

Sunscreen Use and Knowledge of Reef-Safe Products by Akumal Bay Beachgoers

**The Sunscramers
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BECKY

Research Questions

- How many beach goers in Akumal **use sunscreen**, and does local **availability** of sunscreens **influence** their choice?
- What is the **knowledge level** of beach goers on **reef-safe sunscreen** from **signs** and **personal research/knowledge**?

BECKY

Background

- 6,000-14,000 tons into ocean⁽²⁾
- Coral Bleaching⁽¹⁾⁽⁵⁾
- Oxybenzone harmful to coral & fish⁽⁴⁾
- Non-reef safe sunscreens banned
 - Palau⁽²⁾ & Hawaii⁽³⁾
- Health concerns⁽⁵⁾
- 12% of México's GDP



Photos taken at Half Moon Bay by Becky Copper

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- About 6-14,000 tons of sunscreen washes off of people and into the oceans and eventually the reefs every year
- Bleaching of hard corals due to organic ultraviolet filters which promote viral infections - chemicals can awake viruses and make corals bleach at lower temperatures than they normally would
- Effects of oxybenzone on corals & fish: baby coral distress and bleaching, skeleton formation disruption, DNA damage; endocrine and reproduction disruption
- Hawaii banned reef-unsafe sunscreens, announced in 2018 and set to be enforced starting 2020
- Sunburn, photo-aging, skin-cancer
- Akumal is part of the 100 mile stretch of coastline (from Cancun to Tulum) that produces **12% of México's GDP**
 - Need to protect the ecosystem while maintaining the economy for the future

Method

- Go to **local stores** surrounding Akumal Bay (0.5 mi radius) to document types of sunscreen
- **Compare** the advertising and ingredients list on sunscreens
- **Ask beachgoers** to participate in a 3-6 question poll
- **Analyze answers** obtained from beachgoers

BECKY

- Go to **local stores** surrounding Akumal Bay (0.5 mi radius) to document types of sunscreen
- **Draw graphs and compare** the advertising packaging of sunscreens with the true components to conclude if the sunscreen is truly biodegradable.
- **Ask beach goers** to participate in a 3-6 question poll about their personal sunscreen use in the Akumal Bay.
- **Analyze answers** we obtained from beach goers and summarize those answers following **drawing graphs**.

Data Analysis - Chemical Comparisons

The HEL LIST includes:

- [Any form of microplastic sphere or beads.](#)
- [Any nanoparticles like zinc oxide or titanium dioxide.](#) ***
- [Oxybenzone](#)
- [Octinoxate](#)
- [4-methylbenzylidene camphor](#)
- [Octocrylene](#)
- [Para-aminobenzoic acid \(PABA\)](#)
- [Methyl Paraben](#)
- [Ethyl Paraben](#)
- [Propyl Paraben](#)
- [Butyl Paraben](#)
- [Benzyl Paraben](#)
- [Triclosan](#)

*Including **Avobenzone**



Haereticus Environmental Laboratory
(HEL)⁽⁶⁾

SUMMER

Data Analysis - Nearby Stores

Octinoxate - 15

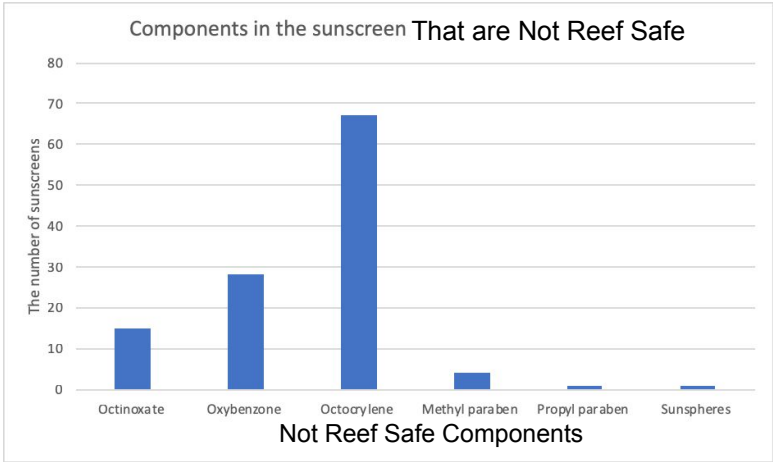
Oxybenzone - 28

Octocrylene - 67

Methyl Paraben - 4

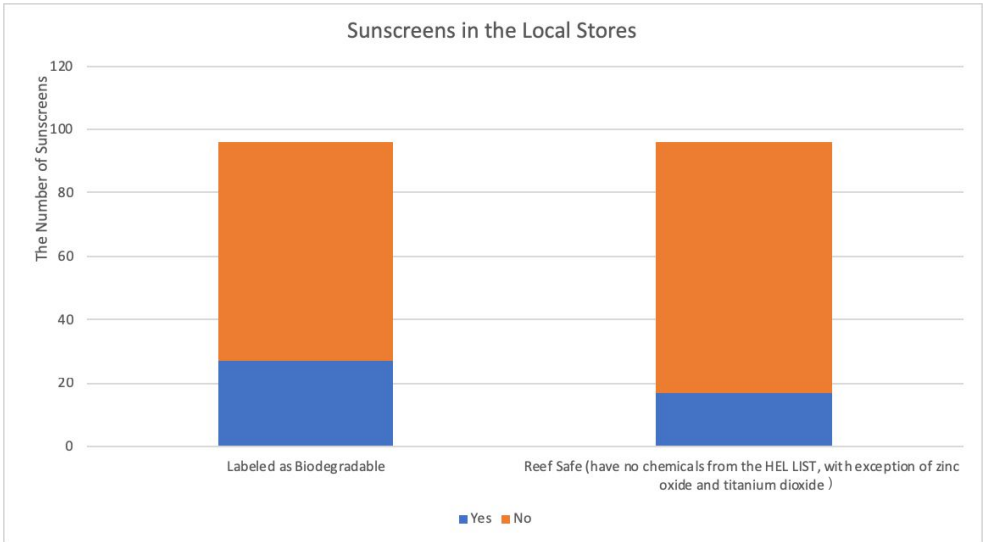
Propyl Paraben - 1

Sunspheres - 1



SUMMER

Data Analysis - Nearby Stores



SUMMER

Results - Nearby Stores

- **6** stores: Maxico, Super Chomak, OXXO, Farmacia Emergencia, Super Market, Akumal Dive Center
- **26** sunscreens labeled reef safe...but only **7 out of 26** actually reef-safe
- **8** sunscreens not labeled as reef safe

ROZ

- We looked at **6** different stores: Maxico, Super Chomak, OXXO, Farmacia Emergencia, Super Market, and Akumal Dive Center.
- **26** of the sunscreens were labeled as biodegradable, however with comparison to the HEL list, only **7/26** were biodegradable.
- However, **8** sunscreens that were not labeled, are biodegradable.

Results - Nearby Stores: Rankings of reef-safeness

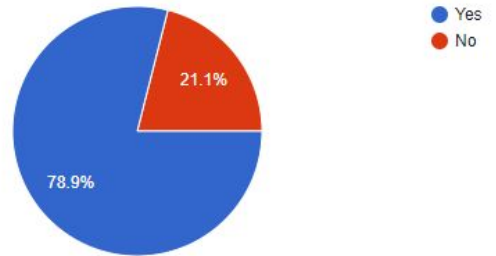
- Two ranks:
 - Safe by Hawaii's standards (no oxybenzone and octinoxate): **53 total**
 - 32 had oxybenzone or octinoxate - of those, 4 had both (ADC)
 - Safe by Hel list's standards and Hawaii's standards: **7 total sunscreens.**
 - These ones also did not have avobenzone
 - *64 had octocrylene, 57 had avobenzone

ROZ

Results - Questions

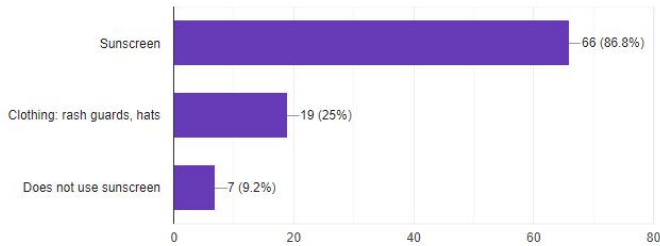
2. Do you currently have sunscreen on?

76 responses



1. How do you protect your skin from the sun?

76 responses



***Only 4 beachgoers had reef safe sunscreen**

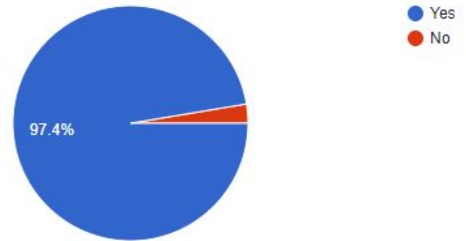
AKIRA

Most beachgoers used sunscreen as the main source of protection from UV rays, and most people had sunscreen on (or were applying it) when we talked to them

Results - Questions

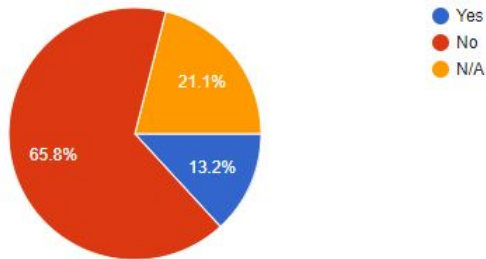
4. Are you on vacation?

76 responses



3. Did you purchase your sunscreen locally?

76 responses



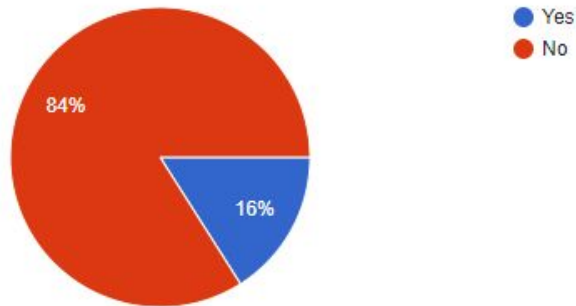
AKIRA

Most people were on vacation, and they bought their sunscreens from the countries they came from

Results - Questions

5. Have you seen any signs in Akumal Bay promoting reef safe sunscreen use?

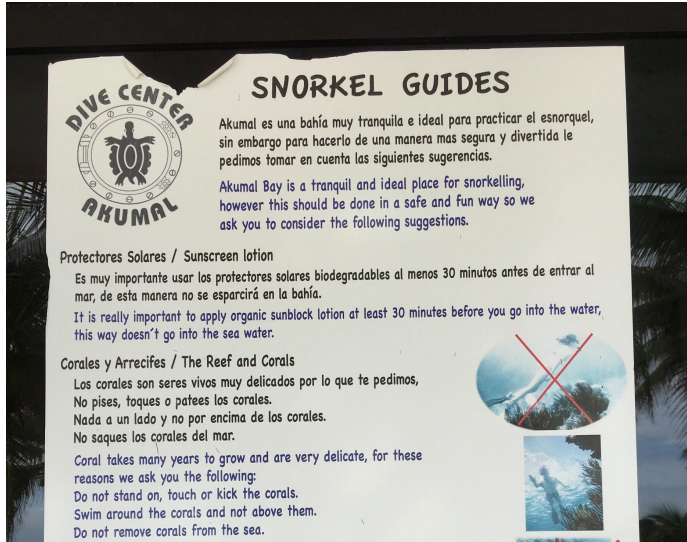
75 responses



AKIRA

- Most people polled in Akumal Bay use sunscreen and were currently using it when polled
- Most people bring their own sunscreen
- An overwhelming majority were not locals
- Very few had seen sunscreen signs in Akumal Bay
 - Some beachgoers noted having talked to guides
 - Suggests need for more education

Results - Signs



Photos taken at Akumal Bay Beach by Becky Copper



SHU

The snorkel sign mentions do not stand on, touch, or kick corals but nothing about the sunscreen damage.

Picture in the right side, big signs at beach did not say anything about sunscreen literally, but around those signs, some people from conservative organizations would introduce knowledge about **reef safe and sunscreens** for tourists if they want to know, so only oral way.

And Tour guides won't let people go swimming with them if they put on sunscreen (or at least they'll tell them to stop applying it if they see people doing that)

Sign on right: just mentions applying organic sunblock lotion at least 30 minutes before entering water (found in a center - that sold equipment, a few sunscreens, and had what looked like the tour guides' schedule - along beach)

Sign on left: mentions nothing about sunscreen, found outside near entrance of beach (where tour guides or people working there would "hover")

Discussion & looking forward...

Following sunscreens are considered less harmful:

Brand	Labeled as Biocidal	Reef Safe (based on HEL LIST)	uncertain chemicals
Maya Solar Lotion SPF 15	Yes	Yes	Zinc oxide, titanium dioxide
Maya Solar Spray SPF 30	Yes	Yes	Zinc oxide, titanium dioxide
Maya Solar Lotion SPF 30	Yes	Yes	Zinc oxide, titanium dioxide
Maya Solar Spray SPF 50+	Yes	Yes	Zinc oxide, titanium dioxide
Maya Solar Lotion SPF 50+	Yes	Yes	Zinc oxide, titanium dioxide
Coco Beach Protector Solar Kids SPF 50+	Yes	Yes	Zinc oxide, titanium dioxide
Coco Beach Protector Solar SPF 50+	Yes	Yes	Zinc oxide, titanium dioxide
Kiin Sun 30 SPF	No	Yes	Zinc oxide, titanium dioxide
Kiin Sun 50 SPF	No	Yes	Zinc oxide, titanium dioxide
Kiin Sun Kids SPF 50	No	Yes	Zinc oxide, titanium dioxide
Simi Block Ultra 90 Lotion SPF 50+	No	Yes	
Simi Block Kids 60 Lotion SPF 50+	No	Yes	
Simi Block Sport 24 Lotion SPF 30	No	Yes	
Anglamark Coop Sunspray Kids SPF 50	No	Yes	
Avène Spray SPF 30	No	Yes	

SHU

Tourists asked about recommendations during the survey, but unfortunately, we hadn't finished our research at that time so we cannot give any recommends, also, we don't want to mislead or do advertising to people in the survey.

But we put the list here eventually because this is a part of our research. Based on labeled ingredients in the sunscreens and from our research, though we could not conclude which sunscreens are fully reef safe, we found the following sunscreens are less harmful for the reefs:

Discussion & looking forward...

- Possible uses
 - Outreach with tourists and stores
- Further actions
 - Price analysis
 - Other beaches
 - **Educate**
 - PL+S certification program



Haereticus Environmental Laboratory⁽⁶⁾

ROZ

HEL has a program called Protect Land + Sea (PL+S) certification program where they test products to be environmentally safe. Future sunscreens could use this program to test their products and label them as PL+S certified so that it is easily identifiable for consumers. The only concern with this is that HEL does not test for avobenzone.

Limitations

- Different lists and names
 - Butyl methoxydibenzoylmethane, a.k.a. Avobenzone
- Language barrier
- Small sample size
- Regulations by country
- Chemical analysis

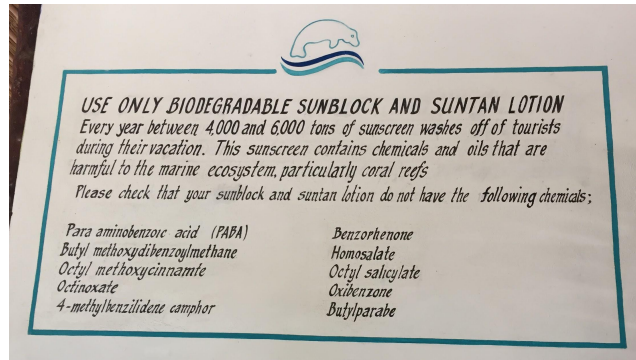


Photo taken at Sian Ka'an by Roz Davis

SHU

Different lists for reef safe standard, but basic harmful chemicals are the same
Regulations by country - maybe some countries only require listing certain ingredients while others might follow stricter rules

Chemical analysis - ratios, concentrations of ingredients; are they harmful at certain levels but innocuous at others? AND difficult to tell if nanoparticles or not (for zinc oxide and titanium dioxide)

Conclusion

- 86.8% of surveyed beachgoers use sunscreen
 - 78.9% had sunscreen on at the time of the survey
- Only 13.2% had purchased their sunscreen locally
- 16% said that they had seen some kind of sign regarding sunscreen usage at Akumal Beach

SHU

Questions?

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- (1) Danovaro, Roberto et al. "Sunscreens cause coral bleaching by promoting viral infections" *Environmental health perspectives* vol. 116,4 (2008): 441-7.
- (2) McGrath, Matt. "Coral: Palau to ban sunscreen products to protect reefs", *Science & Environment*. BBC News, 1 Nov, 2018, <https://www.bbc.com/news/science-environment-46046064>.
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- (5) Wood, Elizabeth. *Impacts of Sunscreens on Coral Reefs*. 2018, *Impacts of Sunscreens on Coral Reefs*, www.icriforum.org/sites/default/files/ICRI_Sunscreen_o.pdf.
- (6) "Protect Land Sea Certification." *Haereticus Environmental Laboratory*, www.haereticus-lab.org/protect-land-sea-certification/.