

SARGCOOP

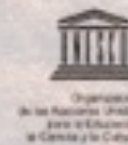
GRUPO DE TRABAJO : FORO CARIBEÑO DE LUCHA
 CONTRA EL SARGAZO

SEMINARIO WEB DEL 13 ENERO 2023 :
 «SARGAZO: ANTICIPAR Y MEDIR EL IMPACTO»

Impacts of the arrival of *Sargassum* in the Mexican Caribbean

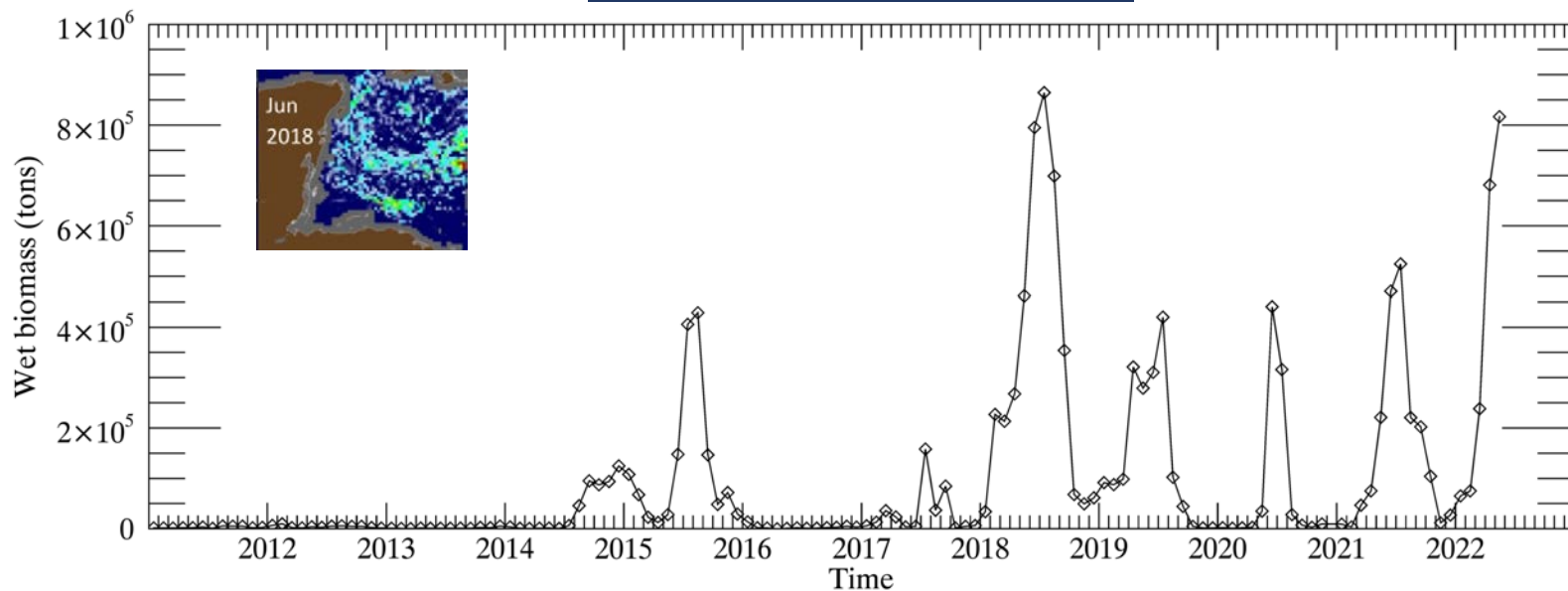
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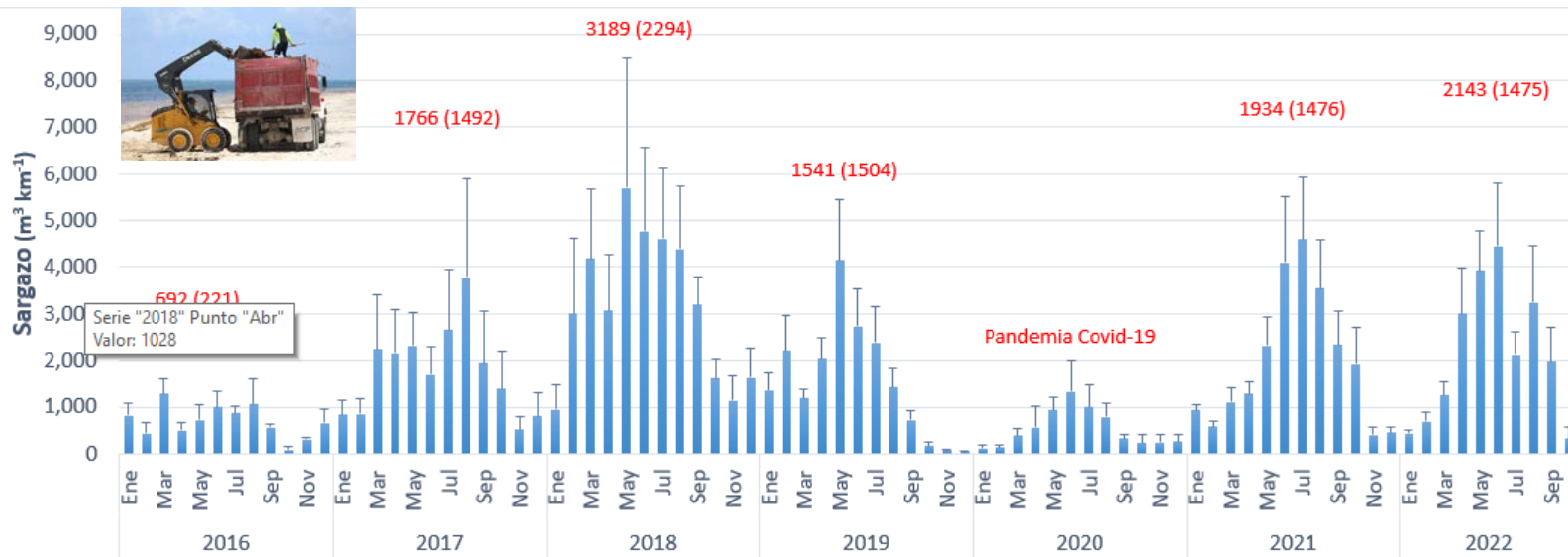


Biomass (Satellite images)

Source: Dr. Hu, FSU



Biomass (hotels NE Quintana Roo)



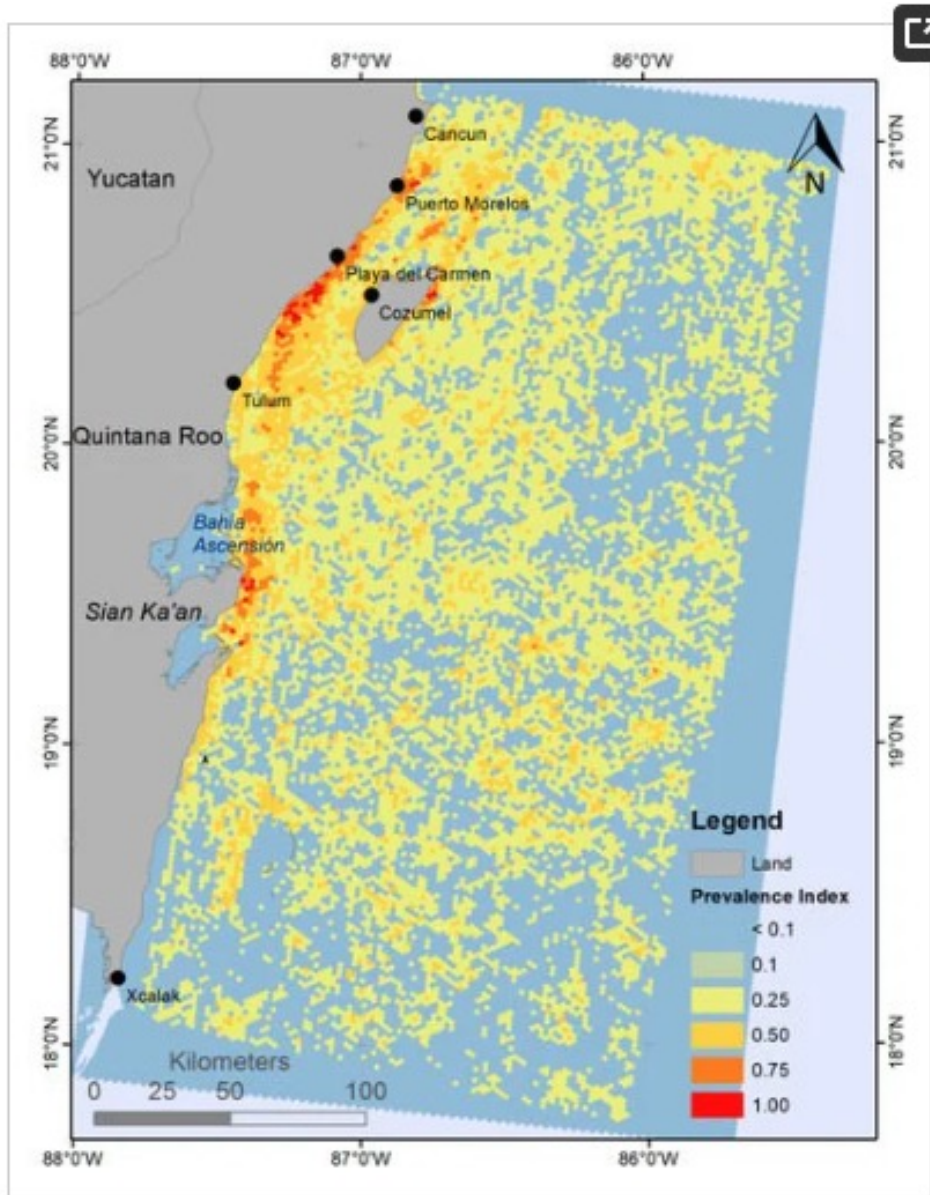
Variability in landing biomass



Article

Massive Influx of Pelagic *Sargassum* spp. on the Coasts of the Mexican Caribbean 2014–2020: Challenges and Opportunities

Valeria Chávez ^{1,*}, Abigail Uribe-Martínez ², Eduardo Cuevas ³, Rosa E. Rodríguez-Martínez ⁴, Brigitta I. van Tussenbroek ⁴, Vanessa Francisco ⁵, Miriam Estévez ⁶, Lourdes B. Celis ⁷, L. Verónica Monroy-Velázquez ⁴, Rosa Leal-Bautista ⁸, Lorenzo Álvarez-Filip ⁴, Marta García-Sánchez ⁴, Luis Masía ⁹ and Rodolfo Silva ^{1,*}



Beach erosion and compaction



Punta Caracol: BI van Tussenbroek



Source: Google Earth

Beach erosion, compaction, and characteristics



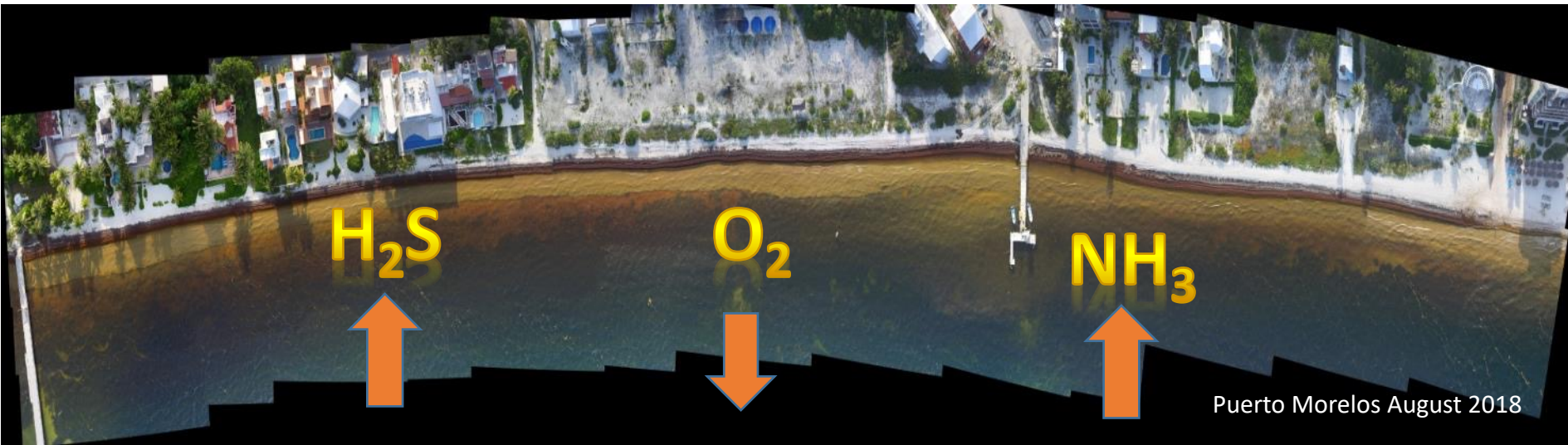
Source: Google Earth



Water quality deterioration



Puerto Morelos August 1998



Puerto Morelos August 2018

Massive motile fauna mortality (since 2018)



Contents lists available at ScienceDirect

Marine Pollution Bulletin

Journal homepage: www.elsevier.com/locate/marpolbul



Faunal mortality associated with massive beaching and decomposition of pelagic *Sargassum*



R.E. Rodríguez-Martínez^{a,*}, A.E. Medina-Valmaseda^a, P. Blanchon^a, L.V. Monroy-Velázquez^b,
A. Almazán-Becerril^c, B. Delgado-Pech^c, L. Vásquez-Yeomans^d, V. Francisco^e, M.C. García-Rivas^e

Group	Percentage
Fish	59%
Crustacea	28%
Equinoderms	5%
Mollusks	4%
Polychaetes	4%



Oxygen: 2.5 mg/L up to 300 m from shore

Petempich Bay, August 2022

Massive coral mortality (since 2018)



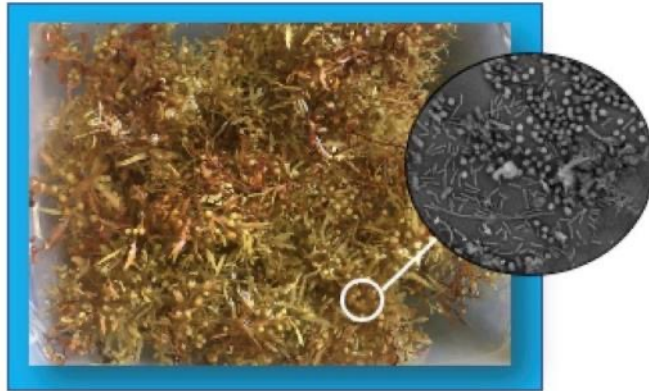
Stony coral tissue loss disease (since May 2018)

- 24 species affected
- Mortality up to 100% in some species
- Possible local extinction of *Dendrogyra cylindrus* and *Meandrina meandrites*

Import of species to coastal ecosystems

Microbiome

Torralba et al. 2017
Michotey et al. 2020
Helvé et al. 2021
Theirlynck et al. 2023



Source: University of Amsterdam, RPA



Dominant genera: Pseudomonadaceae, Rhodobacteraceae and Vibrionaceae

High variability:

- Among morphotypes
- Among biogeographic regions
- Distance to shore
- Seasons

In Mexican Caribbean nearshore waters (Thome y Suescuan – UNAM, pers. comm.)

- High prevalence of *Vibrio* spp. (~50%)
- Higher abundance of *Vibrio* spp. in spring (60-75%)

Import of species to coastal ecosystems

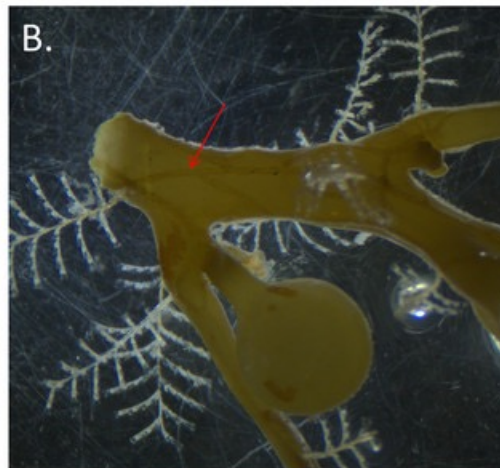
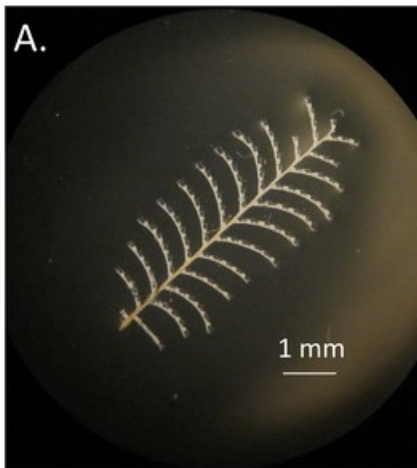
Motile fauna

14 exotic species were recorded in the Mexican Caribbean



Monroy-Velázquez et al. 2020 – Jour. Env. Man.

Hydroids



Govindarajan et al. 2019 – PeerJ



Dermatitis due to exposure to sargassum in Puerto Rico

Presence of toxic elements



< AQUATIC BIOLOGY

Element concentrations in pelagic *Sargassum* along the Mexican Caribbean coast in 2018-2019

View 17 tweets

Research article Aquatic and Marine Chemistry Environmental Contamination and Remediation

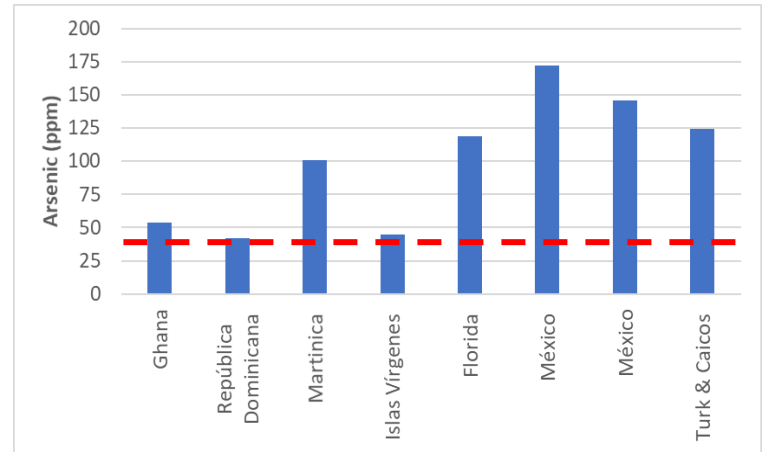
Environmental Impacts

Related research

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Rosa E. Rodríguez-Martínez¹, Priyadarsi D. Roy², Nuria Torrescano-Valle³, Nancy Cabanillas-Terán^{3,4}, Silvia Carrillo-Domínguez⁵, Ligia Collado-Vides⁶, Marta García-Sánchez^{1,7}, Brigitta I. van Tussenbroek¹



Research Article | Published: 26 July 2022

Environmental impact of *Sargassum* spp. landings: an evaluation of leachate released from natural decomposition at Mexican Caribbean coast

Edgar Olguin-Maciél, Rosa María Leal-Bautista, Lilitiana Alzate-Gaviria, Jorge Domínguez-Maldonado & Raul Tapia-Tussell

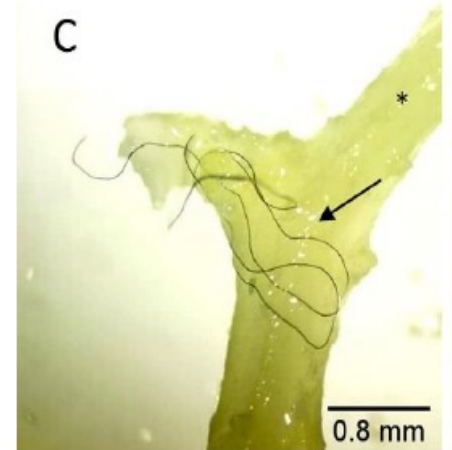
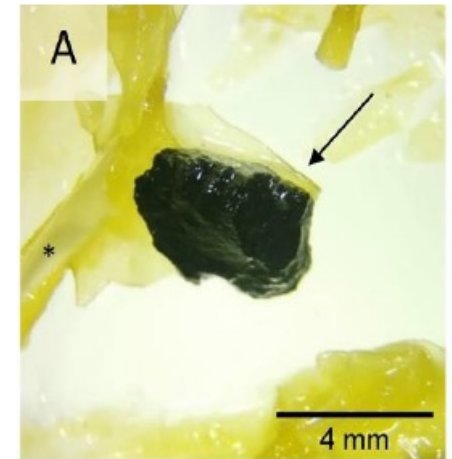
In 30 days 1 ton of *Sargassum* produces 316 L of leachates with **5.7 g of arsenic**





Vector of microplastics

	Concentration (MP kg ⁻¹)	Source
<i>Sargassum</i> (México)	1,500 - 17,900	Gil, 2022
Macroalgae (China)	60 -190	Feng et al., 2020
Macroalgae (China)	900 – 3,000	Li et al., 2020
Macroalgae (China)	0 – 119	Zhang et al. 2022
Marine sediments (Guadalupe)	0 - 10,400	Sandre et al., 2019
Beach (Lesser Antilles)	68 - 620	Bosker et al., 2018
Beach (Guatemala)	30	Mazariegos-Ortíz et al., 2020)
Beach (Puerto Rico)	3 - 17	Pérez-Alvelo et al., 2021



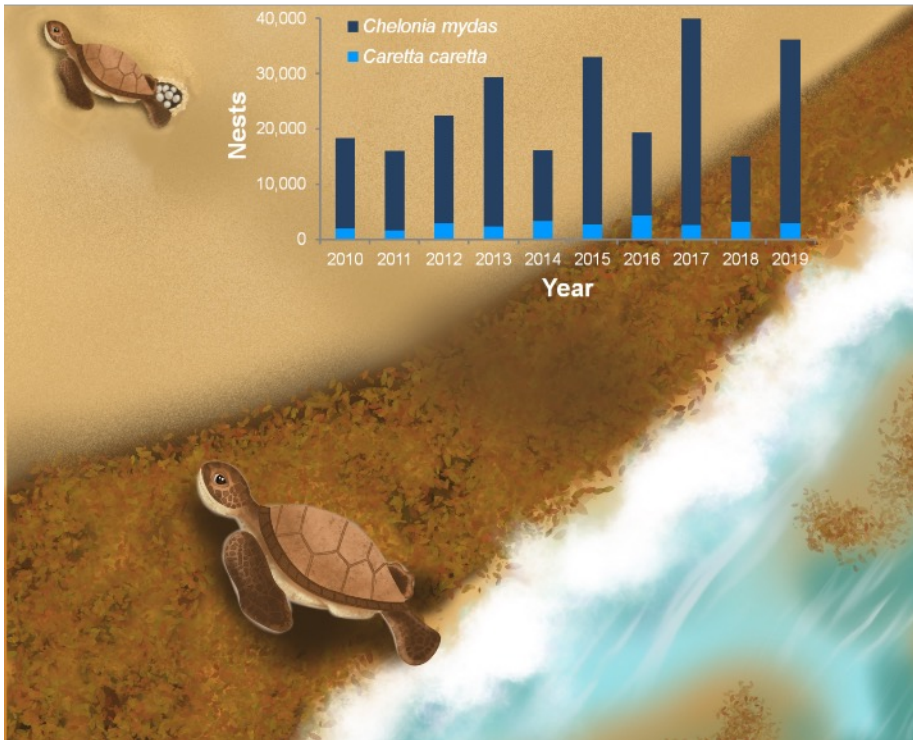
Source: Gil, T. 2022.

Impact on human health

Hydrogen sulfide gas (ppm)



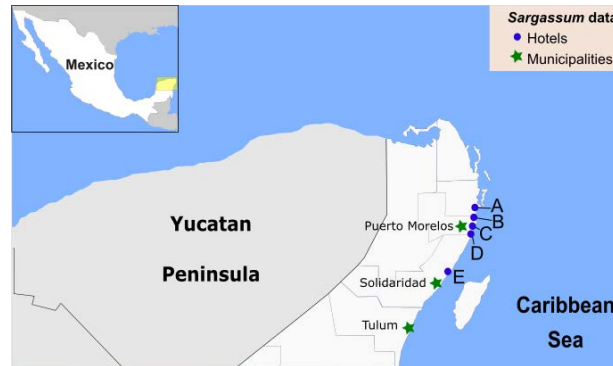
Impact on marine species



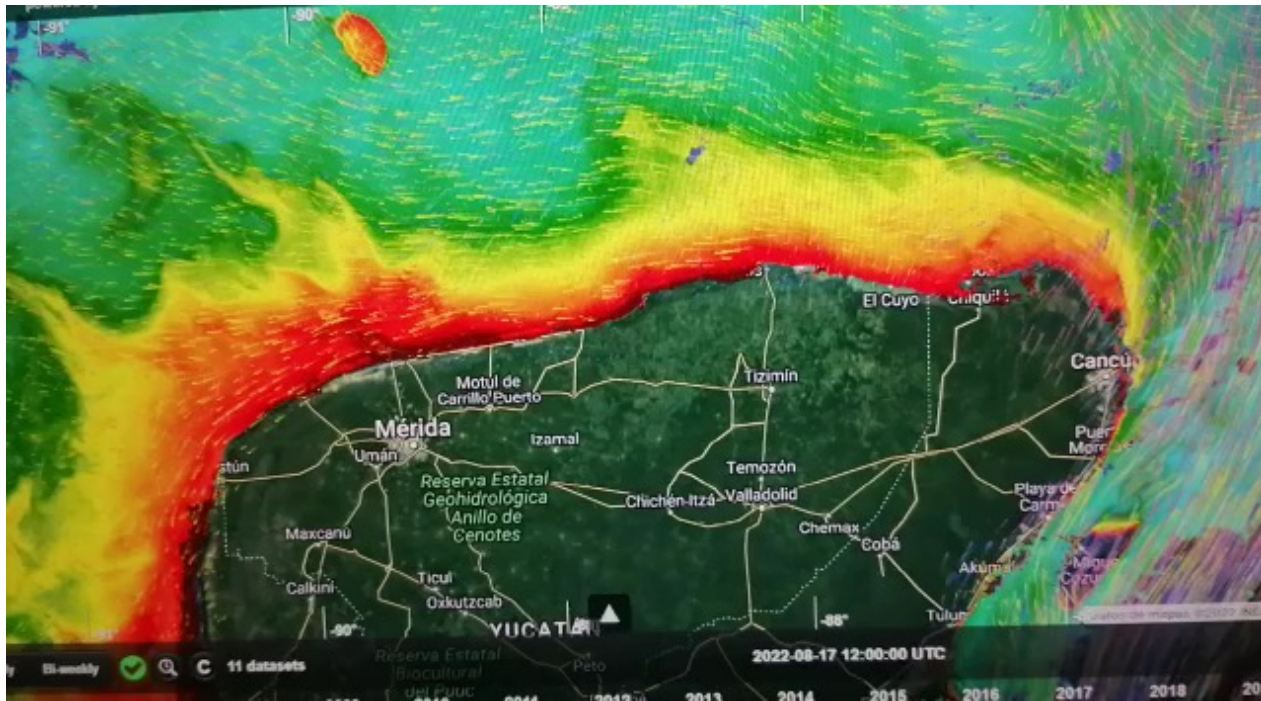
Rodríguez-Martínez et al. 2021 – J. Environ. Manag.



Impact on economy



Variable	Municipalities			Hotels				
	PM	Sol	Tul	A	B	C	D	E
Beachfront distance (km)	1.8	3.5	0.909	2.2	0.2	0.438	0.86	1.7
<i>Sargassum</i> removed (m ³ km ⁻¹)	11,023	10,105	10,790	40,932	23,570	25,582	14,273	17,375
Total cost (\$US)	744,385	2,619,273	611,521	2,081,210	114,035	182,950	259,670	631,536
Per kilometer (\$US)	413,547	748,364	672,741	946,005	570,175	417,694	301,941	371,492
Per m ³ (\$US)	38	67	62	23	24	16	21	21



Video: Hidrobiól. Esteban Amaro



Foto: Cortesía

MUEREN MILES DE PECES POR MAREA ROJA EN COSTA DE YUCATÁN

Fuente: Megalópolis



Fuente: AGRO 2000



Fuente: El Capitalino

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Ing. Alejandro de Luna – MarAlive

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Ing. Dagoberto Ruíz– Grupo Dakatso

Ocean. Joel González - DESMI

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Biól. Verónica Ramos – Now Jade

Biól. Antonio Ortíz – Moon Palace

Biól. Gerardo Castañeda – Moon Palace

Dr. Miguel A. Diego - Zoetry

Protocolo Puerto Morelos A.C.

Ing. Antonio Lascano – El Cid

Biól. Horacio Ocampo – El Cid

Sra. Imelda Juárez – Ocean Coral Turqueza

Biól. Gisela Maldonado – Gpo. Tortuguero Caribe

Biól. Miguel A. Maldonado



Foto: Dr. Lorenzo Álvarez Filip, UNAM



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