## Appendix VIII. Results of the causal chain analyses for Main Area of Concern 01: Water Quality Degradation

Table A1.1: Environmental Impacts Water Quality Degradation (Severity and Scope)

Environmental Impacts	1.1.	1.2.	1.3.1	1.3.2	1.3.3	1.3.4	1.3.5	1.3.6	1.3.7	1.3.8	1.3.9		
	Alteration of natural river	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,	Noise pollution	Thermal pollution	Radioactive contamination	SEVERITY	SCOPE
Degradation of freshwater	1	4				<u> </u>						5	4
Reduction in freshwater discharge	_4_											4	3
Altered coastal sediment dynamics	4											4	3
Shoreline changes (erosion/accretion)	4											4	4
Increased siltation	4					4						8	3
Reduction in clarity of coastal waters (light available for photosynthetic organisms)	4					4		1				9	3
Salinisation of soils	4	2										6	3
Degradation of soil quality	1	2						1				4	3
Degradation of floodplains	4						1	2				7	3
Degradation of deltas	4					1	1	2				8	3
Degradation of salt marshes	4					1	1	2				8	3
Degradation of estuaries	4	3				1	1	2				11	3
Damage to sandy beaches	1					1	1	2				5	3
Damage to rocky shores	1						1	2				4	2
Degradation of mangroves	4	1				2	1	2				10	4
Degradation of coral reefs	3					3	1	2				9	4
Degradation of seagrass	4					3	1	2				10	4
Altered extent of mud beds	4					3						7	3
Decreased natural productivity	4	2	1		1	3		2				13	3
Changes in nutrient input	4	2		3								9	3

Environmental Impacts	1.1	1.	1.2.	1.3.1	1.3.2	1.3.3	1.3.4	1.3.5	1.3.6	1.3.7	1.3.8	1.3.9		
	Alteration of natural river	flow and changes in	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,	Noise pollution	Thermal pollution	Radioactive contamination	SEVERITY	SCOPE
Loss of biodiversity	4		1	1	2	1	1	1	3			1	15	3
Modification of habitats (phase shifts)	3	3	1		2		1		2		1		10	3
Mortality of fish and macro-benthos	1	L		1	2	1		1	1			1	8	3
Declines in seabird populations	1	L				1		1	2				5	3
Declines in turtle populations	1	L				1		2	2				6	3
Declines in marine mammal populations						1		1	3	2		1	8	3
Sub-lethal affects on marine organisms						1	1		2			1	5	3
Chronic effects on marine organisms						1			2			1	4	3
Bio-accumulation of toxins up the food chain						3			3				6	3
Reduction in water quality (smells and colour)			1	2	3	2	3		3				14	3
Eutrophication and anoxic conditions ("Dead zones")			1	3	3				2				9	3
Algal blooms			1	2	3						1		7	3
Increase in the incidences of diseases in marine organisms				3	1	1							5	3
High levels of pathogenic organisms				3	1	1							5	3

Table A1.2: Inter-relationship between Water Quality Degradation issues and other issues.

1.1.	1.2.	1.3.1	1.3.2	1.3.3	1.3.4	1.3.5	1.3.6	1.3.7	1.3.8	1.3.8	
Alteration of natural river flow and changes in freshwater input and	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,	Noise pollution	Thermal pollution	Radioactive contamination	Issue
<b>→</b>											Shoreline modification and coastal erosion
<b>→</b>			<b>→</b>			<b>→</b>	<b>→</b>				Degradation of coastal habitats (beaches, dunes)
<b>→</b>		<b>→</b>	<b>→</b>	<b>→</b>	<b>→</b>	<b>→</b>	<b>→</b>		<b>→</b>		Degradation of coral reefs
<b>→</b>	<b>→</b>	<b>→</b>	<b>→</b>	<b>→</b>	<b>→</b>	<b>→</b>	<b>→</b>		<b>→</b>	<b>→</b>	Degradation of seagrass beds
<b>→</b>	<b>→</b>	<b>→</b>	<b>→</b>	<b>→</b>	<b>→</b>	<b>→</b>	<b>→</b>				Degradation of mangroves
<b>→</b>	<b>→</b>	<b>→</b>	<b>→</b>	<b>→</b>		<b>→</b>	<b>→</b>				Degradation of wetlands
<b>→</b>		<b>→</b>		<b>→</b>		<b>→</b>	<b>→</b>			<b>→</b>	Declines in shore/seabirds
<b>→</b>		<b>→</b>		<b>→</b>		<b>→</b>	<b>→</b>	<b>→</b>		<b>→</b>	Declines in marine mammals
<b>→</b>		<b>→</b>		<b>→</b>		<b>→</b>	<b>→</b>			<b>→</b>	Declines in sea turtles
<b>→</b>		<b>→</b>					<b>→</b>			<b>→</b>	Declines in commercial fish
<b>→</b>		<b>→</b>					<b>→</b>			<b>→</b>	Decline in prawns and shrimps

Table A1.3: Ecosystem Services affected by environmental impacts of Water Quality Degradation on

		P	ROVIS	SIONI	NG SI	RVIC	ES				REC	GULA	TING	SERVI	CES			S	UPPC	ORTIN	G		CULT	URAL	& AM	ENIT	Y SER	VICES	
	Pro01	Pro02	Pro03	Pro04	Pro05	Pro06	Pro07	Pro08	Reg01	Reg02	Reg03	Reg04	Reg05	Reg06	Reg07	Reg08	Reg09	Sup02	Sup02	Sup03	Sup04	Cul01	Cul02	Cul03	Cul04	Cu105	Cul06	Cul07	Cul08
Environmental Impacts	Food (e.g. fish, game fruit)	Freshwater (e.g. for drinking, irrigation,	Raw materials (e.g. fibre, timber, fuel	Genetic resources (e.g. for crop	Biochemical medicines and	Ornamental resources (e.g. artisan work,	Geological resources*	Energy*	Air quality regulation (e.g. Capturing	Climate regulation (e.g. Carbon	Natural hazard regulation (e.g. Storm	Regulation of water flows (e.g. Natural	Waste treatment (especially water	Erosion regulation / prevention	Nutrient cycling and maintenance of	Pollination	Biological control (e.g. Seed dispersal,	Maintenance of life cycles (incl. nursery,	Maintenance of genetic diversity (gene	Photosynthesis and primary production*	Secondary production*	Aesthetics information	Opportunities for recreation, tourism	Inspiration for culture, art and design	Spiritual experience	Bequest, intrinsic and existence*	information for cognitive development	Social relations*	Sense of place*
Degradation of freshwater quality	<b>1</b>	<b>1</b>	<u> </u>					Ш	d -		؛ کی	<u> </u>	>	ш	2 4	_	<b>⊕</b>	<b>^</b>			S	<b>1</b>	<b>1</b>	= 3	S	В	= 3	S	S
Reduction in freshwater discharge	<b>^</b>	<b>^</b>						<b>1</b>									•	•				•	•						
Altered coastal sediment dynamics	•	•						•						<b>1</b>														?	
Shoreline changes (erosion/accretion)											<b>1</b>	<b>^</b>		·															
Increased siltation											•	<u>+</u>	<b>1</b>	•														?	
Reduction in clarity of coastal waters (light available for photosynthetic organisms)												•	•					?				<b>^</b>	<b>1</b>			<b>^</b>			
Salinisation of soils		<b>1</b>											<b>1</b>		<b>1</b>					<b>1</b>									
Degradation of soil quality	<b>1</b>														<b>1</b>					<b>1</b>	<b>1</b>								
Degradation of floodplains		<b>1</b>										<b>1</b>			<b>1</b>														
Degradation of deltas															<b>1</b>														
Degradation of salt marshes	<b>1</b>														<b>1</b>														
Degradation of estuaries	<b>1</b>														<b>1</b>			<b>↑</b>											
Contamination of sandy beaches														<b>^</b>	<b>1</b>			<b>^</b>				<b>^</b>	<b>1</b>			<b>^</b>		<b>^</b>	
Contamination of rocky shores																		<b>^</b>											

		P	ROVIS	SIONI	NG SE	RVIC	ES				REG	GULA	TING	SERV	ICES			S	UPPC	ORTIN	G		CULT	URAL	& AM	ENIT	Y SER	VICES	
	Pro01	Pro02	Pro03	Pro04	Pro05	Pro06	Pro07	Pro08	Reg01	Reg02	Reg03	Reg04	Reg05	Reg06	Reg07	Reg08	Reg09	Sup02	Sup02	Sup03	Sup04	Cul01	Cul02	Cul03	Cul04	Cu105	Cul06	Cul07	Cul08
Environmental Impacts	Food (e.g. fish, game fruit)	Freshwater (e.g. for drinking, irrigation,	Raw materials (e.g. fibre, timber, fuel	Genetic resources (e.g. for crop	Biochemical medicines and	Ornamental resources (e.g. artisan work,	Geological resources*	Energy*	Air quality regulation (e.g. Capturing	Climate regulation (e.g. Carbon	Natural hazard regulation (e.g. Storm	Regulation of water flows (e.g. Natural	Waste treatment (especially water	Erosion regulation / prevention	Nutrient cycling and maintenance of	Pollination	Biological control (e.g. Seed dispersal,	Maintenance of life cycles (incl. nursery,	Maintenance of genetic diversity (gene	Photosynthesis and primary production*	Secondary production*	Aesthetics information	Opportunities for recreation, tourism	Inspiration for culture, art and design	Spiritual experience	Bequest, intrinsic and existence*	Information for cognitive development	Social relations*	Sense of place*
Degradation of mangroves	<b>1</b>													<b>1</b>	<b>1</b>											<b>^</b>			
Degradation of coral reefs	<b>1</b>				<b>1</b>									<b>1</b>	<b>1</b>			<b>1</b>		<b>1</b>	<b>^</b>					<b>^</b>			
Degradation of seagrass	<b>1</b>														<b>^</b>											<b>^</b>			
Altered extent of mud beds	<b>1</b>														<b>^</b>														
Decreased natural productivity	<b>1</b>					<b>1</b>									<b>↑</b>					<b>↑</b>	<b>→</b>								
Changes in nutrient input	<b>1</b>														<b>^</b>			<b>^</b>		<b>^</b>	<b>^</b>								
Loss of biodiversity	<b>1</b>				<b>^</b>	<b>1</b>											<b>^</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>^</b>	<b>^</b>	<b>^</b>	<b>^</b>		<b>^</b>	<b>1</b>	<b>1</b>	<b>^</b>
Modification of habitats (phase shifts)	<b>1</b>									<b>1</b>							<b>1</b>	<b>1</b>		<b>1</b>		<b>^</b>	<b>^</b>	<b>^</b>		<b>^</b>	<b>1</b>	<b>1</b>	<b>^</b>
Mortality of fish and macro-benthos	<b>1</b>					<b>1</b>											<b>^</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>^</b>								
Declines in seabird populations																						<b>^</b>	<b>^</b>			<b>^</b>			
Declines in turtle populations																	<b>1</b>					<b>^</b>	<b>1</b>			<b>1</b>			
Declines in marine mammal populations																	<b>^</b>					<b>^</b>	<b>1</b>			<b>^</b>			
Sub-lethal affects on marine organisms	<b>1</b>					<b>1</b>												<b>1</b>					<b>^</b>			<b>^</b>			
Chronic effects on marine organisms	<b>1</b>					<b>1</b>												<b>^</b>					<b>1</b>			<b>^</b>			
Bio-accumulation of toxins up the food chain																										<b>^</b>			
Reduction in water quality (smells and colour)													<b>↑</b>					<b>↑</b>		<b>↑</b>	<b>^</b>	<b>↑</b>	<b>↑</b>			<b>↑</b>			

		P	ROVIS	SIONII	NG SE	RVIC	ES				REC	GULA	TING	SERV	ICES			S	UPPO	ORTIN	G		CULT	URAL	& AM	IENIT	Y SER	VICES	
	Pro01	Pro02	Pro03	Pro04	Pro05	Pro06	Pro07	Pro08	Reg01	Reg02	Reg03	Reg04	Reg05	Reg06	Reg07	Reg08	Reg09	Sup02	Sup02	Sup03	Sup04	Cul01	Cu102	Cul03	Cul04	Cu105	90InO	Cul07	Cul08
Environmental Impacts	Food (e.g. fish, game fruit)	Freshwater (e.g. for drinking, irrigation,	Raw materials (e.g. fibre, timber, fuel	Genetic resources (e.g. for crop	Biochemical medicines and	Ornamental resources (e.g. artisan work,	Geological resources*	Energy*	Air quality regulation (e.g. Capturing	Climate regulation (e.g. Carbon	Natural hazard regulation (e.g. Storm	Regulation of water flows (e.g. Natural	Waste treatment (especially water	Erosion regulation / prevention	Nutrient cycling and maintenance of	Pollination	Biological control (e.g. Seed dispersal,	Maintenance of life cycles (incl. nursery,	Maintenance of genetic diversity (gene	Photosynthesis and primary production*	Secondary production*	Aesthetics information	Opportunities for recreation, tourism	Inspiration for culture, art and design	Spiritual experience	Bequest, intrinsic and existence*	Information for cognitive development	Social relations*	Sense of place*
Eutrophication and anoxic conditions ("Dead zones")	<b>1</b>																<b>1</b>	<b>1</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>			<b>1</b>			
Algal blooms	<b>1</b>																<b>^</b>	<b>1</b>		<b>^</b>	<b>1</b>	<b>^</b>	<b>1</b>			<b>1</b>			
Increase in the incidences of diseases in marine organisms	<b>^</b>					<b>1</b>											<b>^</b>	<b>1</b>								<b>1</b>			
High levels of pathogenic organisms	•					•											<u>+</u>	•								<b>^</b>			

Table A1.4: Socio-economic impacts as a result of the loss of Ecosystem Services due to Declines in Living Marine Resources

Table A1.4. Socio economic impacts as a result of the loss				ISIONIN								REGULA	TING S	ERVICE	S				SUPPO	ORTING			
	11	75	93	4	5	90		8	11	75	33	94	35	90	70	80	60	20	25	33	94	1	2
	Pro01	Pro02	Pro03	Pro04	Pro05	Pro06	Pro07	Pro08	Reg01	Reg02	Reg03	Reg04	Reg05	Reg06	Reg07	Reg08	Reg09	Sup02	Sup02	Sup03	Sup04	Cul01	Cul02
Socio-economic Impacts	Food (e.g. fish, game fruit)	Freshwater (e.g. for drinking, irrigation, cooling)	Raw materials (e.g. fibre, timber, fuel wood, fodder, fertilizer)	Genetic resources (e.g. for crop improvements and medicinal purposes)	Biochemical medicines and pharmaceuticals (e.g. biochemical products, and test organisms)	Ornamental resources (e.g. artisan work, decorative lolants. pet animals. fashion)	Geological resources*	Energy*	Air quality regulation (e.g. Capturing dust, chemicals, etc)	Climate regulation (e.g. Carbon sequestration, influence of vegetation on rainfall etc.)	azard regulatio	Regulation of water flows (e.g. Natural drainage, irrigation and drought prevention)	Waste treatment (especially water purification)	Erosion regulation / prevention	Nutrient cycling and maintenance of fertility (incl.	Pollination	Biological control (e.g. Seed dispersal, pest and disease control)	Maintenance of life cycles (incl. nursery, spawning, breeding feeding)	Maintenance of genetic diversity (gene pool	Photosynthesis and primary production*	Secondary production*	Aesthetics information	Opportunities for recreation, tourism and lifestyle
Reduction in quantity of freshwater available for drinking / irrigation etc		<b>←</b>																<b>←</b>					
Reduction in quality of freshwater for drinking / irrigation		+																					
Increased vulnerability to coastal flooding (loss of life and property)											+												
Increased cost of coastal defence											+												
Reduction in hydroelectric power generation potential								<b>←</b>															
Damage to coastal infrastructure																							
Reduction in agricultural productivity (due to salt water intrusion)	<b>←</b>																						
Reduction in opportunities for tourism and leisure											+											+	+
Reduction in aesthetics																						+	+
Reduction in future use value																							
Loss of fisheries resources and revenue	+																						

			PROV	/ISIONI	NG SER	VICES		1				REGULA	TING S	ERVICE	S		ı		SUPPO	RTING			
	Pro01	Pro02	Pro03	Pro04	Pro05	Pro06	Pro07	Pro08	Reg01	Reg02	Reg03	Reg04	Reg05	Reg06	Reg07	Reg08	Reg09	Sup02	Sup02	Sup03	Sup04	Cul01	Cul02
Socio-economic Impacts	Food (e.g. fish, game fruit)	Freshwater (e.g. for drinking, irrigation, cooling)	Raw materials (e.g. fibre, timber, fuel wood, fodder, fertilizer)	Genetic resources (e.g. for crop improvements and medicinal purposes)	Biochemical medicines and pharmaceuticals (e.g. biochemical products, and test organisms)		Geological resources*	Energy*	Air quality regulation (e.g. Capturing dust, chemicals, etc)	Climate regulation (e.g. Carbon sequestration, influence of vegetation on rainfall etc.)	hazard regulation	Regulation of water flows (e.g. Natural drainage, irrigation and drought prevention)	Waste treatment (especially water purification)	Erosion regulation / prevention	Nutrient cycling and maintenance of fertility (incl. soil formation)*	Pollination	Biological control (e.g. Seed dispersal, pest and disease control)	Maintenance of life cycles (incl. nursery, spawning, breeding. feeding)	Maintenance of genetic diversity (gene pool protection)	Photosynthesis and primary production*	Secondary production*	Aesthetics information	Opportunities for recreation, tourism and lifestyle
Reduction in fish availability	+																						
Loss of income generating livelihoods associated with fisheries	+										+												
Loss of income generating livelihoods associated with tourism																						<b>←</b>	+
Increased unemployment																							
Reduced quality of seafood products	<b>←</b>																						
Threats to public health	<b>←</b>	<b>+</b>															+						
Human health risk through contact recreation													+										
Human health risk through ingestion of contaminated seafood	<b>←</b>																						
Reduced productivity of workforce due to sickness and ill health	+												+										
Increased cost of living	+							+			+												
Reduction of foreign income / revenues	+																+	+	+	+	+	+	+
Loss of national revenues / reduction in GDP	+					+		+									+	+	+	+			

			PROV	/ISIONII	NG SER	VICES					ı	REGUL/	TING S	ERVICE	S				SUPPO	RTING			
	Pro01	Pro02	Pro03	Pro04	Pro05	Pro06	Pro07	Pro08	Reg01	Reg02	Reg03	Reg04	Reg05	Reg06	Reg07	Reg08	Reg09	Sup02	Sup02	Sup03	Sup04	Cul01	Cul02
Socio-economic Impacts	Food (e.g. fish, game fruit)	Freshwater (e.g. for drinking, irrigation, cooling)	Raw materials (e.g. fibre, timber, fuel wood, fodder, fertilizer)	Genetic resources (e.g. for crop improvements and medicinal purposes)	) ic ic	resources (e.g.	ical resources*	Energy*	Air quality regulation (e.g. Capturing dust, chemicals, etc)	Climate regulation (e.g. Carbon sequestration, influence of vegetation on rainfall etc.)	ral hazard regulation (		Waste treatment (especially water purification)	Erosion regulation / prevention	Nutrient cycling and maintenance of fertility (incl. soil formation)*	Pollination	Biological control (e.g. Seed dispersal, pest and dispease control)		Maintenance of genetic diversity (gene pool protection)	Photosynthesis and primary production*	Secondary production*	Aesthetics information	Opportunities for recreation, tourism and lifestyle
Reduction in wellbeing		+												+								<b>←</b>	+
Reduced resilience	<b>←</b>										+	+		+									
Increasing poverty	+	+			+	+		+				+										+	+
Impacts upon religious festivals / rituals													+										
Loss of social cohesion	+																					+	+

**Table A1.5: Socio-Economic Impacts of Water Quality Degradation** 

Socio-economic Impacts	1.1.	1.2.	1.3.1	1.3.2	1.3.3	1.3.4	1.3.5	1.3.6	1.3.7	1.3.8	1.3.9	
------------------------	------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	--

	Alteration of natural river flow and changes in	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,	Noise pollution	Thermal pollution	Radioactive contamination
Reduction in quantity of freshwater available for drinking / irrigation etc	✓	<b>✓</b>								F	E 0
Reduction in quality of freshwater for drinking / irrigation	✓	✓									
Increased vulnerability to coastal flooding (loss of life and property)	✓										
Increased cost of coastal defence	✓										
Reduction in hydroelectric power generation potential	✓										
Damage to coastal infrastructure	✓										
Reduction in agricultural productivity (due to salt water intrusion)	✓	✓									
Reduction in opportunities for tourism and leisure	<b>✓</b>	✓	<b>✓</b>	✓	<b>✓</b>	$\checkmark$	<b>✓</b>	✓			$\checkmark$
Reduction in aesthetics	<b>✓</b>	✓	<b>✓</b>	✓	✓	$\checkmark$	✓	<b>✓</b>			
Reduction in future use value	<b>✓</b>	✓	<b>✓</b>	✓	✓	$\checkmark$	<b>✓</b>	<b>✓</b>			
Loss of fisheries resources and revenue	<b>✓</b>	$\checkmark$	<b>✓</b>	✓	<b>✓</b>	$\checkmark$		<b>✓</b>			
Reduction in fish availability	<b>✓</b>			$\checkmark$	<b>✓</b>	$\checkmark$		<b>✓</b>			
Loss of income generating livelihoods associated with fisheries	<b>✓</b>		<b>✓</b>	✓	<b>✓</b>	$\checkmark$		<b>✓</b>			$\checkmark$
Loss of income generating livelihoods associated with tourism	<b>✓</b>	✓	<b>✓</b>	✓	$\checkmark$	$\checkmark$	<b>✓</b>	<b>✓</b>			$\checkmark$
Increased unemployment	<b>✓</b>	✓	<b>✓</b>	✓	$\checkmark$	$\checkmark$	<b>✓</b>	<b>✓</b>			
Reduced quality of seafood products			$\checkmark$		$\checkmark$			$\checkmark$			$\checkmark$
Threats to public health	✓	✓	✓		$\checkmark$		$\checkmark$	$\checkmark$			$\checkmark$
Human health risk through contact recreation			✓		✓		$\checkmark$	✓			
Human health risk through ingestion of contaminated seafood		✓	✓		✓			✓			✓
Reduced productivity of workforce due to sickness and ill health		✓	✓		✓						$\checkmark$
Increased cost of living		✓	<b>✓</b>		$\checkmark$			<b>✓</b>			
Reduction of foreign income / revenues	✓	✓	✓		✓	✓	✓	✓			
Loss of national revenues / reduction in GDP	✓	✓	✓		✓	✓	✓	✓			
Reduction in wellbeing	✓	✓	✓	✓	✓	✓	✓	✓			✓

Socio-economic Impacts	1.1.	1.2.	1.3.1	1.3.2	1.3.3	1.3.4	1.3.5	1.3.6	1.3.7	1.3.8	1.3.9
	Alteration of natural river flow and changes in	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,	Noise pollution	Thermal pollution	Radioactive contamination
Reduced resilience	✓	✓	✓	✓	✓	✓	✓	✓	✓	<b>√</b>	✓
Increasing poverty	✓	✓	✓	✓	✓	✓	✓	✓			✓
Impacts upon religious festivals / rituals	✓	✓									
Loss of social cohesion	✓	✓					✓	✓			

Table A1.6: Stakeholders affected by Socio-Economic Impacts of Water Quality Degradation

									STAKE	HOLDE	RS														
	Fishe	eries ar	nd Aqu	acultur	·e		Agric	ulture	and Fo	restry								Tour	ism			Mini	ng		
	Artisanal fishers	ındustrial 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	Small-scale salt producers	Industrial salt works
Socio-economic Impacts	Art	pul	Rec	Sea	pul	Fisł	ຮັ	Sm	pul	Sm	Lar	For	Pas	Rar	Роц	Dai	Вее	Tot	9	Sm	Tot	Ö	Sar	Sm	lnd
Reduction in quantity of freshwater available for drinking / irrigation etc																									
Reduction in quality of freshwater for drinking / irrigation																									
Increased vulnerability to coastal flooding (loss of life and property)																									
Increased cost of coastal defence																									
Reduction in hydroelectric power generation potential																									
Damage to coastal infrastructure																									
Reduction in agricultural productivity (due to salt water intrusion)																									
Reduction in opportunities for tourism and leisure																									
Reduction in aesthetics																									
Reduction in future use value																									
Loss of fisheries resources and revenue																									
Reduction in fish availability																									
Loss of income generating livelihoods associated with fisheries																									
Loss of income generating livelihoods associated with tourism																									
Increased unemployment																									
Reduced quality of seafood products																									
Threats to public health																									

									STAKE	HOLDE	RS														
	Fishe	eries ar	ıd Aqua	acultur	·e		Agric	ulture	and Fo	restry								Touri	ism			Mini	ng		
	Artisanal fishers	ndustrial fishers	Recreational fishers	Seaweed farmers	ndustrial prawn farmers	ı & 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	ır, boat & SCUBA operators	Coral/lime miners	Sand miners	Small-scale salt producers	Industrial salt works
Socio-economic Impacts	Arti	pul	Rec	Sea	pul	Fish	Cha	Sm	lnd	Sm	Lar	For	Pas	Rar	Pou	Dai	Вее	Tou	Hot	Sm	Tour,	Cor	San	Sm	Ind
Human health risk through contact recreation																									
Human health risk through ingestion of contaminated seafood																									
Reduced productivity of workforce due to sickness and ill health																									
Increased cost of living																									
Reduction of foreign income / revenues																									
Loss of national revenues / reduction in GDP																									
Reduction in wellbeing																									
Reduced resilience																									
Increasing poverty												_							_						
Impacts upon religious festivals / rituals																									
Loss of social cohesion																									

Table A1.6 (continued): Stakeholders affected by Socio-Economic Impacts of Water Quality Degradation

Table A1.6 (continued): Stakeholders affected by Socio-						HOLDE															
	Indu	stry			Tran	sportat	tion						Energ	y Produ	ction	Urba	nisatio	n			
	Heavy manufacturing industry	ight manufacturing industry	Agro-processing industries	Oil refining	11011	Dredging companies	Clearing and forwarding	Á	Roads (incl. traffic)	ts	Ş	gu	Hydro-dam operators	ower station operators	Renewable energy producers	olid waste operators	ewage managers	roperty developers	Property owners	own planners	Coastal community
Socia oceanomia lumposta	eavy	ghtr	gro-p	il ref	orts	redg	leariı	Railway	oads	Airports	Airlines	Shipping	ydro	ower	enew	v bild	ewag	rope	ope	uwc	oasta
Socio-economic Impacts  Reduction in quantity of freshwater available for drinking / irrigation etc	I		∢.	0	ă	a	Ū	œ.	œ.	∢	∢	- S	I	Ğ	<u>~</u>	Š	Š	Ğ	ā	<u>_Ĕ</u> _	Ū
Reduction in quality of freshwater for drinking / irrigation																					
Increased vulnerability to coastal flooding (loss of life and property)																					
Increased cost of coastal defence																					
Reduction in hydroelectric power generation potential																					
Damage to coastal infrastructure																					
Reduction in agricultural productivity (due to salt water intrusion)																					
Reduction in opportunities for tourism and leisure																					
Reduction in aesthetics																					
Reduction in future use value																					
Loss of fisheries resources and revenue																					
Reduction in fish availability																					
Loss of income generating livelihoods associated with fisheries																					
Loss of income generating livelihoods associated with tourism																					
Increased unemployment																					
Reduced quality of seafood products																					
Threats to public health																					
Human health risk through contact recreation																					

					STAKE	HOLDE	RS														
	Indu	stry			Trans	sportat	ion						Energ	y Produ	ction	Urba	nisatio	n			
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
Human health risk through ingestion of contaminated seafood			_∢	0	Δ.		O	~	~	_∢	_ ⋖	S	エ	Ь	~	S	S	Ь	Ь		0
Reduced productivity of workforce due to sickness and ill health																					
Increased cost of living																					
Reduction of foreign income / revenues																					
Loss of national revenues / reduction in GDP																					
Reduction in wellbeing																					
Reduced resilience																					
Increasing poverty																					
Impacts upon religious festivals / rituals																					
Loss of social cohesion																					

Table A1.7A: Direct Causes of Water Quality Degradation (Contribution & Irreversibility)

Direct Causes	1.1.	1.2.	1.3.1	1.3.2	1.3.3	1.3.4	1.3.5	1.3.6	1.3.7	1.3.8	1.3.9	
	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).	Noise pollution	rhermal pollution	Radioactive contamination	Contribution
Rainfall variability	1	1			0 %	S	1	N I O		-	~	3
Natural topography	1	1										2
Increased evaporation	1	1										2
Increased water abstraction	3	1										4
Obstruction of natural flows	4	1										5
Changes in land use and vegetation cover	4	4		3		4						15
Deforestation	4	4		1		4						13
Increased sediment loads	3	3	2	2		4	1				1	16
Release of un undertreated effluents from point sources		4	3	4	4	2	1			1		19
Release of un undertreated effluents from nonpoint sources		4	4	4	2	2	1					17
Surface runoff (from agricultural land and urban areas)		4	3	3	2	2	3					17
Inappropriate disposal of solid wastes		2	1	1	2	2	4				2	14
Accidental release of oil during extraction, refining and transport		2						4				6
TOTAL	21	32	13	18	10	20	11	4	0	1	3	

Table A1.7B: Direct Causes of Water Quality Degradation - Irreversibility

Direct Causes	1.1.	1.2.	1.3.1	1.3.2	1.3.3	1.3.4	1.3.5	1.3.6	1.3.7	1.3.8	1.3.9	
	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,	Noise pollution	Thermal pollution	Radioactive contamination	ireversibility
Rainfall variability	4	4					2					12
Natural topography	4	4										8
Increased evaporation	4	4										5
Increased water abstraction	3	3										4
Obstruction of natural flows	3	3										4
Changes in land use and vegetation cover	4	4		4		4						16
Deforestation	2	2		2		2						8
Increased sediment loads	2	2	2	2		2	2				2	14
Release of un- undertreated effluents from point sources		1	1	1	1	1	1			1		7
Release of un -undertreated effluents from non-point sources		2	2	2	2	2	2					12
Surface run-off (from agricultural land and urban areas)		3	3	3	3	3	3					18
Inappropriate disposal of solid wastes		1	1	1	1	1	1				1	7
Accidental release of oil during extraction, refining and transport		4						4				4
TOTAL	26	37	9	15	7	15	11	4	0	1	3	

Table A1.8: Direct Causes and Sectors contributing towards Water Quality Degradation

	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	Environmental	TOTAL (no. sectors)
Rainfall variability																	<b>←</b>	1
Natural topography																	+	1
Increased evaporation																	+	1
Increased water abstraction	<b>←</b>	+	+	<b>←</b>		<b>←</b>										+		6
Obstruction of natural flows	+	+	+	<b>←</b>	+	+										+		7
Changes in land use and vegetation cover	+	+	+	<b>←</b>	+	<b>←</b>												6
Deforestation	+	+	+	<b>←</b>		<b>←</b>										+		6
Increased sediment loads			<b>←</b>	<b>←</b>		<b>←</b>												3
Release of un- undertreated effluents from point sources	<b>←</b>	<b>←</b>	<b>←</b>	<b>←</b>	<b>←</b>	<b>←</b>									<del>(</del>	<b>←</b>		8
Release of un -undertreated effluents from non-point sources			+		<b>←</b>										+			3
Surface run-off (from agricultural land and urban areas)	+	<b>←</b>	<b>←</b>															3
Inappropriate disposal of solid wastes	<b>←</b>	<b>←</b>		<b>←</b>		<b>←</b>										<b>←</b>		5
Accidental release of oil during extraction, refining and transport				<b>←</b>	<b>←</b>	<b>←</b>										<b>←</b>		4
TOTAL (no. of causes)	7	7	8	8	5	8									2	6	3	

Table A1.9 : Sectors, Resource Use Practices, Underlying and Root Causes

	•	(4) Traditional land use practices (slash and burn)								(3) Land clearing for commercial agriculture or logging	Degradation of catchments and poor land use practices e.g.						(iii) High abstraction and water use	<ul><li>(ii) Damming / impoundment of rivers</li></ul>	(i) Diversion of water courses	(2) Irrigation practices e.g.	Agriculture & Forestry								(1) Water abstraction and usage for industries	Industry	1.1.		Sector and Underlying Resource Use Practice
External market demand for food products)	Increased demand for farmland	Lack of education and awareness	Wealth creation and corruption	Lack of monitoring and control capacity	Low enforcement and compliance	Slow policy development	Weak national planning regulatory frameworks	Inadequate or lack of land use plans and environmental policy	Weak economy and need for finances	External market demand for timber or agricultural products	High demand for agricultural land, timber, fuel wood		Low enforcement and compliance	Cultural and historical practices	Incorrect incentives for water use	Inadequate planning, lack of land use plans and environmental policy	Weak national planning regulatory frameworks	Lack of technology use of inappropriate methods	Increased demand for food	Expansion of agriculture and commercial agriculture sector		Inappropriate incentives / subsidies - cheap water (historical)	Inadequate investment	Low enforcement and compliance	Wealth creation and corruption	Lack of planning	Market demand	Economic development pressure	Expansion of industrial sector and increased demand for water		Alteration of natural river flow		Underlying Social, Economic, Legal and Political Causes
			<b>↑</b>	<b>↑</b>	<b>↑</b>	<b>↑</b>	<b>↑</b>	<b>↑</b>				<b>↑</b>	<b>↑</b>			<b>↑</b>	<b>↑</b>			<b>↑</b>		<b>↑</b>	<b>↑</b>	<b>↑</b>	1	<b>↑</b>						[A]Inappropriate governance	
<b>^</b>	<b>1</b>								<b>^</b>	<b>↑</b>	<b>↑</b>	<b>↑</b>			<b>1</b>				<b>←</b>	<b>↑</b>							<b>↑</b>	<b>1</b>	<b>^</b>			[B]Economic drivers	
				<b>↑</b>	<b>^</b>				<b>^</b>		<b>↑</b>	<b>↑</b>	<b>1</b>					<b>↑</b>					<b>^</b>									[C] Inadequate financial resources	
		<b>↑</b>						<b>↑</b>							<b>↑</b>	<b>↑</b>		<b>↑</b>		<b></b>												[D] Inadequate knowledge & awareness	
		<b>↑</b>												<b>^</b>																		[E] Cultural traditions	Root Causes
<b>↑</b>	<b>1</b>	<b>1</b>			<b>1</b>			<b>1</b>		<b>↑</b>	<b>1</b>					<b>↑</b>			<b>↑</b>	<b>↑</b>		<b>1</b>				<b>1</b>	<b>↑</b>	<b>1</b>	<b>↑</b>			[F] Population pressure & demographics	àuses
	<b>1</b>	<b>↑</b>			<b>↑</b>					<b>↑</b>	<b>↑</b>	<b>1</b>								<b>↑</b>												[G] Poverty & inequality	
<b>^</b>											<b>↑</b>																					[H] Climate change & natural processes	
																																[I] Voluntary action fills the governance void	
																																[J] Personal Attitude	

Commercial male harvesting of internal market demand for fuel wood   Compliance	Resource Use Practice  Resource Use Practice  (5) Introduction of alien species (high water consumption)	Political Causes  Political Causes  Lack of outreach and education Lack of appropriate technology  Wealth creation and corruption  Weak regulatory frameworks  Slow policy development	↑ ↑ ↑ [A]Inappropriate governance	↑ [B]Economic drivers	(C) Inadequate financial resources	[D] Inadequate knowledge & awareness	[E] Cultural traditions	[E] Cultural traditions  [F] Population pressure & demographics	↑ ↑ [G] Poverty & inequality	[H] Climate change & natural processes
Income generating livelihood  Lack of alternative fuel source Income generating livelihood Lack of education of awareness Lack of education of awareness Lack of outreach (extension officers) Lack of appropriate information of seasonal Weak regulatory frameworks Low compliance with regulations  Market value driven Lack of capacity for compliance Expansion of commercial mining Expansion of commercial mining Expansion of commercial mining Expansion of companies with weak environmental management polices Lack of monitoring and control capacity Veak economy and need for finances Vealth creation and corruption Expansion of artisanal / traditional mining Lack of planning  According to the compliance  According to the compl		Law enforcement and compliance	<b>1</b>					<b>↑</b>	<b>^</b>	
Lack of alternative fuel source   Income generating livelihood   Act of technology   Lack of education of awareness   Act of education of awareness   Act of appropriate information of seasonal   Act of appropriate information   Act of appropriate information   Act of appropriate information information   Act of appropriate information   Act of appropriate information   Act of appropriate information   Act of appropriate   Act of app	(6) Unsustainable harvesting of	Internal market demand for fuel wood	<b>^</b>	<b>^</b>			<b>↑</b>	<b>1</b>	<b>^</b>	
Lack of technology Lack of education of awareness Lack of outreach (extension officers) Lack of outreach (extension officers) Lack of appropriate information of seasonal Lack of capacity for compliance  Expansion of commercial mining  Expansion of inadequate planning Slow policy development Low enforcement and compliance External companies with weak environmental management policies Lack of monitoring and control capacity  Weak economy and need for finances  Wealth creation and corruption  Expansion of artisanal / traditional mining  External market demand for natural	מווואפו וסו ומבו איססמ	Lack of alternative fuel source				<b>↑</b>			<b>↑</b>	
Lack of education of awareness  Lack of education of awareness  Lack of outreach (extension officers)  Lack of appropriate information of seasonal cack of appropriate informations  Lack of appropriate informations  Lack of appropriate informations  Lack of capacity for compliance  Expansion of commercial mining  Expansion of commercial mining  Lack of or inadequate planning  Slow policy development  Low enforcement and compliance  External companies with weak conomy and need for finances  Wealth creation and corruption  Expansion of artisanal / traditional mining  Expansion of artisanal / traditional mining  Lack of planning  Cack of planning  A C C C C C C C C C C C C C C C C C C		Income generating livelihood		<b>1</b>				<b>↑</b>	<b>^</b>	
Lack of outreach (extension officers)  Lack of outreach (extension officers)  Lack of appropriate information of seasonal rainfall  Weak regulatory frameworks  Low compliance with regulations  Lack of capacity for compliance  Expansion of capacity for natural resources  Global economies  Lack of or inadequate planning  Lack of or inadequate planning  External market demand for natural component and companies with weak recommental management policies  Lack of monitoring and control capacity  Weak economy and need for finances  Wealth creation and corruption  Expansion of artisanal / traditional mining  External market demand for natural  External market demand for natural  External market demand for natural  Capacity  Capac		Lack of technology			1	<b>^</b>			<b>→</b>	
Lack of outreach (extension officers)    Lack of appropriate information of seasonal   C   C   C	(7) Seasonally inappropriate farming activities	Lack of education of awareness				<b>↑</b>				
Weak regulatory frameworks  Weak regulatory frameworks  Low compliance with regulations  Market value driven  Lack of capacity for compliance  Expansion of commercial mining  Expansion of commercial mining  Expansion of commercial mining  Expansion of capacity for natural  External market demand for natural  resources  Global economies  Lack of or inadequate planning  Lack of or inadequate planning  Lack of or inadequate planning  External companies with weak environmental management policies  Lack of monitoring and control capacity  Weak economy and need for finances  Wealth creation and corruption  Expansion of artisanal / traditional mining  Expansion of artisanal / traditional mining  A C C C C C C C C C C C C C C C C C C	(e.g. ploughing before rain or	Lack of outreach (extension officers)	1		1					
Weak regulatory frameworks  Low compliance with regulations  Amarket value driven  Lack of capacity for compliance  Expansion of commercial mining  Expansion of commercial mining  Expansion of commercial mining  External market demand for natural  External market demand for natural  Lack of or inadequate planning  Slow policy development  Low enforcement and compliance  External companies with weak environmental management policies  Lack of monitoring and control capacity  Weak economy and need for finances  Wealth creation and corruption  Expansion of artisanal / traditional mining  External market demand for natural  According to the conomics  According to th	not applying soil conservation measures).	Lack of appropriate information of seasonal rainfall	<b>↑</b>		<b>↑</b>	<b>↑</b>				
Lack of capacity for compliance  Expansion of commercial mining  Expansion of commercial mining  External market demand for natural resources  Global economies  Lack of or inadequate planning  Lack of monitoring and compliance  External companies with weak environmental management policies  Lack of monitoring and control capacity  Weak economy and need for finances  Wealth creation and corruption  Expansion of artisanal / traditional mining  External market demand for natural resources  Global economies  Lack of planning  A A A A A A A A A A A A A A A A A A A		Weak regulatory frameworks	<b>^</b>							
Market value driven  Lack of capacity for compliance  Expansion of commercial mining  Expansion of commercial mining  Expansion of commercial mining  External market demand for natural resources  Global economies  Lack of or inadequate planning  Low enforcement and compliance  External companies with weak environmental management policies  Lack of monitoring and control capacity  Weak economy and need for finances  Wealth creation and corruption  Expansion of artisanal / traditional mining  Expansion of artisanal / traditional mining  External market demand for natural resources  Global economies  Lack of planning		Low compliance with regulations				<b>^</b>	<b>1</b>	<b>^</b>	<b>^</b>	
Expansion of commercial mining  Expansion of commercial mining  Employment opportunities and income generating livelihood  External market demand for natural resources  Global economies  Lack of or inadequate planning  Low enforcement and compliance  External companies with weak environmental management policies  Lack of monitoring and control capacity  Wealth creation and corruption  Expansion of artisanal / traditional mining  Expansion of artisanal / traditional mining  Expansion of artisanal for natural resources  Global economies  Global economies  Global economies	(8) Timber for commercial harvesting	Market value driven		<b>1</b>						
Expansion of commercial mining  Employment opportunities and income generating livelihood  External market demand for natural resources  Global economies  Lack of or inadequate planning  Low enforcement and compliance  External companies with weak environmental management policies  Lack of monitoring and control capacity  Weak economy and need for finances  Wealth creation and corruption  Expansion of artisanal / traditional mining  External market demand for natural resources  Global economies  Global economies  A C C C C C C C C C C C C C C C C C C	•	Lack of capacity for compliance	<b>^</b>		<b>^</b>					
Expansion of commercial mining  Employment opportunities and income generating livelihood  External market demand for natural resources  Global economies  Lack of or inadequate planning  Slow policy development  Low enforcement and compliance  External companies with weak environmental management policies  Lack of monitoring and control capacity  Weak economy and need for finances  Wealth creation and corruption  Expansion of artisanal / traditional mining  External market demand for natural resources  Global economies  Cack of planning  A A A A A A A A A A A A A A A A A A A	Mining									
Employment opportunities and income generating livelihood  External market demand for natural resources  Global economies  Lack of or inadequate planning  Slow policy development  Low enforcement and compliance  External companies with weak environmental management policies  Lack of monitoring and control capacity  Weak economy and need for finances  Wealth creation and corruption  Expansion of artisanal / traditional mining  Income generating livelihood  External market demand for natural resources  Global economies  A C	(9) High water usage / abstraction for processing in commercial mining e.g	Expansion of commercial mining	<b>↑</b>	<b>↑</b>				<b>↑</b>		í
External market demand for natural resources Global economies  Lack of or inadequate planning Slow policy development Low enforcement and compliance External companies with weak environmental management policies Lack of monitoring and control capacity Weak economy and need for finances Wealth creation and corruption Expansion of artisanal / traditional mining Income generating livelihood External market demand for natural resources Global economies  A C	(i) Open cast mining sand deposits	Employment opportunities and income generating livelihood						<b>↑</b>	<b>→</b>	
Lack of or inadequate planning  Slow policy development Low enforcement and compliance External companies with weak environmental management policies Lack of monitoring and control capacity  Weak economy and need for finances  Wealth creation and corruption Expansion of artisanal / traditional mining Income generating livelihood External market demand for natural resources Global economies  A   A	(ii) Alluvial mining	External market demand for natural resources		<b>↑</b>						
Lack of or inadequate planning  Slow policy development  Low enforcement and compliance  External companies with weak environmental management policies Lack of monitoring and control capacity  Weak economy and need for finances  Wealth creation and corruption  Expansion of artisanal / traditional mining External market demand for natural resources  Global economies  A   C   C   C   C   C   C   C   C   C		Global economies		1						
Slow policy development  Low enforcement and compliance  External companies with weak environmental management policies Lack of monitoring and control capacity  Weak economy and need for finances  Wealth creation and corruption  Expansion of artisanal / traditional mining  Income generating livelihood  External market demand for natural resources  Global economies  Lack of planning  Check of planning		Lack of or inadequate planning	<b>↑</b>							
External companies with weak environmental management policies Lack of monitoring and control capacity  Weak economy and need for finances  Wealth creation and corruption Expansion of artisanal / traditional mining External market demand for natural resources  Global economies  Lack of planning  C		Slow policy development	<b>↑</b>							
External companies with weak environmental management policies Lack of monitoring and control capacity  Weak economy and need for finances  Wealth creation and corruption  Expansion of artisanal / traditional mining Income generating livelihood  External market demand for natural resources Global economies  A		Low enforcement and compliance	<b>1</b>		<b>↑</b>					
Lack of monitoring and control capacity C   Weak economy and need for finances C   Wealth creation and corruption C   Expansion of artisanal / traditional mining C   Income generating livelihood C   External market demand for natural resources C   Global economies C   Lack of planning C		External companies with weak environmental management policies	<b>↑</b>							
Weak economy and need for finances  Wealth creation and corruption  Expansion of artisanal / traditional mining Income generating livelihood  External market demand for natural resources Global economies  Lack of planning  C		Lack of monitoring and control capacity	<b>↑</b>		<b>^</b>					
Wealth creation and corruption  Expansion of artisanal / traditional mining  Income generating livelihood  External market demand for natural resources Global economies  A A		Weak economy and need for finances			<b>↑</b>					
Expansion of artisanal / traditional mining Income generating livelihood External market demand for natural resources Global economies  Lack of planning		Wealth creation and corruption	<b>↑</b>							
Income generating livelihood  External market demand for natural resources Global economies  Calck of planning  Calcharate the market demand for natural the	(10) Water abstraction for artisanal / traditional mining	Expansion of artisanal / traditional mining		<b>↑</b>				<b>↑</b>	<b>→</b>	
demand for natural	e.g. for sapphire and gold	Income generating livelihood						<b>↑</b>	<b>^</b>	
1		External market demand for natural resources		<b>↑</b>						
		Global economies		<b>1</b>						
		Lack of planning	<b>^</b>							

Sector and Underlying Resource Use Practice	Underlying Social, Economic, Legal and Political Causes					Root Causes	auses				
		iate governance	drivers	te financial	te knowledge &	raditions		inequality	hange & natural	action fills the oid	Attitude
		[A]Inappropri	[B]Economic (	[C] Inadequat resources	[D] Inadequat awareness	[E] Cultural tr	[F] Populatior demographics	[G] Poverty &	[H] Climate ch processes	[I] Voluntary a governance vo	[J] Personal A
	Slow policy development	<b>1</b>									
	Lack of regulation of artisanal mining	<b>↑</b>						<b>↑</b>			
	Limited capacity for monitoring and control	<b>^</b>		<b>1</b>							
	Weak economy and need for finances			<b>↑</b>							
	Wealth creation and corruption	<b>1</b>									
Energy											
(11) Damming / impoundment of rivers for hydroelectric nower generation	Increased electricity demand		<b>↑</b>				<b>↑</b>				
	Economic development pressure		<b>↑</b>				<b>↑</b>				
	Lack of investment in alternative technologies (e.g. solar)	<b>↑</b>		<b>↑</b>	<b>↑</b>						
(12) High use of water for cooling (e.g. coal / nuclear)	Increased electricity demand		<b>↑</b>				<b>↑</b>		<b>↑</b>		
	Economic development pressure		1				<b>1</b>				
	Demand for cheap power for industries and households						<b>↑</b>	<b>↑</b>			
	Inadequate energy legislation/policy	1									
	Inadequate investment	1		<b>^</b>							
	Lack of investment in alternative technologies (e.g. solar)	<b>↑</b>		<b>↑</b>	<b>↑</b>						
	Low enforcement and compliance	1									
	Wealth creation and corruption	<b>↑</b>									
Tourism											
(13) High water consumption by tourism sector	Increased numbers of tourists		<b>↑</b>								
	Weak planning and implementation, lack of land use plans and environmental policy	<b>↑</b>		<b>^</b>	<b>↑</b>						
	Lack of regulation to encourage water saving	<b>↑</b>		<b>↑</b>	<b>↑</b>						
	Low uptake of alternative technologies (e.g.	<b>↑</b>		<b>↑</b>	<b>↑</b>			<b>1</b>			
	Law enforcement and compliance	<b>↑</b>									
	Wealth creation and corruption	<b>^</b>									
(14) Clearing of land for tourism	Expansion of tourism sector		<b>↑</b>				<b>↑</b>				
	Economic development pressures		<b>↑</b>				<b>↑</b>				
	Limited suitable land available and increased demand		<b>↑</b>				<b>1</b>				
	Inadequate planning, lack of land use plans and environmental policy	<b>↑</b>		<b>↑</b>	<b>1</b>						
	Lack of regulation to encourage sustainable tourism development	<b>↑</b>		<b>↑</b>	<b>↑</b>						
	Lack of capacity for monitoring and control	<b>1</b>		1	1						
	Low enforcement and compliance	1									
(15) Large scale changes to topography and inappropriate drainage	Expansion of tourism sector	<b>↑</b>									
(											

Transportation & Shipping  (21) Land clearing and Expansion of road topographic changes for road	Transportation & Shipping	Lack of inv technolog	Lack of inv systems	and enviro		(20) Increased surface run-off Expansion	Wealth cr	Lack of mo	Low enfor	Inadequat activities	Inadequate p development	(19) Construction activities Increased development	Weak unders technologies	Lack of inv technolog	Inadequate p development	(18) Damming for water supply Increased	Inadequat water disp	Inadequate p development	Increased	(17) Domestic water disposal Increased	Lack of inv technolog	Inadequat	Lack of or inadevelopment	Increased se	Increased	(16) Domestic water usage Increased	Urbanisation	Law enfor	Lack of ca	Badly plar	Gaps in regulations		Sector and Underlying Underlying Soci
	of road network	Lack of investment in alternative technologies (e.g. rain water harvest)	Lack of investment in upgrading drainage systems	and environmental policy	Inadequate planning, lack of land use plans	Expansion of urban areas	Wealth creation and corruption	Lack of monitoring and enforcement	Low enforcement and compliance	Inadequate regulation of construction activities	Inadequate planning and policy development	Increased development and construction of modern homes	Weak understanding of potential alternative technologies	Lack of investment in alternative technologies (e.g. rain water harvest)	nadequate planning and policy development	Increased demand for domestic water	Inadequate investment in municipal waste water disposal infrastructure	nadequate planning and policy development	Increased volume of waste water	Increased urbanisation	Lack of investment in alternative technologies (e.g. rain water harvest)	Inadequate investment in infrastructure	Lack of or inadequate planning and policy development	ncreased service delivery and availability of biped water	Increased demand for piped water	Increased urbanisation		Law enforcement and compliance	Lack of capacity for monitoring and control	Badly planned construction processes	gulations		Underlying Social, Economic, Legal and Political Causes
		<b>↑</b>		1	•		<b>↑</b>	<b>1</b>	<b>↑</b>	<b>↑</b>	<b>↑</b>	<b>^</b>			<b>↑</b>		<b>↑</b>	<b>^</b>		<b>^</b>	<b>↑</b>	<b>1</b>	<b>↑</b>			<b>1</b>		<b>1</b>	<b>1</b>	<b>↑</b>		[A]Inappropriate governance	
	<b>↑</b>					<b>↑</b>						<b>→</b>				<b>→</b>			<b>↑</b>	<b>↑</b>				<b>↑</b>	<b>↑</b>	<b>^</b>					<b>↑</b>	[B]Economic drivers	
		<b>↑</b>	<b>↑</b>			<b>↑</b>		<b>↑</b>	<b>→</b>					<b>↑</b>			<b>↑</b>				<b>↑</b>	<b>↑</b>							<b>↑</b>			[C] Inadequate financial resources	
		<b>↑</b>		1	•						<b>↑</b>		<b>↑</b>	<b>↑</b>	<b>↑</b>			<b>↑</b>			<b>↑</b>		<b>↑</b>						<b>1</b>	<b>↑</b>		[D] Inadequate knowledge & awareness	
																																[E] Cultural traditions	Root (
	<b>↑</b>					<b>↑</b>						<b>↑</b>				<b>↑</b>			<b>1</b>	<b>^</b>				<b>↑</b>	<b>↑</b>	<b>^</b>					<b>^</b>	[F] Population pressure & demographics	Root Causes
												<b>^</b>																				[G] Poverty & inequality	
																																[H] Climate change & natural processes	
																																[I] Voluntary action fills the governance void	
																																[J] Personal Attitude	

	(4) Inadequate management and disposal of livestock waste							(3) Increased surface run-off (through agriculture and forestry)									(2) Increased use of agrochemicals (fertilizers and pesticides)				(e.g. lack of crop rotation)	(1) Poor land use management and farming practices	Agriculture & Forestry	1.2.	Wild Fires	Increased Flooding	Increased evaporation	High rainfall variability	Environmental			(22) Inappropriate drainage and canalisation for roadways			Sector and Underlying Resource Use Practice
	gement ock waste							off													ion)	agement	Y				٦	`							ng e
Increased demand for food	Lack of education, knowledge and	Lack of incentives for good practice	Lack of capacity for monitoring or enforcement	Lack of or inadequate regulation	Inadequate land use planning	awareness	Increased demand for food, timber etc	Expansion of commercial agricultural sector	Lack of incentives for good practice	Lack of capacity for monitoring or enforcement	Lack of compliance	Lack of or inadequate regulation	Inadequate land use planning	External market demand	High demand for food production	Increased demand for food	Expansion of commercial agricultural sector	Lack of compliance	Lack of agricultural extension officers	Lack of incentives for good practice	Lack of education, knowledge and awareness	High demand for food production		Degradation of ground and surface water quality						Lack of compliance with regulations	Poor road construction practices	Lack of or inadequate planning	Lack of or inadequate regulation		Underlying Social, Economic, Legal and Political Causes
		1	<b>↑</b>	1	1				<b>↑</b>	<b>↑</b>	1	1	<b>→</b>						<b>↑</b>	<b>→</b>	<b>→</b>									<b>↑</b>	<b>↑</b>	<b>→</b>	<b>1</b>	[A]Inappropriate governance	
														<b>→</b>	<b>→</b>							<b>→</b>								<b>↑</b>	<b>↑</b>			[B]Economic drivers	
		<b>^</b>	<b>↑</b>						<b>^</b>	<b>↑</b>									<b>^</b>	<b>^</b>														[C] Inadequate financial resources	
	<b>1</b>					<b>1</b>															<b>↑</b>									<b>↑</b>	<b>↑</b>	<b>↑</b>	<b>↑</b>	[D] Inadequate knowledge & awareness	
																			<b>↑</b>		<b>↑</b>													[E] Cultural traditions	Root Causes
<b>↑</b>							1				<b>↑</b>				<b>↑</b>	1		<b>1</b>				<b>↑</b>												[F] Population pressure & demographics	àuses
	<b>↑</b>																																	[G] Poverty & inequality	
																									<b>^</b>	<b>1</b>	<b>↑</b>	<b>↑</b>						[H] Climate change & natural processes	
																																		[I] Voluntary action fills the governance void	
																																		[J] Personal Attitude	

	Sector and Underlying Resource Use Practice	Underlying Social, Economic, Legal and Political Causes					Root Causes	auses			
Increased livestock production  Lack of continue splanning or choruster regulation  Lack of capacity for monitoring or choruster regulation  Increased urbanisation  Inadequate possibility or channing for urban areas  Increased urbanisation  Inadequate provision of tourism sector  Explanning inadequate legislation / weak enforcement  Inadequate legislation / weak enforcement  Inadequate legislation of weak enforcement  Inadequate legislation  Inadequate legislation of weak enforcement  Inadequate legislation  Inadequa			e governance	ivers	financial	knowledge &	ditions	oressure &	nequality	nge & natural	titude
Increased Investock production			\]Inappropriate g	B]Economic drive			] Cultural tradition		i] Poverty & ineq		] Personal Attitu
Inadequate land use planning  Lack of or inadequate regulation  Lack of lapacity for monitoring or  Lack of lincentives for good practice  Comornic growth potential and employment  Lack of capacity for planning  Lack of capacity for planning  Foor selection of waste water treatment  Lack of capacity for planning  Lack of capacity for planning  Foor selection of waste disposal site  Lack of capacity for planning  Lack of capacity for planning  Foor selection of waste enforcement  Lack of capacity for planning  Lack of capacity for planning  Lack of capacity for planning  Expansion of tourism sector  Lack of capacity for planning  Lack of capaci		Increased livestock production	[	<b>↑</b>			[		[		[
Lack of or inadequate regulation		Inadequate land use planning	<b>↑</b>			<b>↑</b>					
anch of capacity for monitoring or enforcement lack of incentives for good practice		Lack of or inadequate regulation	<b>↑</b>								
Increased urbanisation  Increased urbanisation Increased urbanisation Inadequate provision for waste water treatment and management opportunities greater in urban areas Inadequate provision for waste water treatment and management opportunities Inadequate provision for waste water treatment and management of regulations of variation of waste water treatment and management opportunities  Inadequate provision for waste water treatment of regulations of variation of waste disposal site  Inadequate provision of waste disposal site  Inadequate polyment opportunities  Poor selection of waste disposal site  Inadequate planning for urban areas  Poor maintenance  Poor selection of waste disposal site  Inadequate planning for urban areas  Inadequate p		Lack of capacity for monitoring or enforcement	<b>↑</b>		<b>↑</b>						
Increased urbanisation  areas  Employment opportunities greater in urban areas  Inadequate planning for urban areas  Poor maintenance  Poor selection of waste disposal site  Lack of capacity for planning  Lack of capacity for planning for urban areas  Lack of capacity for planning  Lack of capacity		Lack of incentives for good practice	<b>↑</b>		1						
Increased urbanisation  Increased urbanisation  Increased urbanisation  Indequate planning for urban areas  Inadequate provision for waste water treatment and management Inadequate planning for urban areas  Inadequate provision for waste water Inadequate legislation / weak enforcement Indequate legislation Inack of capacity for planning Inack of capacity for plannin	Urbanisation										
Employment opportunities greater in urban areas  Increased urbanisation  Inadequate planning for urban areas  Inadequate provision for waste water treatment and management in infrastructure  Lack of capacity for planning  Poor selection of waste disposal site  Lack of capacity for planning  Lack of capacity for planning for urban areas  Lack of dalange systems  Lack of dalange systems  Lack of dalange systems  Lack of capacity for planning for urban areas  Lack of capacity for planning for urban areas  Lack of adequate waste water treatment in infrastructure  Lack of capacity for planning for urban areas  Lack of or capacity for planning for urban areas  Lack of dalange systems  Lack of or adequate waste water treatment in infrastructure  Lack of adequate waste water treatment in the component	(5) Disposal of un and under treated municipal waste water	Increased urbanisation		<b>1</b>				<b>↑</b>			
Increased urbanisation  Inadequate planning for urban areas Inadequate provision for waste water Irreatment and management Inadequate investment in infrastructure Lack of capacity for planning Increased urbanisation Increased urbaning Increased u		Employment opportunities greater in urban areas		<b>↑</b>				<b>↑</b>			
Inadequate planning for urban areas Inadequate provision for waste water Inadequate investment in infrastructure Inadequate investment in infrastructure Inadequate investment in infrastructure Inadequate investment in infrastructure Inadequate legislation / weak enforcement Of regulations Poor maintenance Poor selection of waste disposal site Poor selection of waste disposal site Inadequate planning for urban areas Inadequate legislation / weak enforcement Infrastructure I		Increased urbanisation	<b>↑</b>	<b>↑</b>	<b>↑</b>					<b>^</b>	
Inadequate provision for waste water treatment and management Inadequate investment in infrastructure    Ack of capacity for planning		Inadequate planning for urban areas	<b>^</b>								
Inadequate investment in infrastructure    Ack of capacity for planning		Inadequate provision for waste water treatment and management	<b>↑</b>		<b>↑</b>			<b>↑</b>			
Lack of capacity for planning Increased urbanisation Inadequate legislation / weak enforcement of regulations Poor maintenance Poor selection of waste disposal site Lack of capacity for planning Lack of capacity for planning for urban areas Lack of capacity Inadequate legislation / weak enforcement Lack of capacity Inadequate legislation / weak enforcement Lack of capacity  Expansion of tourism sector  Expansion of tourism sector  Expansion of inadequate legislation Lack of investment Lack of investment Lack of or inadequate legislation Lack of or planning Lack of capacity for monitoring and an activity for monitoring and an activity for monitoring an activity for monitoring an activity for monitoring an		Inadequate investment in infrastructure	<b>↑</b>		1						
Increased urbanisation  Inadequate legislation / weak enforcement of regulations  Poor maintenance  Poor selection of waste disposal site  Lack of capacity for planning  Lack of capacity for urban areas  Lack of capacity  Inadequate planning for urban areas  Lack of capacity  Inadequate legislation / weak enforcement  Expansion of tourism sector  Expansion of tourism sector  Expansion of investment  Lack of adequate waste water treatment  Lack of or inadequate development lack of investment  Lack of capacity for monitoring and  Lack of capacity for monitoring and  Expansion of tourism sector		Lack of capacity for planning			<b>^</b>	<b>^</b>					
Inadequate legislation / weak enforcement of regulations  Poor maintenance  Poor reselection of waste disposal site  Lack of capacity for planning  Lack of capacity for planning for urban areas  Lack of capacity  Inadequate planning for urban areas  Lack of capacity  Inadequate legislation / weak enforcement  Lack of capacity  Expansion of tourism sector  Expansion of tourism sector  Expansion of tourism sector  Lack of adequate waste water treatment infrastructure  Lack of investment  Lack of or inadequate development planning, inadequate legislation  Lack of capacity for monitoring and  Lack of capacity for monitoring and  Expansion of tourism sector	(6) Construction activities	Increased urbanisation		<b>1</b>				<b>^</b>			
Poor maintenance  Poor selection of waste disposal site  Lack of capacity for planning  Lack of drainage systems  Inadequate planning for urban areas  Lack of capacity  Expansion of tourism sector  Expansion of tourism sector  Economic growth potential and employment opportunities  Global economic market demand  Lack of investment  Lack of or inadequate legislation  Lack of or inadequate legislation  Lack of capacity for planning  Lack of capacity for monitoring and  Expansion of tourism sector		Inadequate legislation / weak enforcement of regulations	<b>↑</b>		<b>↑</b>						
Poor selection of waste disposal site  Lack of capacity for planning  Lack of drainage systems  Inadequate planning for urban areas  Lack of capacity  Inadequate legislation / weak enforcement  Expansion of tourism sector  Expansion of tourism sector  Economic growth potential and employment opportunities  Global economic market demand  Lack of adequate waste water treatment planning, inadequate legislation  Lack of capacity for planning  Lack of capacity for planning  Lack of capacity for monitoring and  enforcement  Expansion of tourism sector  Expansion of tourism sector  Conomic growth potential and employment opportunities  Figure 1  A C C C C C C C C C C C C C C C C C C	(7) Seepage from pit latrines	Poor maintenance	<b>↑</b>		<b>↑</b>						
Lack of capacity for planning  Lack of drainage systems  Inadequate planning for urban areas  Lack of capacity  Inadequate legislation / weak enforcement  Expansion of tourism sector  Expansion of tourism sector  Expansion of adequate waste water treatment infrastructure  Lack of or inadequate development planning, inadequate legislation  Lack of capacity for planning  Expansion of tourism sector	(8) Leachate from waste	Poor selection of waste disposal site	<b>↑</b>								
Lack of drainage systems  Lack of capacity  Inadequate planning for urban areas  Lack of capacity  Inadequate legislation / weak enforcement  Expansion of tourism sector  Economic growth potential and employment opportunities  Global economic market demand  Lack of adequate waste water treatment infrastructure  Lack of investment  Lack of or inadequate development planning, inadequate legislation  Lack of capacity for planning  Lack of capacity for planning  Lack of capacity for monitoring and enforcement  Expansion of tourism sector  Expansion of tourism sector  Economic growth potential and employment  planning country for monitoring and enforcement  Expansion of tourism sector	7	Lack of capacity for planning			<b>^</b>	<b>↑</b>					
Inadequate planning for urban areas  Lack of capacity  Inadequate legislation / weak enforcement  Expansion of tourism sector  Economic growth potential and employment opportunities  Global economic market demand  Lack of adequate waste water treatment infrastructure  Lack of investment  Lack of or inadequate development planning, inadequate legislation  Lack of capacity for planning  Lack of capacity for monitoring and enforcement  Expansion of tourism sector  Expansion of tourism sector  Economic growth potential and employment opportunities	(9) Surface water run-off	Lack of drainage systems	<b>↑</b>		<b>↑</b>						
Lack of capacity  Expansion of tourism sector  Economic growth potential and employment opportunities Global economic market demand Lack of adequate waste water treatment infrastructure Lack of or inadequate development planning, inadequate legislation Lack of capacity for planning Lack of capacity for monitoring and enforcement Expansion of tourism sector  Economic growth potential and employment  Conomic growth potential and employment  Expansion of tourism sector		Inadequate planning for urban areas	<b>↑</b>								
Expansion of tourism sector  Economic growth potential and employment opportunities  Global economic market demand  Lack of adequate waste water treatment infrastructure  Lack of investment  Lack of or inadequate development planning, inadequate legislation  Lack of capacity for planning  Lack of capacity for monitoring and enforcement  Expansion of tourism sector  Economic growth potential and employment  popportunities		Lack of capacity			<b>^</b>	<b>^</b>					
Expansion of tourism sector  Economic growth potential and employment opportunities Global economic market demand Lack of adequate waste water treatment infrastructure Lack of investment Lack of or inadequate development planning, inadequate legislation Lack of capacity for planning Lack of capacity for monitoring and enforcement Expansion of tourism sector  Economic growth potential and employment opportunities		Inadequate legislation / weak enforcement	<b>1</b>								
Economic growth potential and employment opportunities Global economic market demand Lack of adequate waste water treatment infrastructure Lack of investment Lack of or inadequate development planning, inadequate legislation Lack of planning Lack of capacity for planning Lack of capacity for monitoring and enforcement Expansion of tourism sector  Economic growth potential and employment opportunities	Tourism										
Economic growth potential and employment opportunities Global economic market demand Lack of adequate waste water treatment infrastructure Lack of investment Lack of or inadequate development planning, inadequate legislation Lack of planning Lack of capacity for planning Lack of capacity for monitoring and enforcement Expansion of tourism sector  Economic growth potential and employment opportunities	(10) Disposal or seepage of un under treated waste water	Expansion of tourism sector		<b>↑</b>				<b>↑</b>			
Comportunities   Comport	•	Economic growth potential and employment opportunities		<b>↑</b>				<b>↑</b>			
Lack of adequate waste water treatment infrastructure  Lack of investment  Lack of or inadequate development planning, inadequate legislation  Lack of planning  Lack of capacity for planning  Cack of capacity for monitoring and enforcement  Expansion of tourism sector  Economic growth potential and employment opportunities		Global economic market demand		<b>↑</b>							
Lack of investment  Lack of or inadequate development planning, inadequate legislation  Lack of planning  Lack of capacity for planning  Lack of capacity for monitoring and enforcement  Expansion of tourism sector  Economic growth potential and employment opportunities		Lack of adequate waste water treatment infrastructure	<b>↑</b>		<b>↑</b>						
Lack of or inadequate development planning, inadequate legislation  Lack of planning  Lack of capacity for planning  Lack of capacity for monitoring and enforcement  Expansion of tourism sector  Economic growth potential and employment opportunities		Lack of investment		<b>↑</b>							
Lack of planning  Chack of capacity for planning  Chack of capacity for monitoring and enforcement  Expansion of tourism sector  Economic growth potential and employment opportunities		Lack of or inadequate development planning, inadequate legislation	<b>↑</b>								
Lack of capacity for planning  Lack of capacity for monitoring and enforcement  Expansion of tourism sector  Economic growth potential and employment opportunities		Lack of planning	<b>1</b>		<b>↑</b>						
Lack of capacity for monitoring and enforcement  Expansion of tourism sector  Economic growth potential and employment opportunities		Lack of capacity for planning	<b>^</b>		<b>↑</b>						
Expansion of tourism sector  Economic growth potential and employment opportunities		Lack of capacity for monitoring and enforcement			<b>↑</b>	<b>↑</b>	<b>↑</b>				
Economic growth potential and employment opportunities	(11) Construction activities	Expansion of tourism sector		<b>1</b>				<b>1</b>			
	(e.g. increased surface run-off, inadequate building practices)	Economic growth potential and employment opportunities		<b>↑</b>				<b>↑</b>			

Sector and Underlying	Underlying Social, Economic, Legal and					Root Causes	auses			
Resource Use Practice	Political Causes									
		ernance		cial	ledge &	5	ire &	lity	ı natural	ills the
		priate gove	ic drivers	ıate financ	uate knowl	traditions	ion pressu ics	& inequal	change &	y action fi void
		[A]Inappro	[B]Econom	[C] Inadeq esources	[D] Inadeq wareness	[E] Cultura	[F] Populat Iemograph	[G] Povert	[H] Climate processes	[I] Volunta governance
	Global economic market demand	ı	1			I		I		
	Inadequate legislation / weak enforcement	<b>↑</b>		<b>↑</b>						
	Inadequate regulation of construction	<b>↑</b>		<b>↑</b>						
	Lack of capacity for monitoring and			<b>1</b>	<b>↑</b>	<b>↑</b>				
	Lack of investment	<b>↑</b>		<b>↑</b>						
	Lack of or inadequate planning and	<b>1</b>		<b>↑</b>			<b>1</b>			
Industry	C									
(13) Inappropriate disposal of un or under treated effluents	Expansion of industries in the catchment		<b>↑</b>				<b>↑</b>			
	Inadequate planning for industrial areas	<b>↑</b>		<b>↑</b>	<b>1</b>					
	Lack of industrial effluents treatment systems and disposal infrastructure	<b>↑</b>		<b>↑</b>						
	Lack of capacity for planning	<b>↑</b>		<b>↑</b>	<b>↑</b>					
	Difficulty in identifying polluting industries	<b>1</b>		1	<b>↑</b>					
	Inadequate monitoring and enforcement	<b>1</b>		1						
	Lack of monitoring capacity	1		1						
	Weak compliance	1	1	1						
(1 4) Surface run-off	Lack of drainage systems / infrastructure	1		1						
	Lack of planning for industrial development	1			<b>↑</b>					
	Lack of or inadequate capacity for enforcement of legislation	<b>↑</b>		<b>↑</b>						
Mining										
(15) Processing of mine wastes / washing of tailings etc	Expansion of mining sector		<b>↑</b>							
Surface run-off	Lack of enforcement of legislation	<b>^</b>		<b>↑</b>						
	Lack of or inadequate planning	<b>↑</b>								
	Lack of stakeholder participation and involvement	<b>↑</b>		1						
Environmental										
Algal blooms									<b>↑</b>	
Floods									<b>^</b>	
Droughts									<b>↑</b>	
Climate variability and change									<b>^</b>	
1,8,1	Microbiological contamination									
Olbailisadoi	7									
(1) Disposal of un or undertreated municipal wastewater	Expansion of urban areas and increased volume of waste water		<b>↑</b>				<b>↑</b>			
	Inadequate waste water treatment and disposal facilities and sanitation	<b>↑</b>		<b>↑</b>			<b>↑</b>			
	Lack of planning	<b>1</b>								
	Lack of investment	<b>↑</b>		<b>^</b>						

Sector and Underlying Resource Use Practice	Underlying Social, Economic, Legal and Political Causes					Root Causes	auses				
		governance	ers	nancial	nowledge &	ions	essure &	quality		on fills the	ude
		[A]Inappropriate go	[B]Economic driver	[C] Inadequate fina resources	[D] Inadequate kno awareness	[E] Cultural traditio	[F] Population pres demographics	[G] Poverty & inequ	[H] Climate change processes	[I] Voluntary action governance void	[J] Personal Attitud
(2) Increased surface run-off	Expansion of urban areas without adequate drainage		<b>↑</b>						ŗ		
	Inadequate municipal drainage or poor	<b>↑</b>		<b>↑</b>			<b>1</b>				
	Lack of planning	1									
	Lack of investment	<b>1</b>		<b>↑</b>							
(3) Seepage from pit latrines	Expansion of urban areas without adequate drainage		<b>↑</b>				<b>↑</b>				
	Inadequate municipal drainage or poor maintenance	<b>↑</b>		<b>↑</b>							
	Lack of planning	<b>↑</b>									
	Lack of investment	1		<b>^</b>							
Tourism											
(4) Disposal of un undertreated municipal wastewater	Expansion of tourism sector		<b>↑</b>								
	Inadequate municipal drainage or poor maintenance	<b>↑</b>		<b>↑</b>							
	Lack of planning	<b>↑</b>									
	Lack of investment	<b>1</b>		<b>↑</b>							
	Low compliance with regulations (e.g. all hotels are meant to have their own wastewater processing facilities)	<b>↑</b>									
	Limited capacity for post construction monitoring and enforcement	<b>↑</b>		<b>1</b>							
	Wealth creation and corruption		<b>↑</b>								
(5) Increased surface run-off	Expansion of tourism development without adequate drainage		<b>→</b>				<b>↑</b>				
	Inadequate municipal drainage or poor maintenance	<b>↑</b>		<b>↑</b>							
	Lack of planning	<b>↑</b>									
	Lack of investment	1		<b>^</b>							
	Wealth creation and corruption		<b>↑</b>								
Agriculture											
(6) Free roaming livestock	Demand for food		<b>↑</b>				<b>1</b>	<b>1</b>			
	Lack of treatment of agricultural waste	1									
iransportation & snipping	Eff. (										
(1) Disposal of Stilp waste	increase in slipping traffic (cruises)	•	1	•							
	colid waster (maxima debris (alasticate)	1	1	1							
Urbanisation	Solid Mastes / Hallille debits (brasiles etc.)										
(1) Inappropriate disposal of	Increased urbanisation and volume of waste		<b>^</b>				<b>↑</b>	<b>^</b>			
	Lack of planning for increased urbanisation	<b>↑</b>		<b>^</b>			<b>↑</b>				
	Lack of or inadequate municipal waste collection system	<b>↑</b>		<b>↑</b>			<b>1</b>				
	Lack of or inappropriate municipal waste disposal sites	<b>↑</b>		<b>↑</b>			<b>↑</b>				

Lack of capacity	Inadequate	Lack of edu	Lack of ade garbage co	(8) Beach littering Expansion		v (	Weak enforcement	ı El	(7) Inappropriate disposal of Expansion solid waste	Tourism	Inadequate capacity		<b>(6)</b> Discarded and lost fishing Inappropri	Inadequate capacity		(5) Throwing / dumping solid Inadequate waste / garbage overboard	Fisheries & Aquaculture	s carried in river	(3) Solid waste carried in Inadequate surface run-off	Lack of was	Inadequate capacity	(2) Dumping of garbage Lack / wear		Waste mar (in the abs questionec	Weak or un	Finances av unspent	Unresolved dispu	No social a environme	Limited unde environment	Lack of awareness	Lack of capac enforcement	Inadequate	Inadequate I managemen		Sector and Underlying Underlying Resource Use Practice Political Co
acity	Inadequate monitoring and enforcement	Lack of education and awareness	Lack of adequate number of bins and garbage collection system	Expansion of tourism sector	iorities		al site	ack of adequate waste collection system	Expansion of tourism sector		capacity	Lack of awareness and education	Inappropriate fishing practices	capacity	Lack of awareness and education	Inadequate monitoring and enforcement		Inadequate maintenance of watercourses	Inadequate planning of urban area	Lack of waste collection system	capacity	Lack / weak enforcement	Different political priorities	Waste management organised voluntarily (in the absence of government action) questioned – is this a problem?	Weak or unimplemented legislation	Finances available for waste disposal - unspent	Unresolved disputes over land ownership for disposal sites.	No social attachment to coastal environment (no beach culture)	Limited understanding about the environment	areness	Lack of capacity for monitoring and enforcement	Inadequate monitoring and enforcement	Inadequate legislation on solid waste management		Underlying Social, Economic, Legal and Political Causes
	<b>↑</b>		<b>↑</b>	<b>↑</b>		1	١	<b>↑</b>								<b>↑</b>		1	<b>↑</b>	<b>1</b>		<b>↑</b>	1		<b>^</b>	<b>↑</b>	<b>↑</b>					<b>↑</b>	<b>↑</b>	[A]Inappropriate governance	
								<b>1</b>	<b>1</b>				<b>↑</b>																					[B]Economic drivers	
<b>↑</b>	<b>↑</b>		<b>↑</b>	<b>^</b>	<b>↑</b>	1	•	<b>↑</b>			<b>↑</b>			<b>^</b>		<b>↑</b>				<b>^</b>		<b>↑</b>	1								<b>↑</b>	<b>↑</b>		[C] Inadequate financial resources	
<b>^</b>		<b>1</b>									<b>1</b>	<b>^</b>	<b>↑</b>	<b>^</b>				<b>↑</b>	<b>↑</b>		<b>1</b>							<b>↑</b>	<b>↑</b>	<b>^</b>	<b>↑</b>			[D] Inadequate knowledge & awareness	
												<b>1</b>	<b>↑</b>		<b>1</b>													<b>↑</b>						[E] Cultural traditions	Root 0
			<b>↑</b>	<b>1</b>				<b>↑</b>					<b>↑</b>					<b>1</b>	<b>↑</b>															[F] Population pressure & demographics	Root Causes
													<b>↑</b>																					[G] Poverty & inequality	
																																		[H] Climate change & natural processes	
																								<b>↑</b>										[I] Voluntary action fills the governance void	
		<b>→</b>										<b>1</b>	<b>→</b>		<b>↑</b>			<b>1</b>	<b>↑</b>									<b>↑</b>	<b>↑</b>					[J] Personal Attitude	

Sector and Underlying	Underlying Social, Economic, Legal and					Root 0	Root Causes				
Resource Ose Practice	Political Causes	ice			. &				ral	е	
		e governanc	ivers	financial	knowledge &	ditions	oressure &	nequality	nge & natura		titude
		[A]Inappropriate	[B]Economic driv	[C] Inadequate fi resources	[D] Inadequate k awareness	[E] Cultural tradi	[F] Population pr demographics	[G] Poverty & ine	[H] Climate chan processes	[I] Voluntary acti governance void	[J] Personal Atti
Industry						1		I			
(9) Dumping of garbage	Expansion of coastal industries		<b>^</b>								
	Inadequate garbage collection facilities	<b>1</b>	<b>↑</b>								<b>1</b>
	Lack of knowledge and awareness				<b>^</b>						
	Weak enforcement	<b>^</b>									
Transportation & Shipping											
(10) Throwing solid wastes overboard	Lack of facilities for collection and disposal of solid waste at ports	<b>↑</b>		<b>↑</b>							
	Inadequate monitoring and enforcement	<b>^</b>		<b>^</b>							
	Lack of capacity			<b>↑</b>	<b>↑</b>						
	Lack of awareness, carelessness				<b>^</b>						<b>1</b>
(11) Waste disposal at sea / dumping (at sea and on land)	Lack of enforcement of maritime legislation	<b>↑</b>									
Agriculture & Forestry											
(12) No composting (80% of	No traditional practice of composting					<b>1</b>					
0.	No resources for collection			<b>↑</b>							
	Lack of awareness				<b>↑</b>						
	No training provided				<b>^</b>						
1.3.6 Oil spills Mining											
(1) Risk of accidental oils spill	Increased market demand for oil		<b>1</b>				<b>↑</b>				
c c	Global economies		<b>↑</b>								
	Potential for economic development		<b>↑</b>								
	Lack of funds or insufficient allocation of funds for monitoring and checking	<b>↑</b>		<b>↑</b>							
(2) Risk of oil spills from point of extraction	Expansion of the oil sector		<b>↑</b>								
	Global economies - market demand		<b>^</b>								
	Foreign companies with inadequate environmental management policies	<b>↑</b>									
	Poor regulation of foreign companies	<b>^</b>	<b>↑</b>		<b>↑</b>						
	Poor operational management	<b>1</b>									
	Untrained personnel			<b>1</b>	<b>↑</b>						
	Lack of proper equipment and maintenance			<b>1</b>	<b>↑</b>						
	Lack of appropriate safety procedures			<b>↑</b>	<b>↑</b>						
	No Emergency response plans in place				1						
	Limited knowledge, skills and use of best practice				<b>↑</b>						
	Lack of capacity for handling cleanup operation	<b>↑</b>		<b>↑</b>	<b>→</b>						
	Insufficient allocation of funds for monitoring companies	<b>↑</b>		<b></b>							
(3) Oil spills from refineries during processing and storage	Increased market demand for oil		<b>↑</b>								
during processing and storage											

			(7) Risk of large scale spill						<b>(6)</b> Higher Risk of oil spill in areas in proximity to shipping lanes	Transportation & Shipping									generation			(4) Oil spill from storage facility	Energy											Sector and Underlying Resource Use Practice
High risk poorly maintained vessels used for transport	Economic development pressure	Global economies - market demand	Expansion of oil industry and increased shipping traffic	Lack of information about possible natural hazards (weather, storms, freak waves)	Negligence	Global economies - market demand	Lack of or inadequate planning for shipping lanes (being addressed through WIO-highways)	Lack of or inadequate navigational resources	Increased shipping traffic		Inadequate investment	Limited knowledge, skills and use of best practice	Emergency response plans in place	Lack of appropriate safety procedures	Lack of proper equipment and maintenance	Untrained personnel	Weak operational management of facilities	Weak national planning / regulatory frameworks	Market demand for energy	Lack of capacity for handling clean up operation	Lack of funds for monitoring and checking	Increased internal demand for energy		Inadequate investment	Limited knowledge, skills and use of best practice	No Emergency response plans in place	Lack of appropriate safety procedures	Lack of proper equipment and maintenance	Untrained personnel	Weak operational management of refineries	Weak national planning / regulatory frameworks	Global economies		Underlying Social, Economic, Legal and Political Causes
<b>↑</b>							<b>↑</b>	1										<b>↑</b>		1											<b>↑</b>		[A]Inappropriate governance	
<b>^</b>	<b>↑</b>	<b>↑</b>	<b>1</b>			<b>↑</b>			<b>↑</b>								<b>1</b>		<b>1</b>			<b>^</b>		<b>↑</b>						<b>↑</b>		<b>1</b>	[B]Economic drivers	
								<b>1</b>			<b>↑</b>		<b>↑</b>	<b>^</b>	<b>1</b>						<b>1</b>			<b>↑</b>									[C] Inadequate financial resources	
				<b>1</b>	<b>1</b>		<b>1</b>	<b>1</b>				<b>↑</b>	<b>↑</b>	<b>^</b>	<b>1</b>	<b>^</b>				<b>1</b>					<b>↑</b>	<b>^</b>	<b>↑</b>	<b>↑</b>	<b>↑</b>				[D] Inadequate knowledge & awareness	
																																	[E] Cultural traditions	Root (
																			<b>1</b>			<b>^</b>											[F] Population pressure & demographics	Root Causes
																																	[G] Poverty & inequality	
				<b>↑</b>																													[H] Climate change & natural processes	
																																	[I] Voluntary action fills the governance void	
<b>↑</b>					<b>↑</b>																				_						_		[J] Personal Attitude	

Sector and Underlying Resource Use Practice				(8) Risk of large scale spill during loading off loading			(9) Small scale spills through	-	
Underlying Social, Economic, Legal and Political Causes		Negligence	Lack of information about possible natural hazards (weather, storms, freak waves)	Expansion of oil industry and increased shipping traffic	Out of date inadequate infrastructure at ports	Carelessness / Negligence	Expansion of oil industry and increased shipping traffic		Carelessness / Negligence
nce	[A]Inappropriate governance				<b>↑</b>			<b>↑</b>	
	[B]Economic drivers			<b>↑</b>			<b>1</b>		
	[C] Inadequate financial resources				<b>↑</b>				
e &	[D] Inadequate knowledge & awareness		<b>↑</b>		<b>↑</b>	<b>^</b>			1
Root	[E] Cultural traditions								
Root Causes	[F] Population pressure & demographics								
	[G] Poverty & inequality								
ıral	[H] Climate change & natural processes		<b>↑</b>						
е	[I] Voluntary action fills the governance void								
						<b>↑</b>			1