Paradox of over-tourism, income opportunities and coral degradation: A case of Maya bay, Thailand

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Abstract
Tourism plays an important role in the economic development of the country. Tourism contributes to as much as 7% of Thailand national GDP. Pristine beaches in Thailand attracts millions of tourists every year. On one hand, local economy is boosted with tourism. Contrary to that, over-tourism may lead to stress on the local environment. One of the classical examples of impact of over tourism on the environment is the degradation of pristine beach and coral communities in the Maya bay, Phi Phi Leh, southern Thailand. This paper, aims to analyze the paradox of over-tourism, income opportunities and the impact on coral community in Maya bay, based on the literatures. Ever since, Maya bay was known to the world in early 2000’s, the number of tourists visiting there every day increased by close to 3000-fold in the last 20 years. Though, tourism helped to increase the local economy dramatically, later, due to impact of probably over exploitation of corals from snorkeling and diving, and wash-off of the toxic UV-filters led to bleaching of the corals. Most of the corals were dead in 20 years of tourism exploitation by 2017. Government of Thailand came up with the strategy to ban Maya bay as a tourist hotspot, and promoted coral recovery. Because of the solid policy, and action plan of the multiple stakeholders, in the last three years, corals has been significantly recovered. This paper discusses about the strength, weakness, challenges, opportunities and threat of the action plan in restoring coral community in Maya bay.

Keywords: Maya bay, UV-filters, coral planting, bleaching, over-tourism, stakeholder management

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5th International Symposium on Conservation and Management of Tropical Lakes

Feb 5, 2021, Day 2- Session 2- Environment 10:40-10:55 CST
Tourism
What are Corals?

Coral polyps (1 – 3 mm)
Coral Reef in Southeast Asia

Facts
- 100,000 sq km (34%)
- 600/800 corals
- USD ~10 billion / annum
- Tourism 55% ~ 35 Mil people
- 8000 business ~ 3 Mil local

Risks
- 88% vulnerable
- ~ 95% threatened
- Climate change
- Marine exploitation
- Acidification
- Chemicals

Burke, Lauretta, Liz Selig, and Mark Spalding (2002)

Globally 75% of coral reefs threatened (2020) –
Business as usual - 90% by 2030 and close to > 95% by 2050
~ 30% increment in threatened coral in the past 10 years
Coral threats in SeAsia

Economic impact of marine pollution

a rapid-emission-reduction pathway, whereby temperatures are estimated to reach 2.2°C above pre-industrial levels by 2100 RCP2.6

a business-as-usual pathway that sees temperatures rising 4.0°C by 2100 RCP6

<table>
<thead>
<tr>
<th></th>
<th>Low climate impacts</th>
<th></th>
<th>High climate impacts</th>
<th></th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2050</td>
<td>2100</td>
<td>2050</td>
<td>2100</td>
<td>2050</td>
</tr>
<tr>
<td>Fisheries</td>
<td>67.5</td>
<td>262.1</td>
<td>88.4</td>
<td>343.3</td>
<td>20.9</td>
</tr>
<tr>
<td>Sea-level rise</td>
<td>10.3</td>
<td>34.0</td>
<td>111.6</td>
<td>367.2</td>
<td>101.3</td>
</tr>
<tr>
<td>Storms</td>
<td>0.6</td>
<td>14.5</td>
<td>7.0</td>
<td>171.9</td>
<td>6.4</td>
</tr>
<tr>
<td>Tourism</td>
<td>27.3</td>
<td>301.6</td>
<td>58.3</td>
<td>639.4</td>
<td>31.1</td>
</tr>
<tr>
<td>Ocean carbon sink</td>
<td>0.0</td>
<td>0.0</td>
<td>162.8</td>
<td>457.8</td>
<td>162.8</td>
</tr>
<tr>
<td>Total</td>
<td>105.7</td>
<td>612.2</td>
<td>428.1</td>
<td>1,979.6</td>
<td>322.5</td>
</tr>
<tr>
<td>Percent of GDP</td>
<td>0.06%</td>
<td>0.11%</td>
<td>0.25%</td>
<td>0.37%</td>
<td>0.18%</td>
</tr>
</tbody>
</table>
## Coral Threats in SeAsia

<table>
<thead>
<tr>
<th>Country</th>
<th>Major Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambodia</td>
<td>Over fishing, blast fishing, poison fishing.</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Over fishing, blast fishing, sand mining.</td>
</tr>
<tr>
<td></td>
<td>Over fishing, blast fishing, poison fishing,</td>
</tr>
<tr>
<td></td>
<td>trawling.</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Over fishing, blast fishing, poison fishing,</td>
</tr>
<tr>
<td></td>
<td>siltation.</td>
</tr>
<tr>
<td>Philippines</td>
<td>Over fishing, coastal tourism, siltation.</td>
</tr>
<tr>
<td>Thailand</td>
<td>Over fishing, poison fishing.</td>
</tr>
<tr>
<td>Vietnam</td>
<td>Over fishing, poison fishing.</td>
</tr>
</tbody>
</table>

UNEP 2004
Tourism
UV-filters

Oxybenzone and octinoxate - banned / planning

Republic of Palau, Bonaire island, Hawaii and Mexico
The concentrations of oxybenzone are said to be 0.8-19.2 μg/L at Hawaiian sites and 75-1400 μg/L in the US Virgin Islands.

Oxybenzone
LC50 = 139 – 779 mg/L at 24 h *Stylophora pistillata*
Downs et al., 2016. *Arch Environ Contam Toxicol*. **70**(2):265-288

Bleaching in Zooxanthella (as low as 10 μL/L) and temperature-related (greater at 30°C vs 28°C) bleaching.

The concentrations of oxybenzone are said to be 0.8-19.2 μg/L at Hawaiian sites and 75-1400 μg/L in the US Virgin Islands.
Tourism

Maya bay, Thailand

2008

170 people

2017

3500 people

@ BBC
Maya bay Restoration strategy

Before Maya Bay was closed

Dead coral

Rubbish (straws, plastic bags, cans, etc)
Maya bay Restoration strategy

After Maya Bay was closed

Rubbish washing up is picked up

Planting coral

DigitalGlobe, a Maxar company
Maya bay Restoration strategy

After Maya Bay was closed

Coral
recovering naturally

Coral nursery

Demarcation Line

© DigitalGlobe, a Maxar company
Maya bay Restoration strategy

Blacktip reef sharks can now be spotted at Maya Bay

Thailand
Coral Reef Restoration Plan

Reduce threats from
Strategy 1: Tourism
Strategy 2: Water pollution
Strategy 3: Sedimentation
Strategy 4: Fisheries

The coral has begun recovering
Responsible diving

Avoid excessive use of flash photography

Avoid taking photos in rough conditions; this can lead to reef damage

Photograph marine animals in their natural habitat - don’t relocate

DANGER: Keep off the bottom

Maintain diving skill level and training

Southern Cross University

Consider all marine life including the subject and its habitat

Best practice guide for underwater photographers and videographers
Low Impact Diving

Bottom dwelling

Dangling gauges

Equipment close to body

Neutral buoyancy
<table>
<thead>
<tr>
<th><strong>Strength</strong></th>
<th><strong>Weakness</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Strong government and local people support</td>
<td>• Quantitative parameters to define sustainable tourism</td>
</tr>
<tr>
<td>• Funding opportunities for the restoration,</td>
<td>• Qualitative and quantitative measure to define pollution, and economy</td>
</tr>
<tr>
<td>• Alternate tourism opportunities</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Opportunities</strong></th>
<th><strong>Threat</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• As a model site for studying case of overtourism</td>
<td>• Poacher tourism</td>
</tr>
<tr>
<td>• Multiple stakeholder engagement</td>
<td>• Continuity of the preventive measures</td>
</tr>
<tr>
<td>• Consensus between government, tourism operators, and local people</td>
<td>• Change in policy due to socio-economic pressure</td>
</tr>
<tr>
<td></td>
<td>• Lack of trainings on sustainable tourism</td>
</tr>
</tbody>
</table>
Sustainable tourism

Adapted from Koh and Fakfare, 2019.
Acknowledgements

APN - Asia-Pacific Network for Global Change Research for funding this project - "Collaborative Research Platform to Manage Risk and Enhance Resilience of Coral Reef in Southeast Asia, CRRP2019-08MY-Khanal"

Photo: http://wallpaperswide.com/

Let’s join our hands to SAVE the CORAL