

SUPPLEMENTARY FILES

Comparison of dive industry perspectives on threats to coral reefs in four Asian pacific countries

Kirsten Benkendorff^{1*}, Quach Thi Khanh Ngoc², Roslizawati Ab Lah³, Inem Ode⁴, Kay Dimmock⁵, Do Thuy Trinh², Ana Banda-Marquez¹, Gino Limmon⁶

Supplementary Table S1: Dive Master Interview Questions

What is your Nationality?
How long have you lived in the region?
Where did you complete your SCUBA diving qualifications?
When did you complete your SCUBA diving qualifications?
How many years have you been employed in SCUBA Dive industry?
What do you think are the major threats to coral reefs?
Have you heard about ocean acidification and the problems it might cause for coral reefs?
Do you think activities like boating and diving cause damage to coral reefs?
Have any dive sites you use been heavily impacted or degraded by human activities?
Do you communicate concern about reef health or potential diver-induced damage to charter divers?
Do you provide training to alert and educate divers (e.g. buoyancy control, fin damage, not holding coral)?
Have you noticed change to conditions of local reefs since you have been diving in? (if so what sort of damage have you noticed)
Do you have a choice of dive sites with different quality reef health where you take divers?
Are inexperienced divers taken to particular dive sites – already damaged sites? fragile sites?
Do you have a minimum / maximum diving group size? How many is in each group?
Does local culture influence choice of dive sites (e.g. protected areas, no diving during coral spawning)?
Do you think there is a carrying capacity for how many people can dive on the local reefs?
Do you think the capacity has been reached or is there room for expansion of the dive industry
Are you involved with any marine based community environmental activities? (e.g. underwater clean-ups)
Would you like to make other comments about your experience with the local coral reefs?

Supplementary Table S2: Dive Company Manager Surveys:

Is the dive company Australian owned?
How many years has your dive company been in operation?
How many Dive Masters does your dive company employ?
What proportion of Dive Masters are local people?
How many staff in total does your company employ?
Are there training programs for local people to train and become Dive Masters?
Can you outline the types of environmental programs (for example, underwater clean-ups) your dive company is involved with please?
What would be the approximate number of dive/snorkel pax per year / month?
Do you have a key diver market you attract? Are they from a specific country?
Is there a busy period/ peak time of year for diving here?
What do your divers/snorkelers come to see? What do you offer them?
Do you believe they are generally satisfied when they leave?
What is the approach taken with divers with regard to protecting coral reef quality?
Looking ahead, how would you describe as the future for the diving industry in this region?
What do you see as some of the challenges dive managers in this region confront?
Is there a view on the capacity of the local reefs to sustain SCUBA diving in the area?

Supplementary Table 3: Management Agency Interview Questions

Can you tell me about the focus of this organization regarding coral reefs?
What are the sort of roles the organization has regarding coral reefs?
How does the organization go about completing its role?
How would you describe the quality of the coral reefs in your local area?
Are there particular threats to the reef quality in your local area?
Is this a high level threat?
Are there steps in place to mitigate against the threats?
Is regulation one of the steps in place? Should there be regulation in place to protect the reefs here?
Do you work closely with the SCUBA dive industry in your local region?
Is there room for expansion with the SCUBA dive industry in your local area? If so do you think it needs to be more strongly regulated (e.g. licenses restricted to accredited providers or locals willing to undergo an accreditation program)
Are you optimistic about the SCUBA dive industry in your local area?
Does the local community benefit from the SCUBA dive industry that you know?
Have you heard about ocean acidification and the problems it might cause for coral reefs?
Do you think recreational activities like boating and diving cause any damage to coral reefs?
Have any dive sites you know been heavily impacted or degraded by human activities?
Do you communicate concern about reef health or potential diver-induced damage to minimize further impacts? Who do you communicate to?
Have you noticed change to conditions of local reefs in the local area? (if so what sort of changes have you noticed)
Is local culture a respected part of decisions about where to dive (e.g. Traditional closures during spawning, special protected areas, culturally significant areas that are off limits to divers)?
Do you think there should be a carrying capacity for how many people can dive on the local reefs?
Do you think the capacity has been reached or is there room for expansion of the dive industry
Do you participate in marine based community environmental activities? (e.g. Reef life surveys)
Do you participate in any marine based research? (e.g. volunteering for researchers at local universities)
Would you like to make other comments about your experience with the dive industry or the local coral reefs?

Supplementary Table S4: Overview of demographics for participants in SCUBA dive stakeholder interviews a) Dive Company Managers and b) Dive Masters.

a)

Characteristics		Nha Trang	NSW	Maluku	Tioman Island
The total number of surveyed managers		7	4	4	9
Type of company	Domestic company	4	4	1	6
	Company with foreign investment	3	0	3	3
Years in operation	<2	2	0	1	1
	2-5	2	0	1	2
	6-10	2	1	2	1
	>10	1	3	0	4
Number of dive masters employed	< 5 people	2	1	3	7
	5 -10 people	4	1	1	1
	>10 people	1	2	0	1
Number of Company Staff	< 10 people	3	2	2	8
	10 - 15 people	1	0	1	0
	> 15 people	3	2	1	1
Proportion of Dive Masters that are local residents	< 50%	1	1	0	4
	50 - 80%	3	1	1	1
	> 80%	3	2	3	4
Training for locals to become dive masters?	Yes	6	2	3	8
	No	1	2	1	1
Main tourist market	Domestic	(4)	3	0	1 (4)
	Asian countries (incl domestic)	2	0	0	3
	Other foreign countries (Europe, USA, Canada, Australia, Russia)	1	0	0	2
	Diverse	4	1	4	3
Average number of divers (customers) per month	<50 people	2	0	3	1
	51-250	1	2	1	6
	251-500	2	0	0	1
	>500	2	2	0	1
Carrying capacity	Should be lower	2	0	0	2
	Needs to be enforced	0	0	0	3
	Suitable as is	2	4	0	2
	Not applicable	3	0	4	2
Participation in environmental programs?	Yes	7	2	3	9
	No	0	2	1	0
Approach to educating divers for improving coral reefs	Pre-dive briefings - buoyancy & skills	>3	4		7
	No touch or take policy	>3	4		4
	Rubbish awareness/collection				3
	Small dive groups	1	1		1

b)

Characteristics		Nha Trang	NSW	Makuku	Tioman Island
The total number of dive masters		23	4	7	19
Nationality	Domestic	15	3	6	15
	Foreign	8	1	1	3
Time lived in the region	>25 years	8	2	6	12
	10 - 25 years	9	1	0	4
	5 - 10 years	3	0	0	2
	1-5 years	2	1	1	1
	<1 year	1	0	0	0
Years employed in the SCUBA industry	<1 year	1	0	0	0
	1- 5 years	3	2	4	6
	5 - 10 years	2	0	3	7
	10 - 15 years	9	1	0	3
	>15	8	1	0	3