



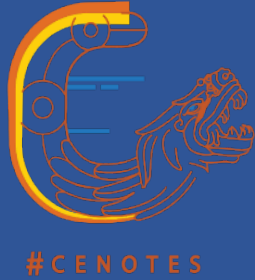
*Community-Participatory Approach to  
Yucatec-Maya Cultural Landscapes,  
Codices, and Environmental Conservation*

Patricia A. McAnany, UNC-Chapel Hill  
Iván Batún Alpuche, Universidad de Oriente, Valladolid, Yucatán  
Dylan Clark, UNC-Chapel Hill  
Khristin Landry-Montes, Cornell College

Madrid Codex, 3a-6a

Presented at the Coling Summer School, 2019, UNC-Chapel Hill, July 1-12, 2019

# Cultural Heritage, Ecology, and Conservation of Yucatec Cenotes (*Patrimonio Cultural, Ecología y Conservación de Cenotes Yucatecos* o “PACECCY”)



THE UNIVERSITY  
of NORTH CAROLINA  
at CHAPEL HILL



- A collaborative project by InHerit: Indigenous Heritage Passed to Present at the University of North Carolina at Chapel Hill (UNC) and the Universidad de Oriente (UNO), Valladolid, Yucatán
- Funding Agency: National Geographic Society (NGS)
- IRB #18-1587, UNC-Chapel Hill



Cenote Yax Ek', Kaua, Yucatán. Photo by a middle school student from Kaua, Yucatán



# Celebrating + Amplifying the Voices of Indigenous Communities

InHerit is a partner of the Alliance for Heritage Conservation, a registered 501(c)3 non-profit organization

## Our Mission

Through progressive collaborations, InHerit works to educate, conserve, and advocate for native languages, traditions, and rights to the past.

[Read more](#)

## Forging Alliances

InHerit leads an alliance of communities, organizations, and experts working toward heritage conservation.

[Learn more](#)

## Field Notes

View the latest news and activities of InHerit researchers and collaborators

[View Latest](#) English



## Yucatec Cenotes workshop 2018



From left: Guadalupe Ay Pec, Patricia McAnany, Khristin Landry, Magaly Martín, Gabrielle Vail, Dylan Clark

- Community-based participatory archaeology and cultural heritage conservation
- Bridging knowledge systems through dialogue
- Promoting local goals in heritage management
- Educate, conserve, and advocate for Native languages, traditions, and rights to the past.



Tahcabo Community Museum, 2015



Museums Connect students practicing archaeological survey in 2017

# Cultural Heritage, Ecology, and Conservation of Yucatec Cenotes

## Goals and “braiding” knowledge:

- Promote conservation by raising awareness of the cultural and ecological significance and vulnerability of cenotes
- Collaboratively create innovative, experiential education materials and curricula for teachers for secondary school students (ages 11-14)
- Acquaint teachers & students with role of cenotes in Maya cultural history & codices
- Connect scientific research to local knowledge and experience to intersect with community goals of protecting threatened water sources
- Local “patrimonialization” – reconnecting with cenotes as community biocultural heritage



Photo: Khristin Landry-Montes

Cenote Palomitas near Hunukú, Yucatán.

Student drawing of Cenote Yax Ek'in  
his community of Kaua

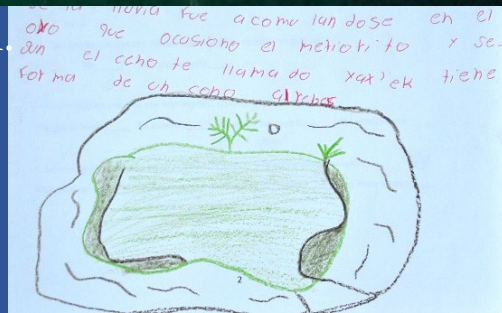




Photo by D. Clark

## Ts'ono'ot (Cenote)

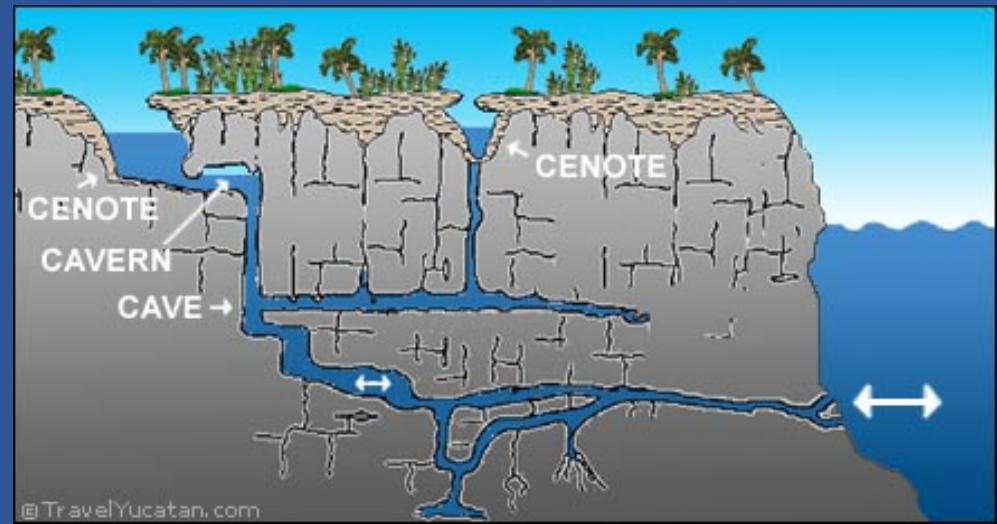
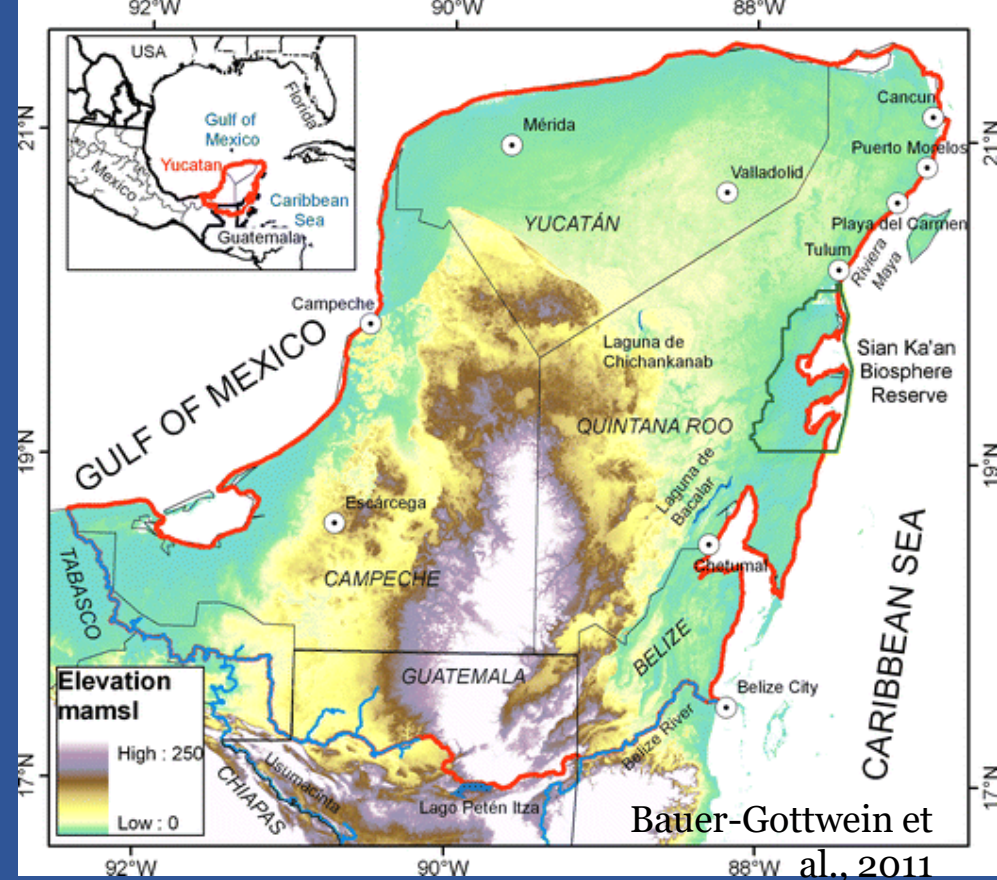
Limestone solution sinkholes exposing the subterranean aquifer

Cenote in the center of the community of Tixhualactun. View from street level



Photo by L. Crisostomo-Morales

View of same from inside the cavern below



- Based upon activities, findings, and results of a *National Geographic Society* "Bold Ideas" grant
- "Cultural Heritage, Ecology and Conservation of Yucatec Cenotes"



- Why cenotes? (*Ts'ono'ot* or *dz'onot*)
- Most significant geomorphic feature of Peninsula
- Limestone solution sinkholes (porous substrate)
- Over 3,000 known to exist
- Perennial water source
- Cosmologically, portal to deities & powerful spirits
- Endangered by
  - Pollution from neglect
  - Industrial farming
  - Pollution from civic & regional development
  - Tourism development



Fossil remains found inside the largest cave system in the world, Sac Actun, in Mexico.

GRAN ACUIFERO MAYA, INAH



Cenote entrance at Tahcabo, Yucatán

Ancient Maya ceremonial pottery at Balankanché Cave



Rain deity Chaak in a cenote. Madrid Codex p. 73

Location:

9 Maya communities in eastern Yucatán, Mexico

- Cenotes located in or near communities
- Universidad de Oriente (Valladolid), student ambassadors (public administration students)
- UNC Global Investigators (2 undergrads)





# Methods

## I. Collaboration

- Advisory board
- 18 secondary school teachers and directors
- UNO student ambassadors (1/community)
- Expert consultants, local and non-local

## II. Assessment

- Mixed methods, surveys, open-ended questionnaires (during and after one full semester of implementation)
- **Photovoice: participatory research method**; pre-project assessment activity – shapes workshops, activities, and perspectives of the project

## III. Workshops for teachers and UNO students

- Three workshop themes lead directly into experiential education activities at the cenotes and curriculum resources (published workbooks)

## IV. Implementation of activities in schools...leads to community activities and workbooks



Archaeologist Fatima Tec discusses the topic with maestra Magaly Martín at Workshop 3.



Project Facilitator Khristin Landry-Montes and UNO student Fernando Cupul assist with an activity on códices at Calotmul

# Educator Workshop Themes Connected to Cenotes

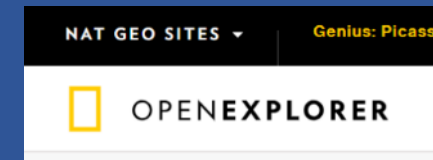
## I. Oral History & Folklore (Maya oral tradition)

- Community oral history backpacks
- **Yucatec Maya language, indigenous knowledge**
- Storytelling, art – connecting traditional knowledge and language to conservation goals



## II. Science & Safety

- Geology and biology (flora & fauna)
- Water conservation and the aquifer, water quality test kits
- Safety and legal protection

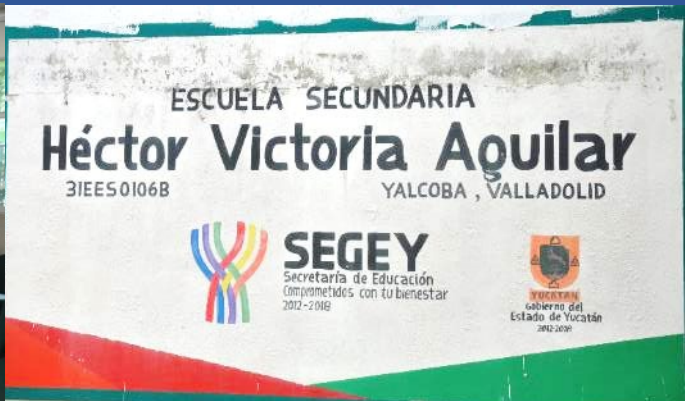


## III. Archaeology & Heritage

- Maya codices, cenotes and caves
- Cenotes in cosmovisión, sacred landscapes
- Underwater and cave archaeology in Yucatán
- Theoretical and historical perspectives in pedagogy

OpenROV Trident “underwater drones”

CBPR photovoice in Tixhualactun, Kaua, and Yalcobá provides a snapshot of students' views and brings their voices into planning...



← Photo shoots in cenotes at Tixhualactún and Kaua ↑

# Photovoice



Yalcobá, Yucatán  
Photo credit: Patricia McAnany



Kaua, Yucatán  
Photo Credit: Yaremi Tuz May,  
UNO student ambassador



Kaua, Yucatán  
Photo Credit: Yaremi Tuz May,  
UNO student ambassador



Kaua, Yucatán. Photo Credit: Yaremi Tuz May,  
UNO student ambassador

## “What do cenotes mean to you?”



Para mí los cenotes son muy importantes y yo creo que para los mayas lo fue también porque sacrificaban a las doncellas para pedirles algo a los dioses. También me acuerdo del día que fui a visitar el cenote de Chichen Itzá con mis compañeros para mí la experiencia fue muy agradable visitar el cenote y saber un poco más sobre él, por que a mí me gustan mucho los cenotes y me gustaría ir algún día a visitar ese cenote de nuevo.



2

Los cenotes son muy importantes porque en los cenotes puedes encontrar algunos fósiles mayas y algunas esculturas hechas de piedra etc. Por eso quiero que la gente de mi comunidad cuide los cenotes que están cerca de mi comunidad.



2

Students taking pictures at Cenote Yax Ek' at Kaua, and examples of open-ended survey answers.

# Photo Sessions



Photo by a middle school student, Kaua, Yucatán



Photo by a middle school student, Kaua, Yucatán



Photo by a middle school student, Yalcobá, Yucatán

Fotovoz



Talleres 1, 2 y 3

Visitas y reuniones informales en las escuelas y/o Valladolid (Mstros., UNO, PACECCY)

Crear y modificar actividades

Implementación de actividades en las escuelas

Demos de los Tridents



Reuniones del Consejo

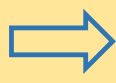
Manuales de "prácticas" o actividades



Talleres 1, 2 y 3



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# Educator Workshop Themes Connected to Cenotes

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Madrid 3a-9a

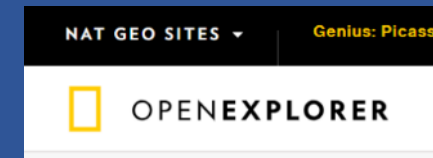


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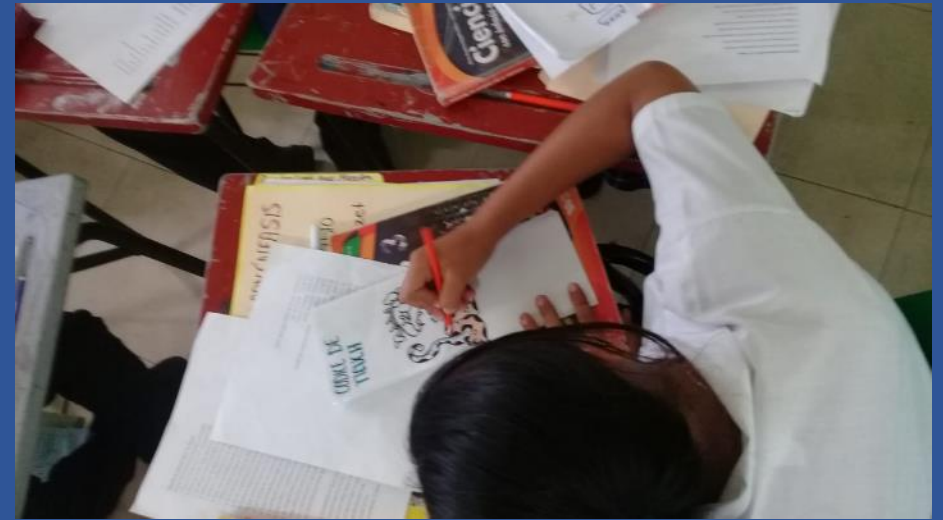
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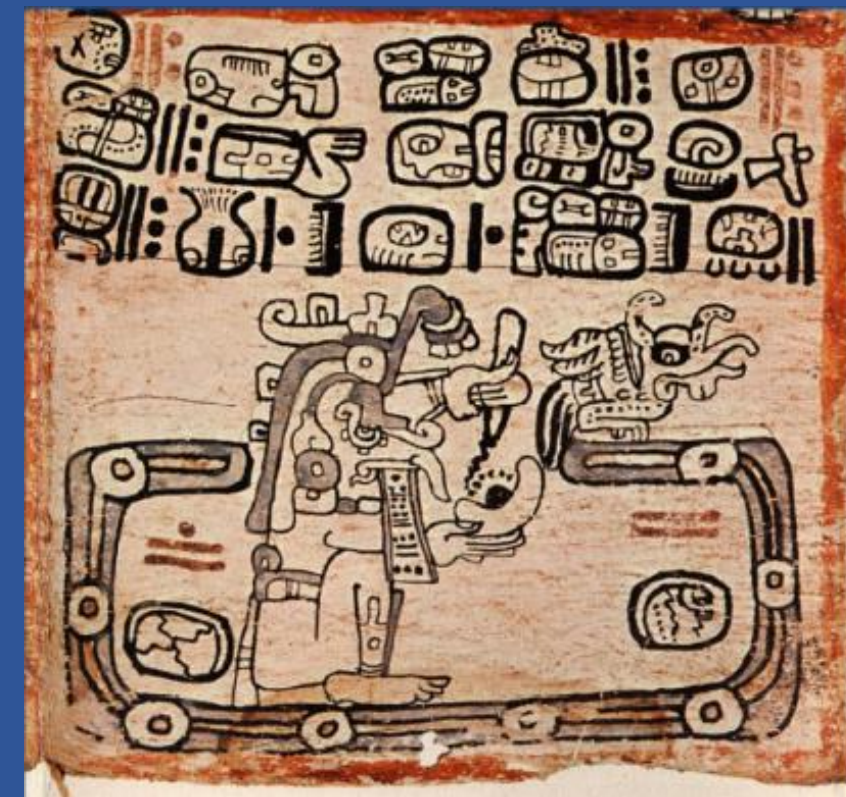
OpenROV Trident “underwater drones”



# Primary Sources: Maya codices in Yucatec communities

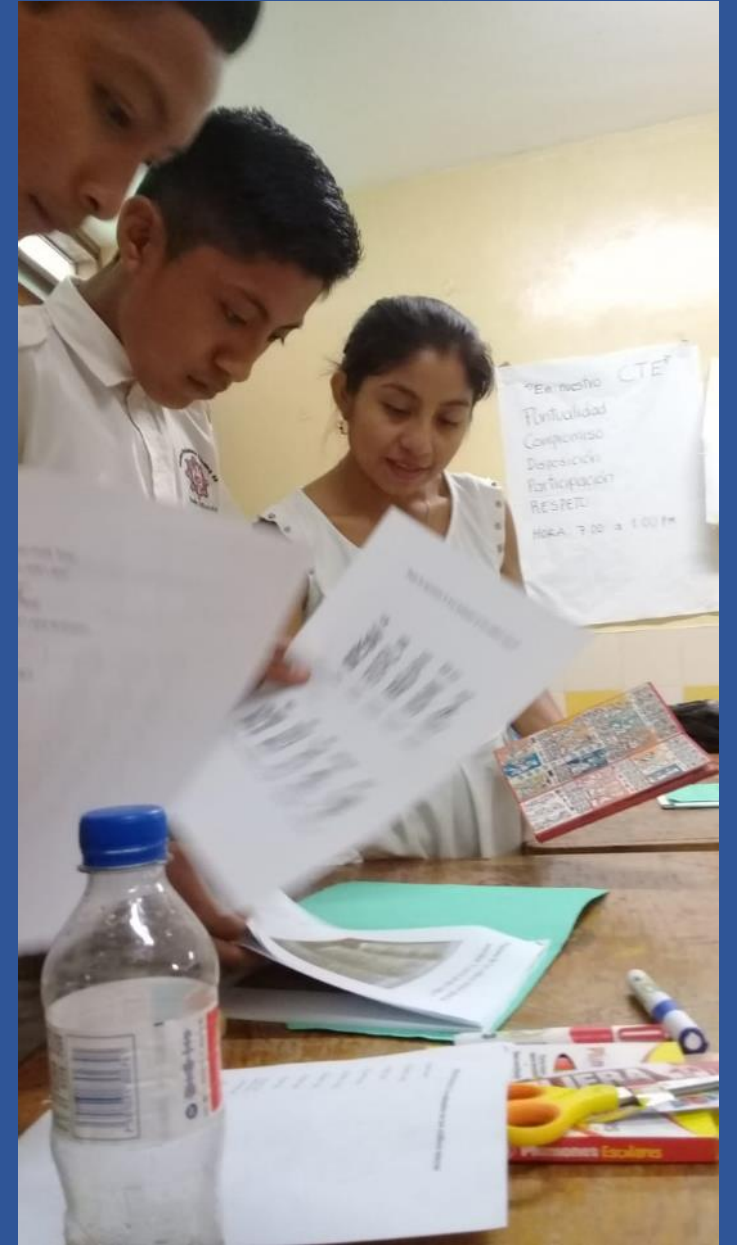
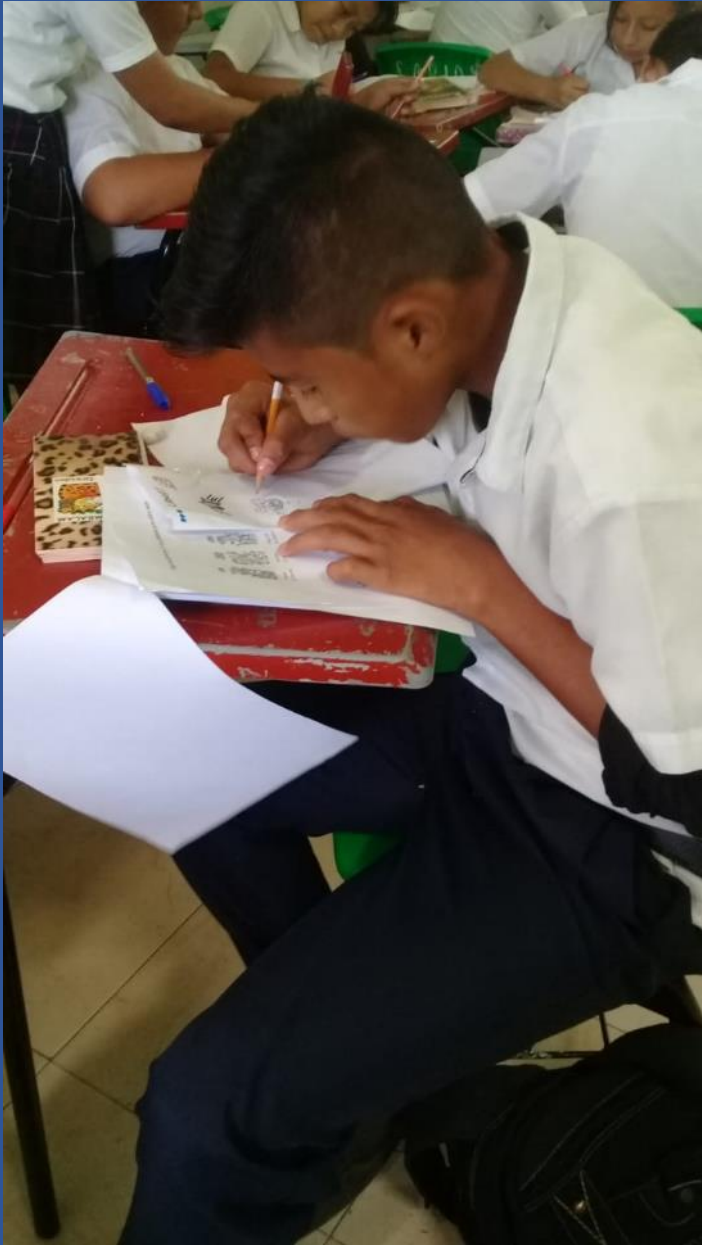


Maya students working on making codices at Ticuch, Yucatán



Pages from the Madrid Codex featuring the Maya rain god Cháak in and around cenotes

The death god straddles a cenote, holding a flowering maize plant in one hand and a skull in the other in the Madrid Codex (91b)



Students working on codices at Ticuch, Yucatán



Students working on identifying deities in a copy of the Dresden Codex at Cuncunul, Yucatán

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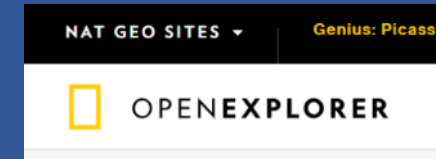


Madrid 3a-9a



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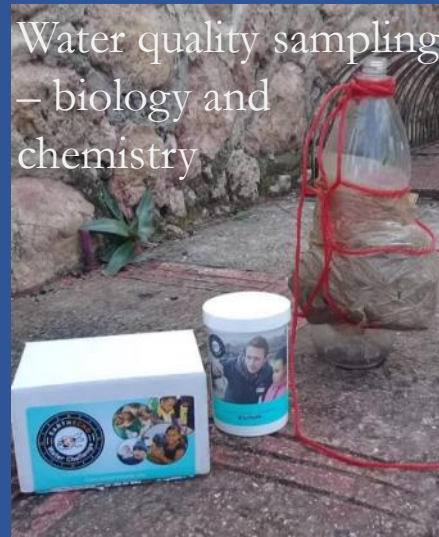
Photo : Yaremi Tuz May

Ms. Daniela Garrido Durán leading a cenotes session in her classroom at Cuncunul, Yucatán and a student at Cenote Yax Ek' in Kaua launches an OpenROV Trident

# Implementation in 2018



Students at their cenote in Kaua



Water quality sampling – biology and chemistry



UNO students provide background on water quality test kits for EarthEcho Water Challenge in Calotmul



Subaquatic drone testing

Oral history interviews with elders at Xocen



**Prelim results:** Transformation in students' ideas about cenotes and the collective benefit of keeping them and the larger aquifer healthy.

Increased validation of community knowledge and Yucatec Maya language, connecting these to environmental conservation

- Emphasis in schools on cenotes as a tangible connection between natural and cultural heritage, past and present – stressing the “vínculos”
- Connecting local to global networks

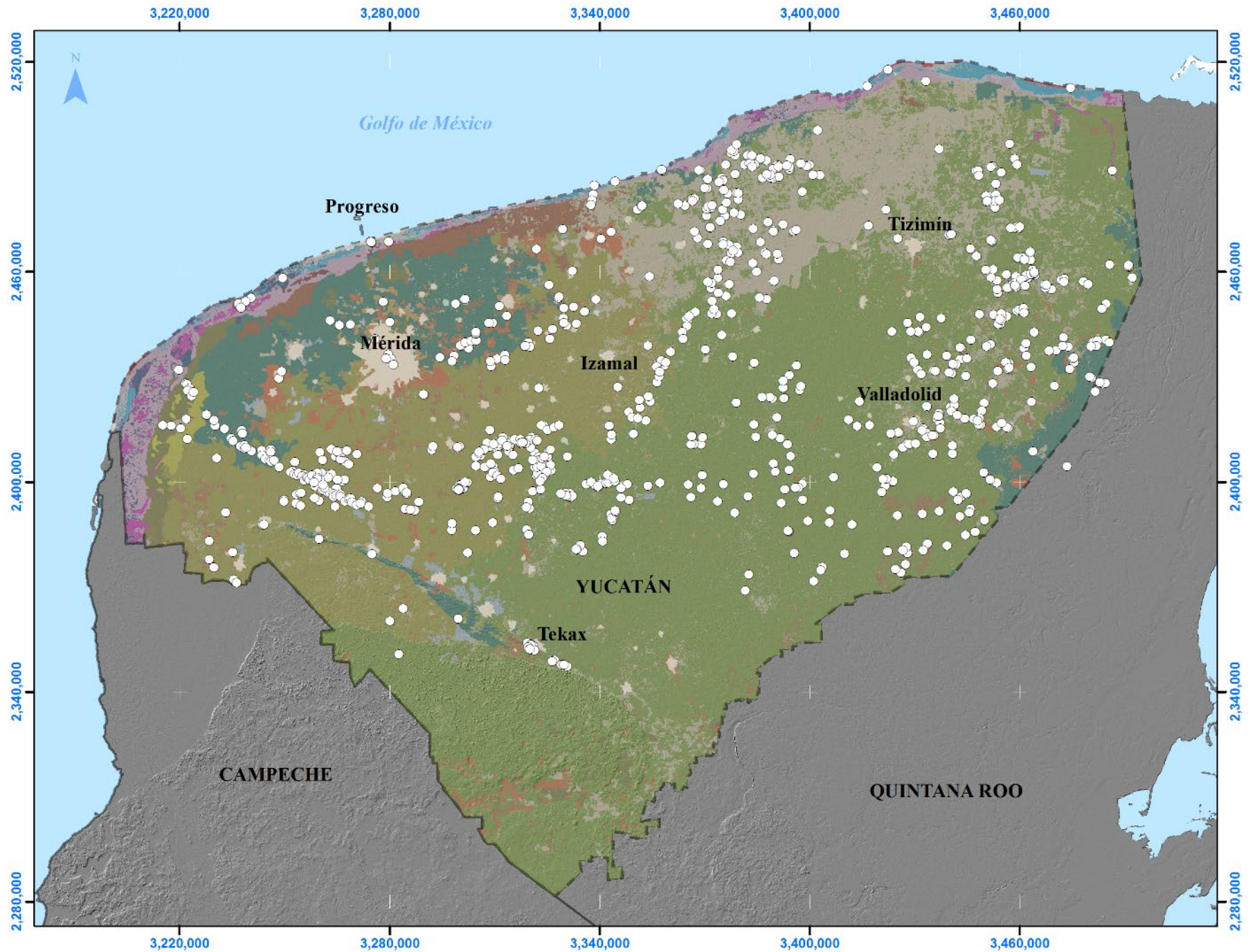
# Community Knowledge & Language



Pages of the Dresden Codex



# Ring of Cenotes

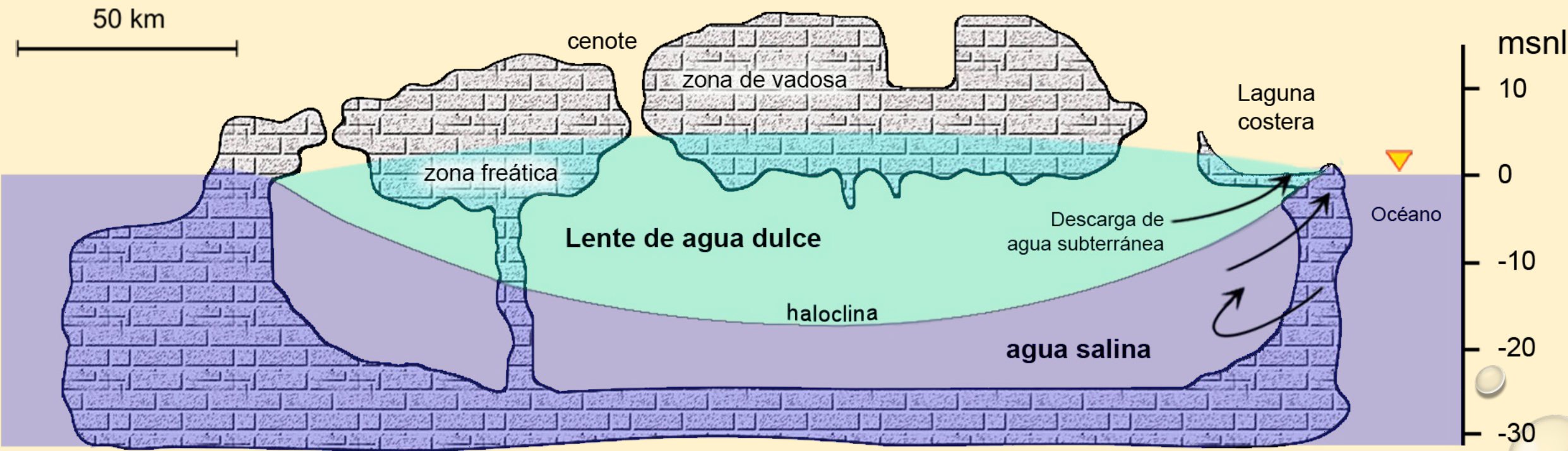


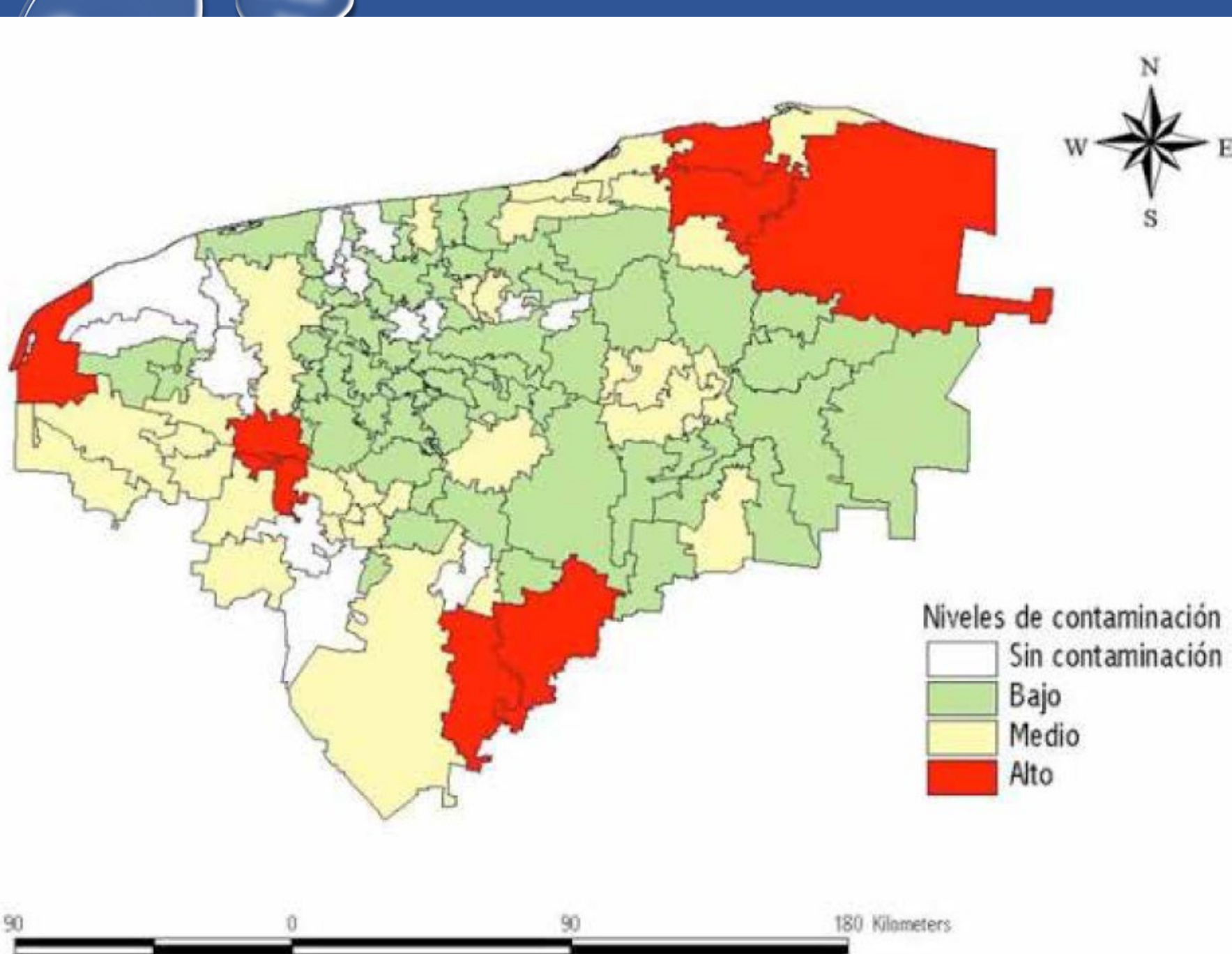
**Fuerzas terrestres:**

- Nivel del agua
- Lluvia continental
- Extracción de agua para uso humano

**Fuerzas oceánicas:**

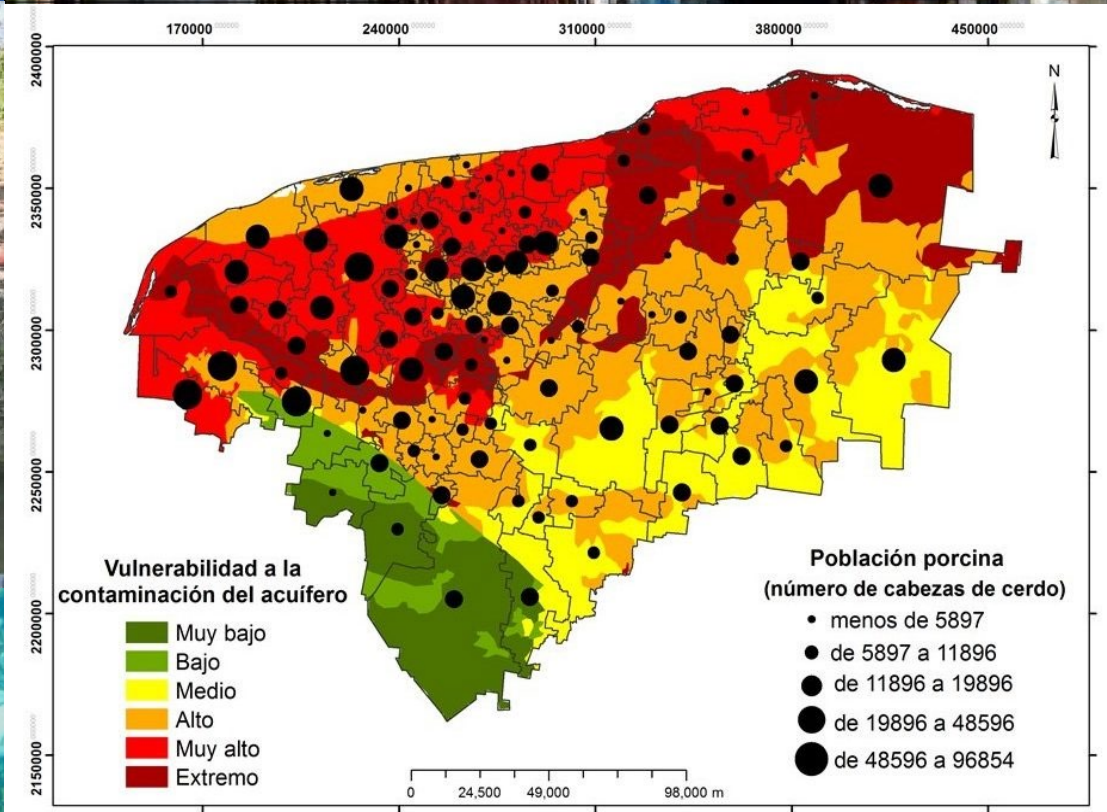
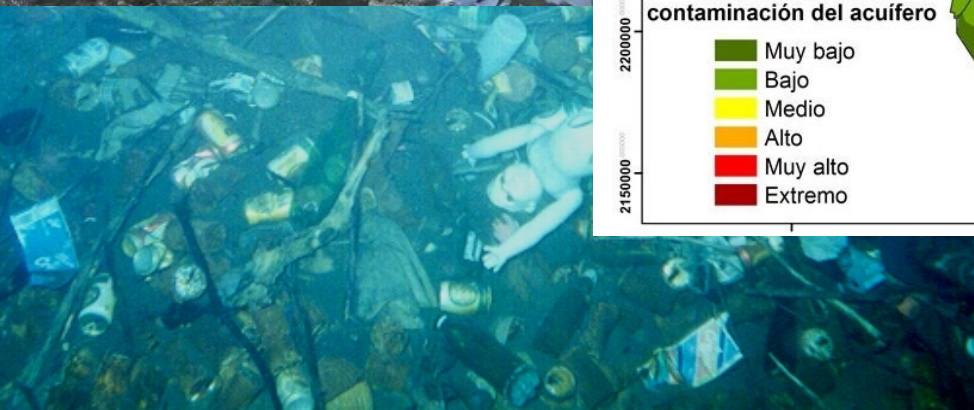
- Presión hidrostática
- Bombeo de mareas
- Diferencia de temperatura





Levels of chemical contamination of the Yucatec aquifer after Hurricane Isidore (2002)





## Population of Yucatán in 2005

The state of Yucatán had a population of approximately 1.8 million. Of those 49.2% were men and 50.8% women.



### Evolución demográfica de Yucatán

Año	Población
1970	758 400
1980	1 063 700
1990	1 362 900
2000	1 658 200
2010	1 955 577

Fuente: INEGI. [6159](#)

### Population in 2018 (beginning of the year)

As of last year, the state of Yucatán has a population of approximately **2,185,271** inhabitants, with 49.2% men and 50.8% women.



# ¡Dios bo'otik!

Our project was made possible by funding from the National Geographic Society, by generous donations from EarthEcho International and OpenROV, and through the dedication of all of our team partners. These include InHerit and UNO faculty, staff, researchers and students; our middle school partners: directors, teachers, and students; and all of our invited speakers, researchers, designers and artists. We are particularly grateful to the community members of Kaua, Yalcobá, Cuncunul, Tikuch, Calotmul, Tahcabo, Tixhualactún, Xocen, and Hunukú for supporting their daughters and sons throughout our project.



#CENOTES



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