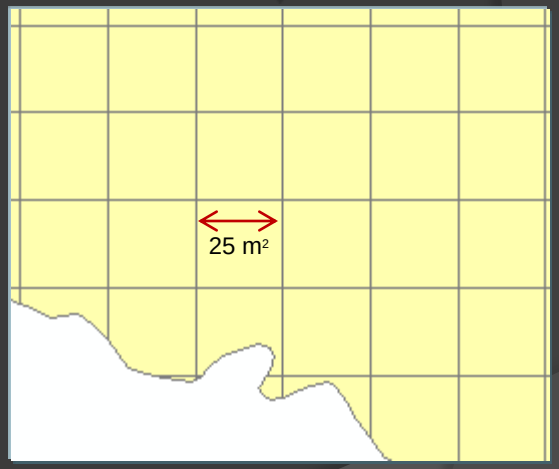


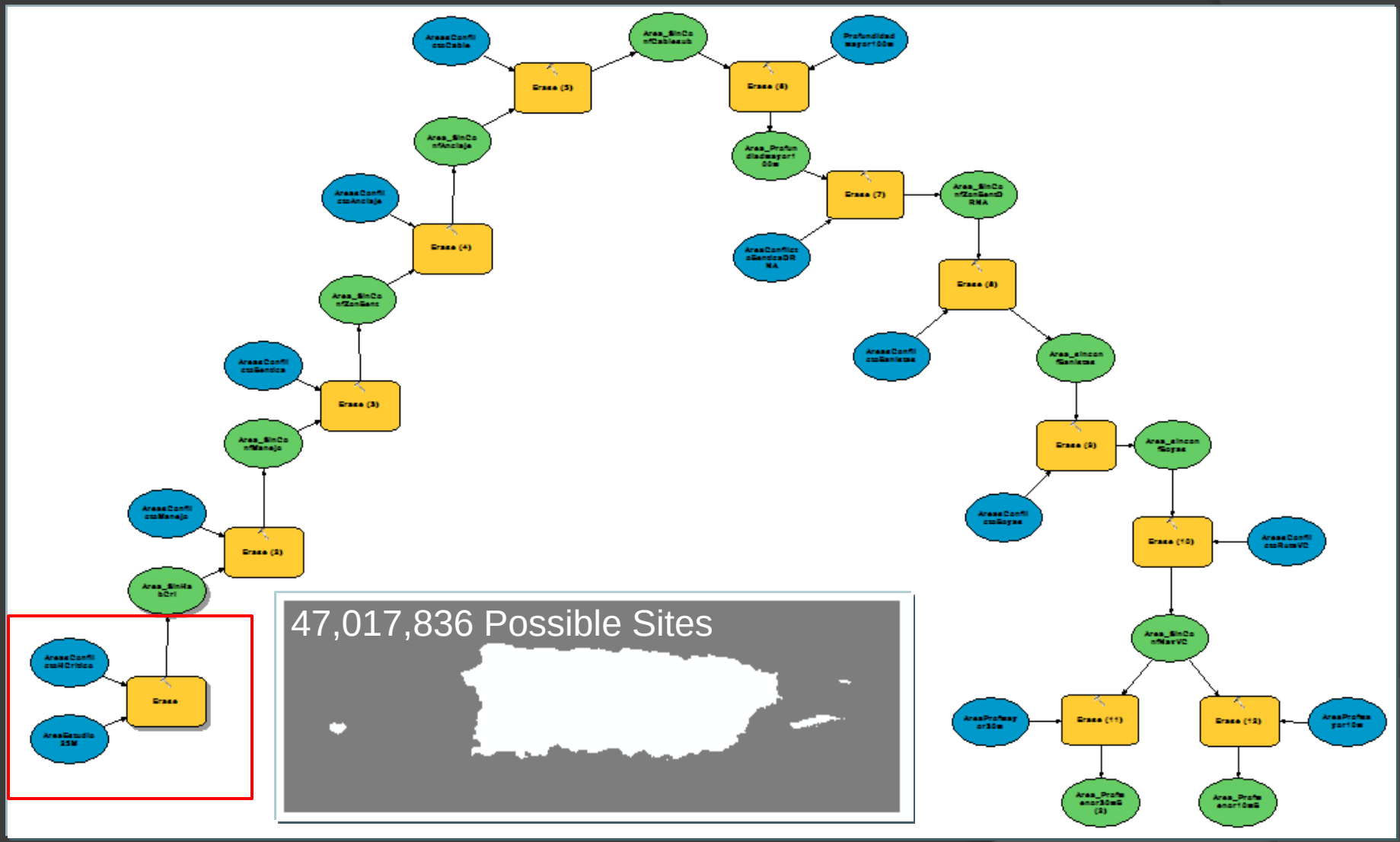


Conflict Areas

Optimal Areas

AQUACULTURE SITES

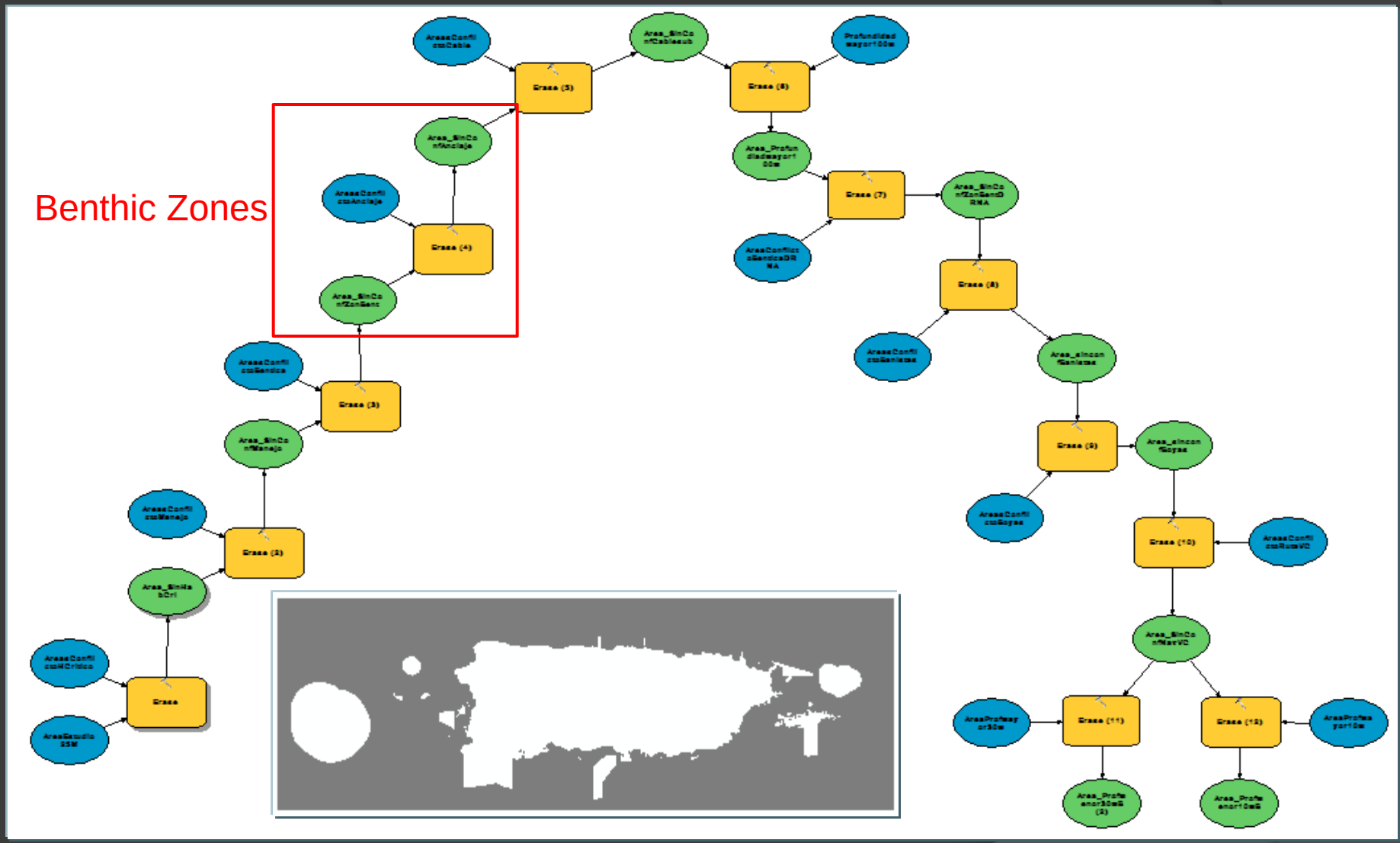
Conflict Areas



1,175,445.9 Km^2 / 1,175,445,900 m^2 available area

Conflict Areas

Benthic Zones



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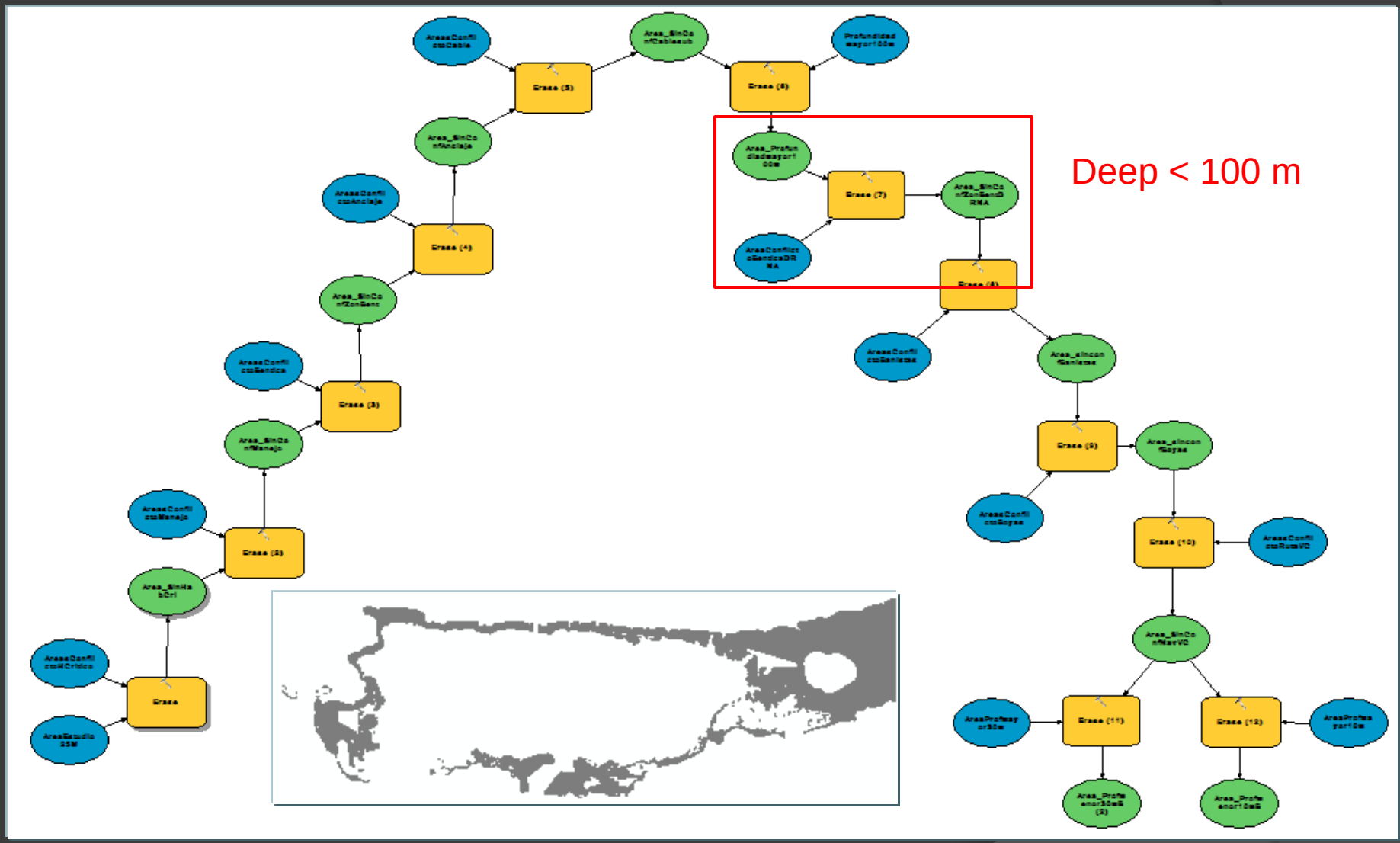

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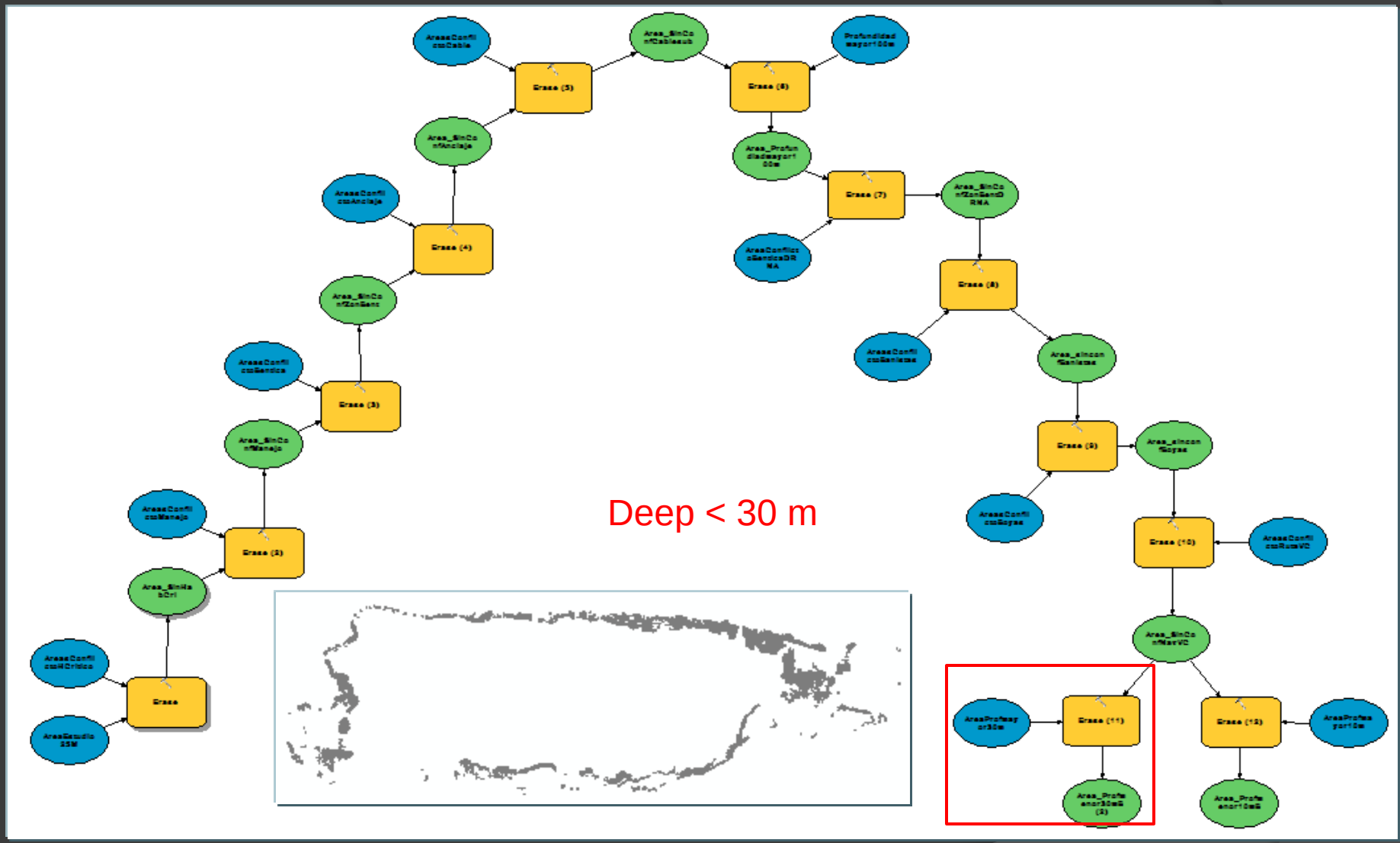

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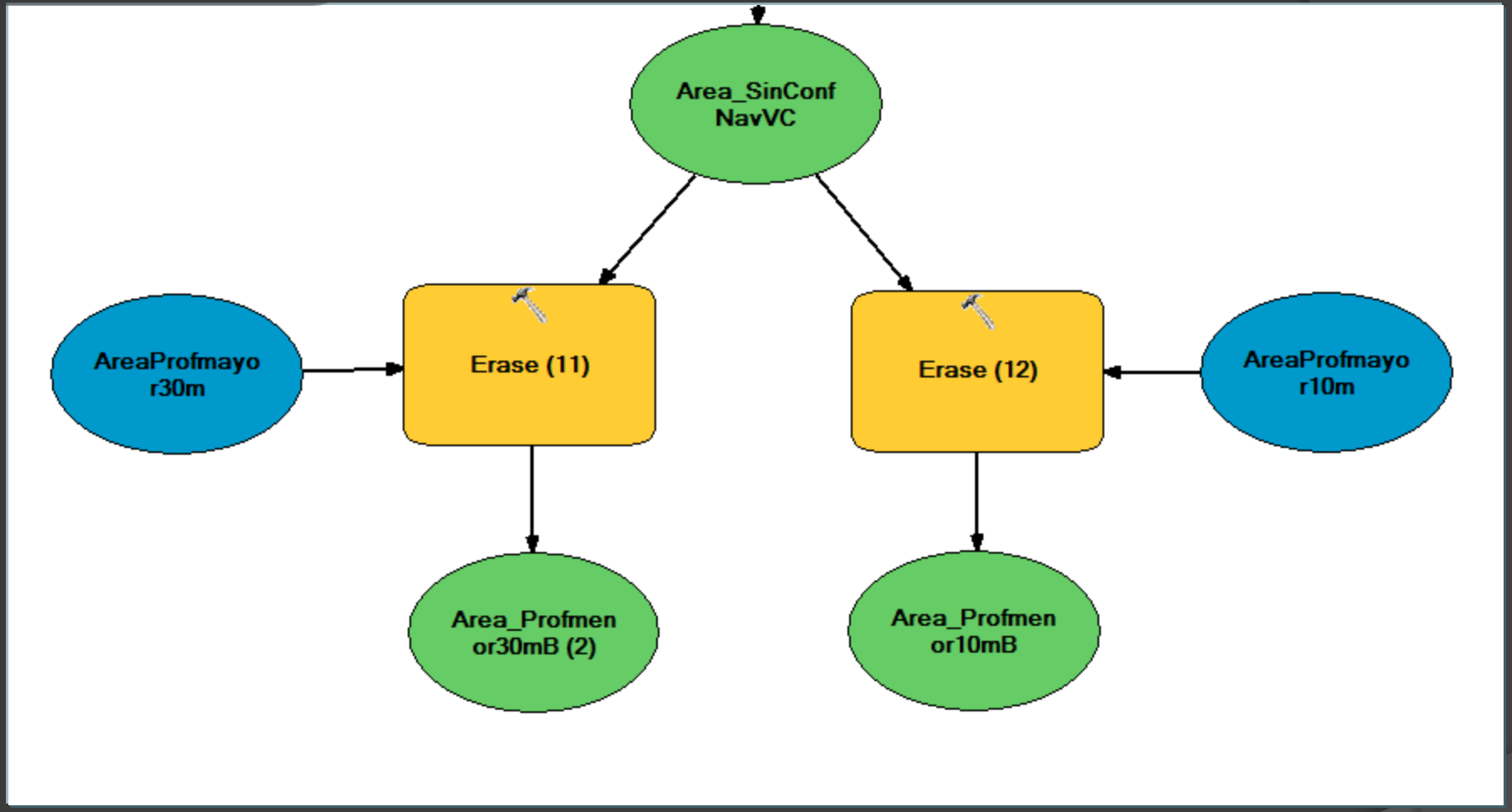
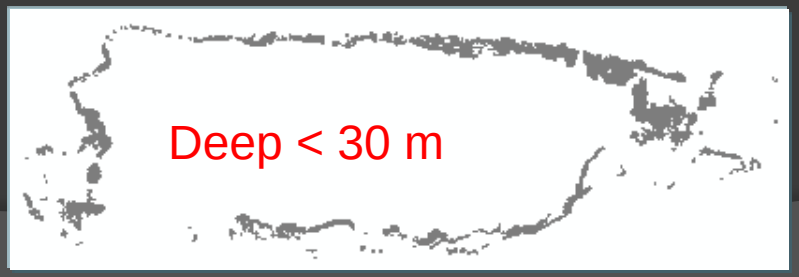
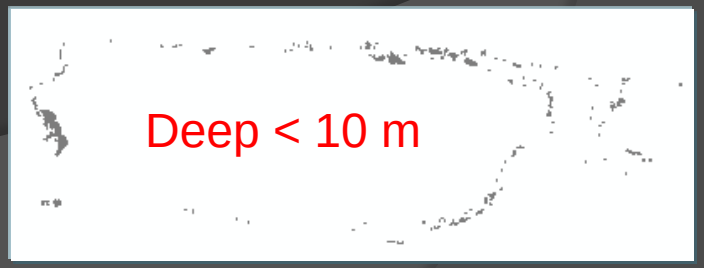


783,533 P.S. / 19,588,325 m^2 / 19,588.326 Km^2

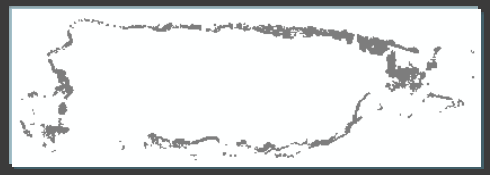


58,538 P.S. / 1,463,450 m^2 / 1,463.45 Km^2



Analysis of possible sites

In Puerto Rico

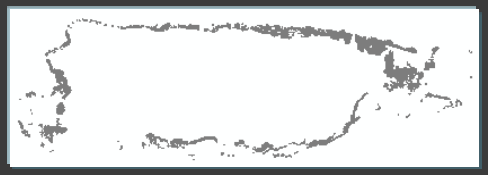


No Conflict Areas

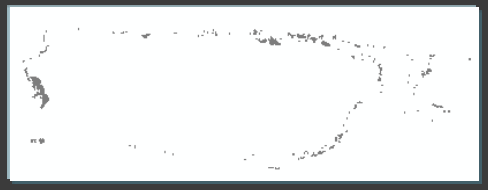
Analysis of possible sites

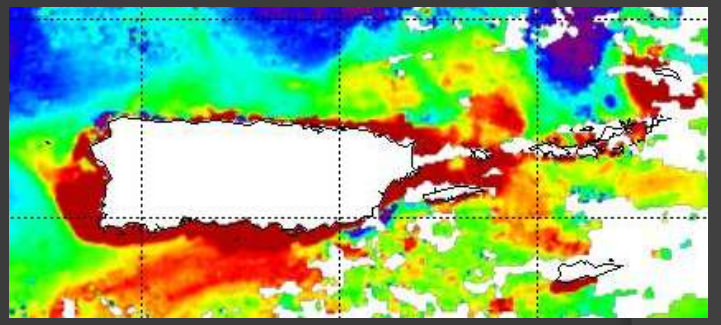
In Puerto Rico

Next



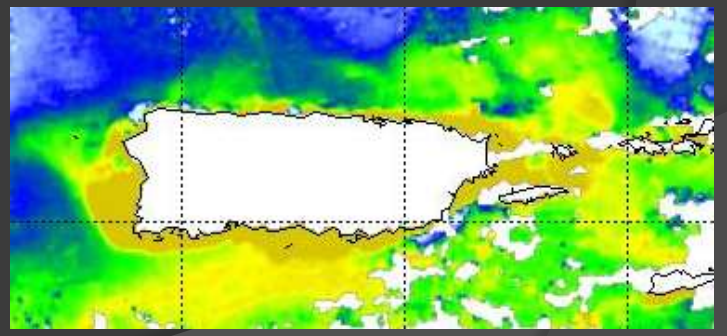
No Conflict Areas





Chlorophyll

Optimal Areas

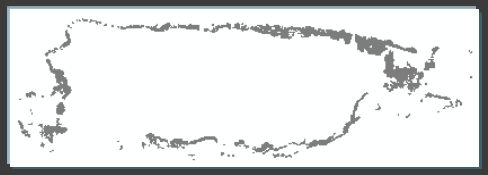


Light

Analysis of possible sites

In Puerto Rico

Next



No Conflict Areas

Optimal Areas

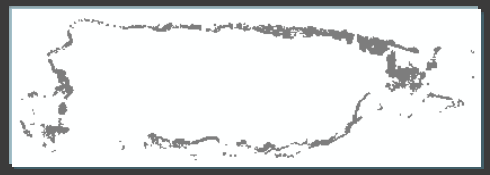
Available Infrastructure

Wave Intensity

Analysis of possible sites

In Puerto Rico

Next



No Conflict Areas

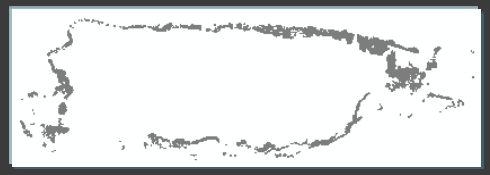
Optimal Areas

AQUACULTURE SITES

Analysis of possible sites

In Puerto Rico

Next



No Conflict Areas

Optimal Areas

AQUACULTURE SITES

Field Data Analysis

Analysis of possible sites

In Puerto Rico

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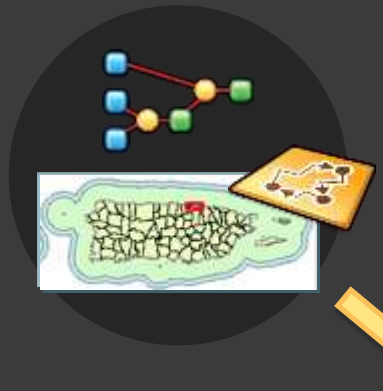
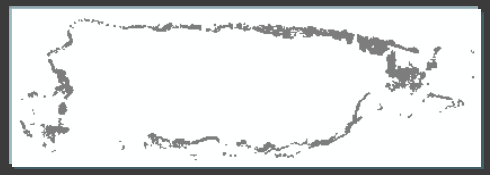




No Conflict Areas

Optimal Areas

AQUACULTURE SITES

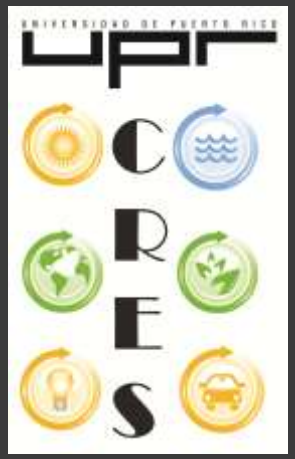
Field Data Analysis

Thanks

Support

Data

Questions?



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