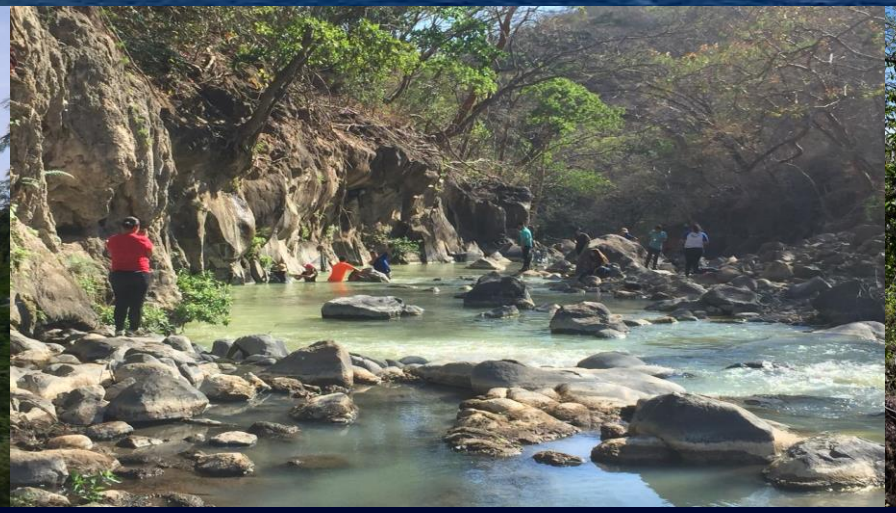

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Centro de Recursos Hídricos para Centroamérica y el Caribe

Andrea Suárez, PhD. General Coordinator

HIDROCEC: Management of water resources from a interinstitucional and intersectorial approach

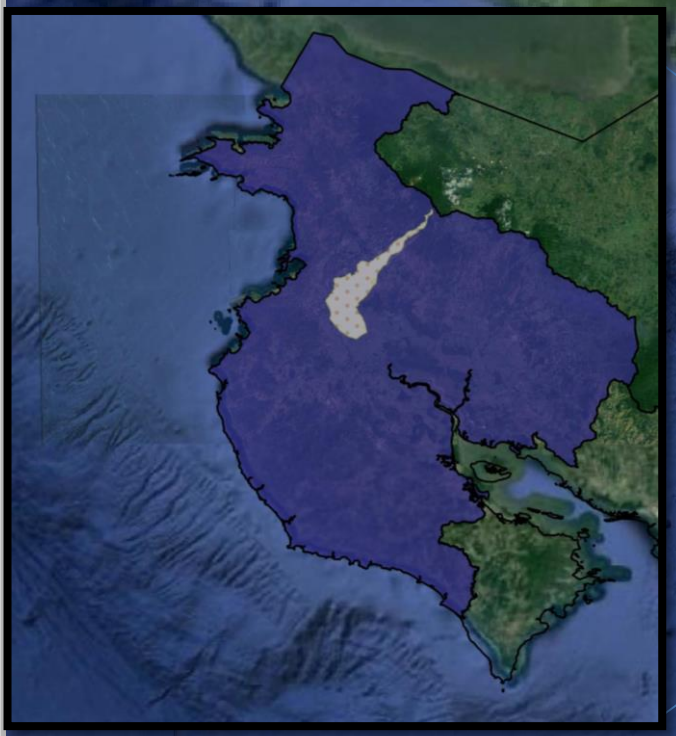
26th June 2019, Dresden-Germany.

UNA
UNIVERSIDAD NACIONAL
COSTA RICA

Outline

1. Introduction
2. Work areas
3. Main activities
4. Ongoing projects

Guanacaste



Nicaragua

Costa Rica

Caribbean sea

Panamá

Pacific Ocean

Tropical dry forest, transition to humid
Two seasons: dry (november to may) rainy (may to november)

Rural and peri urban areas
Vulnerable populations

Campus Liberia, Sede Regional Chorotega-UNA

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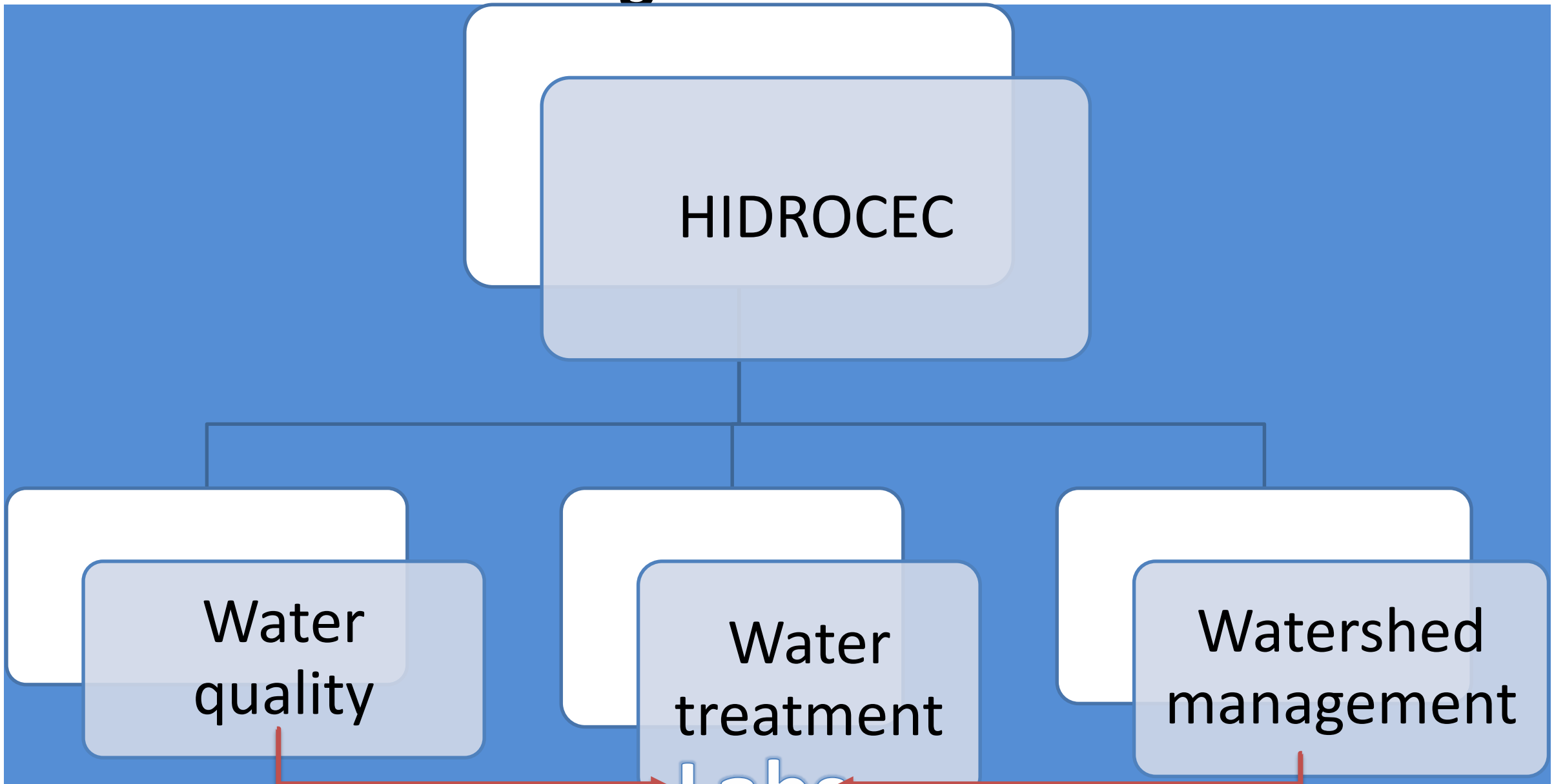
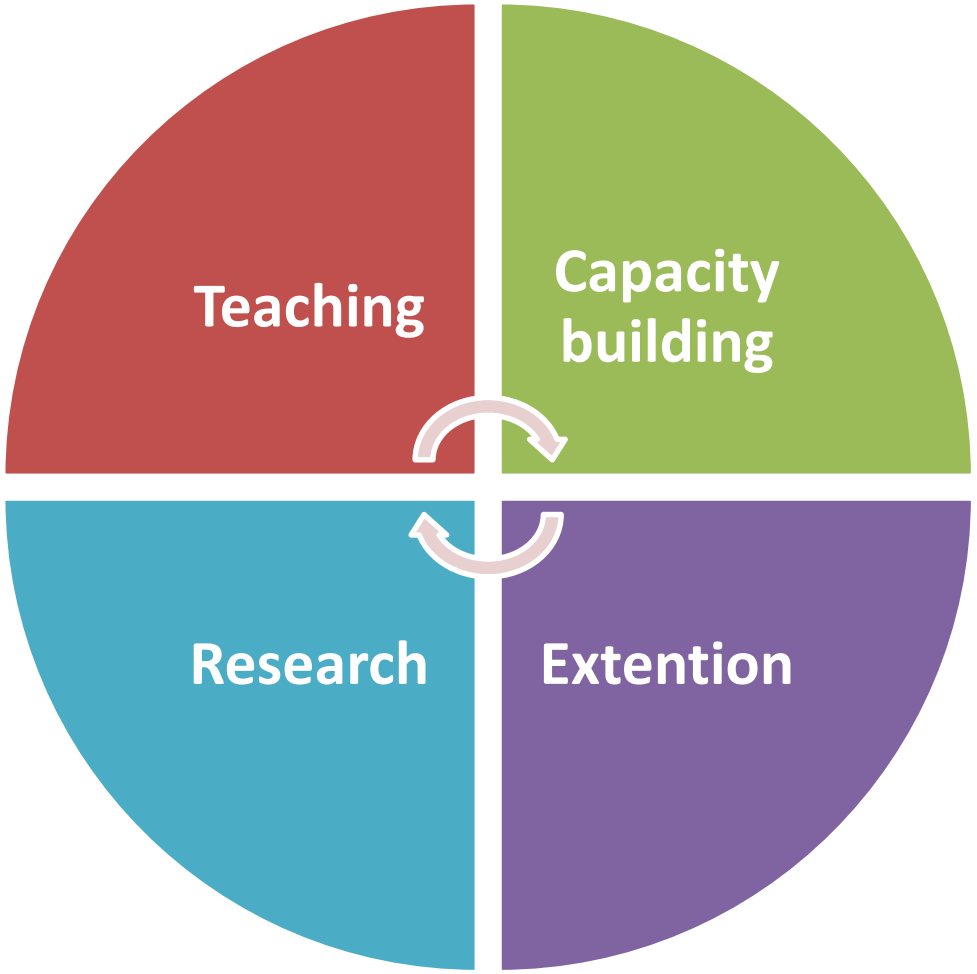
Centro de Recursos Hídricos para Centroamérica y el Caribe

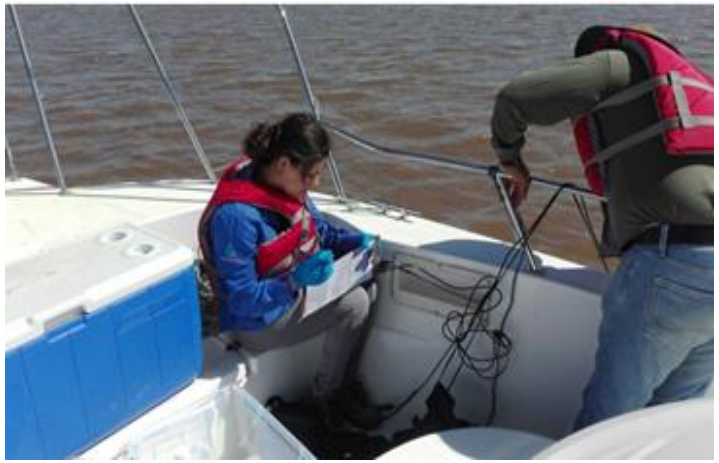
Center for Central America
n

Organization



Main activities





Hidrological Engineering

- 2016 (40 students)
- 2019 (160 students)

Social management of water resources

Curricular axes

Water technologies

Water cycle approach

Water quality and Quantity

International Diploma about Alternative Technologies in Drinking Water and Sanitation for Central America and the Caribbean (2015)

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Cooperación Suiza
en América Central

UNA
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NACIONAL
COSTA RICA

Consejo Superior Universitario Centroamericano
-CSUCA-

Convocatoria al curso de especialización en:

"Tecnologías alternativas de abastecimiento de agua potable y saneamiento"

International Diploma about Alternative Technologies in Drinking Water and Sanitation for Central America and the Caribbean (2015)

Cierre del Diplomado. Dr. Urs Hangauer - Cooperación Suiza, MSc. José Coronel - Recto ai, Msc. India Ríos -Decana ai, Dra. Andrea Suárez Coordinadora HIDROCEC. David Panamá, UNACHI.

- Universidad Nacional de Costa Rica and Universidad Autónoma de Chiriquí-Panamá

- 24 students from CA and the Caribbean
- Interdisciplinary group from UNA

SEMANA PRESENCIAL:
Biojardinera, Corral de Piedra, Nicoya.

n Julio SEMANA PRESENCIAL:
SCALL en Corral de Piedra, Nicoya.

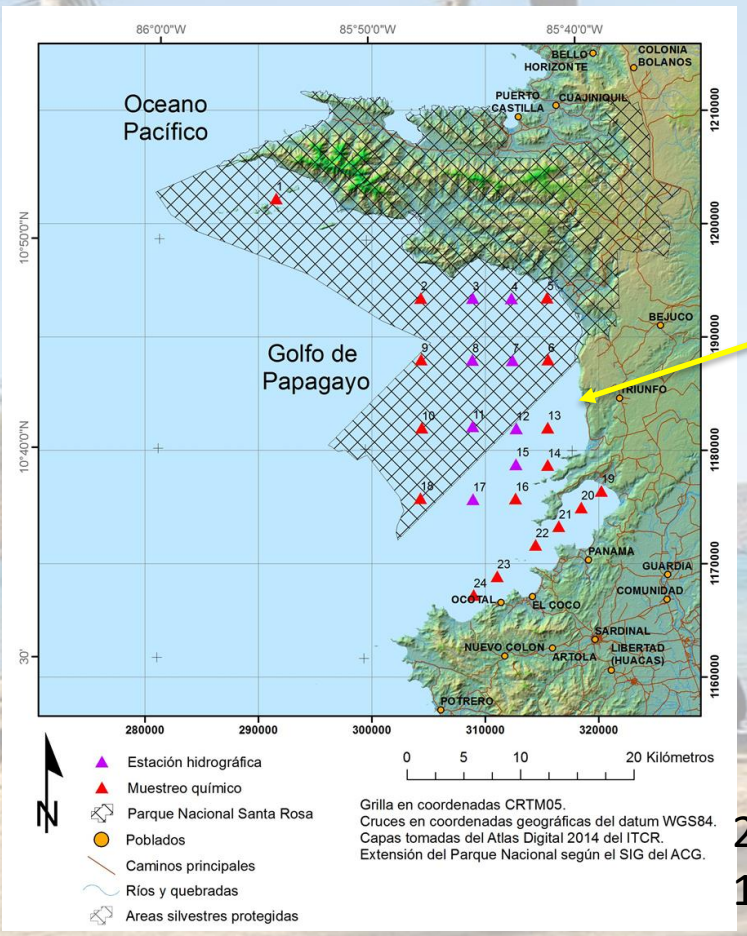
Intercambio cultural

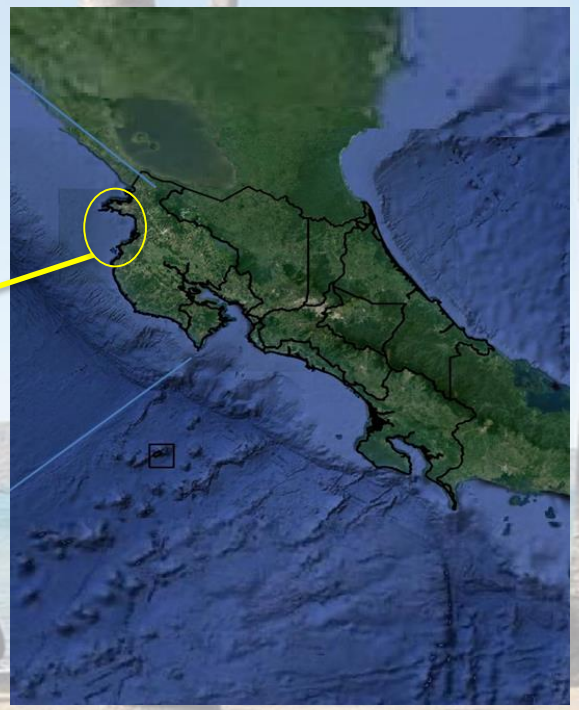
Ongoing projects

PROJECTS

- Facilitation of green adaptation techniques for reduction of seasonal water scarcity in Costa Rica (GREAT)
- Seasonal changes in the water quality of the Gulf of Papagayo.
- Monitoring plan of water quality of the lower Tempisque river basin
- Treatment, management and reuse of septic sludge
- Capacity building on members of comunal water asociations
- Agricultural water innovations in the tropics (AgWit)

Water Quality monitoring: Papagayo Gulf (2016-2019)





24 sampling points in the Gulf
14 sampling points in the coast

Evaluate the water quality of the Gulf of Papagayo during different times of the year, monitoring: physical, chemical and microbiological parameters

Improve the management of the coastal marine zone base on scientific information

Workshops with personal of protected areas (Guanacaste and Tempisque conservation areas) ACG, ACT about implementation of sea water quality protocol

Research group: SERIO (Physical department), Lab of Marine chemistry, Regional Institute of Studies on toxics substances (IRET) and HIDROCEC.

Water Quality monitoring: Papagayo Gulf

Microbiological analysis:

Fecal coliforms and *E.coli*

Enterococcus

Physicochemical analysis:

Ammonium

Nitrites

Nitrates

Phosphates

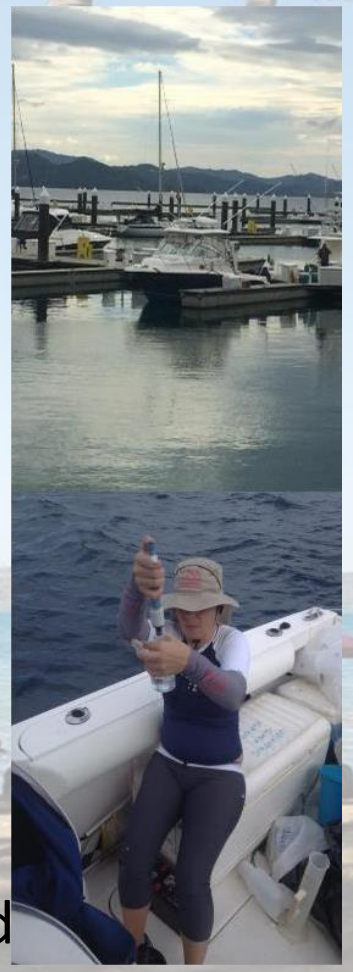
Chlorophyll A

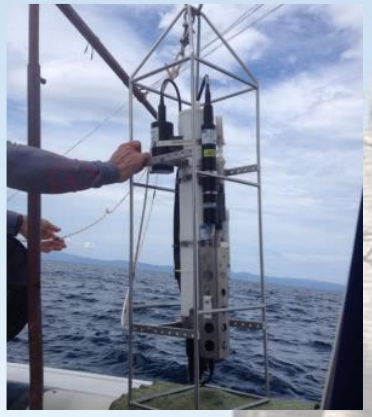
Total solids

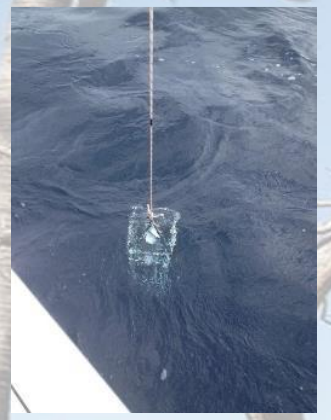
Petroleum hydrocarbons dispersed / dissolved

Pesticide residues

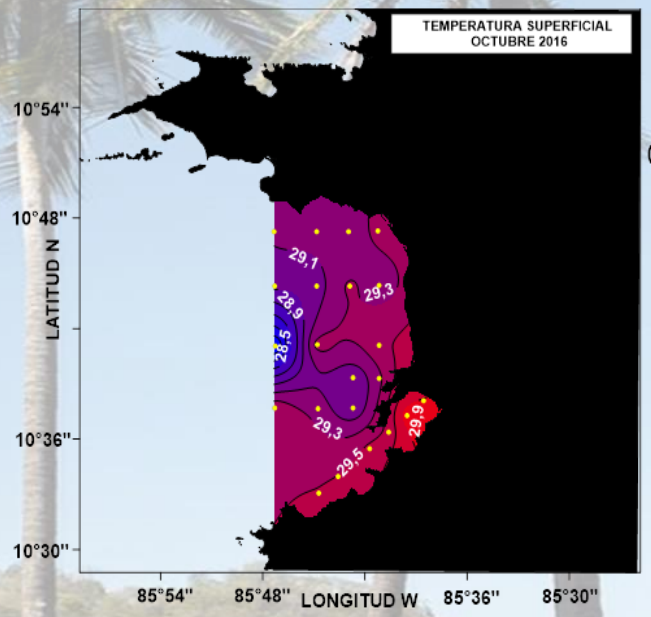
Screening of other semi-polar organic compounds



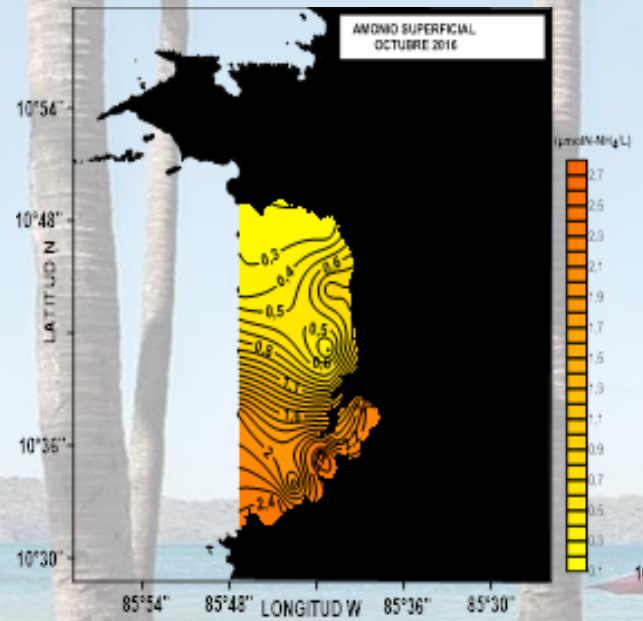




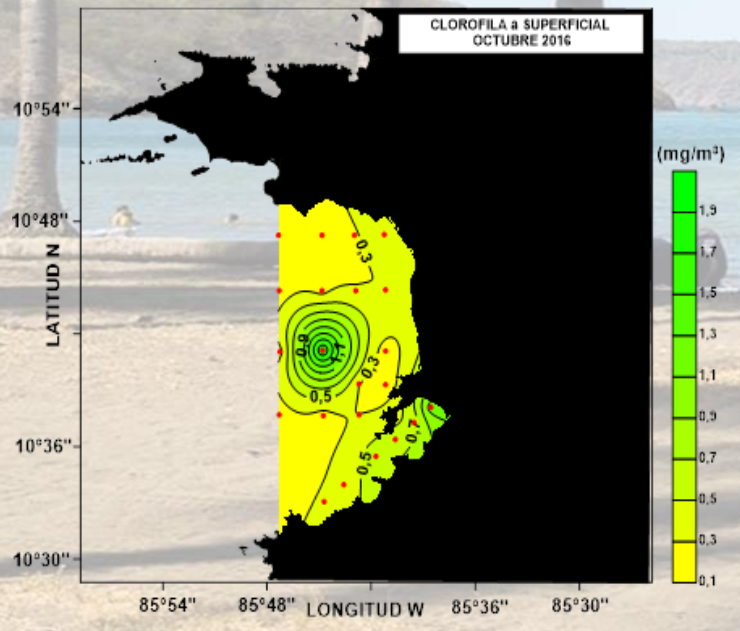
Water Quality monitoring Papagayo Gulf:2016,2017,2018…2019



Temperature



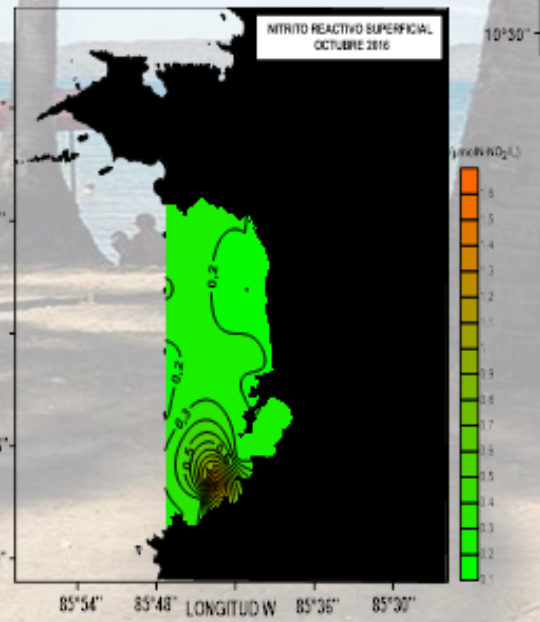
Amonium

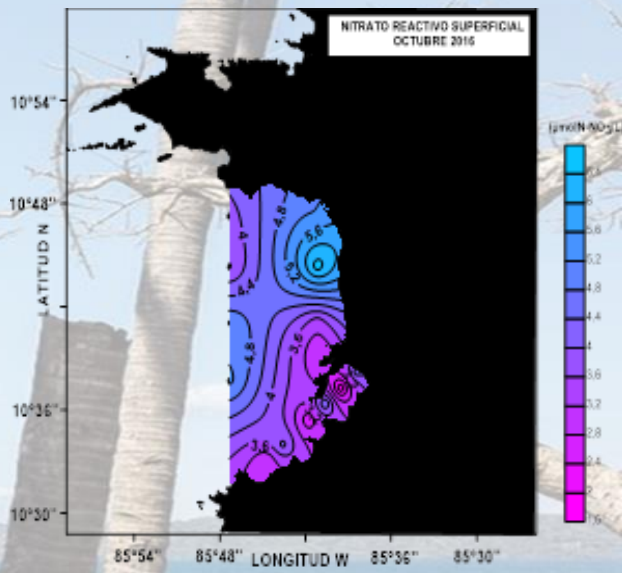


Chlorophyl a

Superficial Nitrogen

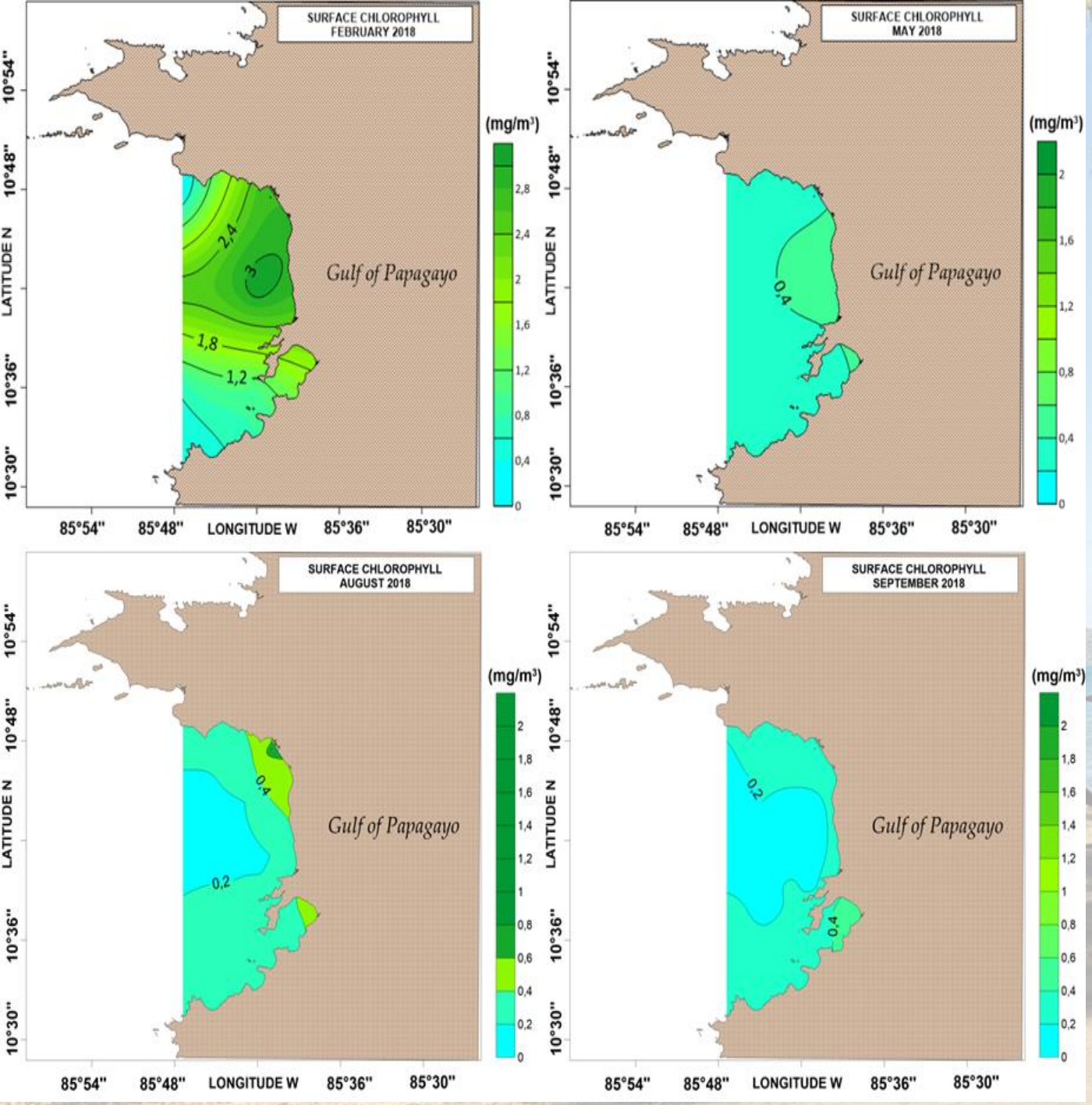
Nitrites

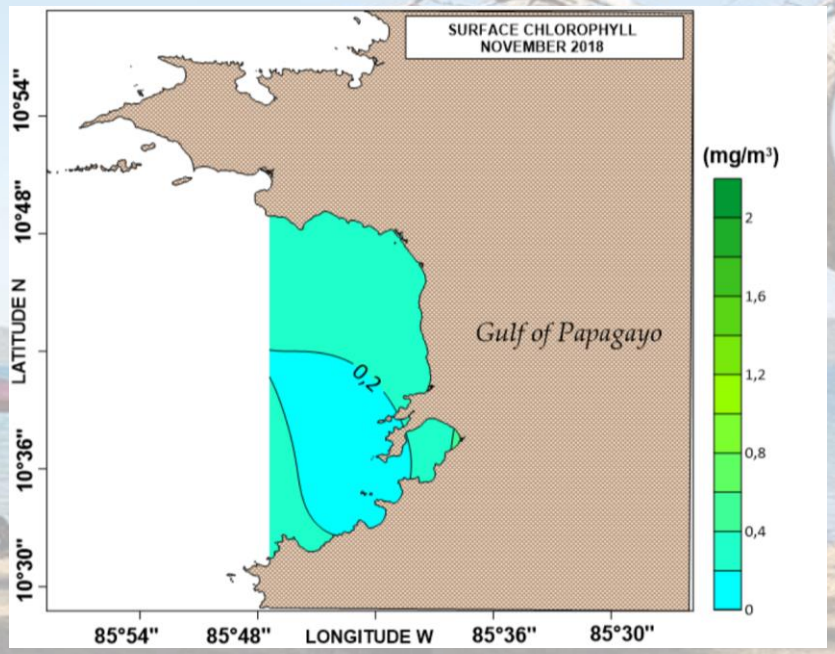




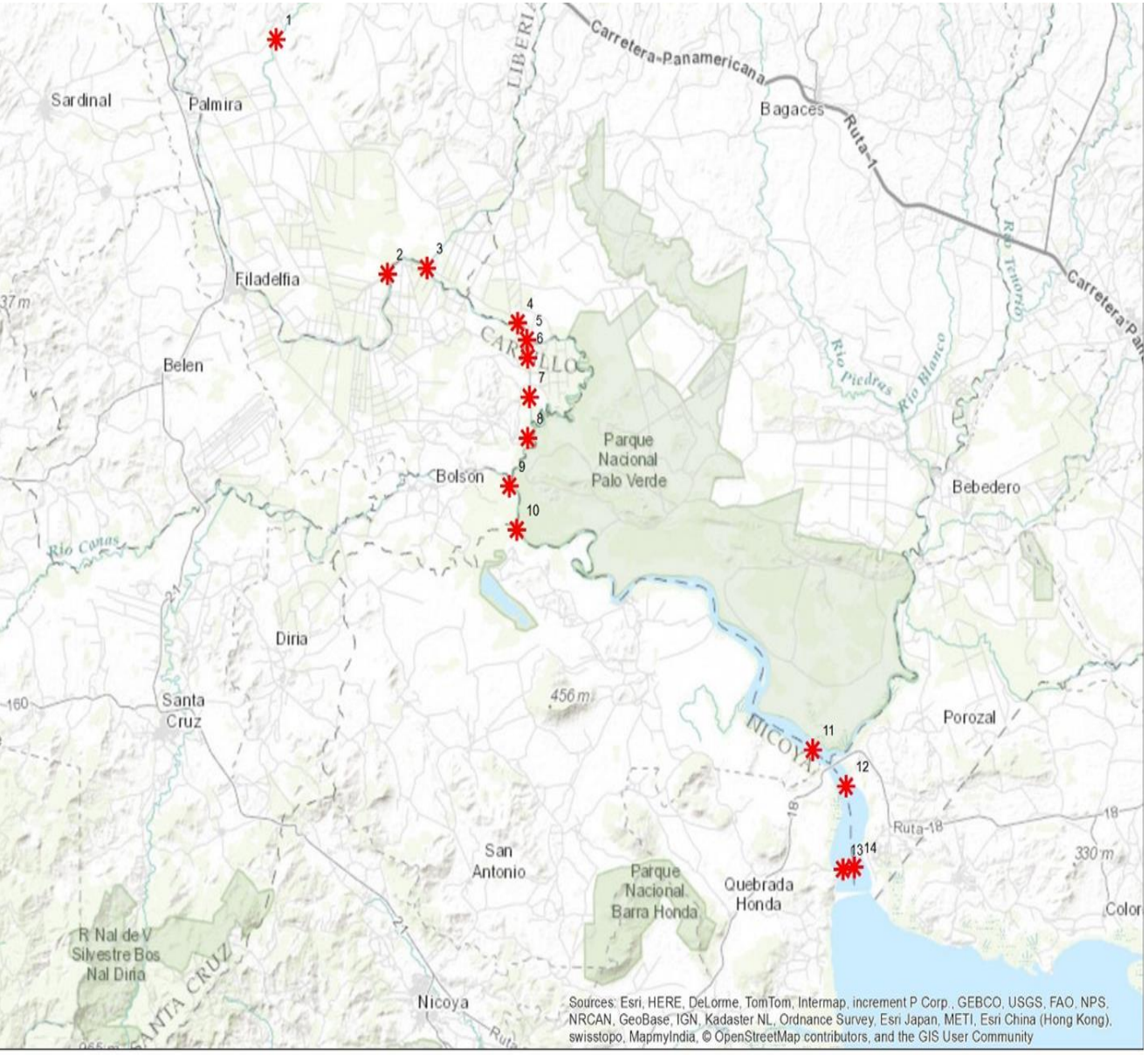
Nitrates

Superficial Chlorophyll a (Chl-a) for different climatic seasons during the year 2018 in the Gulf of Papagayo





Water Quality monitoring: Tempisque river (2016-2018)



Monitoring plan in the lower basin of Tempisque river

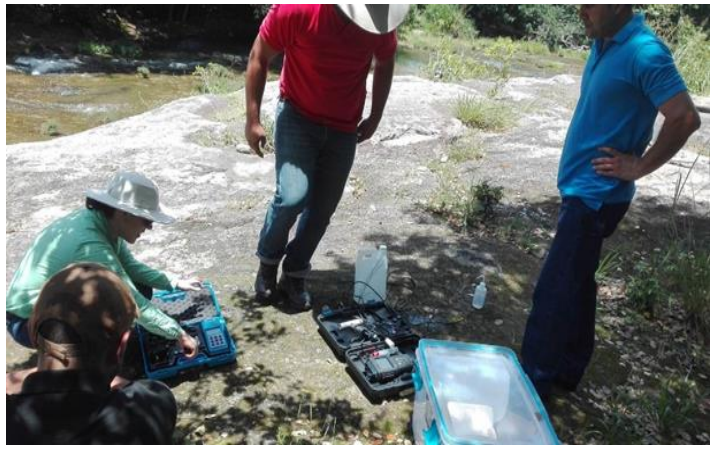
Training officials from minister of environment and key actors of the basin

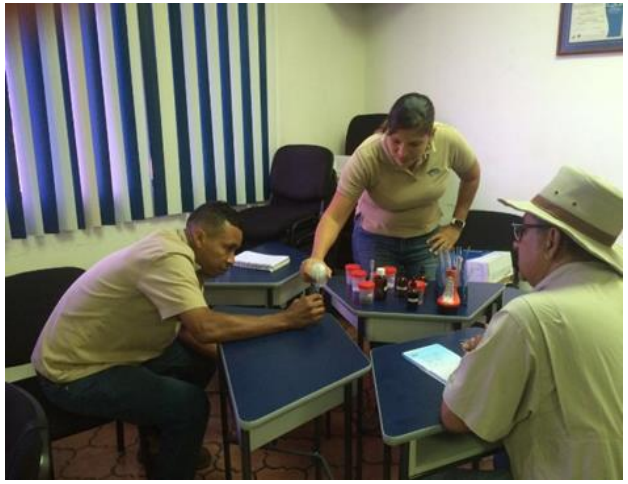
Improve watershed management

- 14 sampling points
- Workshops

CIGITEM: Intersectorial commission sustainable management of the lower Tempisque river basin.

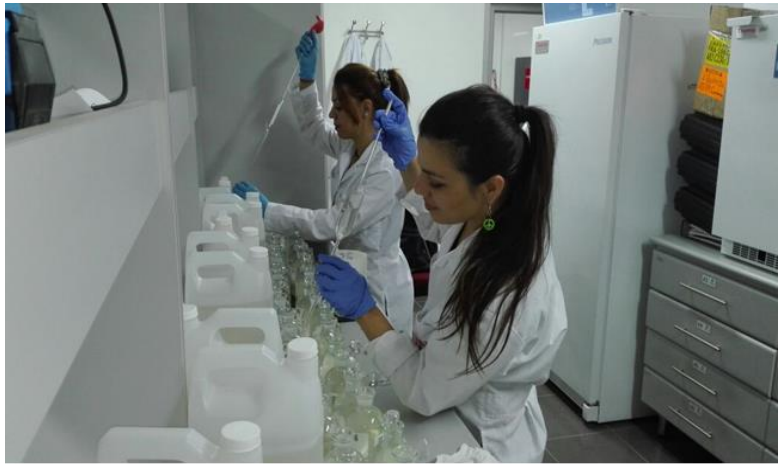
Tempisque river water quality monitoring: workshops

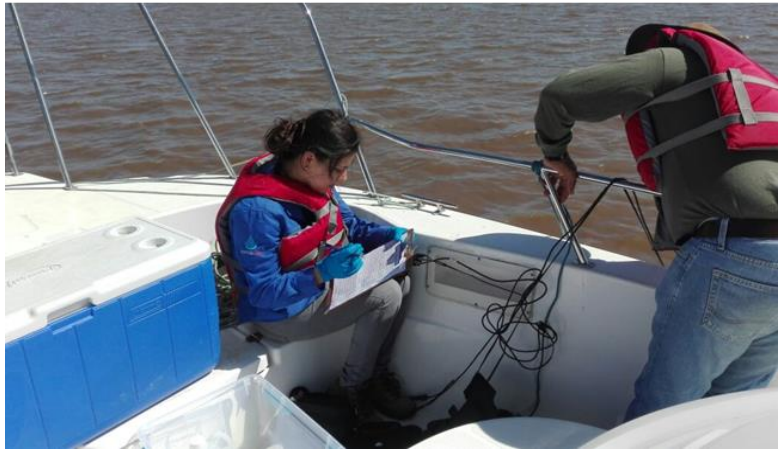




- Sampling protocols
- Interpretation of physico-chemical analyses
- National legislation
- Fish mortality events

Water Quality monitoring: Tempisque river





According to standardized protocols:

Reactive nitrate in water
Reactive nitrite in water
Ammonium
Reactive phosphorus in water
Dissolved oxygen
Fecal coliforms
Total coliforms
DBO5
in situ temperature
Dissolved solids
Settleable solids
Total suspended solids,
Total solids
Screening of pesticides with HPLC and CG-MS

Agricultural water innovations in the tropics: AgWIT

- **Principal Investigator:** Mark Johnson, UBC

HIDROCEC is carried out in conjunction with the University of British Columbia in Canada (UBC) that serves as the general coordinator of the project, the Max Planck Institute of Biogeochemistry in Germany, the Institute of Environmental Research of the Amazon (IPAA) in Brazil, the Technical University of Denmark (DTU), the University of Stockholm (SU) in Sweden, the National University of Taiwan (NTU), with the collaboration of the Enrique Jiménez Núñez Experimental Station (INTA-MAG) and the group of Stable isotopes UNA.

Water JPI 2016 Joint Call for Transnational Collaborative Research Projects

Study sites:

Guanacaste, Costa Rica

Matto Grosso, Brazil

Crops: rice and melon

2018-2020

AgWIT partnership will test strategies to lower agricultural impacts on water resources while improving the resiliency of tropical agricultural systems to climate change.

AgWIT will use a unique network of tropical agricultural water observatories to quantify water footprints and carbon footprints for crops under standard and alternative management practices.

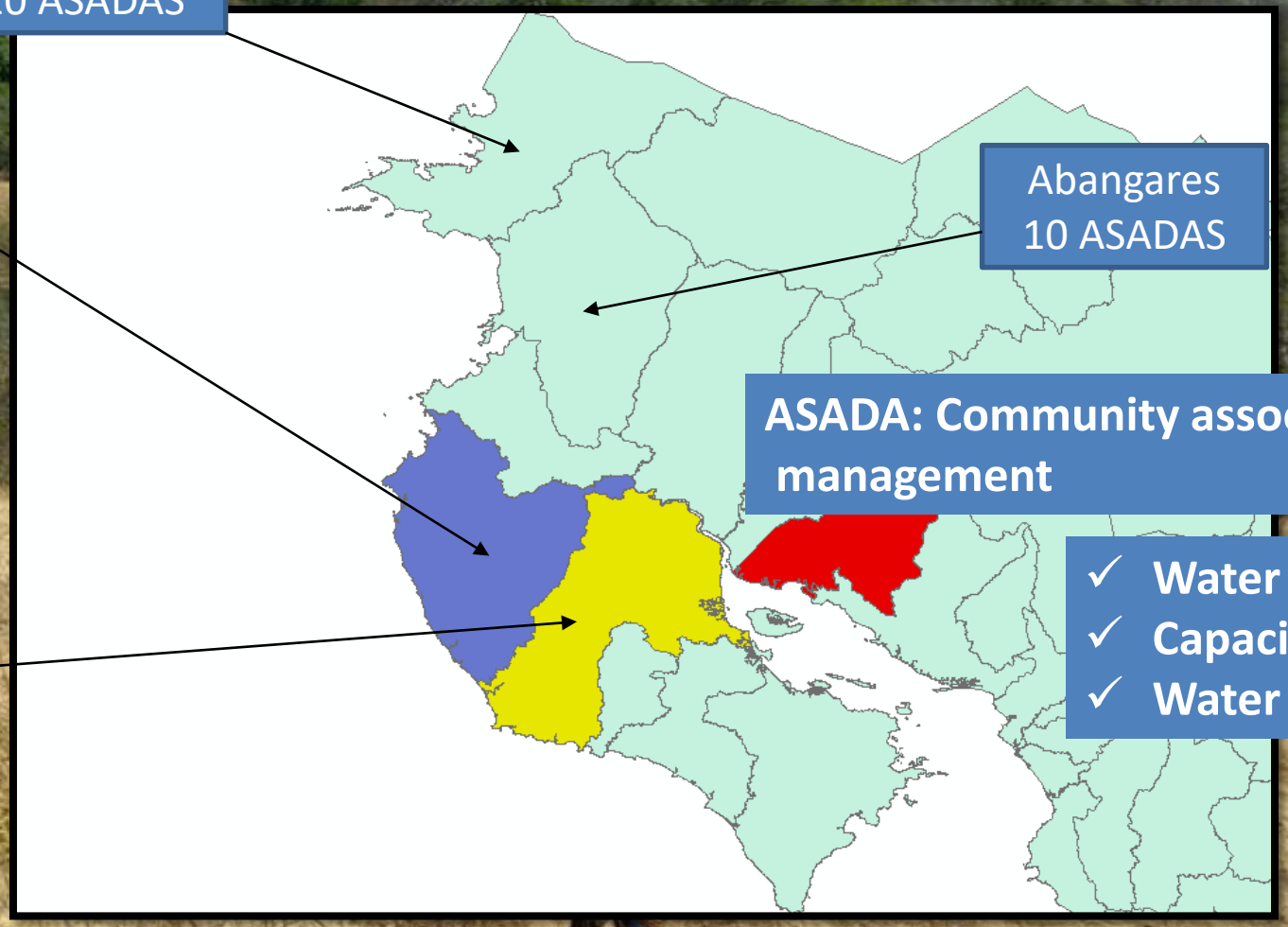
Capacity building on members of comunal water asociations (2015-2019)

La Cruz
10 ASADAS

Santa Cruz
15 ASADAS

Abangares
10 ASADAS

Nicoya
10 ASADAS



ASADA: Community association for water management

- ✓ Water quality analyses
- ✓ Capacity building
- ✓ Water safety plan approach

Capacity building on members of comunal water asociations (2015-2019)

Module 1: Water and Sanitation.

Module 2: Physical-chemical and microbiological indicators of water.

Module 3: Measurement, saving and efficient use of water

Module 4: Administration of an aqueduct

Module 5: Introduction to Water Safety Plans: benefits of its implementation and identification of critical control points in the communal aqueducts.

Module 6: Operational maintenance of the communal aqueducts

Module 7: Risk Management in Natural Disasters and Climate Change

Module 8: Reaching agreements through conflict resolution

Facilitation of green adaptation techniques for reduction of seasonal water scarcity in Costa Rica (GREAT) (2019-2020)

This proposal aims to understand Costa Rica's water-related challenges in vulnerable communities to identify and test adaptation options for facing water scarcity.

Specifically, we will learn from two case studies: i) **Coastal aquifers salinization in the Santa Cruz Canton**; and ii) **Water scarcity in Pacific insular communities**.

Background

Harvesting water for human consumption

Nicoya Gulf

270 personas (50 familias)
4 Km2
4 tanques (5000L= 20 000 L)

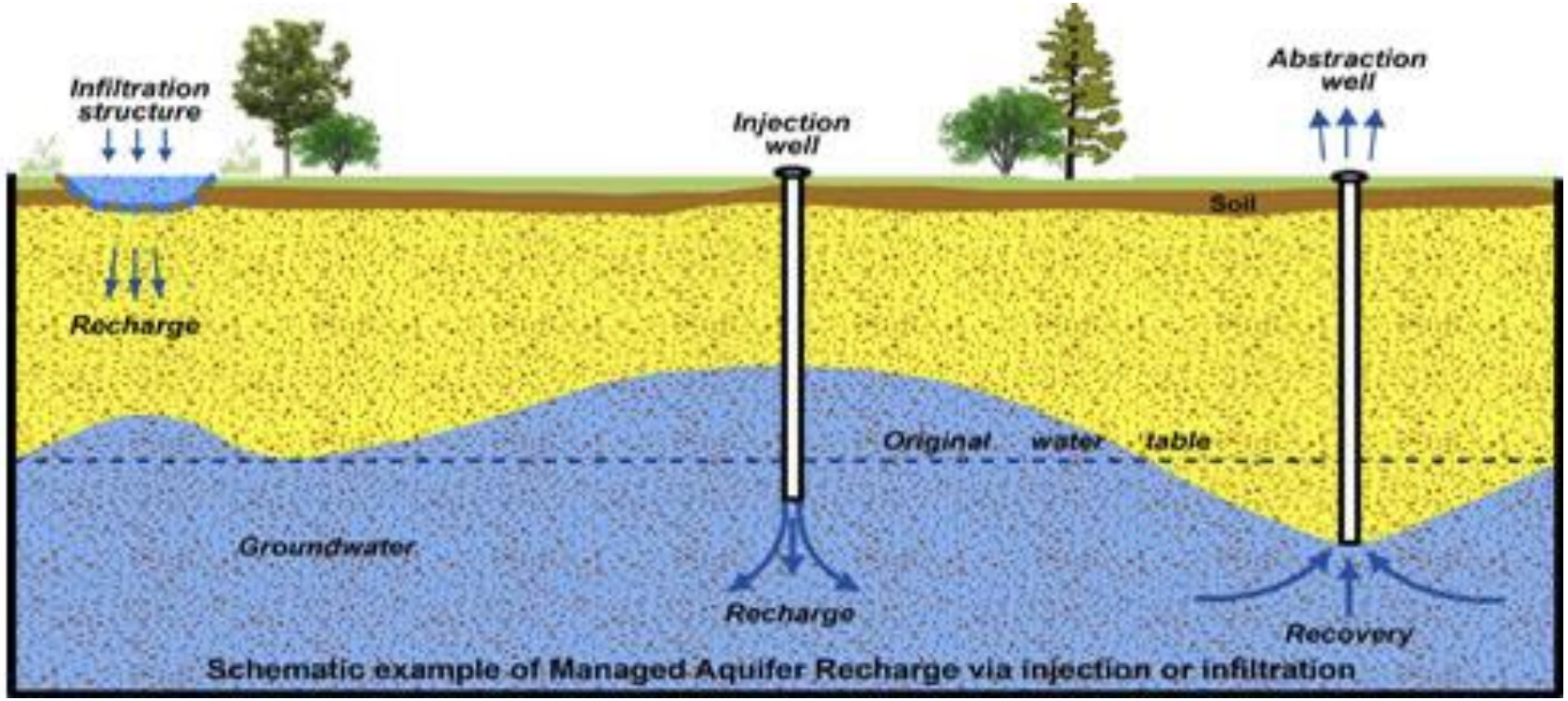
Sustanable use of water: artificial wetlands

- Gray waste water treated by artificial wetlands.
- 10 artificial wetlands in small villages
- Reuse of treated water for irrigation of vegetables furing the dry season.

INOWAS
MAR Junior Research Group

TECHNISCHE UNIVERSITÄT DRESDEN

MAR- TECHNIQUES



http://www.water.wa.gov.au/urban-water/water-recycling-efficiencies/managed-aquifer-recharge

The following specific objectives will be addressed:

1) Survey of current situation and evaluation of possible adaptation measures for the sustainable management of water resources in Costa Rica affected by climate change and urbanization
2) Promote environmental-friendly technologies by dissemination through workshops and training courses (capacity building)
3) Increase environmental awareness and build a regional board of experts in sustainable water management;
4) Prepare joint research project to secure the seasonal water availability especially in coastal areas (saltwater intrusion) and insular communities (water scarcity).
5) Academic exchange, including internships for German and Costa Rican students and researchers

National and foreign students




ENGEES
ÉCOLE NATIONALE DU GÉNIE DE L'EAU ET DE L'ENVIRONNEMENT DE STRASBOURG

AgroParisTech

EARTH UNIVERSITY

Carnegie Mellon University
Civil and Environmental Engineering

Thank you!

Questions?

SEDE REGIONAL
CHOROTEGA