Appendix IX. Results of the causal chain analyses for Main Area of Concern 02: Habitat and Community Modification

Table A2.1: Environmental Impacts of Habitat and Community Modification (Severity)

Environmental Impacts																
	2.1.	2.2.1.	2.2.2.	2.2.3.	2.2.4.	2.2.5.	2.2.6.	2.3.1	2.3.2	2.3.3	2.3.4	2.3.5	2.4	2.5	2.6	
	Shoreline change, due to modification, land	upland / watershed habitats (>10 m elevation)	coastal forest habitats	coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10	wetland habitats	estuarine habitats	mangrove habitats	Disturbance, damage and loss of coral reef habitats	seagrass habitats	macroalgal habitats	soft sediment habitats	deep water habitats (including sea mounts)	pelagic habitats (nearshore <30 m, neritic 30-200m and	Increase in the occurrence of harmful or toxic algal blooms	Introduction of exotic non- native species, invasives and	SEVERITY
Loss of biodiversity	3	1	1	2	3	2	4	4	3	2	1	3	4	1	2	36
Increased risk of extinction of vulnerable / focal species	3			3	3	2	3	4	3			1	3	0	0	25
Loss of biomass 'carbon' sink			1	1	2		2	1	3	1	1	1	1			14
Increased GHG emissions (through burning)		1	1	1	1											4
Reduced area of critical habitats (feeding, breeding, spawning)	2	3	2	2	3	2	4	4	3	2	2	3	4	2	3	41
Changes to epifauna and infauna	1			1	1	1	1	1	1	1	1	1		1	1	12
Changes to trophic structure	1	1	1	1	2	2	3	4	3	2	2	2	4	3	2	33
Loss of 'natural' shoreline protection and increased risk of coastal flooding.	3	1	1	3	2	1	4	4	3	2	3				1	28
Increased coastal erosion	3	1	1	3	2	2	4	4	4	2	4					30
Changes to sediment composition (e.g. organic composition, particle size etc.)	3	3	2	3	3	3	3	4	3	2	3					32
Changes to sediment transport dynamics (accretion / siltation)	3	3	2	3	2	2	4	4	4	2	4					33
Reduced water clarity and light available to photosynthetic organisms (turbidity)	4	2	1	2	1	3	3	2	3	2	4			3		30
Reduced water quality (increased nutrients)	2	3	1		2		3	1	2	2	1	1		2		20
Reduced water quality (chemical contaminants)	1	1					1									3
Increased salt water intrusion (and salinisation of soils)	2	1			2	1	1									7
Loss of coastal vegetation	2		2	2	2		2									10
Modification of coastal hydrodynamics	3	2		2	1	1	3	3	3	1	2					21

Environmental Impacts																
	2.1.	2.2.1.	2.2.2.	2.2.3.	2.2.4.	2.2.5.	2.2.6.	2.3.1	2.3.2	2.3.3	2.3.4	2.3.5	2.4	2.5	2.6	
	Shoreline change, due to modification, land	upland / watershed habitats (>10 m elevation)	coastal forest habitats	coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10	wetland habitats	estuarine habitats	mangrove habitats	Disturbance, damage and loss of coral reef habitats	seagrass habitats	macroalgal habitats	soft sediment habitats	deep water habitats (including sea mounts)	pelagic habitats (nearshore	Increase in the occurrence of harmful or toxic algal blooms	Introduction of exotic non- native species, invasives and	SEVERITY
Creation of areas of 'hypoxic' areas (and smell)	1				1		1				2			3		8
Reduction in freshwater inflow into coastal waters	1	3	2	2	2	1										11
Changes in fisheries productivity	2	1	1	1	2	3	3	4	4	3	3	3	4	3	2	39
Changes in primary productivity	1	1	1	1	2	2	2	2	3	3	1	1	2	3	1	26
Changes in secondary productivity							2	2	2				2	3		11
Phase shifts and changes in community composition	3	1	1	2	1	2	3	4	3	2	2	3	3	3	3	36

Table 2: Inter-relationship between Habitat and Community Modification and other issues.

2.1.	2.2.1.	2.2.2.	2.2.3.	2.2.4.	2.2.5.	2.2.6.	2.3.1.	2.3.2.	2.3.3.	2.3.4.	2.3.5.	2.4.	2.5.	2.6.	
Shoreline change, due to modification, land reclamation	watershed and upland habitats	coastal forest habitats	coastal habitats (beaches, dunes, coastal vegetation and	wetland habitats	estuarine habitats	mangrove habitats	coral reef habitats	seagrass habitats	macroalgal habitats	soft sediment habitats	deep water habitats	of pelagic habitats	crease in the occurr Irmful or toxic algal	Introduction of exotic non- native species, invasives and	
	→														Alteration of natural river flow and changes in freshwater input and sediment load
→	→	+	→	→	→	→	→								Degradation of ground and surface water quality
	→	→		→	→	→						→			Microbiological contamination
	→	→		→	→	→	→	→	→	→		→	→		Nutrient enrichment
	→	→		→	→	→	→	→	→	→		→	→		Chemical contamination (excluding oil spills)
→	→	→	→	→	→	→	→	→	→	→		→	→		Suspended solids
	→	→		→	→	→						→			Solid wastes / marine debris (plastics etc.)
				→	→	→	→	→	→	→		→			Oil spills (drilling, exploitation, transport, processing, storage, shipping).
			→	→	→	→	→	→	→	→		→			Shoreline change, due to modification, land reclamation and coastal erosion
															upland / watershed habitats (>10 m elevation)
	→		→									→	→		coastal forest habitats
→	→	→		→	→	→	→	→	→	→		→	→		coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)
→	→		→		→	→	→	→	→	→		→	→		wetland habitats
→	→		→	→		→			_			→			estuarine habitats
→	→	→	→	→	→		→	→	→	→		→			mangrove habitats
→	`	→	→	→	→	→		→	→	→		→	→		coral reef habitats
→	→	→	→	→	→	→	→		→	→		→	-		seagrass habitats
→	→	→	→	→	→	→	→	→		→		→			macroalgal habitats
→	,	→	→	→	→	→	→	→	→			→			soft sediment habitats

2.1.	2.2.1.	2.2.2.	2.2.3.	2.2.4.	2.2.5.	2.2.6.	2.3.1.	2.3.2.	2.3.3.	2.3.4.	2.3.5.	2.4.	2.5.	2.6.	
	.,,		• • •		.,			.,				-,,		.,,	
Shoreline change, due to modification, land reclamation	watershed and upland habitats	coastal forest habitats	coastal habitats (beaches, dunes, coastal vegetation and	wetland habitats	estuarine habitats	mangrove habitats	coral reef habitats	seagrass habitats	macroalgal habitats	soft sediment habitats	deep water habitats	of pelagic habitats	Increase in the occurrence of harmful or toxic algal blooms	Introduction of exotic non- native species, invasives and	
												→			deep water habitats (including sea mounts)
→	→	→	→	→	→	→	→	→	→	→	→		→	→	Disturbance, damage and degradation of pelagic habitats
	→	→	→	→	→	→	→	→	→	→		→			Increase in the occurrence of harmful or toxic algal blooms (HABs)
															Introduction of exotic non-native species, invasives and nuisance species
								→				→			Declines in populations of marine mammals
								→				→			Declines in populations of cetaceans
→			→									→			Declines in populations shore and seabirds
→			→				→	→	→			→			Declines in populations of turtles
					→	→	→	→	→	→	→	→	→		Declines in populations of sharks and rays
					→	→	→	→	→	→		★	→		Declines in populations of large pelagics
					→	→	→	→	→	→		+	→		Declines in populations of small pelagics
											→	→			Declines in populations of deep water demersals
					→	→	→	→	→	→		→	→	→	Declines in populations of reef and demersal fish
							→	→	→	→		→	→	→	Declines in populations of molluscs (bivalves, gastropods)
							→	→				→			Declines in populations of cephalopods
							→	→	→	→		→			Declines in populations of sea cucumbers
					→			→		→		→	→		Declines in populations of prawns and shrimp
							→		→		→	→			Declines in populations of lobsters
					→	→	→		→	→					Declines in populations of crabs
												→			Excessive bycatch and discards
												→	→	→	Expansion of mariculture industry (biosecurity, diseases in wildstocks, etc.)

Table A2.3 Ecosystem Services affected by Environmental Impacts of Habitat and Community Modification

	PRO	OVISIO	ONIN	G SE	RVIC	ES			RE	GUL	ATIN	IG						SUP	POR	ΓING	ì	CUI	LTUF	RAL 8	& AN	MENI	TY		
	Pro01	Pro02	Pro03	Pro04	Pro05	Pro06	Pro07	Pro08	Reg01	Reg02	Reg03	Reg04	Reg05	Reg06	Reg07	Reg08	Reg09	Supus	Sup02	sodns	Sup04	Cul01	Cul02	Cul03	Cul04	Cul05	Cul06	Cul07	Cul08
Environmental Impacts	Food (e.g. fish, game fruit)	Freshwater (e.g. for drinking,	Raw materials (e.g. fibre, timber,	Genetic resources (e.g. for crop	sines and	Ornamental resources (e.g.		Energy*	Air quality regulation (e.g.	Climate regulation (e.g. Carbon	Natural hazard regulation (e.g.	Regulation of water flows (e.g.	Waste treatment (especially	Erosion regulation / prevention	Nutrient cycling and	Pollination	Biological control (e.g. Seed	Maintenance of life cycles (incl.	Maintenance of genetic diversity	Photosynthesis and primary	Secondary production*	Aesthetics information	Opportunities for recreation.	Inspiration for culture, art and	Spiritual experience	Bequest, intrinsic and existence*	Information for cognitive	Social relations*	Sense of place*
Loss of biodiversity	↑		↑	↑	1	↑											个	↑	个	↑	^	1	1	↑	↑	↑	↑	↑	↑
Increased risk of extinction of vulnerable / focal species	1			1	↑												个	个	个	↑	1	1	1	1	1	↑	1	↑	↑
Loss of biomass 'carbon' sink										1	1															↑	1		
Increased GHG emissions (through burning)									↑	1	1															↑	1		
Reduced area of critical habitats (feeding, breeding, spawning)	↑			↑		→										1	↑	^	1	^	1		1			↑			↑
Changes to epifauna and infauna	↑			↑											↑	1	1	↑	1	↑	1							П	
Changes to trophic structure	↑														↑	1	个	1	1	1	1		1			↑	1		
Loss of 'natural' shoreline protection and increased risk of coastal flooding.		^									↑	↑		1				1	1	1	1	1	1			↑		1	↑
Increased coastal erosion		^									1	↑		1				1	1	1	1	1	1			↑		1	↑
Changes to sediment composition (e.g. organic composition, particle size etc.)							1				1			1	1			1	1	1	1	1	1			↑			
Changes to sediment transport dynamics (accretion / siltation)							1				↑	1		1	1			1	1	1	1	1	1			1			
Reduced water clarity and light available to photosynthetic organisms (turbidity)	1														1		个	1	1	1	1	1	1			1			↑
Reduced water quality (increased nutrients)	1												↑		1		个	1	1	1	1	1	1			1			↑
Reduced water quality (chemical contaminants)	1												↑		1		个	1	1	1	1	1	1			1			↑
Increased salt water intrusion (and salinisation of soils)	1	^											↑		↑			1		1			1			↑			
Loss of coastal vegetation	↑								↑	↑	↑		↑	1	^			^		^		1	1	↑		↑			↑
Modification of coastal hydrodynamics	↑																	^		^	Ī		1	\Box		↑	\Box	\neg	↑
Creation of areas of 'hypoxic' areas (and smell)	↑								↑	↑			↑		↑		个	^		1	1	1	1	↑		↑	丁		↑
Reduction in freshwater inflow into coastal waters	1											↑	^		1		个	1		1	个					1	丁	丁	
Changes in fisheries productivity	1			1	1	1									1			1	1	1	1		1	1		1		1	↑
Changes in primary productivity	1			1	1	1									1					_	个		1			1	T	丁	
Changes in secondary productivity	1			1	1	1									1			1	1	1	个		1			1	丁	丁	
Phase shifts and changes in community composition	1			1	1	1					1				^			^	^	♠	个	1	1	T		1	T	寸	

Table A2.4 Socio-economic impacts as a result of a loss of Ecosystem Services due to Habitat Community Modification

					PROVI	SIONIN	G SER	VICES			R	EGULA	TING S	ERVICE	S				SUPPO	RTING		
	Pro01	Pro02	Pro03	Pro04	Pro05	Pro06	Pro07	Pro08	Reg01	Reg02	Reg03	Reg04	Reg05	Reg06	Reg07	Reg08	Reg09	Sup01	Sup02	Sup03	Sup04	Cul01
Socio-economic Impacts	Food (e.g. fish, game fruit)	Freshwater (e.g. for drinking,	Raw materials (e.g. fibre,	Genetic resources (e.g. for crop	Biochemical medicines and	Ornamental resources (e.g.	Geological resources*	*_	ality regulation (e.g.	e regulation (e.g. Carbon	Natural hazard regulation (e.g.	Regulation of water flows (e.g.	Waste treatment (especially	Erosion regulation / prevention	Nutrient cycling and	ation	Biological control (e.g. Seed	Maintenance of life cycles (incl.	Maintenance of genetic	Photosynthesis and primary	dary production*	etics information
	Food	Fresh	Raw r	Gene	Bioch	Ornar	Geolo	Energy*	Air quality	Climate	Natur	Regul	Waste	Erosic	Nutrie	Pollination	Biolog	Maint	Maint	Photo	Secondary	Aesthetics i
Increased risk of coastal flooding										+	+	+		←							<u> </u>	
Increased risk to human life									+	+	+	+									<u> </u>	
Loss of property										+	+	+									<u> </u>	
Reduction in property / real estate value									+	+	+	+	+	+							<u> </u>	
Loss of infrastructure										+	+	+	+	+							<u> </u>	
Increased costs of sea defence										+	+	+		+							<u> </u>	
Change in livelihood	+									+	+	+	+	+	+		+				<u> </u>	
Increased operational costs (increased travel costs due to loss of landing sites for fishers)	+													+								
Reduction in recreational space available for local community (e.g. beach barbeques)														←							<u></u>	+
Reduction in recreational space available for tourists														+							Ш_	+
Loss of foreign revenues			+								+	+	+	+	+			+	+	+	+	+
Reduction in GDP	+		+						+	+	+	+	+	+	+			+	+	+	+	+
Reduction in income generating livelihoods (non-fisheries related e.g. tourism)	+		+			+				+	+	+	+	+	+		+	+	+	+	+	+
Reduction in income generating livelihoods (fisheries related)	+									+			+	←	←		+	+	+	+	+	
Reduced resilience / increased vulnerability	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Reduced food availability / security	+											+	+		←	+	+	+	+		<u> </u>	
Reduced availability of favoured food fishes / loss of traditions	+																	+			Ш_	
Increased malnutrition	+									+	+	+	+	+	+		+	+		+	+	
Increased cost of living	+	+	+				+			+	+	+	+	+	+		+	+				$oxed{oxed}$
Reduced attractiveness of coastal areas due to unpleasant odour (stagnant water)												+	+		+					+	+	+
Loss of landscape and seascape aesthetics			+						+			+	+	+	+			+			+	+
Loss of cultural heritage and traditions	+													+				+				$oxed{oxed}$
Loss of inspiration and materials for local artworks						+				+	+	+	+	+	+			+				+

					PROVIS	SIONIN	G SER\	/ICES			R	EGULA	TING S	ERVICE	S				SUPPO	RTING		
	Pro01	Pro02	Pro03	Pro04	Pro05	Pro06	Pro07	Pro08	Reg01	Reg02	Reg03	Reg04	Reg05	Reg06	Reg07	Reg08	Reg09	Sup01	Sup02	Sup03	Sup04	Cul01
Socio-economic Impacts	Food (e.g. fish, game fruit)	Freshwater (e.g. for drinking,	Raw materials (e.g. fibre,	Genetic resources (e.g. for crop	Biochemical medicines and	Ornamental resources (e.g.	Geological resources*	Energy*	Air quality regulation (e.g.	Climate regulation (e.g. Carbon	Natural hazard regulation (e.g.	ition of wate	Waste treatment (especially	Erosion regulation / prevention	Nutrient cycling and	Pollination	Biological control (e.g. Seed	Maintenance of life cycles (incl.	Maintenance of genetic	Photosynthesis and primary	Secondary production*	Aesthetics information
Reduction in availability of traditional handicrafts						+								+	+			+				
Reduced availability of traditional medicines			+		+							+							+			
Loss of habitats important for religious festivals and rituals														+				+				
Reduction in air quality (increase in respiratory diseases)			+						+													<u> </u>
Reduced well-being	+	+	+			+			+	+	+	+	+	+	+	+	+	+	+	+	+	<u> </u>
Increased stress	+	+	+			+			+	+	+	+	+	+	+	+	+	+	+	+	+	
Loss of social cohesion	←	+	+			+			+	+	+	+	+	+	+	+	+	+	+	+	+	
Increase in social conflicts	+	+	+		Ш	+			+	+	+	+	+	+	+	+	+	+	+	+	+	igspace
Increased unemployment	+	+	+			+			+	+	+	+	+	+	+	+	+	+		+		igsquare
Increased climate variability and change	ldot	ldot	L																			$oxed{oxed}$
Reduced revenue from fisheries	+	ш								+	+							+		+	+	
Reduced freshwater availability		+																			<u> </u>	<u> </u>
Reduced availability of raw materials (building etc)		igsqcut	+															+			<u> </u>	oxdot
Threats to public health		igsqcut	L						+	+	+	+	+	+	+		+				<u> </u>	
Reduction in bathing water quality		igsquare	L		igsqcut					+		+	+		+						<u> </u>	
Reduction in quality of seafood	+	igsquare	L		igsqcut							+	+		+		+					$oxed{oxed}$
Increased poverty and inequality	+		<u> </u>						+	+	+	+	+	+	+		+	+	+	+	+	

Table A2.5: Socio-Economic Impacts of Habitat and Community Modification - SEVERITY

Socio-economic Impacts																
	2.1.	2.2.1	2.2.2.	2.2.3.	2.2.4.	2.2.5.	2.2.6.	2.3.1.	2.3.2.	2.3.3.	2.3.4.	2.3.5.	2.4.	2.5.	2.6.	
		7	7	7	7	7	7	7	7	7	7	7	7	7	7	
	Shoreline change, due to modification, land reclamation	watershed and upland	coastal forest habitats	coastal habitats (beaches, dunes, coastal vegetation and	wetland habitats	estuarine habitats	mangrove habitats	coral reef habitats	seagrass habitats	macroalgal habitats	soft sediment habitats	deep water habitats (including sea mounts)	of pelagic habitats (nearshore <30 m, neritic 30-	Increase in the occurrence of harmful or toxic algal blooms	Introduction of exotic non- native species, invasives and	SEVERITY
Increased risk of coastal flooding	4		2	4	1	1	4	4								20
Increased risk to human life	4		1	4	1	1	4	4								19
Loss of property	4	1	1	4	1		4	4								19
Reduction in property / real estate value	4	1	1	4	1		1	4								16
Loss of infrastructure	4	1	1	4	1	1	2	4								18
Increased costs of sea defence	4	1	1	4	1	1	4	4								20
Change in livelihood	4		4	4			4	4	3		2		4	2		31
Increased operational costs (e.g. due to increased travel costs due to loss of landing sites for fishers, fishing grounds etc)	4			4			4	4	3		2		4	2		27
Reduction in recreational space available for local community (e.g. beach barbeques)	3		1	3				2					2	2		13
Reduction in recreational space available for tourists	3		1	3			4	4					3	2		20
Loss of foreign revenues	4			4			3	4					4	4		23
Reduction in GDP	4			4			3	4			2		4	4	4	29
Reduction in income generating livelihoods (non-fisheries related e.g. tourism)	4		2	4			3	4					4	3	2	26
Reduction in income generating livelihoods (fisheries related)	4	3		4			4	4	4	4	4	4	4	3	4	46
Reduced resilience / increased vulnerability	4	4	4	4	4	4	4	4	4	4	4	3	4	4	4	59
Reduced food availability / security					3	3	4	4	4	3	3	3	4	4	4	39
Reduced food availability / security due to degradation of soil quality (salinisation).	2	2	2	2			4	4	4							20
Reduced food availability / security due to the loss of coastal habitat			4	4												8
Reduced availability of favoured food fishes / loss of traditions								4								4
Increased malnutrition	2			2			3	4	4		4		4			23
Increased cost of living			2				2	2					4		2	12
Reduced attractiveness of coastal areas due to unpleasant odour (stagnant water)	4													4		8
Loss of landscape and seascape aesthetics	4	4	4	4			4	4	4				4	2	4	38

Socio-economic Impacts	2.1.	2.2.1	2.2.2.	2.2.3.	2.2.4.	2.2.5.	2.2.6.	2.3.1.	2.3.2.	2.3.3.	2.3.4.	2.3.5.	2.4.	2.5.	2.6.	
	Shoreline change, due to modification, land reclamation	watershed and upland	coastal forest habitats	coastal habitats (beaches, dunes, coastal vegetation and	wetland habitats	estuarine habitats	mangrove habitats	coral reef habitats	seagrass habitats	macroalgal habitats	soft sediment habitats	deep water habitats including sea mounts)	of pelagic habitats nearshore <30 m, neritic 30-	ncrease in the occurrence of narmful or toxic algal blooms	introduction of exotic non- native species, invasives and	SEVERITY
Loss of cultural heritage and traditions	4	4	4	4				4	4				2		4	30
Loss of inspiration and materials for local artworks		4	4	4			4									16
Reduction in availability of traditional handicrafts		4	4													8
Reduced availability of traditional medicines		4	4													8
Loss of habitats important for religious festivals and rituals	3	4	4	3												14
Reduction in air quality (increase in respiratory diseases)		4	4													8
Reduced well-being	4	4	4	4			4	4					4			28
Increased stress	4	4	4	4	4		4	4								28
Loss of social cohesion	4	4	4	4			4	4								24
Increase in social conflicts	4	4	4	4			4	4	4		2		4			34
Increased unemployment	2	4	4	4			4	4	4		2		4		2	34
Increased vulnerability to climate variability and change	4	4	4	4	4	4	4	4	4							36
Reduced revenue from fisheries							4	4	4		2		4	4	2	24
Reduced freshwater availability		4	3												2	9
Reduced availability of raw materials (building etc)			4	4			4	4								16
Threats to public health		4		4	4	4							4	4	4	28
Reduction in bathing water quality													4	4	4	12
Reduction in quality of seafood						4	4	4					4	4	4	24
Increased poverty and inequality	3		4	4	3	3	4	4			4		4	4	4	41

Table A2.6A: Stakeholders affected by Socio-Economic Impacts of Habitat and Community Modification

Very Strong (V): Stakeholder group affected in all countries throughout the ASCLME. Strong (S): Stakeholder group affected in many (not all) countries of the ASCLME. Moderate (M): Stakeholder group on affected in less than half the countries of the ASCLME. Weak (W): Stakeholder group likely to be affected in 1 or 2 countries of the ASCLME.

								STAKE	HOLDE	RS													
	Fishe	eries a	nd Aqu	acultui	re		Agri	ulture	and Fo	restry								Tour	ism			Min	ng
Socio-economic Impacts	Artisanal fishers	Industrial fishers	Recreational fishers	Seaweed farmers	Industrial prawn farmers	Fish & shellfish farmers	Charcoal makers	Small-scale loggers	Industrial loggers	Small-scale farmers	Large-scale farmers	Forest users/herbalists	Pastoralists	Ranchers	Poultry farmers	Dairy farmers	Beekeepers	Tourists	Hotel owners & operators	Small-scale traders	Tour, boat & SCUBA operators	Coral/lime miners	Sand miners
Increased risk of coastal flooding	V	S	S	S	S	S	M	М	М	S	S	S	S	S	S	S	S	V	V	V	V	M	S
Increased risk to human life	V	S	S	S V	S	S	M	M	M	S	S	S	S	S	S	S	S	V	V	V	V	M	S
Loss of property / real estate value				V	М	М	M	М	М	М	M	M	M	М	M	М	M	M	V		V	M	<u> </u>
Loss of infrastructure	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	M V	V	V	V
Increased costs of sea defence	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Change in livelihood	V	V	M	M	M	M	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	M	M
Increased operational costs (travel costs due to loss of landing sites for fishers)	V	V	V	V	IVI	IVI												V	V	V	V	IVI	IVI
Reduction in recreational space available for local community (e.g. beach bbq)	V		V	V														V	V	V	V		-
Reduction in recreational space available for focal community (e.g. beach bod) Reduction in recreational space available for tourists																		V	V	V	V		
Loss of foreign revenues	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Reduction in GDP	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Reduction in income generating livelihoods (non-fisheries related e.g. tourism)	· ·	V	- V	· ·	V	V	V	V	V	· ·	V	- V	- V	· ·	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	V	V	· ·	· ·	V	V	ľ	<u> </u>
Reduction in income generating livelihoods (fisheries related e.g. tourism)	V		V																				
Reduced resilience / increased vulnerability	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Reduced food availability / security	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Reduced availability of favoured food fishes / loss of traditions	<u> </u>	ļ -	ļ -	H		ļ -	ļ -			<u> </u>	ļ -	<u> </u>	ļ -	Ė	† ·	ļ -	ļ -	Ė	Ė	Ė	ļ -		Ė
Increased malnutrition	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Increased cost of living	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Reduced attractiveness of coastal areas due to unpleasant odour (stagnant water)	S	S	V	S	S	S												V	V	V	V		
Loss of landscape and seascape aesthetics	S	S	S	S	S	S												V	V	V	V		
Loss of cultural heritage and traditions	S						S	S		S	S	S	S	S	S	S	S	S	S	S	S	S	S
Loss of inspiration and materials for local artworks																							

								STAKE	HOLDE	RS													
	Fishe	eries a	nd Aqu	acultui	·e		Agric	ulture	and Fo	restry								Tour	ism			Mini	ng
Socio-economic Impacts	Artisanal fishers	ndustrial fishers	Recreational fishers	Seaweed farmers	ndustrial prawn farmers	Fish & shellfish farmers	Charcoal makers	Small-scale loggers	ndustrial loggers	Small-scale farmers	arge-scale farmers	Forest users/herbalists	Pastoralists	Ranchers	Poultry farmers	Dairy farmers	Beekeepers	Tourists	Hotel owners & operators	Small-scale traders	Four, boat & SCUBA operators	Coral/lime miners	Sand miners
Reduction in availability of traditional handicrafts	_ ⋖	=	~	S	=	ш	0	S	=	S		т.	Δ.	~	Δ.		В	<u> </u>		S	<u> </u>	0	S
Reduced availability of traditional medicines																							
Loss of habitats important for religious festivals and rituals																							
Reduction in air quality (increase in respiratory diseases)																							
Reduced well-being	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Increased stress	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Loss of social cohesion	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Increase in social conflicts	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Increased unemployment	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Reduced revenue from fisheries	V	٧	V	٧	٧	٧	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Reduced freshwater availability	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	٧	S	٧	S	S
Reduced availability of raw materials (building etc)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Threats to public health	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Reduction in bathing water quality	S	S	S	S	S	S												S	S	S	S	S	S
Reduction in quality of seafood	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Increased poverty and inequality	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

Table A2.6B: Stakeholders affected by Socio-Economic Impacts of Habitat and Community Modification

Very Strong (V): Stakeholder group affected in all countries throughout the ASCLME. **Strong (S):** Stakeholder group affected in many (not all) countries of the ASCLME. **Moderate (M):** Stakeholder group on affected in less than half the countries of the ASCLME. **Weak (W):** Stakeholder group likely to be affected in 1 or 2 countries of the ASCLME.

				STAKI	EHOLD	ERS															
	Indu	stry			Trans	sportat	ion						Energ	y Produ	uction	Urba	nisatio	n			
	Heavy manufacturing industry	ight manufacturing industry	Agro-processing industries	Oil refining	Ports	Dredging companies	Clearing and forwarding	Railway	Roads (incl. traffic)	Airports	Airlines	Shipping	Hydro-dam operators	Power station operators	Renewable energy producers	Solid waste operators	Sewage managers	Property developers	Property owners	Town planners	Coastal community
Socio-economic Impacts Increased risk of coastal flooding	<u>т</u> М	M	_ ∢ M	M	S	M	M	W	M M	∢ W	−≪ W	M	W	W W	W	W W	W S	S	V	S	V
Increased risk to human life	101	101	101	141		141	101	- **	101	•••	- "	101	•••	**	**	**	**	,	V		V
Loss of property																		V	V		V
Reduction in property / real estate value																		V	V		V
Loss of infrastructure	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Increased costs of sea defence	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Change in livelihood																					V
Increased operational costs (travel costs due to loss of landing sites for fishers)																		٧	V		V
Reduction in recreational space available for local community (e.g. beach bbq)																					V
Reduction in recreational space available for tourists																		V	V		٧
Loss of foreign revenues	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Reduction in GDP	٧	V	V	V	V	V	V	V	V	V	٧	V	V	V	٧	٧	V	٧	٧	V	٧
Reduction in income generating livelihoods (non-fisheries related e.g. tourism)																					٧
Reduction in income generating livelihoods (fisheries related)																					V
Reduced resilience / increased vulnerability	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	٧	V	V
Reduced food availability / security	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	٧	V	V
Reduced availability of favoured food fishes / loss of traditions																					V
Increased malnutrition	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	V
Increased cost of living	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	V
Reduced attractiveness of coastal areas due to unpleasant odour (stagnant water)																					V
Loss of landscape and seascape aesthetics																					V
Loss of cultural heritage and traditions																					V
Loss of inspiration and materials for local artworks																					V

				STAKE	HOLDI	ERS															
	Indu	stry			Trans	sportat	ion						Energ	y Prodi	uction	Urba	nisatio	n			
	industry	ıdustry	tries				96							ırs	ducers						
Socio-economic Impacts	Heavy manufacturing industry	Light manufacturing industry	Agro-processing industries	Oil refining	Ports	Dredging companies	Clearing and forwarding	Railway	Roads (incl. traffic)	Airports	Airlines	Shipping	Hydro-dam operators	Power station operators	Renewable energy producers	Solid waste operators	Sewage managers	Property developers	Property owners	Town planners	Coastal community
Reduction in availability of traditional handicrafts																					V
Reduced availability of traditional medicines																					V
Loss of habitats important for religious festivals and rituals																					V
Reduction in air quality (increase in respiratory diseases)																					V
Reduced well-being	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	V
Increased stress	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	V
Loss of social cohesion	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	V
Increase in social conflicts	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	V
Increased unemployment	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	V
Reduced revenue from fisheries	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	V
Reduced freshwater availability	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	V
Reduced availability of raw materials (building etc)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	V
Threats to public health	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	V
Reduction in bathing water quality	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	V
Reduction in quality of seafood	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	V
Increased poverty and inequality	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	V

Table A2.7A: Direct Causes of Habitat and Community Modification - Contribution

	2.1	2.2.1	2.2.2	2.2.3	2.2.4	2.2.5	2.2.6	2.3.1	2.3.2	2.3.3	2.3.4	2.3.5	2.4	2.5	2.6	
Direct Causes	Shoreline change, due to modification, land reclamation and coastal	upland / watershed habitats (>10 m elevation)	coastal forest habitats	coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to	wetland habitats	estuarine habitats	mangrove habitats	coral reef habitats	seagrass habitats	macroalgal habitats	soft sediment habitats	deep water habitats (including sea mounts)	pelagic habitats	harmful or toxic algal blooms (HABs)	Introduction of exotic non- native species, invasives and nuisance species	Contribution
Physical removal of sediments	3		1	3					1		4					12
Construction of hard shoreline defence structures	2			2												4
Beach replenishment / creation	1			1					1		1					4
Infilling and land reclamation	1			1	4		3	2	2	1						14
Changes in land use and vegetation cover (e.g. grazing)	2	3	2	3	4											14
Changes in the natural sediment transport patterns	2			2		2	1	2	2		1					12
Physical habitat disturbance, removal and loss	2	3	2	4	4	2	4	2	4	1	2	1				31
Overextraction of non-living marine resources	1			2				1	3		2		1			10
Destructive fishing practices							3	3	2		2	2	2			14
Overexploitation of living marine resources								1	1			1				3
Oil spills and pollution (marine)				1	1	1	1	1	1		1		1			8
Chemical pollution					1	1	1	1	1		1		1			7
Nutrient pollution					1	1	1	1	1	1	1		1	4		12
Microbial pollution					1	1	1	1	1	1	1		1			8
Noise pollution													1			1
Suspended solids (turbidity)					1			3	2	1	1		1			9
Anchoring								2	1				1			4
Siltation / sedimentation	3			3	1	1	1	3	2	1	1					16
Coastal erosion	4			3			1				1					9

	2.1	2.2.1	2.2.2	2.2.3	2.2.4	2.2.5	2.2.6	2.3.1	2.3.2	2.3.3	2.3.4	2.3.5	2.4	2.5	2.6	
Direct Causes	Shoreline change, due to modification, land reclamation and coastal	ater 0 m	coastal forest habitats	coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to	etland habitats	estuarine habitats	mangrove habitats	coral reef habitats	seagrass habitats	macroalgal habitats	soft sediment habitats	deep water habitats (including sea mounts)	pelagic habitats	harmful or toxic algal blooms (HABs)	Introduction of exotic non- native species, invasives and nuisance species	ribution
Coral reef degradation	4			2			1		1					3		11
Natural climate variability and change	3	2	2	2	2	2	2	4	1	1				2	2	25
Increased sea water temperature					1			4	1	1			2	2		11
Ocean acidification								2								2
Cyclones	3	2	1	3	2	1	1	2	1	1	1					18
Increased frequency and intensity of storm waves (e.g. cyclones, tsunami etc.)	3			3	2	1	2	1	1	1	1					15
Cold water upwelling												1				1
Sea level rise	3		1	2	2	2	1									11
Disease and plague organisms							1	2								3
Direct introduction								1							3	4
Accidental introductions								1					1	4	4	10
Light				1									1			2
TOTAL	37	10	9	38	27	15	25	40	30	10	21	5	14	15	9	

Table A2.7B: Direct Causes of Habitat and Community Modification - Irreversibility

	2.1.	2.2.1	2.2.2	2.2.3	2.2.4	2.2.5	2.2.6	2.3.1	2.3.2	2.3.3	2.3.4	2.3.5	2.4.	2.5.	2.6.	
Direct Causes	Shoreline change, due to modification, land reclamation and erosion	upland / watershed habitats (>10 m elevation)	coastal forest habitats	coastal habitats (beaches, dunes, etc10 m elevation)	wetland habitats	estuarine habitats	mangrove habitats	coral reef habitats	seagrass habitats	macroalgal habitats	soft sediment habitats	deep water habitats (including sea mounts)	pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	harmful or toxic algal blooms (HABs)	exotic non-native species, invasives and nuisance species	Irreversibility
Physical removal of sediments	4		4	4					4		4					20
Construction of hard shoreline defence structures	3			3												6
Beach replenishment / creation	2			2					2		2					8
Infilling and land reclamation	4			4	4		4	4	4	4						28
Changes in land use and vegetation cover (e.g. grazing)	3	1	1	1	1			1								8
Changes in the natural sediment transport patterns	4			2		2	2	2			4					16
Physical habitat disturbance, removal and loss	3	2	2	2	2	2	2	4	3		3					25
Overextraction of non-living marine resources	3			4				3	3		3		2			18
Destructive fishing practices							2	3	2	2	2	3	2			16
Overexploitation of living marine resources							2	2	2	2	2		2			12
Oil spills and pollution (marine)				1	2	2	4	2	2		3		1			17
Chemical pollution					2	2	2	2	2		2		2			14
Nutrient pollution					2	2	2	2	2		2		2			14
Microbial pollution					2	2	2	2	2		2		2			14
Noise pollution													2			2
Suspended solids (turbidity)					2		2	2	2		2		2			12
Anchoring								2	2							4
Siltation / sedimentation	2			2	2	2	2	2	2	2	2					18

	2.1.	2.2.1	2.2.2	2.2.3	2.2.4	2.2.5	2.2.6	2.3.1	2.3.2	2.3.3	2.3.4	2.3.5	2.4.	2.5.	2.6.	
Direct Causes	Shoreline change, due to modification, land reclamation and erosion	upland / watershed habitats (>10 m elevation)	coastal forest habitats	coastal habitats (beaches, dunes, etc10 m elevation)	wetland habitats	estuarine habitats	mangrove habitats	coral reef habitats	seagrass habitats	macroalgal habitats	soft sediment habitats	deep water habitats (including sea mounts)	pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	harmful or toxic algal blooms (HABs)	exotic non-native species, invasives and nuisance species	Irreversibility
Coastal erosion	4			4			2	2			2					14
Coral reef degradation	4			4			4		4	4						20
Natural climate variability and change	4	4	4	4	4	4	4	4	4				4		4	44
Increased sea water temperature					3			3								6
Ocean acidification					?			3								3
Cyclones	3	2	2	2	2	2	2	2	2	2	2					23
Increased frequency and intensity of storm waves (e.g. cyclones, tsunami etc.)	3			2	2	2	2	2								13
Cold water upwelling																0
Sea level rise	4		4	4	4	4	4	4								28
Disease and plague organisms							3	3							4	10
Direct introduction								4					4	4	4	16
Accidental introductions													4	4	4	12
Light				2												2
TOTAL	50	9	17	47	34	26	47	60	44	16	37	3	29	8	16	

Table A2.8 : Direct Causes and Sectors contributing towards Habitats and Community Modification

Direct Causes	Urbanisation	Tourism	Agriculture & Forestry	Industry	Transportation & Shipping	Mining	Fisheries (industrial / commercial)	Fisheries (semi-industrial - local)	Fisheries (artisanal / traditional)	Fisheries (small scale)	Fisheries (inshore trawl fishery)	Fisheries (recreational)	Fisheries (sports)	Fisheries (poaching)	Fisheries (mariculture)	Energy	Natural environmental variability	TOTAL (no sectors)
Physical removal of sediments	√	\checkmark		\checkmark	\checkmark	\checkmark												5
Construction of hard shoreline defence structures	\checkmark	\checkmark																2
Beach replenishment / creation		\checkmark																1
Infilling and land reclamation	\checkmark	\checkmark		\checkmark	\checkmark	\checkmark										\checkmark		6
Changes in land use and vegetation cover (e.g. grazing)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark											\checkmark	7
Changes in the natural sediment transport patterns	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark											\checkmark	7
Physical habitat disturbance, removal and loss	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark			\checkmark				12
Overextraction of non-living marine resources	\checkmark	\checkmark		\checkmark		\checkmark												4
Destructive fishing practices							\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark				7
Overexploitation of living marine resources	\checkmark	\checkmark					\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark			11
Oil spills and pollution (marine)	\checkmark	\checkmark		\checkmark	\checkmark		\checkmark	\checkmark	\checkmark							\checkmark		8
Chemical pollution	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark									\checkmark	\checkmark		8
Nutrient pollution	✓	\checkmark	\checkmark	\checkmark	\checkmark										\checkmark			6
Microbial pollution	✓	\checkmark	\checkmark												\checkmark			4
Noise pollution					\checkmark	✓	\checkmark				✓							4
Suspended solids (turbidity)	✓	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark					\checkmark				\checkmark			8
Anchoring		\checkmark			\checkmark		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark				10

Direct Causes	Urbanisation	Tourism	Agriculture & Forestry	Industry	Transportation & Shipping	Mining	Fisheries (industrial / commercial)	Fisheries (semi-industrial - local)	Fisheries (artisanal / traditional)	Fisheries (small scale)	Fisheries (inshore trawl fishery)	Fisheries (recreational)	Fisheries (sports)	Fisheries (poaching)	Fisheries (mariculture)	Energy	Natural environmental variability	TOTAL (no sectors)
Siltation / sedimentation	✓	✓	V	√	✓	√					✓							7
Coastal erosion						√											√	2
Coral reef degradation	\checkmark	√	✓	\checkmark	✓	\checkmark	✓	✓	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	√	\checkmark	√	√	17
Natural climate variability and change																\checkmark	\checkmark	2
Increased sea water temperature																\checkmark	\checkmark	2
Ocean acidification																\checkmark	\checkmark	2
Cyclones																	\checkmark	1
Increased frequency and intensity of storm waves (e.g. cyclones, tsunami etc.)																	\checkmark	1
Cold water upwelling																	✓	1
Sea level rise																	\checkmark	1
Disease and plague organisms	✓	✓	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	√	\checkmark				√		\checkmark	13
Direct introduction															✓			1
Accidental introductions					✓		\checkmark								✓			3
Light	\checkmark	✓			\checkmark											_		3
TOTAL (no. causes)	16	18	10	12	16	12	9	7	7	6	9	4	3	5	9	7	12	

Table A2.9: Sectors, Resource Use Practices, Underlying and Root Causes

Sector and Underlying Resource Use Practice	Underlying Social, Economic, Legal and Political Causes				2	oot C	Root Causes				
		nce			and				tural	ş	
		opriate governance	mic drivers	juate financial	quate knowledge an s	al traditions	tion pressure	ty and inequality	e change and natur	ary action fills the ce void	al Attitude
		[A] Ina	[B] Eco	[C] Ina	[D] Ina awarei	[E] Cul	[F] Pop	[G] Pov	[H] Clir proces		[J] Pers
2.1	Shoreline change										
Iourism											
 Infill sea frontage to increase land for recreation 	Increasing demand for land for tourist development	↑	↑		↑		1				
(3) Coastal development	Non-compliance with coastal set back	1	1				1				
	Weak enforcement of coastal set-back	1	1	1							
	Environment inspectors lack resources (e.g. fuel)	↑		↑							
	Environment inspectors lack knowledge (of marine and coastal issues)	↑		↑	1						
(3) Use of groins in front of hotels to retain beach frontage	Developers and hoteliers fail to comply with coastal set-back	↑	↑								1
,	Weak enforcement of coastal set-back	↑	↑	1							
	Lack of extension officers / environment inspectors	↑		↑							
	Environment inspectors lack resources (e.g. fuel)	1		↑							
	Environment inspectors lack knowledge (of marine and coastal issues)	↑		↑	1						
	Gap in legislation relating to construction of groins	↑									
	Legal issues related to land ownership	↑					1				
Transportation and Shipping											
(4) Dredging in port entrance and to maintain shipping channels	Weaknesses in EIA process related to dredging	↑	↑	↑							
	Lack of training in EIA	1			↑						
(5) Dredge spoils used to reclaim land	Demand for flat land		↑				↑	↑			
	Lack of training in EIA	^		↑	↑						
	Lack of ICZM plan / ICZM plan not implemented	↑		↑	↑						
	Limited financial resources for implementation of ICZM			↑							
Urbanisation											
(6) Sand mining from coastal rivers and beaches for	High local demand for sand for construction industry		↑				1				
	Sand mining - low skilled and low technology livelihood		1		↑			1			
	Lack of alternative livelihood for miners						1	1			
	Non-compliance with regulations concerning sand mining	↑			↑						1
	Weak enforcement of sand mining in designated sites	↑		↑	1						
	Lack of knowledge and awareness in				1						

Sector and Underlying Resource Use Practice	Underlying Social, Economic, Legal and Political Causes				R.	Root Causes	uses				
		e governance	vers	nancial	nowledge and	tions	essure	nequality			tude
		[A] Inappropriate	[B] Economic driv	[C] Inadequate fir resources	[D] Inadequate kr awareness	[E] Cultural tradit	[F] Population pre	[G] Poverty and in	[H] Climate chang processes	[I] Voluntary action governance void	[J] Personal Attit
	Govt.										
(7) Infilling and reclamation to create additional land for	Demand for flat land for economic development		↑				↑	↑			
development	Non-compliance with coastal set back	↑									1
	Lack of ICZM plan / ICZM plan not implemented	↑		↑	↑						
	Limited financial resources for implementation of ICZM			↑							
(8) Destruction of natural	Migration to the coast						↑				
dunes coastal vegetation)	Lack of mainstreaming of climate change in coastal development planning	1		1					↑		_
	Lack of ICZM plan / ICZM plan not implemented	↑		↑	↑						
	Limited financial resources for implementation of ICZM			↑							
Agriculture & Forestry											
(9) Increased run-off from agricultural land	Economic development priorities	1	↑		↑						
(10) Poor land use management	Lack of land use management plan	1		↑	1						
	Inability to enforce land use management practices	↑		↑							
	Lack of resources	1		^							
	Lack of training	1		1							
	High percentage private land ownership		1								
	Lack of ICZM plan / ICZM plan not implemented	↑		↑	↑						
	Limited financial resources for implementation of ICZM			↑							
Industry											
(11) Land clearing and deforestation for salt pans	Market demand for salt		↑		↑		↑	↑			_
	Non-compliance with regulations	1		↑	↑						
	Weak enforcement of salt pan plot boundaries	↑		↑							
	Clearing of mangrove to create additional space for salt pan		1					↑			
	Lack of knowledge and awareness in Govt	1			1						
	Limited number of extension officers	1		↑							
	Lack of ICZM plan / ICZM plan not	↑		↑	↑						
	Limited financial resources for implementation of ICZM			↑							
Natural environmental variability and change											
Sea level rise									1		
יים וכארו ווסר									1		L

(4) Abstraction of freshwater Increasin	Urbanisation	Limited fi implemer	Lack of te	Lack of ICZM implemented	the need		(3) Damage to sensitive habitats Rapid unp	Corruption	Lack of tr	Lack of te	Limited fi implemer	Lack of ICZM implemented	Failure to	Poor com planning :	(2) Construction too close to the Complications shoreline mandated	Lack of ICZM implemented	Unemplo	(1) Damage to habitats and Lack of com regulations	Tourism	2.2.3 Coastal h	Lack of tech	Corruption	Other ecc	No enforc	No replanting		큐	Agriculture & Forestry		Storm surges	Increased storm frequency	Heavy rains	Waves		Sector and Underlying Resource Underlying Soci Use Practice Political Causes
Increasing demand for freshwater		Limited financial resources for implementation of ICZM	Lack of technical capacity	Lack of ICZM plan / ICZM plan not implemented		No marked trails and lack awareness of	Rapid unplanned expansion of tourism sector	n	Lack of transparency in planning process	Lack of technical capacity	Limited financial resources for implementation of ICZM	Lack of ICZM plan / ICZM plan not implemented	Failure to enforce legislation	Poor communication between mandated planning authorities	Complicated planning with many mandated authorities	Lack of ICZM plan / ICZM plan not implemented	Unemployment and migration to coast	Lack of compliance with building regulations		Coastal habitats (e.g. Beaches, dunes)	Lack of technical capacity (human and technology)	n	Other economic priorities	No enforcement of legislation	ting	Overexploitation of resource	International demand for timber		Upland / watershed habitats						Underlying Social, Economic, Legal and Political Causes
1			1	1	1	↑	↑	↑	→			↑	↑	↑	→	↑	↑	↑			↑	↑	1	↑			1							[A] Inappropriate governance	
				1			↑					↑				↑	1	1				1	1			1	1							[B] Economic drivers	
		1	1		1	↑		1	^	↑	↑		↑	^	↑	↑					↑		1	1	1									[C] Inadequate financial resources	
1			1	-						↑											↑		1		1	↑								[D] Inadequate knowledge and awareness] "
↑			1																															[E] Cultural traditions	Root Causes
			1													↑	1	1																[F] Population pressure	auses
																↑	1																	[G] Poverty and inequality	
																														1	1	1	1	[H] Climate change and natural processes	
																																		[I] Voluntary action fills the governance void	
								1														1												[J] Personal Attitude	

							↑ ↑	r flat land for development d planning with many authorities unication of coastal s d planning with many authorities unication between mandated thorities d planning lan not ad nforce legislation pliance with regulation pliance with regulation product for building resources nand for building resources ement of EIA regulations ive fuel source	3
1		1					1	regulation	(6) Levelling of coastal land for Increa
↑		↑ ↑					`		(5) Desalinization plants Increa Demai
[H] Climate change and natural processes [I] Voluntary action fills the	[G] Poverty and inequality	[F] Population pressure	[E] Cultural traditions	[D] Inadequate knowledge and awareness	[C] Inadequate financial resources	[B] Economic drivers	[A] Inappropriate governance		
-								י פוונוכמו כממזכז	OSC - Idectice

La	<u> </u>		.	timber trans		n of	اد	- Q	aquaculture ponds		<u></u>	5		(8) Destructive fishing practices u	Fisheries & Aquaculture	۵	livestock	ng free-roaming	Ţ	(6) Increased sediment load and Last Last Last Last Last Last Last Last	d M	T =	(5) Increased intensive farming Ir		[<u></u>	(4) Increased use of fertilizers Ir	Li Control	Ŀ		(3) Inappropriate land-use Ir practices p	ii Li	ii. L		(2) Clearing of land for Li cultivation / grazing	CC		Use Practice P
Lack of compliance with regulations	Lack of knowledge	ואס פופניו וכונא מווח וחבו באליפוואאב	o electricity and find expensive	Need for hoats for livelihoods	Need for wood for shelters	Migration to coast	Lack of knowledge	Poor land use planning	Malvet Obbourdility	arket opportunity	Lack of education	Lack of capacity	Lack of technology	Migration to coast due to rural unemployment		Disposal of untreated waste	Insufficient land suitable for grazing	Poor land use planning	Lack of knowledge	Lack of compliance with regulations	Weak enforcement due to high percentage of private land ownership	Inappropriate subsidies	International market demand (e.g. sugar)	Lack of knowledge	Lack of capacity	Increased demand for agricultural products	Lack of education	Lack of capacity	Lack of technology	Increased demand for agricultural products	implementation of ICZM	Lack of ICZM plan / ICZM plan not implemented	Lack of technology	Limited land suitable for cultivation	compliance		Political Causes
1								^		1	^	^	↑			↑	1	↑	1	↑	↑	1		1	1		^	^	^			↑	↑			[A] Inappropriate governance	
						→			1					↑		↑			↑	↑	↑	1	1	1		→				↑		→				[B] Economic drivers	
→	1	↑	1	,	↑		^	↑		1	^	^	1					↑							→		→	→	→		↑		→			[C] Inadequate financial resources	
	1						^	↑		1	^	↑	1			↑			↑	↑			1	1	→		→	→	→				→			[D] Inadequate knowledge and awareness	
	^			•	1											^			1	1			^	1			^									[E] Cultural traditions	
↑	1	↑	1	۱ '	1	1	↑			1	^	1	1	1			1			1					1	1	1	1	1	↑						[F] Population pressure	
1	1	↑	1	1	↑	1	1			1	^	↑	1	1			1								1	↑	1	1	↑	↑						[G] Poverty and inequality	
																	1																	↑		[H] Climate change and natural processes	
																																				[I] Voluntary action fills the governance void	
																																				[J] Personal Attitude	

Sector and Underlying Resource	Underlying Social, Economic, Legal and				_R	Root Causes	Ses				
Use Practice	Political Causes					7	Cach				
		vernance		cial	rledge and	S	ıre		nd natural	ills the	
		[A] Inappropriate gov	[B] Economic drivers	[C] Inadequate financ resources	[D] Inadequate knowl awareness	[E] Cultural traditions	[F] Population pressu	[G] Poverty and inequ	[H] Climate change ar processes	[I] Voluntary action fil governance void	[J] Personal Attitude
	No alternatives			1			1	1			
Urbanisation											
(11) Clearing of mangroves for road construction	Poor land use planning	1	1				1				
(12) Inappropriate disposal of	Increased coastal population	^		^	1	1	1				
solid waste littel	Inadequate provision for solid waste disposal	↑		↑	↑						
(13) Inappropriate disposal of	Increased coastal population						1	1			
un- untreated domestic wastewater	Inadequate wastewater infrastructure	1		1	1						
(14) Clearing of mangrove to improve the 'view'	Lack of compliance with regulations	↑		↑			1				
	Lack of enforcement	1	1		1		1	1			
Industry	Lack of awareness	1			1	1	1				
(15) Disposal of un- untreated	Lack of treatment facilities for industrial	↑	↑	↑	1						
	Lack of compliance with regulations	↑	1								
(16) Disposal of solid waste litter	Inadequate waste collection	↑		1							
(17) Clearing for salt pans	Lack of compliance with regulations		↑								
lourism		١	•			•					
(19) Clearing of mangroves to	Lack of compliance with regulations	1	1		1	1					
-	Knowledge awareness and use of best practice	1		1							
Natural environmental											
Increasing frequency of storms									1		
Storm surges									1		
Waves									↑		
Tourism											
(1) Trampling	Market demand for tourism activities		1				_				
	Ignorance / Lack of awareness				1						1
(2) Collection ornamental products (by tourists)	Lack of enforcement outside MPAs	1		^							
	Lack of capacity in Min. of Tourism	1		^							
(2) Harvesting of shells and ornamental products (by locals) for sale to fourists	Market demand from tourist trade		1								
	Money making livelihood				1		1	1			
	Lack of enforcement of the law	1		1							
(3) Anchor damage by	Market demand for charters and bare boat charters (no skipper)		↑		↑						1

	(7) Release of ballast water						(6) Dredging		(5) Ship groundings	Transportation and shipping		(4) Inappropriate wastewater disposal									,	(3) Anchor damage by tour operators										(ii) 'bare boat' charters		Sector and Underlying Resource Use Practice
Failure to adhere to international	Lack of facilities in port for processing ballast water	Other priorities	Inadequate human or financial resources	Limited number of taxonomic experts	Lack of resource assessments and biodiversity inventories	Limited planning and lack of sensitivity maps	Dredging essential to maintain port access	Lack of navigation aids	Accidents - due to navigational hazards		No capital investment in education	Personal attitude (impunity)	Lack of regulation and enforcement	Limited financial resources for implementation of ICZM	Lack of ICZM plan / ICZM plan not implemented	Lack of planning and management outside MPAs	Lack of training of tour guides / operators	Gap in regulations (anyone can operate in MPAs)	No capital investment in awareness and education	Lack of trained tour guides	Ignorance / Lack of awareness	Market demand for tourist activities	Lack of capacity	Lack of legal expertise	Outdated legislation	Institutional conflicts	No zoning plan	No management capacity outside MPAs	Lack of enforcement in MPAs	Technical difficulties installing moorings	Lack of moorings	Lack of awareness among tourists and tour guides		Underlying Social, Economic, Legal and Political Causes
	1		1			1		1	1		1		^		↑	1	1	1	1	1			1		1	1	1	1	1	1	1		[A] Inappropriate governance	
1		1					1								^							1											[B] Economic drivers	
	1		↑	^				1					^	^		1			↑	^			↑	^				1	^	↑	↑		[C] Inadequate financial resources	
				1	1						^	↑					↑				1			1			^			^		↑	[D] Inadequate knowledge and awareness	,
																																	[E] Cultural traditions	Root Causes
																																	[F] Population pressure	auses
																																	[G] Poverty and inequality	
																																	[H] Climate change and natural processes	
																																	[I] Voluntary action fills the governance void	
1												→		_				1			^											→	[J] Personal Attitude	

Sector and Underlying Resource Use Practice					(8) Accidental release of contaminants from ships and ports			(9) Salvage for scrap metal (dragging along seabed)			Fisheries & Aquaculture	(10) Overfishing	1					(11) Illegal / destructive fishing methods (e.g. dynamite, poisons, beach seines)						ı						
Underlying Social, Economic, Legal and Political Causes		guidelines	Lack of capacity to monitor and enforce guidelines	Other priorities	Limited waste disposal facilities in ports	Lack of information and training for	Poor planning and lack of ICZM plan	Salvage is open access resource	No guidelines for salvage operations	enforcement	-	Money making livelihood and lack of alternatives	Common pool resource - tragedy of commons	Overcapacity of fishery	Lack of compliances with regulations	Lack of MPAs and ICZM	Lack of monitoring, control and surveillance capacity	Increasing local demand for fish	Increasing use of illegal / destructive methods as catches decline	Money making livelihood and no alternative	Competition with migrant fishers	Common pool resource - tragedy of commons Overcapacity	Choice of lowest cost fishing method	Access to dynamite from mining companies and home-made	Lack of compliances with regulations	Lack of knowledge and awareness of best practice	Lack of monitoring, control and surveillance capacity	Lack of resources for enforcement	Need to be able to justify budget request for MCS	امطحود عرف مام ونحو جديده المراد
	[A] Inappropriate governance		^		1	^	1		1	1					1	1	1				^			1	1	1	↑			
	[B] Economic drivers			^				^										↑												
	[C] Inadequate financial resources		↑		^	1				1					1	1	↑								↑		↑	1	↑	
, ,	[D] Inadequate knowledge and awareness					↑	↑					↑			↑				→	1					1	↑			→	
Root Causes	[E] Cultural traditions																													
auses	[F] Population pressure											←	↑	↑								1								
	[G] Poverty and inequality						_]	↑				←	1	1						1		↑	1							
	[H] Climate change and natural processes																													
	[I] Voluntary action fills the governance void																													
	[J] Personal Attitude																													

		(16) Poor land use practices for agriculture	Agriculture & Forestry										(15) Aquarium fisheries	(14) Pollution (e.g. from fisher boats (oil) and nutrients /effluents)				(13) Removal of keystone predators			-	Trampling (ambulatory fisheries e.g. octopus)		(iii) Anchor and 'gal' (wooden stick used to move boat in shallow water)			(ii) Damage from permitted gear (trawling / nets / traps)	(12) Physical damage e.g.(i) Anchor damage by fishers			Sector and Underlying Resource Use Practice
Poor farming practices	Subdivision of family lands	Limited land available for agriculture		Lack of capacity for management and enforcement	Lack of technical capacity to prepare plan	No management plan	No standards or guidelines for collection methods	Price of fish not regulated - increases competition	Permitted fishery but no limits on number of permits	Increasing popularity as pays at higher premium than ordinary fisheries	Often a common access resource (not permitted)	Money making livelihood	International demand for aquarium trade ornamental species	Common pool resource	Lack of monitoring, control and surveillance capacity	Inadequate regulations or compliance	Lack of willingness amongst fishers to change	High demand for certain food fishes	Money making livelihood and no alternative	Choice of lowest cost fishing method	Overcapacity in fishery	Common access resource	Fuel costs	Lack of awareness and knowledge	No capital investment in awareness and education	Ignorance lack of awareness	Demand for fish	Lack of awareness and knowledge	Weak enforcement		Underlying Social, Economic, Legal and Political Causes
				^		^	→	↑	1						→	^									1			↑	1	[A] Inappropriate governance	
								↑		1	↑		1	↑				1				→	↑				→			[B] Economic drivers	
	1					1									↑	^									1					[C] Inadequate financial resources	
1					↑		↑				↑			↑		^	↑		↑			↑		↑		^		1		[D] Inadequate knowledge and awareness	_
•																											↑			[E] Cultural traditions	Root Causes
1	1	1									↑	1		↑							1	↑								[F] Population pressure	auses
1	1										↑	1		↑					↑	1		1	1	↑						[G] Poverty and inequality	
		↑																												[H] Climate change and natural processes	
																														[I] Voluntary action fills the governance void	
											↑			1			↑	↑				↑				↑				[J] Personal Attitude	

				(21) Poor management of wastewater	Urbanisation					(20) POPs				(19) Over application of fertilisers					(18) Increased runoff and sedimentation						(17) Deforestation for fuelwood and timber								Sector and Underlying Resource Use Practice
Low percentage of households connected to sewage network	Land tenure issues	Lack of land use plan / land use plan not implemented	Unplanned developments	Increase in coastal population		No enforcement of illegal practices	Lack of compliance with regulations	Tragedy of commons - river banks open access	Loss of traditional management practices	Lack of ownership (land tenure issues)	No extension officers (retrenched)	No education about best practices	Low productivity soils	Poor farming practices	Lack of compliance with regulations	No extension officers (retrenched)	No education about best practices	Lack of knowledge and awareness of best practices	Poor farming practices	Lack of ICZM plan / ICZM plan not implemented	Other economic priorities	Inadequate infrastructure for growing population	No alternative energy source or expensive alternative (e.g. kerosene)	Reliance of wood for fuel or for construction	Market demand for fuelwood and timber	Limited financial resources for implementation of ICZM	Lack of land use plan / land use plan not implemented	Other economic priorities	No extension officers (retrenched)	No education about best practices	Lack of knowledge and awareness of best practices new technologies		Underlying Social, Economic, Legal and Political Causes
	^	1				1				1	1			↑	1	1				1							1		1			[A] Inappropriate governance	
↑																				1	1				↑		↑	1				[B] Economic drivers	
↑						1									↑	↑		1	↑				1			1			^		↑	[C] Inadequate financial resources	
		1					^		^		1	1				^	1	↑		↑							↑		↑	↑	↑	[D] Inadequate knowledge and awareness	, ,
														↑					1													[E] Cultural traditions	Root Causes
	1	1		1				1						↑				1	↑			1	1		1						1	[F] Population pressure	səsne
			1	1				1						1					↑					1								[G] Poverty and inequality	
													1																			[H] Climate change and natural processes	
																																[I] Voluntary action fills the governance void	
							^								→																	[J] Personal Attitude	

		(25) Sand mining	Mining	Discharge of industrial effluents (chemical contamination)					Release of nutrients from canning factory	Industry		(24) Desalination								(23) Coastal construction (particularly during rainy season)		(22) Land reclamation		(21) Improper disposal of solid waste								Sector and Underlying Resource Use Practice
Lack of alternative	Low price of beach sand and high price of imported cement	Local demand for building materials		Lack of compliance with regulations	Lack of capacity to regulate actions by foreign companies	Weak corporate social responsibility of company	Lack of investment in treatment for effluents	Important source of foreign revenue and employment	Global market demand for tuna		Poor planning no anticipation of increased water demand and disposal	Limited public awareness of water shortage issues	Corruption in planning activities	EIA processes not transparent	Lack of capacity to monitor for EIA compliance	Lack of legal expertise	Gaps in legislation - coastal setback is guideline not a regulation	Lack of awareness in Govt.	Increased migration to coast	Demand for properties along the coast	High demand for flat land	Steep natural topography	Lack of solid waste management and disposal	Increase migration to the coast	Corruption	Political priorities	Other priorities	Infrastructure out of dates and under capacity	Demand for modern housing	Poor planning no anticipation of increased water demand and disposal		Underlying Social, Economic, Legal and Political Causes
^				^	1		1				1		1	↑	↑	1	↑	^					↑		^	1		1		1	[A] Inappropriate governance	
		1				1		1	↑										↑	↑	^						1		1		[B] Economic drivers	
					↑		↑								↑											↑		↑		↑	[C] Inadequate financial resources	
						1						↑				↑		^													[D] Inadequate knowledge and awareness	,
																															[E] Cultural traditions	Root Causes
1		1		1					1			1							1	↑	1			1					1		[F] Population pressure	auses
1	↑			1															1					1							[G] Poverty and inequality	
																						1									[H] Climate change and natural processes	
																															[I] Voluntary action fills the governance void	
																															[J] Personal Attitude	

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					↑		1	Inadequate waste disposal facilities in ports	(ii) Accidental release / marine accidents(iii) Collisions and(iv) Noise
					↑		1	Non-application or incomplete respect of international legislation	(4) Increased shipping and risk of contamination(i) Release of ballast water
									Transportation and shipping
					1		1	Lack of or inadequate planning	
					↑		1	Lack of municipal drainage / under capacity	
	↑	↑		1			1	Poor land used practices	
		↑				→		Increased urbanisation and hard structures	(3) Increased surface run-off
					1		1	Lack of ICZM plan / ICZM plan not implemented	
					1		1	Lack of infrastructure	-
	↑	↑			↑		1	Inadequate municipal wastewater treatment	(2) Release of un under treated municipal wastewater
									Urbanisation
					^		1	No monitoring control or surveillance	
					↑		1	Lack of fisheries management plans	
	1	↑		↑				Lack of compliance	
	↑	↑						Open access to resource - tragedy of commons	
	↑	↑				↑		Market demand for fisheries resources	(1) Overexploitation & use of non-selective gear and accidental capture
								pelagic habitats	Fisheries
	1								Increasing frequency and intensity of waves
	1								Ocean acidification
	^								Increased sea Water temperatures
									Natural environmental variability and change
					1		1		(27) Hydroelectric -changes in river flow and sediment loads
					1		1	Limited maintenance of storage facilities	(26) Accidental release of oil from storage facility
									Energy
							1	Lack of regulation and enforcement	
						→		Market demand for lime	(25) Coral extraction for use in construction
				^			1	Lack of surveillance and enforcement	
	↑			↑			1	Lack of compliance with regulations	
processes [I] Voluntary action fills the governance void	[G] Poverty and inequality [H] Climate change and natural	[F] Population pressure	[E] Cultural traditions	[D] Inadequate knowledge and awareness	[C] Inadequate financial resources	[B] Economic drivers	[A] Inappropriate governance		
	=							- 01111001 000000	

n ad control of hipping and hi	Sector and Underlying Resource Use Practice	Underlying Social, Economic, Legal and Political Causes					Root Causes			al le	
land-use practices Lack of land-use planning Lack of land-use use land-use use land-use use land-use use planning Lack of land-use use planning L			[A] Inappropriate governance	[B] Economic drivers		[D] Inadequate knowledge and awareness	[E] Cultural traditions	[F] Population pressure	[G] Poverty and inequality		governance void
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Inadequate inspection and control of	(4) Deliberate introduction of species	Lack of technical capacity				1					
וומונימונים ביוויים	-	Inadequate inspection and control of mariculture facilities	↑			<u> </u>					

	(5) Accidental introduction of species						Natural environmental variability and change	
	Increased global demand for seafood	Market opportunity	Lack of knowledge	Lack of technical capacity	Inadequate inspection and control of mariculture facilities	Negligence		
[A] Inappropriate governance					↑			
[B] Economic drivers	1	^						
[C] Inadequate financial resources				1				
[D] Inadequate knowledge and awareness			1	^	↑			
[E] Cultural traditions								
[F] Population pressure							1	
[G] Poverty and inequality								
[H] Climate change and natural processes							•	1
[I] Voluntary action fills the governance void								
[J] Personal Attitude						1		

Sector and Underlying Resource Underlying Social, Economic, Legal and Use Practice Political Causes

Root Causes