

Sustainable economic growth on the water's edge

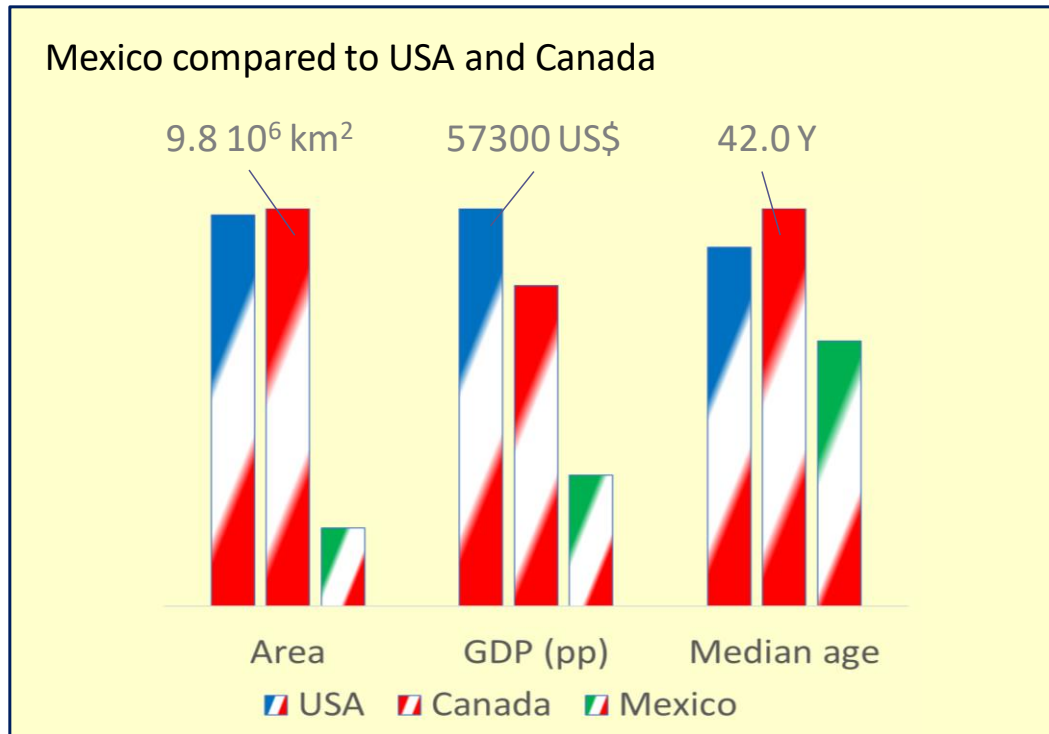
Research – Case studies in Mexico



Frédéric Thalasso
Cinvestav



Mexico



Additional important figures from Mexico

8.3% of GDP comes from tourism

46% population is below poverty line

24% of the economy is informal

Aquatic Ecosystems

9,300 km of coast

- Formal and informal economy
- Relatively well-protected in formal resorts

50,000 km² of aquatic ecosystems

- Informal activities: Fishing, restaurants, horse riding...
- Not well-protected

Additional important figures from Mexico

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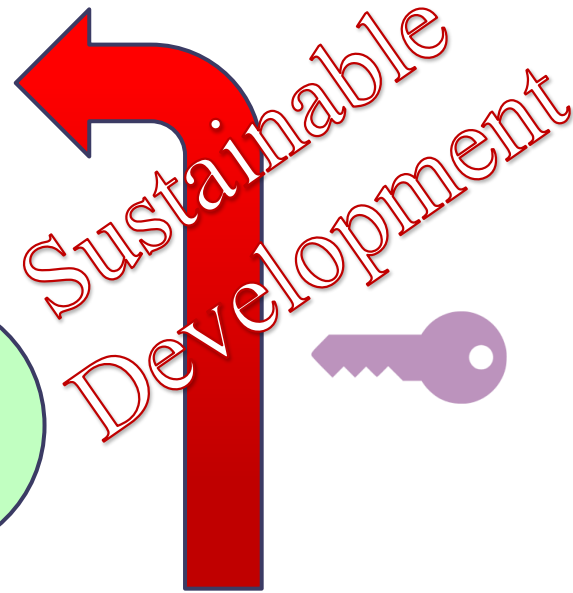
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Water's edge

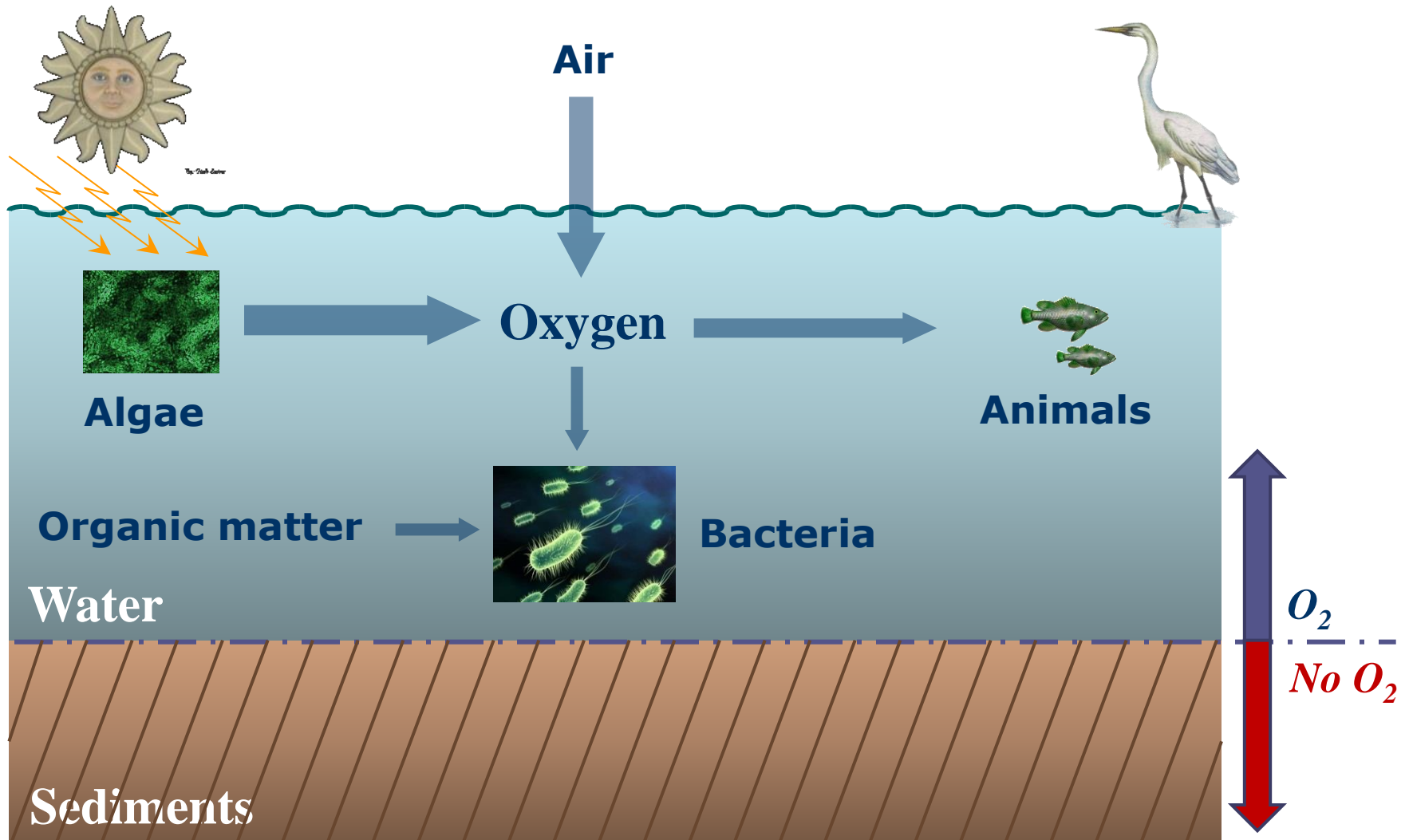
Informal activities
+ Treatment of <40% wastewater
+ High water demand
+ High demographic pressure

Aquatic Ecosystems
2.5% total (0.35% lakes and reservoirs)

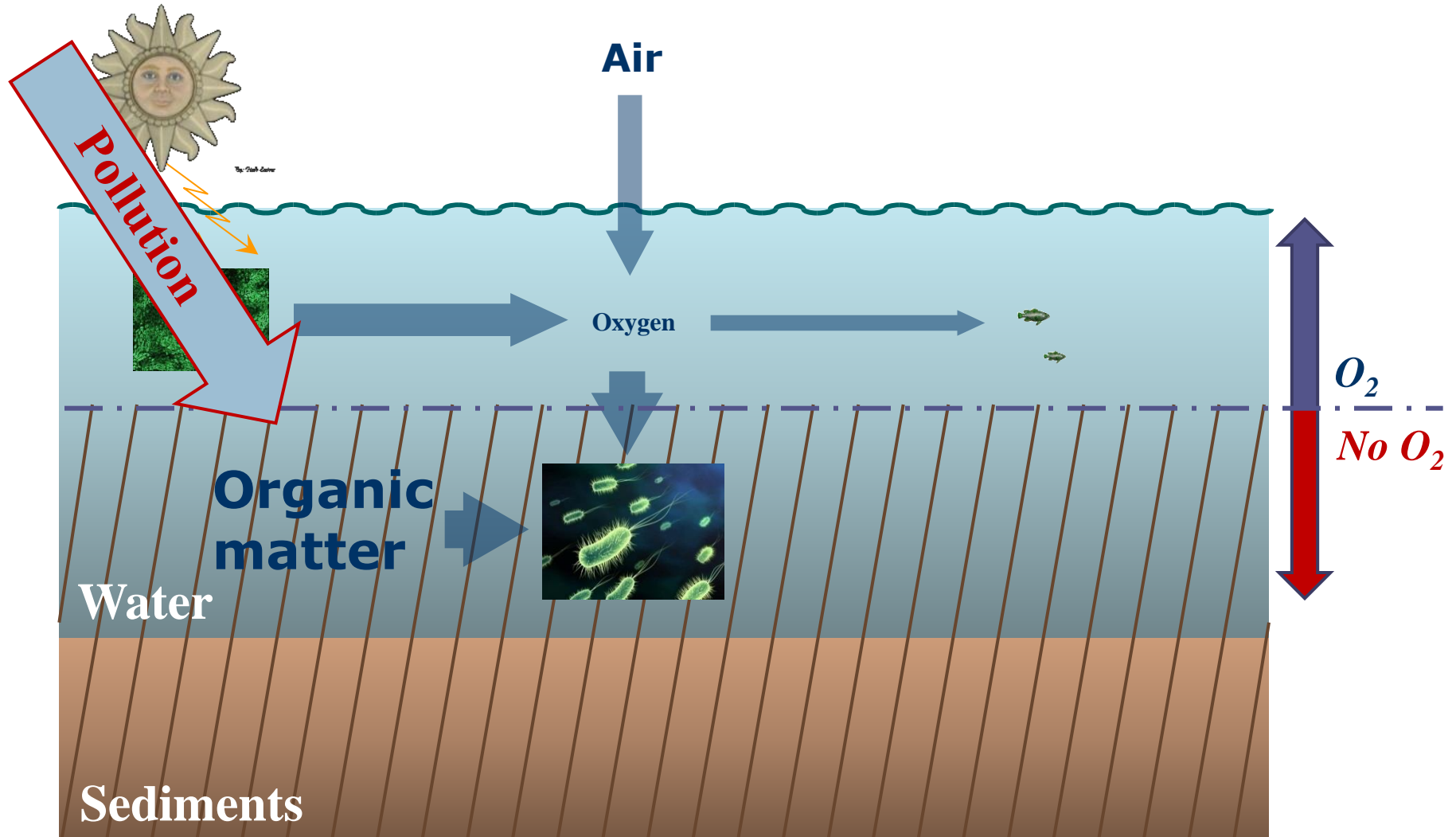


Pollution:
75% of lakes and reservoirs are
polluted or highly polluted.

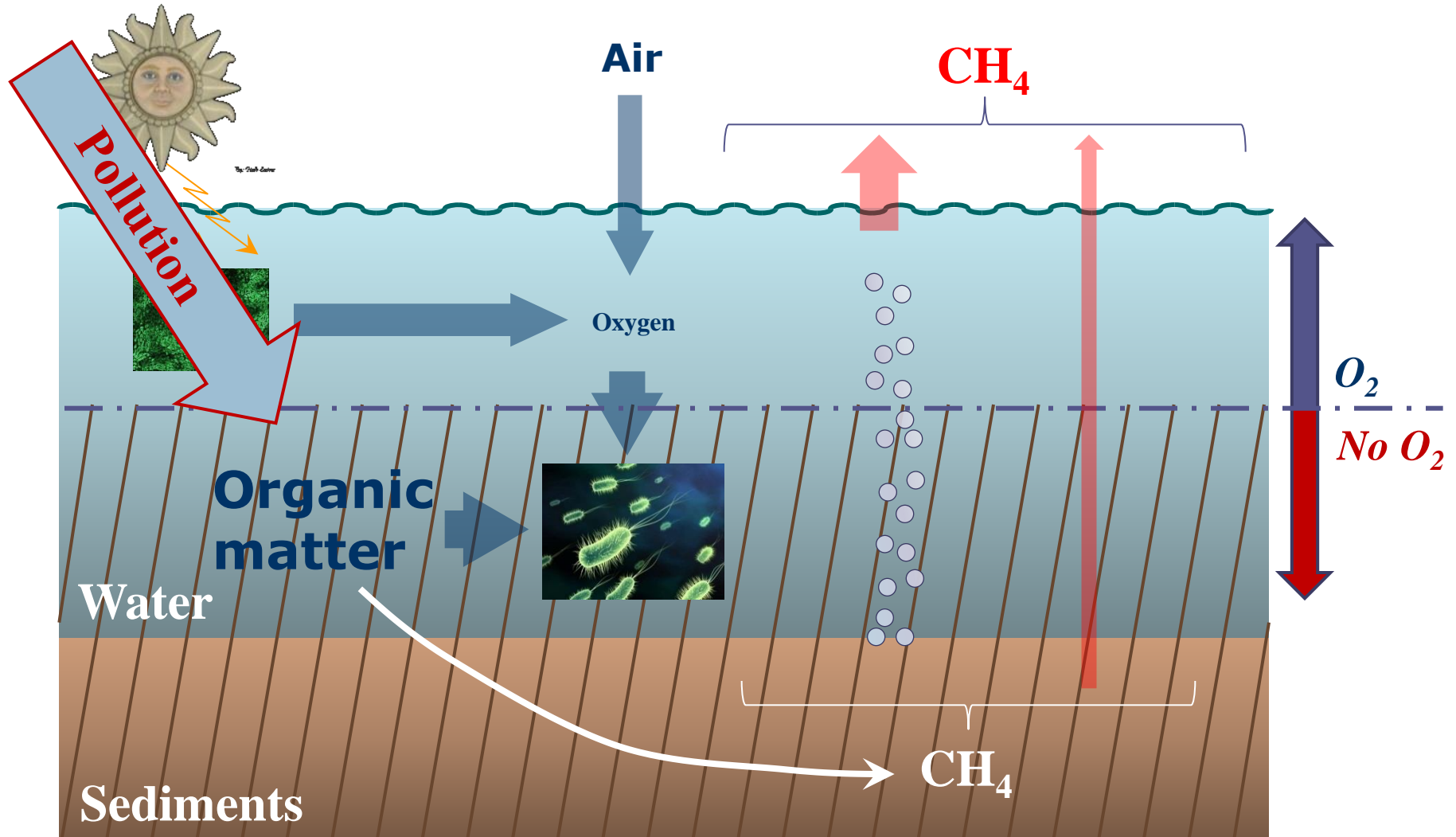
Functioning of aquatic ecosystems



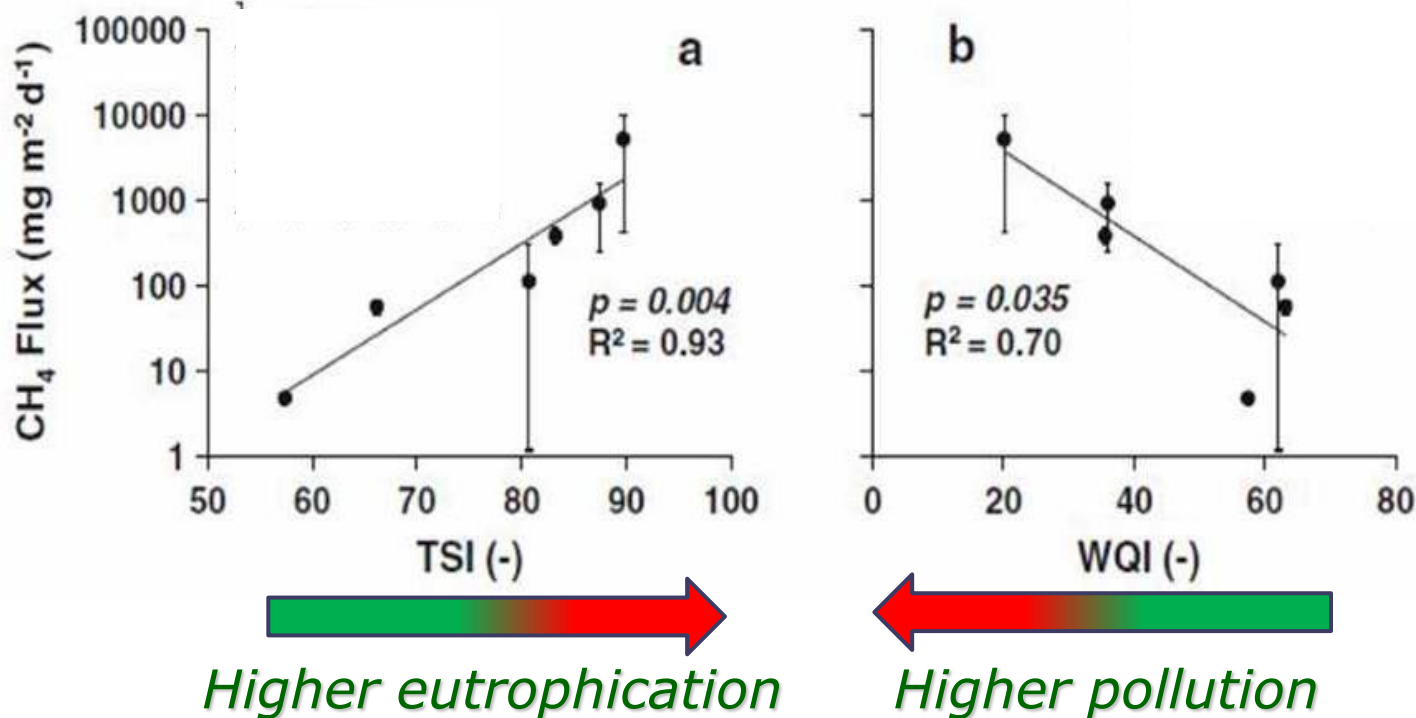
Functioning of aquatic ecosystems



Functioning of aquatic ecosystems



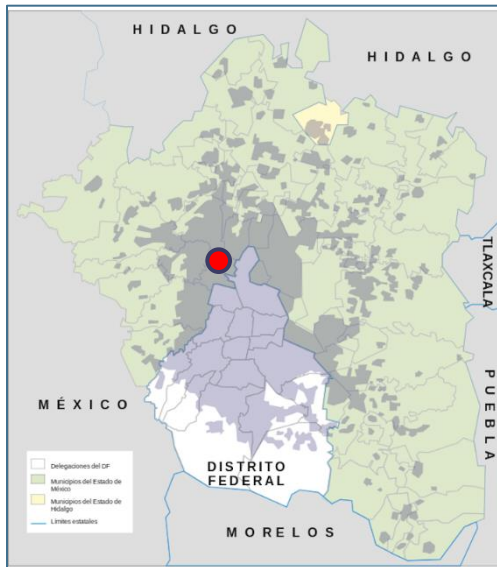
Functioning of aquatic ecosystems



Effect of Trophic State Index (TSI) and Water Quality Index (WQI) on methane (CH_4) emissions from Mexican lakes.

Gonzalez-Valencia et al. (2014) Hydrobiologia.

First (failure) case: Lago de Guadalupe



First (failure) case: Lago de Guadalupe

Reservoir:

450 Ha (4.5 km²)

30,000,000 m³

18 m max depth

Residence time 2 years

Importance:

Unique “green freshwater ecosystem”

Important water source

100+ species of birds

Including migratory species: Ducks



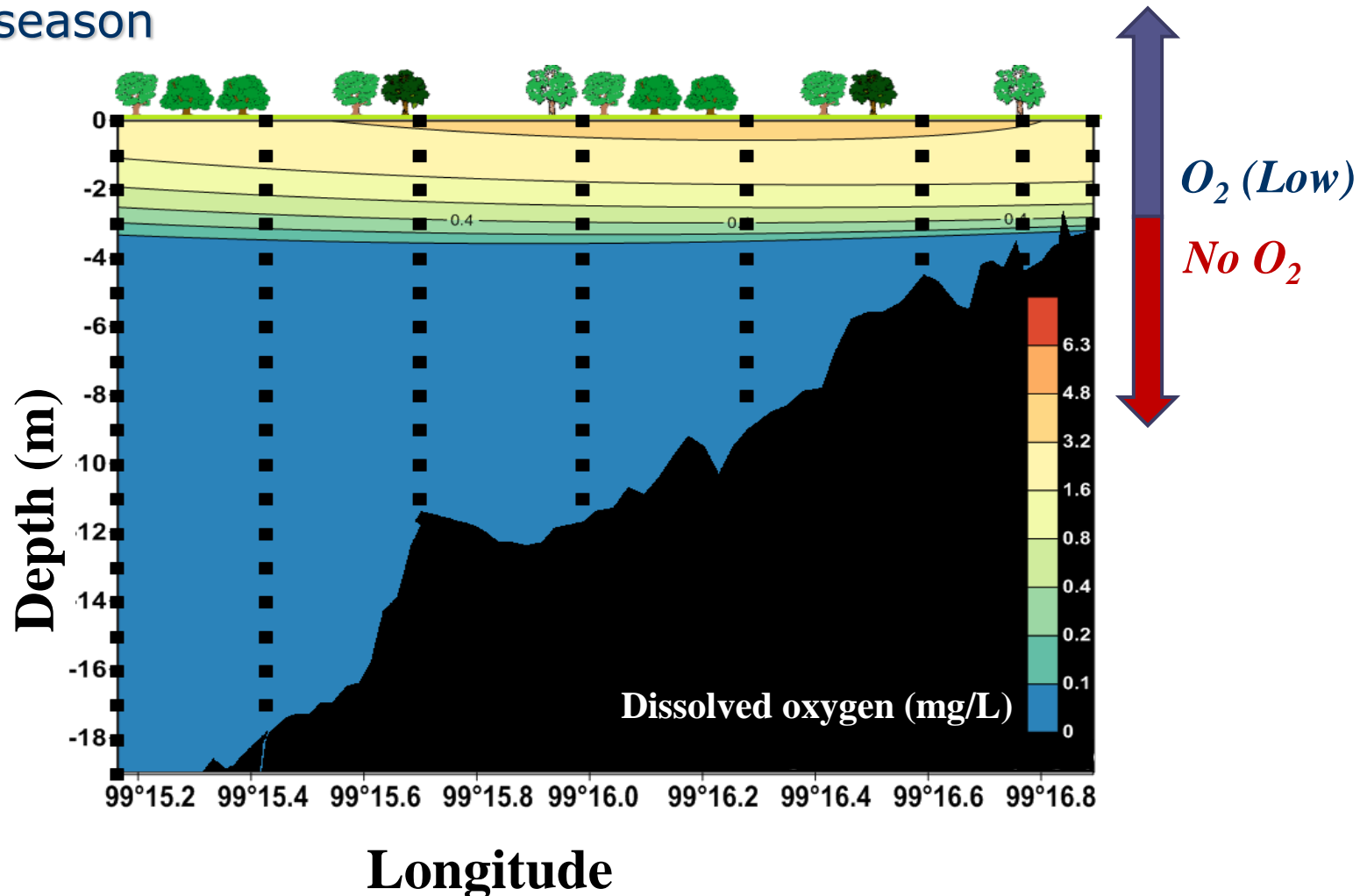
Benjamin Aguilar



**The reservoir receives
~ 10,000,000 m³ of wastewater**

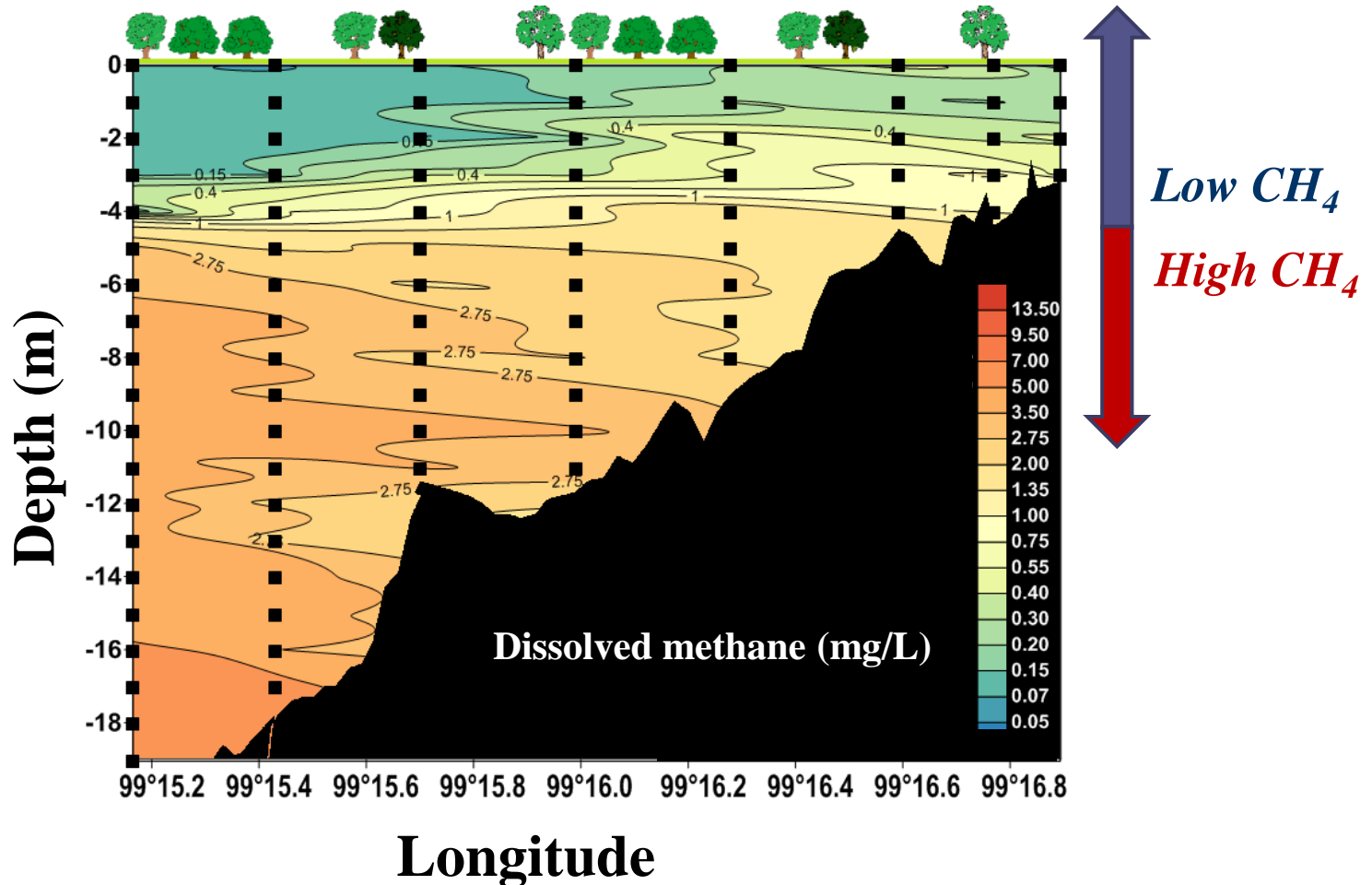
First (failure) case: Lago de Guadalupe

Rainy season



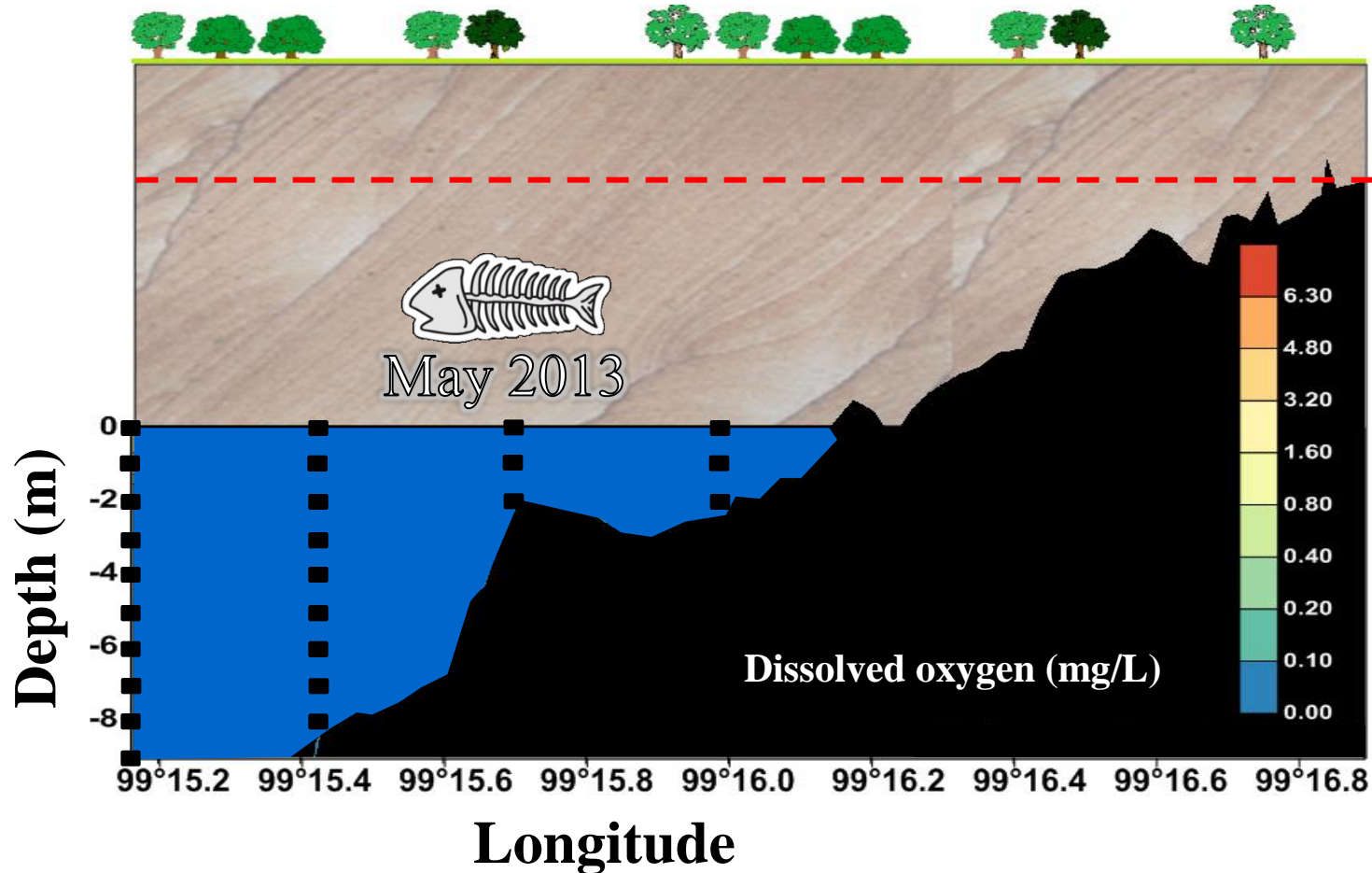
First (failure) case: Lago de Guadalupe

Rainy season



First (failure) case: Lago de Guadalupe

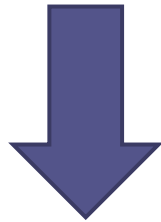
Dry season



First (failure) case: Lago de Guadalupe

Solution: To avoid wastewater discharges
(long and tedious process)

Can we wait?



No

Since 2013 several actors have promoted a “rescue plan”:

1. Mechanical partial aeration of the water column
2. Protection of the area (applying existing rules)
3. Sensitization campaigns
4. Global positive impact on greenhouse gas emission
5. To allow for survival of the lake ecosystem

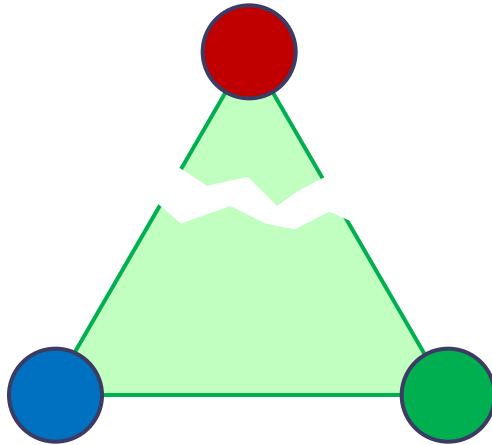
Cost: 100,000 US\$

Results: Nil, zero, zilch



First (failure) case: Lago de Guadalupe

Authorities



✓ Civil associations
Basin commission

Scientists ✓

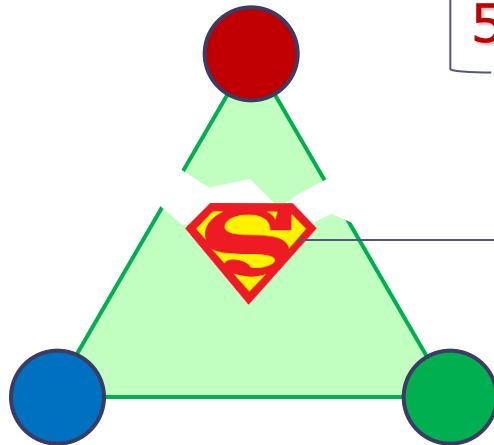


First (failure) case: Lago de Guadalupe

3 Levels of Government

Federal (water)
State (natural reserve)
5 Municipalities (wastewater)

Authorities



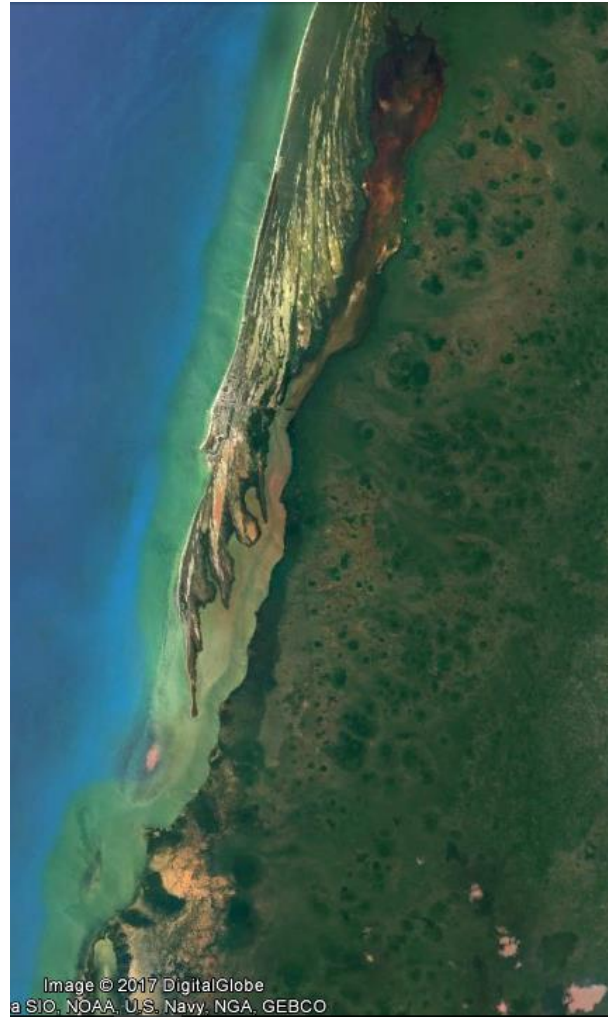
Who would that be?

✓ Civil associations
Basin commission

Scientists ✓



Second (success) case: Celestun



Second (success) case: Celestun

**Coastal aquatic ecosystem:
Federal Biosphere Reserve
600 km²
Flamingos + many migratory birds
Formal international ecotourism
Fishing...**



Wikipedia

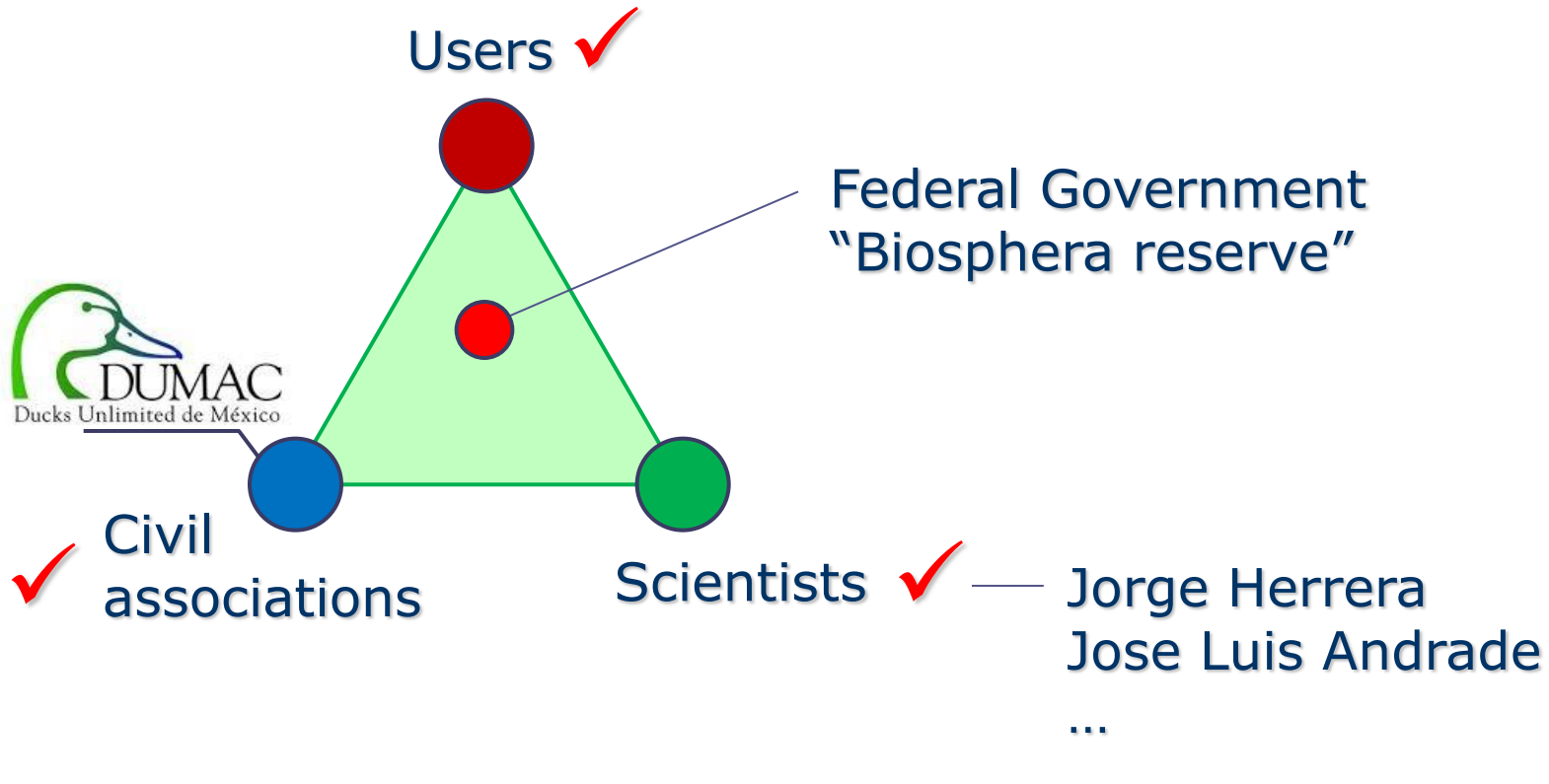


Bill Bell



Grupo Rivas

Second (success) case: Celestun



Good results:

- Well-protected area
- Under restauration
- Under continuous and close surveillance

Possible reasons of successes/failures

Lago de Guadalupe	Celestun
State Reserve	Federal Reserve
National and Informal Tourism	International and formal Tourism
Unorganized users	Organized users
Complex/multiple political jurisdictions	Simpler political jurisdiction
Small size (4.5 km²)	Large size (600 km²)
Lack of well organized NGO	Dumac

Thank you
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