Annex 1: National CCA Meetings Schedule.

Country	Date	Location	Workshop Venue
Madagascar	14th July 2011	Antananarivo	Ivotel, V C 29 Ambohidahy Rue Razafindratandra, Antananarivo 101, MADAGASCAR
Seychelles	19th July 2011	Beau Vallon	Coco d'Or, Beau Vallon, Mahe, SEYCHELLES
Mauritius	21st July 2011	Ebene	The Link Hotel, 65, Ebene Cybercity, Ebene, MAURITIUS
Kenya	1st August 2011	Mombasa	Kenya Marine Fisheries Research Institute, English Road, Mombasa, KENYA
Comoros	3rd August 2011	Moroni	Ministère de l'Agriculture de la Pêche et de l'Environnement Moroni, COMOROS
Somalia	4th August 2011	Nairobi	Nomad Palace Hotel, General Wairungi Street, Nairobi, KENYA
Tanzania	8th August 2011	Dar es Salaam	Mbezi Garden Hotel, Bagamoya Road, DAR ES SALAAM
Mozambique	11th August 2011	Maputo	Tivoli Hotel, Av 25 de Setembro 1321, Maputo, MOZAMBIQUE
South Africa	15th August 2011	Cape Town	Department of Environmental Affairs (DEA), 8th Floor, 1 Dorp Street, Cape Town, 8000 Cape Town, SOUTH AFRICA.

Annex 2: Workplan for National CCA meetings

	Date	Day	Location	Details	Flights
1	10-Jul	Sun	Transit (pm)	Transit from London Heathrow to Johannesburg.	SA237 Y 10JUL LHR JNB HK1 2000 -0825
2	11-Jul	Mon	Transit (am) Grahamstown (pm)	Transit from Johannesburg to Grahamstown. Meeting with Ms. Lucy Scott at SAIAB.	SA405 Y 11JUL JNB PLZ HK1 1015-1155
3	12-Jul	Tue	Grahamstown (am) Grahamstown (pm)	Meeting with Ms. Lucy Scott at SAIAB to discuss workshop preparation details and printing workshops.	
4	13-Jul	Wed	Grahamstown (am) Grahamstown (pm)	Meeting with Warwick Sauer and Magnus Ngoile at SAIAB to discuss Coastal Livelihood Assessments and Policy and Governance related issues.	
5	14-Jul	Thu	Transit (am) Madgascar (pm)	LS and RK travel to Madagascar. Arrival at the Sakamanga Hotel. Finalised preparation of powerpoint presentations for the Madagascar workshop. In the afternoon met with National Focal Point for Madagascar and Dr Ranjeet Bhaghooli (RB) at the Sakamanga Hotel to discuss the CCA Analysis workshop and to prepare the attendee packs.	SA402 Y 14JUL PLZ JNB HK1 0610-0750 SA8252 Y 14JUL JNB TNR HK1 1000-1410
6	15-Jul	Fri	Madagascar	CCA Analysis meeting (0800 to 1700)	
7	16-Jul	Sat	Transit (am) Johannesberg (pm)	The Air Madagascar flight from Madagascar to Seychelles was cancelled. Transferred onto aflight route to Johannesburg to make the connection to Seychelles. Flight from Johannesburg to Seychelles overbooked and no seats made available. In transit until one hour before departure.	MD185 Y 16JUL TNR MRU HK1 1235-1630 HM54 Y 16JUL MRU SEZ HK1 1730-2000
8	17-Jul	Sun	Seychelles (am) Seychelles (pm)	LS, RB and RK arrived in Seychelles (am) transferred to the hotel. Write up of the Madagascar CCA results.	
9	18-Jul	Mon	Seychelles (am) Seychelles (pm)	Continued write up of the Madagascar CCA results. Finalised preparations for Seychelles workshop. In the afternoon LS, RB and RK met with Michelle and Denise at the Marine Parks offices to discuss the CCA workshop and to explain the process.	
10	19-Jul	Tue	Seychelles	CCA Analysis meeting (0800 to 1700)	
11	20-Jul	Wed	Seychelles (am) Transit (pm)	LS, RB, RP and RK travelled to Mauritius via Reunion. Arrived in Mauritius at 2150 and transferred to hotel.	UU432 Y 20JUL SEZ RUN HK1 1530-1805 MK249 Y 20JUL RUN MRU HK1 2105-2150
12	21-Jul	Thu	Mauritius	CCA Analysis meeting (0800 to 1700)	
13	22-Jul	Fri	Mauritius (am)	RK travelled from Mauritius to Rodrigues.	
14	30-Jul	Sat	Mauritius (pm)	RK travelled from Rodrigues to Mauritius.	
15	31-Jul	Sun	Transit (am) Transit (pm)	RK travelled from Mauritius to Johannesburg and met with LS. LS and RK travelled to Nairobi. Flight arrived late, transferred onto later flight onto Mombasa. Arrived in Mombasa at 11pm and transferred to the hotel. Met with the WIOMSA regional reviewer Dr Johnson Kitheka (JK).	MK851 Y 31JUL MRU JNB HK1 0915-1150 KQ763 K 31JUL JNB NBO HK1 1320-1825
16	01-Aug	Mon	Kenya	CCA Analysis meeting (0800 to 1800)	
17	02-Aug	Tue	Transit (am) Comoros (pm)	LS, JK, and RK transferred from Mombasa to Nairobi and onto Moroni, Comoros.	KQ623 M 02AUG MBA NBO HK1 0530-0630

				Transfer to hotel arrived by 1530. Finalised preparations for workshop and commenced write-up of Seychelles CCA workshop results.	KQ452 M 02AUG NBO HAH HK1 0840-1305
18	03-Aug	Wed	Comoros (am)	CCA Analysis meeting	
			Comoros (pm)	Continued write-up of Seychelles CCA workshop results.	KQ452 M 04AUG HAH NBO HK1 1400-1610
19	04-Aug	Thu	Comoros (am)	CCA Analysis meeting	
			Transit (pm)	Transfer from Comoros to Nairobi. Flight delayed. Arrived Nairobi 2000. Transferred to hotel.	KQ452 M 04AUG HAH NBO HK1 1400-1610
20	05-Aug	Fri	Somalia (am)	CCA Analysis meeting	
			Transit (pm)	Transfer to Dar es Salaam arrived at hotel 2300.	
21	06-Aug	Sat	Tanzania (am) Tanzania (pm)	Continued write-up of Seychelles CCA workshop results.	KQ480 M 06AUG NBO DAR HK1 0805-0920
22	07-Aug	Sun	Tanzania	Commenced write-up of Mauritius CCA workshop results.	
23	08-Aug	Mon	Tanzania	CCA Analysis meeting	
24	09-Aug	Tue	Transit (am) Mozambique (pm)	LS, JK and RK transfer from Dar es Salaam via Johannesburg to Maputo, Mozambique.	SA189 Y 09AUG DAR JNB HK1 0730-1010 SA144 Y 09AUG JNB MPM HK1 1350-1455
25	10-Aug	Wed	Mozambique	LS, JK and RK meeting at MICOA, Maputo to discuss the CCA Analysis workshop and to explain the process to the workshop facilitators to better enable translation.	
26	11-Aug	Thu	Mozambique	CCA Analysis meeting	
27	12-Aug	Fri	Mozambique (am) Transit (pm)		SA786 Y 12AUG MPM CPT HK1 1245-1520
28	13-Aug	Sat	South Africa		
29	14-Aug	Sun	South Africa		
30	15-Aug	Mon	South Africa	CCA Analysis meeting	
31	16-Aug	Tue	South Africa		SA220 Y 16AUG CPT LHR HK1 1845-0620

Annex 3: Causal Chain Analysis Workshop Agenda

Time	Activity	Type
08h00	Registration	
08h30	Welcome and Introduction	
08h45	**Session 1**	
08h45	ASCLMES Project Overview and Update	Presentation 1
09h00	Introduction to Causal Chain Analysis (CCA)	Presentation 2
09h15	National Issues of Concern identified from MEDAs	Presentation 3
09h30	Issues of Concern – Part 1 – Prioritisation	Group Work 1
10h30	Tea	
11h00	**Session 2**	
11h00	Issues of Concern – Part 2 – Impacts	Group Work 2
12h45	Issues of Concern – Review	Report Back 1
13h00	Lunch	
14h00	**Session 3**	
14h00	Causal Chain Analysis – Part 1	Group Work 3
15h30	Tea	
16h00	**Session 4**	
16h00	Causal Chain Analysis – Part 2	Group Work 4
17h00	Causal Chain Analysis – Report Back	Report Back 2
17h30	Closing and thanks	

Annex 4 Powerpoint presentations for the Workshops (Part I)

Causal Chain Analysis Workshop

The Agulhas and Somali Current Large Marine Ecosystems Project

Overview and update

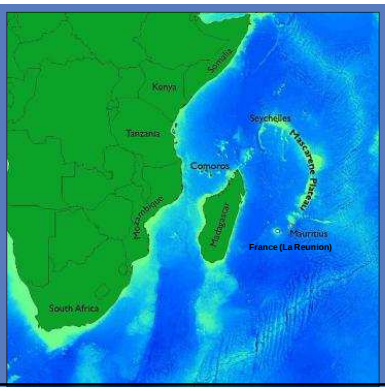
GEF Projects

1. Addressing Land-based Activities in the Western Indian Ocean (WIO-LaB), focusing on the issues relating to land-based sources of pollution and other activities that impact on the marine and coastal environment (UNEP).
2. South Western Indian Ocean Fisheries Project (SWIOFP), addressing the issues related to assessment and shared management of the region's offshore commercial fisheries (World Bank).
3. Agulhas and Somali Currents Large Marine Ecosystem (ASCLME) Project, whose scope is focused on issues relating to ocean dynamics, productivity, artisanal fisheries, coastal livelihoods, marine pollution and invasive species (UNDP).

ASCLME objectives

- understand the major transboundary impacts within these ecosystems,
- strengthen scientific and management expertise,
- with a view to introducing/strengthening an ecosystem approach to managing living marine resources.

Agulhas and Somali Currents Large Marine Ecosystem (ASCLME) Project



- Somalia
- Kenya
- Tanzania
- Mozambique
- South Africa
- Comoros
- Madagascar
- Seychelles
- Mauritius
- (France)

Five years 2008-2012

ASCLME Objectives

Through a participative, multi-country process of setting priorities and adopting commitment to action.

Deliverables:
1) Transboundary Diagnostic Analysis (TDA)
2) Strategic Action Programme (SAP)

A **Transboundary Diagnostic Analysis** (TDA) is a scientific and technical process of fact-finding (or diagnosing) the state of, and threats to, international waters.

A **Strategic Action Programme** (SAP) is a pragmatic, workable framework and unambiguous statement of common goals and objectives and the means of their achievement.

GEF IW LME Projects: TDA/SAP Process

The typical TDA/SAP process can be divided into 5 phases:

1. Project development
2. Planning the TDA/SAP
3. TDA development
4. SAP formulation
5. SAP implementation

TDA = Transboundary Diagnostic Analysis
SAP = Strategic Action Programme

Marine Ecosystem Diagnostic Analyses The Country Level Approach

The ASCLME project is approaching the TDA-SAP process at the country level through a national Marine Ecosystem Diagnostic Analysis (MEDA)

MEDAs have been developed by teams in each country to compile comprehensive, updated state of the environment information together, as well as to develop a diagnostic analysis of threats to the national marine ecosystem.

MEDA reports are the basis for each country's contribution to the TDA

The long-term aim would be to update the MEDAs and the TDAs on a regular (5-10 year?) basis

MEDAs x 9

Marine Ecosystem Diagnostic Analyses The Country Level Networking

The MEDAs have received input from all sectors within governments as well as from the private sectors, NGOs and communities. They cover issues that include:

- Inshore fisheries, pollution, habitat distribution and health, observed changes and variability in the ecosystem
- Socioeconomic linkages
- Governance structures and their shortfalls
- Capacity building needs
- Data management and data networking
- Community involvement and empowerment

The MEDAs also aim to review in-country ecosystem monitoring to support planning for integrated LME monitoring

MEDAs identify

i) AREAS OF CONCERN With particular attention to

a) Issues within the country that are caused or influenced by other countries / international activities,
b) Regional issues (shared),
c) Activities or issues within the country that have an influence externally – on other countries or on areas beyond national jurisdiction.

ii) DATA sets relevant to each section

iii) GAPS in knowledge and recommendations to address these sectors.

ASCLME TDA/SAP Process

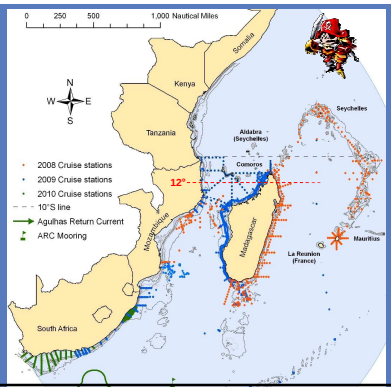
1. Project development
2. Planning the TDA/SAP

MEDAs x 9

3b. TDA development
4. SAP formulation
5. SAP implementation

TDA = Transboundary Diagnostic Analysis
SAP = Strategic Action Programme

ASCLME Offshore Surveys & Monitoring



Primary Activities of the ASCLME Project

Offshore Ecosystem Assessment Cruises

Cruises are being developed in conjunction with the FAO-EAF Nansen Project and SWIOFP to ensure an effective ecosystem monitoring approach is employed. Cruises focus on:

- Meteorological and hydrographical sampling

Air and sea temperature, salinity, chlorophyll, current and wind speed and direction

- Plankton Sampling

Phytoplankton and zooplankton abundance and distribution;

- Biological Fish Sampling

Weight and length measurements; genetic (DNA) analysis

- Acoustic biomass estimation

Additional activities for ecosystem monitoring and early warning

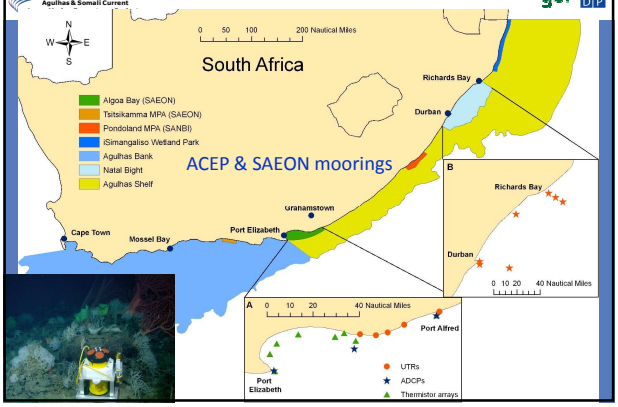
Deployment of ocean-atmosphere data capture moorings (ATLAS) for climate and ecosystem change early warning (in collaboration with NOAA)

Deployment of drifters and Argo floats for long-term data capture of water column parameters (in collaboration with NOAA)

Servicing and maintenance of seabed deployed Underwater Temperature Recorders (in collaboration with Royal Dutch Institute for Marine Research)

Comparative surveys of dipole eddies and productivity within the Mozambique channel (in collaboration with SWIOFP and IRD)

ASCLME Inshore Surveys & Monitoring



In-country training: Inshore

Participating countries have been assisted to commence or augment inshore oceanographic monitoring.

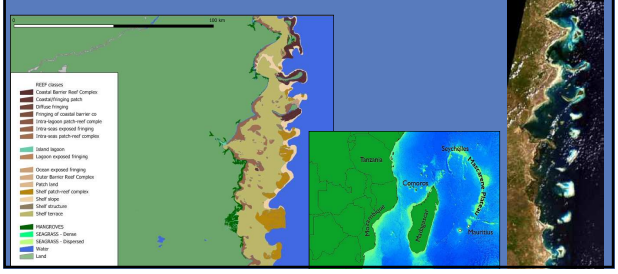
Training course (hosted by the MOI)

Countries have submitted monitoring plans

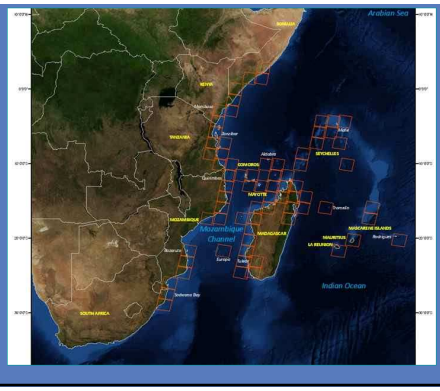
- YSI Multi-meter (salinity, temperature, depth & space available for either O2 / pH / chlorophyll) & 200 m capable
- GPS linked to YSI
- 5 L Niskin bottle & 200 m rope to collect water samples

Nearshore habitats

- The ASCLME Project and the IRD have jointly undertaken a baseline high resolution assessment of coastal reef, seagrass and mangrove habitats in the Western Indian Ocean (WIO)



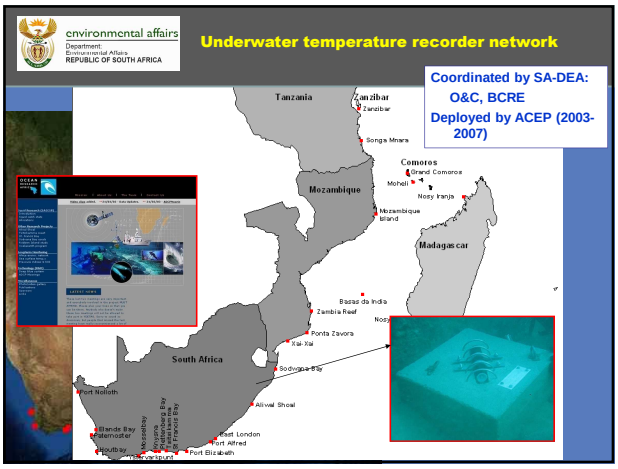
ASCLME Landsat Image Archive



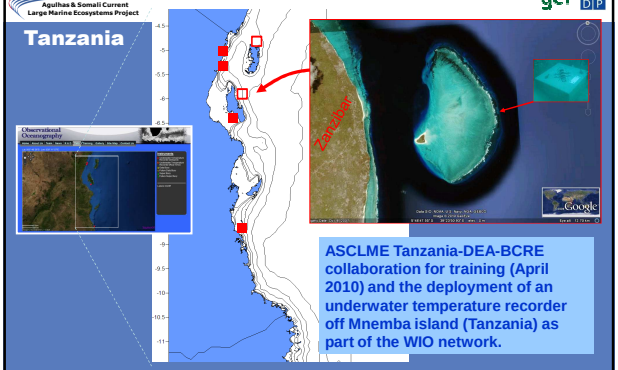
Connectivity study

- Hydrodynamic connectivity and dispersal modelling of fish larvae
- Connectivity between reefs of the WIO
- In collaboration with with IRD (Research Institute for the Development), La Réunion University, Marine Geospatial Ecology Laboratory (Duke University, USA) and AVISO (altimetry data) modellers.

Underwater temperature recorder network



WIO UTR network



ASCLME Tanzania-DEA-BCRE collaboration for training (April 2010) and the deployment of an underwater temperature recorder off Mnemba island (Tanzania) as part of the WIO network.

Other Important Activities for Sustainability

Data management

Cruise data provided to scientists and national data managers.
Literature, metadata and data management in-country
Integrated regional policy for data management to ensure sustainability.

Capacity Building and Training

A 3-week programme for local scientific trainees (2008 and 2009).

21 scientists now trained to work in Ecosystem Assessment (11 undertaken extensive cruises and publishing papers)

National Training plans

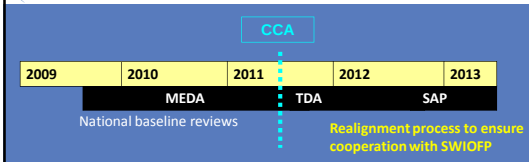
Communications and Participation

A participatory Communications Strategy for stakeholder engagement and community involvement

Next steps

- **ASCLME and SWIOFP have committed to a roadmap for joint TDA and SAP development, between now and early 2013, with SWIOFP data contributions coming in in Mid-2012.**
- The next step in the development of the joint regional TDA is the **Causal Chain Analysis (CCA)**, which will draw out the transboundary Issues of Concern in the ASCLME-supported MEDA reports.
- **This is what we're doing today!**
- The causal chain analysis will prioritise and critically analyse the most important issues or problems identified in MEDAs in order for them to be targeted by appropriate policy measures for remediation or mitigation.
- Although the focus of these CCA meetings will be on environmental and artisanal fisheries issues, it will be essential for SWIOFP to participate in this process, so that issues related to commercial fisheries can be addressed in 2012 when the SWIOFP data gathering activities are complete.

Next steps



- A Causal Chain Analysis meeting will be held in each country

CCA Meeting date		Location
15-Jul	Friday	Madagascar
19-Jul	Tuesday	Seychelles
21-Jul	Thursday	Mauritius
01-Aug	Monday	Kenya - Mombasa
03-Aug	Wednesday	Comoros
05-Aug	Friday	Somalia - In Nairobi
08-Aug	Monday	Tanzania - Dar
11-Aug	Thursday	Mozambique
15-Aug	Monday	South Africa - Cape Town

- It will facilitate the incorporation of MEDA issues into a standard regional framework
- The Causal Chain Analysis report will be checked by each country
- The Causal Chain Analysis will be a component of your national MEDA
- It will guide the framework for the regional TDA

Causal Chain Analysis Workshop

The Agulhas and Somali Current Large Marine Ecosystems Project

MEDA to TDA

ASCLME TDA/SAP Process

1. Project development
2. Planning the TDA/SAP
3. MEDAs x 9
3b. TDA development
4. SAP formulation
5. SAP implementation

TDA = Transboundary Diagnostic Analysis
SAP = Strategic Action Programme

TDA Steps

1. Identification and initial prioritisation of transboundary problems (often termed Scaling – Scoping – Screening)
2. Gathering and interpreting information on environmental impacts and socio-economic consequences of each problem
3. Final prioritisation of transboundary problems
4. Causal chain analysis (including root causes)
5. Governance Analysis of institutions, laws, policies and projected investments (institutional/governance analysis)

MEDA Steps

1. Identification and initial prioritisation of transboundary problems
2. Gathering and interpreting information on environmental impacts and socio-economic consequences of each problem
3. Prioritisation of transboundary problems
4. Causal chain analysis (including root causes)
5. Governance analysis of institutions, laws, policies and projected investments (institutional/governance analysis)

These are the same as the TDA steps but at the NATIONAL LEVEL…. to be repeated at the REGIONAL LEVEL for TDA

CCA Workshop Agenda

GROUP WORK SESSION 1
Identification and initial prioritisation of transboundary problems

GROUP WORK SESSION 2
Environmental impacts and socio-economic consequences of issues

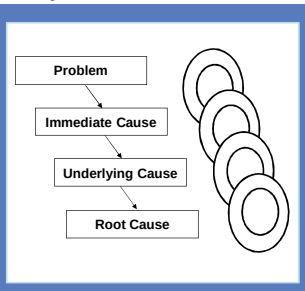
REPORT BACK 1
Review of priority transboundary problems

GROUP WORK SESSION 3 & 4
Causal chain analysis (including root causes)

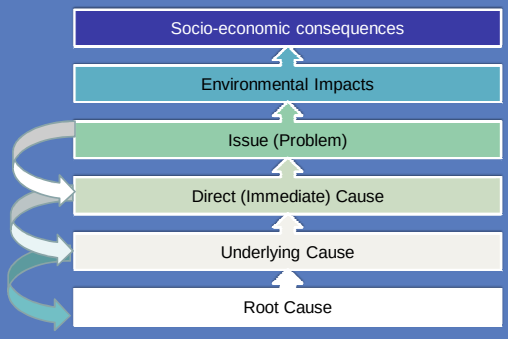
REPORT BACK 2
Report back on causal chain analyses

What is Causal Chain Analysis?

- A causal chain is a series of statements linking the causes of a problem with its effects
- Each link in the chain is forged by answering the question "*why? - what is the cause?*"
- A simple causal chain is one-dimensional – but there are also often interlinkages between causes and effects, and between sectors that need to be taken into account.



Causal Chain Analysis (GEF IW)



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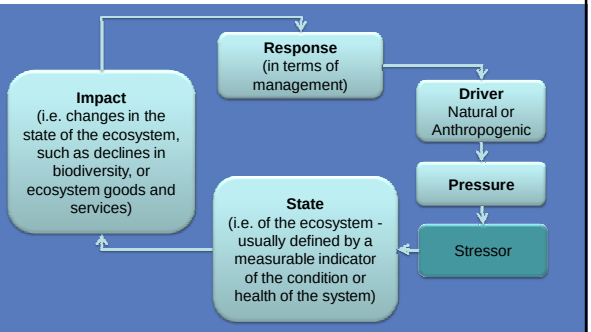
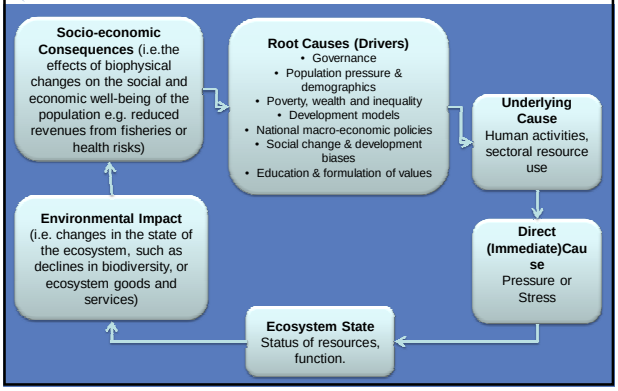
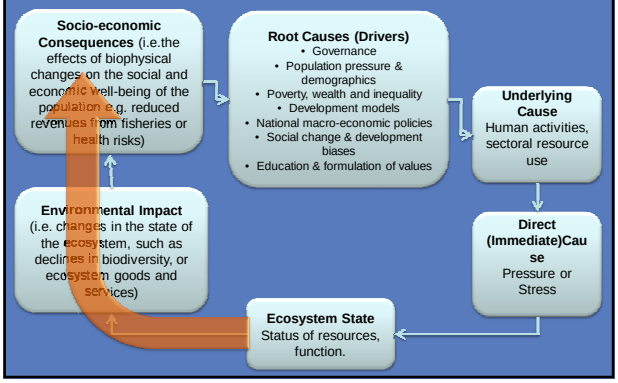


The *pressure* on the ecosystem is the result of a *driver* acting through a *stressor* or multiple stressors, which have an effect on the *state* of the ecosystem

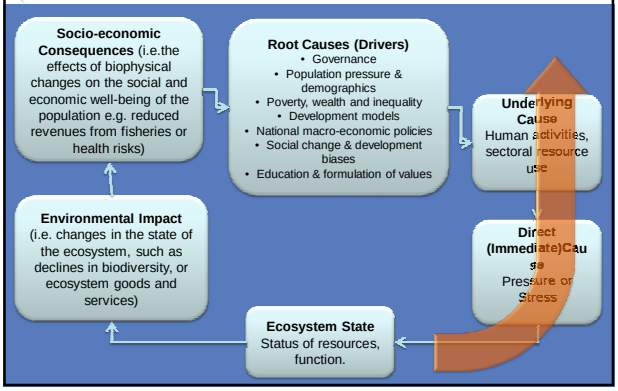
MEDA to TDA



Impacts – up the chain



Causal Chain Analysis



Causal Chain Analysis

The Agulhas and Somali Current Large Marine Ecosystems Project

Draft Regional Issues Framework

ASCLME TDA/SAP Process

1. Project development
2. Planning the TDA/SAP
MEDAs x 9
3b. TDA development
4. SAP formulation
5. SAP implementation

TDA = Transboundary Diagnostic Analysis
SAP = Strategic Action Programme

Issue captured from MEDAs

MEDAs x 9

Issues captured from MEDA x 9

Identification of Issue Categories

MEDAs x 9

Identification of Issue Categories & Main Areas of Concern

Main Area of Concern | Main Area of Concern | Main Area of Concern | Main Area of Concern

Creation of Draft Regional Issues Framework

MEDAs x 9

Issues captured from MEDA x 9

Identification of Issue Categories

Main Area of Concern | Main Area of Concern | Main Area of Concern | Main Area of Concern

Categorisation of national issues

For discussion and validation by countries → Draft Regional Issues Framework

e.g. Issues captured from MEDAs

- *The main point sources that cause pressures on the environment are the effluents from households, industries and hotels. At present 25% of the population is connected to a public sewerage system. 73% of the population makes use of onsite disposal systems consisting of either cess pits or septic tanks followed by absorption systems. The remaining 2 % make use of pit latrines. Most of the effluents are either discharged directly to the sea or are carried by rain runoff and rivers*
- *The sports fishery catch is estimated at 600 tonnes with majority of catch being the marlin and tunas. Reliable data are lacking as the landed catch is beyond the control of the Fisheries Protection Service (FPS); moreover, as they are registered with the Ministry of Tourism, they are not bound by law to report landed catch. The main species caught around FADs are yellow-fin tuna, albacore, skipjack, dolphin and wahoo.*

Categorisation of National Issues

1.3.2 Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources

Fish mortality has become quite common in recent years. This has been attributed to discharge of untreated effluents mainly from industries and sewage plants as well as pesticides and uncontrolled use of fertilizers from coastal agricultural activities.

1.3.6 Oil spills (drilling, exploitation, transport, processing, storage, shipping).

Foreign fishing vessels are the cause of major oil pollution of port waters, it is testified by various parties that fishing vessels, prior to taking to sea, for a shipping campaign, leave drums of used lubricating oil on the quay without any instructions or message.

Categorisation of National Issues

2.1 Shoreline change, due to modification, land reclamation and coastal erosion

- *Hard structures placed too near the shoreline gave rise initially to localized erosion. Seawalls built to contain the erosion gave rise to further erosion down drift and other protection measures were taken.*
  .

Categorisation of National Issues

3.2.2 Declines in populations of large pelagics

The sports fishery catch is estimated at 600 tonnes with majority of catch being the marlin and tunas. Reliable data are lacking as the landed catch is beyond the control of the Fisheries Protection Service (FPS); moreover, as they are registered with the Ministry of Tourism, they are not bound by law to report landed catch. The main species caught around FADs are yellow-fin tuna, albacore, skipjack, dolphin and wahoo.

Draft Regional Issues Framework

1. Water Quality Degradation

Major Area of Concern	No.	Issue categories	Comoros	Kenya	Madagascar	Mauritius	Mozambique	South Africa	Seychelles	Somalia	Tanzania	TOTAL
1. Water quality degradation	1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	✓	✓	✓	✓	✓	✓	✓	✓	✓	8
	1.2.	Degradation of ground and surface water quality		✓	✓	✓		✓	✓	✓	✓	7
	1.3.	Degradation of coastal and marine water quality		✓	✓	✓	✓	✓	✓	✓	✓	8
	1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources		✓	✓	✓	✓		✓	✓		6
	1.3.2	Nutrient enrichment from land-based (domestic, industrial, agriculture, livestock) and marine (mariculture) sources		✓	✓	✓	✓		✓	✓	✓	7
	1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources			✓	✓	✓	✓	✓	✓	✓	7
	1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone		✓	✓	✓	✓	✓	✓	✓		7
	1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources		✓	✓	✓			✓	✓	✓	6
	1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).		✓	✓	✓	✓	✓	✓	✓	✓	8

2. Habitat & Community Modification

Major Area of Concern	No.	Issue categories	Comoros	Kenya	Madagascar	Mauritius	Mozambique	South Africa	Seychelles	Somalia	Tanzania	TOTAL
2: Habitat and community modification	2.1.	Shoreline change, due to modification, land reclamation and coastal erosion		✓	✓	✓	✓	✓	✓	✓	✓	8
	2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats		✓	✓	✓	✓	✓	✓	✓	✓	8
	2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)			✓	✓		✓	✓	✓		5
	2.2.2.	Disturbance, damage and loss of coastal forest habitats		✓	✓			✓			✓	4
	2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)		✓	✓	✓	✓	✓	✓	✓	✓	8
	2.2.4.	Disturbance, damage and loss of wetland habitats		✓	✓	✓						3
	2.2.5.	Disturbance, damage and loss of estuarine habitats		✓					✓		✓	3
	2.2.6.	Disturbance, damage and loss of mangrove habitats		✓	✓	✓	✓	✓		✓	✓	7
	2.3.	Disturbance, damage and loss of subtidal benthic habitats		✓	✓	✓	✓	✓	✓		✓	7
	2.3.1.	Disturbance, damage and loss of coral reef habitats		✓	✓	✓	✓	✓	✓	✓	✓	8
	2.3.2.	Disturbance, damage and loss of seagrass habitats		✓	✓	✓	✓		✓	✓	✓	7
	2.3.3.	Disturbance, damage and loss of macroalgal habitats						✓				1
	2.3.4.	Disturbance, damage and loss of soft sediment habitats		✓	✓	✓	✓	✓	✓	✓	✓	8
	2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)			✓			✓				2
	2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)		✓	✓	✓		✓	✓	✓		6

3. Declines in living marine resources

Major Area of Concern	No.	Issue categories	Comoros	Kenya	Madagascar	Mauritius	Mozambique	South Africa	Seychelles	Somalia	Tanzania	TOTAL
3: Declines in living marine resources	3.1.	Declines in populations of focal species		✓	✓	✓	✓	✓	✓	✓	✓	8
	3.1.1.	Declines in populations of marine mammals		✓	✓	✓	✓	✓	✓	✓	✓	8
	3.1.2.	Declines in populations of cetaceans			✓		✓		✓	✓		4
	3.1.3.	Declines in populations of seabirds		✓	✓	✓	✓	✓	✓	✓		7
	3.1.4.	Declines in populations of turtles		✓	✓	✓	✓	✓	✓	✓	✓	8
	3.2.	Declines in populations of commercial fish stocks		✓	✓	✓	✓	✓	✓	✓	✓	8
	3.2.1.	Declines in populations of sharks and rays			✓	✓	✓	✓	✓	✓		6
	3.2.2.	Declines in populations of large pelagics			✓	✓		✓	✓	✓		5
	3.2.3.	Declines in populations of small pelagics			✓			✓		✓	✓	4
	3.2.4.	Declines in populations of deep water demersals						✓			✓	2
	3.2.5.	Declines in populations of reef and demersal fish		✓	✓	✓	✓	✓	✓	✓	✓	8

3. Declines in living marine resources

Major Area of Concern	No.	Issue categories	Comoros	Kenya	Madagascar	Mauritius	Mozambique	South Africa	Seychelles	Somalia	Tanzania	TOTAL
	3.3.	Declines in populations of commercial invertebrates	✓	✓	✓	✓	✓	✓	✓	✓	✓	8
	3.3.1.	Declines in populations of molluscs (bivalves, gastropods)			✓			✓		✓	✓	4
	3.3.2.	Declines in populations of abalone						✓				1
	3.3.3.	Declines in populations of cephalods			✓	✓					✓	3
	3.3.4.	Declines in populations of sea cucumbers		✓	✓	✓			✓	✓	✓	6
	3.3.5.	Declines in populations of sea urchins			✓							1
	3.3.6.	Declines in populations of prawns and shrimp			✓	✓	✓			✓	✓	5
	3.3.7.	Declines in populations of lobsters			✓					✓	✓	3
	3.3.8.	Declines in populations of crayfish			✓					✓		2
	3.3.9.	Declines in populations of crabs		✓	✓					✓		3
	3.4.	Excessive bycatch and discards		✓	✓	✓	✓	✓		✓	✓	7
	3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)		✓	✓	✓	✓	✓	✓			6

4. Unpredictable Environmental Variability and Extreme Events

Major Area of Concern	No.	Issue categories	Comoros	Kenya	Madagascar	Mauritius	Mozambique	South Africa	Seychelles	Somalia	Tanzania	TOTAL
4. Risks, unpredictable environmental variability and extreme events	4.1.	Climate hazards and extreme weather events (cyclones, storms, rainfall, coastal flooding)		✓	✓	✓	✓	✓	✓	✓	✓	8
	4.2.	Sea level change		✓	✓	✓	✓	✓	✓	✓	✓	8
	4.3.	Ocean acidification		✓	✓	✓		✓	✓	✓	✓	7
	4.4.	Changes in seawater temperatures		✓	✓	✓	✓	✓	✓	✓	✓	8
	4.5.	Changes to hydrodynamics and ocean circulation			✓		✓	✓		✓		4
	4.6.	Changes in productivity (shifts in primary and secondary production)		✓	✓	✓		✓	✓	✓		6
	4.7.	Geohazards (tsunamis, volcanic eruptions, earthquakes)		✓		✓	✓	✓		✓	✓	6

Mauritius
Issues Identified from MEDA

1. Water Quality Degradation

Issue Categories

1.1 Alteration of natural river flow and changes in freshwater input and sediment load	✓
1.2 Degradation of ground and surface water quality	✓
1.3 Degradation of coastal and marine water quality	✓
1.3.1 Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	✓
1.3.2 Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	✓
1.3.3 Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	✓
1.3.4 Suspended solids in coastal waters due to human activities on land and in the coastal zone	✓
1.3.5 Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	✓
1.3.6 Oil spills (drilling, exploitation, transport, processing, storage, shipping).	✓

2. Habitat & Community Modification

Issue Categories

2.1 Shoreline change, due to modification, land reclamation and coastal erosion	✓
2.2 Disturbance, damage and loss of coastal, watershed and upland habitats	✓
2.2.1 Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	✓
2.2.2 Disturbance, damage and loss of coastal forest habitats	
2.2.3 Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	✓
2.2.4 Disturbance, damage and loss of wetland habitats	✓
2.2.5 Disturbance, damage and loss of estuarine habitats	
2.2.6 Disturbance, damage and loss of mangrove habitats	✓

2. Habitat & Community Modification

Issue Categories	
2.3 Disturbance, damage and loss of subtidal benthic habitats	✓
2.3.1 Disturbance, damage and loss of coral reef habitats	✓
2.3.2 Disturbance, damage and loss of seagrass habitats	✓
2.3.3 Disturbance, damage and loss of macroalgal habitats	
2.3.4 Disturbance, damage and loss of soft sediment habitats	✓
2.3.5 Disturbance, damage and loss of deep water habitats (including sea mounts)	
2.4 Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	✓
2.5 Increase in the occurrence of harmful or toxic algal blooms (HABs)	✓
2.6 Introduction of exotic non-native species, invasives and nuisance species	✓

3. Declines in living marine resources

Issue Categories	
3.1 Declines in focal species	✓
3.1.1 Declines in populations of marine mammals	✓
3.1.2 Declines in populations of cetaceans	
3.1.3 Declines in populations seabirds	✓
3.1.4 Declines in populations of turtles	✓
3.2 Declines in populations of commercial fish species	✓
3.2.1 Declines in populations of sharks and rays	✓
3.2.2 Declines in populations of large pelagics	✓
3.2.3 Declines in populations of small pelagics	
3.2.4 Declines in populations of deep water demersals	
3.2.5 Declines in populations of reef and demersal fish	✓

3. Declines in living marine resources

Issue Categories	
3.3 Declines in populations of commercial invertebrates	✓
3.3.1 Declines in populations of molluscs (bivalves, gastropods)	✓
3.3.2 Declines in populations of abalone	
3.3.3 Declines in populations of cephalopods	✓
3.3.4 Declines in populations of sea cucumbers	✓
3.3.5 Declines in populations of sea urchins	
3.3.6 Declines in populations of prawns and shrimp	✓
3.3.7 Declines in populations of lobsters	
3.3.8 Declines in populations of crayfish	
3.3.9 Declines in populations of crabs	
3.4 Excessive bycatch and discards	✓
3.5 Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)	✓

4. Unpredictable Environmental Variability and Extreme Events

Issue Categories	
4.1 Climate hazards and extreme weather events (cyclones, storms, rainfall, coastal flooding)	✓
4.2 Sea level change	✓
4.3 Ocean acidification	✓
4.4 Changes in seawater temperatures	✓
4.5 Changes to hydrodynamics and ocean circulation	✓
4.6 Changes in productivity (shifts in primary and secondary production)	✓
4.7 Geohazards (tsunamis, volcanic eruptions, earthquakes)	✓

To Do List…

GROUP WORK SESSION 1

- Check if the issues captured in framework are correct
- Rank the issues at national level
- Identify those issues that might be transboundary
- Identify baseline data
- Identify monitoring programmes
- Identify any gaps
- Define the Severity of the Issues
- Define the Scope of the Issues

N.B.This will be done in every country and it will help to validate refine the Draft Regional Issues Framework.

- **13:30-14:15 Impacts discussion (continue)**
- **14:15-14:30 Intro to CCA (15 mins)**
- **14:30-15:30 Group Work on CCA**
- **15:30-16:00 Tea**
- **Group Work 16:00-17:00**

- **THANK YOU!!**

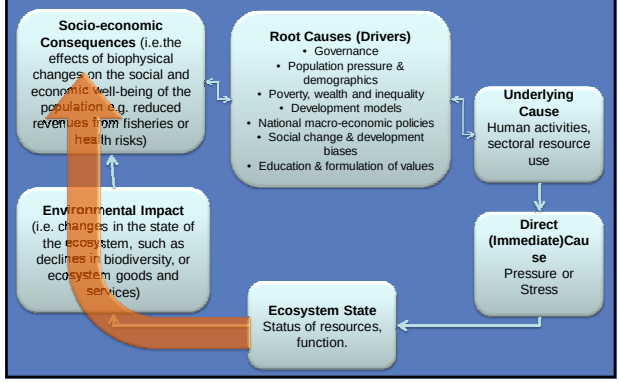
Annex 5 Powerpoint presentations for the Workshops (Part II)

Causal Chain Analysis

The Agulhas and Somali Current Large Marine Ecosystems Project

GROUP WORK SESSION 2
Draft Impacts & Causes

Impacts



Environmental Impacts

Environmental Impacts

- The effects of a transboundary problem on the integrity of an ecosystem.
- Not an environmental impact assessment (EIA) which is a tool to identify and assess the *potential* environmental impacts of a *proposed* project.
- Also think about how the impact upon ecosystem services.

Ecosystem Services

- Ecosystem Services are……. *"the direct and indirect contributions of ecosystems to human well-being"* (TEEB 2011).
- This follows the Millennium Assessment definition except that it makes a distinction between services and benefits and acknowledges that services can benefit stakeholders different ways.
- e.g. the opportunities provided for recreation and tourism by a healthy marine ecosystem bring different benefits to tour operators than they do to fishers.

Ecosystem Services

PROVISIONING SERVICES

Pro1	Food (e.g. fish, game fruit)
Pro2	Freshwater (e.g. for drinking, irrigation, cooling)
Pro3	Raw materials (e.g. fibre, timber, fuelwood, fodder, fertilizer)
Pro4	Genetic resources (e.g. for crop improvements and medicinal purposes)
Pro5	Biochemical medicines and pharmaceuticals (e.g. biochemical products, and test organisms)
Pro6	Ornamental resources (e.g. artisan work, decorative plants, pet animals, fashion)
Pro7	Geological resources*
Pro8	Energy*

Ecosystem Services

REGULATING SERVICES

Reg1	Air quality regulation (e.g. Capturing dust, chemicals, etc)
Reg2	Climate regulation (e.g. Carbon sequestration, influence of vegetation on rainfall etc.)
Reg3	Natural hazard regulation (e.g. Storm protection and flood prevention)
Reg4	Regulation of water flows (e.g. Natural drainage, irrigation and drought prevention)
Reg5	Waste treatment (especially water purification)
Reg6	Erosion regulation / prevention
Reg7	Nutrient cycling and maintenance of fertility (incl. soil formation)*
Reg8	Pollination
Reg9	Biological control (e.g. Seed dispersal, pest and disease control)

Ecosystem Services

SUPPORTING / HABITAT SERVICES

Sup1 Maintenance of life cycles (incl. nursery, spawning, breeding, feeding)
Sup2 Maintenance of genetic diversity (gene pool protection)
Sup3 Photosynthesis & Primary production*
Sup4 Secondary production*

Ecosystem Services

CULTURAL & AMENITY SERVICES

Cul1 Aesthetics information
Cul2 Opportunities for recreation, tourism and lifestyle
Cul3 Inspiration for culture, art and design (Cultural heritage values)
Cul4 Spiritual experience
Cul5 Bequest, intrinsic and existence*
Cul6 Information for cognitive development Knowledge systems and education values
Cul7 Social relations*
Cul8 Sense of place*

Socio-economic Consequences

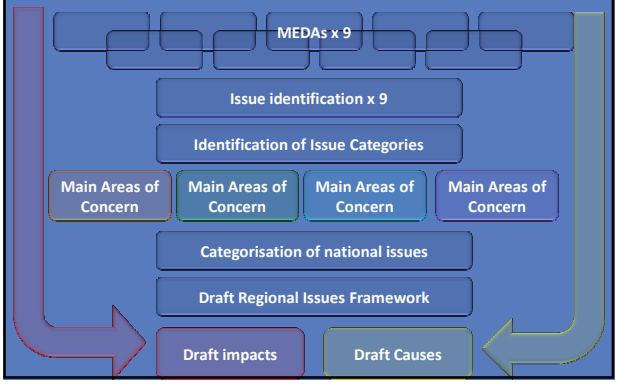
Socio-economic consequences
Changes in the socio-economic situation due to the issue or its environmental impacts.

There are a vast range of possible socio-economic consequences

- Economic benefits and values (welfare)
- Socio-cultural benefits and values (wellbeing)
- Ecological benefits and values (sustainbility, resilience)

Think about different stakeholder groups and who will be impacted and how.

Draft Generic Impacts & Causes



1. Water Quality Degradation

Example Impacts - Environmental

- Shoreline changes (erosion / accretion)
- Increased siltation & turbidity
- Salinisation of soils
- Degradation of floodplains, deltas & coastal ecosystems
- Degradation of saltmarshes
- Degradation of mangroves
- Degradation of coral reefs
- Degradation of seagrass
- Decreased natural productivity
- Loss of biodiversity

1. Water Quality Degradation

Example Impacts – Socio-economic

- Loss of life and property
- Degradation of soil quality
- Reduced touristic value
- Human health risk through contact recreation
- Human health risk through ingestion of contaminated seafood
- Loss of fisheries resources & revenue
- Reduced quality of seafood products

1. Water Quality Degradation

Example Causes

- Disposal of un- or undertreated municipal waste
- Industries discharging un-or undertreated wastewater
- Waste from coastal mining & exploration activities
- Waste products from aquaculture/mariculture
- Dumping of chemical waste at sea
- Dredging
- Contaminated surface and sub-surface run-off (from municipal, industrial & agricultural areas)
- River discharges transporting waste from catchment areas
- Atmospheric emissions
- Spills from tankers, oil refineries & oil exploration
- Public littering in coastal areas
- Abandoned fishing gear.

2. Habitat & Community Modification

Example Impacts - Environmental

- Increased coastal erosion
- Increased sand accretion
- Increased sedimentation and turbidity
- Reduced water quality
- Increased vulnerability to coastal flooding
- Decline in flow volume of river
- Increased salt water intrusion
- Reduced area of critical habitats (feeding, breeding, spawning grounds)
- Decline in populations of seabirds
- Decline in populations of turtles
- etc

2. Habitat & Community Modification

Example Impacts – Socio-economic

- Loss of life and property
- Reduced revenue from fisheries
- Reduced food security
- Reduced freshwater availability
- Reduced raw materials (building etc)
- Reduced touristic value
- Loss of cultural heritage
- Threats to public health
- Increased poverty

2. Habitat & Community Modification

Example Causes

- Mining of beach sand and rock and removal of corals
- Land reclamation
- Construction of sea defences
- Pollution (discharge of wastewater, agricultural and industrial effluents, oil spills)
- Release of ballast water
- Overfishing
- Destructive fishing practices
- Anchor damage
- Seagrass removal for tourist developments
- Beach replenishment
- Introduction of alien or invasive species
- Dredging for ports and harbours

3. Declines in living marine resources

Example Impacts - Environmental

- Loss of biodiversity
- Loss of marine biomass (and productivity)
- Changes in nutrient cycling pathways
- Reduction in genetic diversity of wild populations (meta-populations) and implications for their long term survival
- Enhanced risk of extinction of vulnerable or endangered species
- Trophic cascades (food web impacts) associated with the removal of apex predators
- Trophic cascades associated with other keystone predators (e.g. Lethrinids and sea urchins)
- Shifts in benthic cover / composition as the result of the loss of the species / group
- Reduction in food available to other species (food-web cascade) as a result of fishery

3. Declines in living marine resources

Example Impacts – Socio-economic

- Reduction in food security
- Reduction in opportunities for recreation, tourism and leisure
- Reduction in aesthetics 'landscape/seascape' value of the natural environment
- Reduction in future use value (bequest, intrinsic and existence value)
- Decrease in value of catches as a result of "fishing down the food chain"
- Reduction in income generating livelihoods
- Reduction in local biodiversity and derivable
- Reduction in ornamental resources
- Reduction in biomedical resources
- Impacts upon traditional resource use patterns
- Livelihood impacts due to theft and vandalism

3. Declines in living marine resources

Example Causes

- Incidental capture (artisanal / traditional) as a non-target species
- Unsustainable harvesting (artisanal / traditional)
- Destructive (artisanal / traditional) fishing practices (dynamite, pull seine nets, poisons)
- Recruitment overfishing (juveniles) due to the use of destructive methods (e.g. poisons)
- Recruitment overfishing (juveniles) due to the use of non-selective gear (e.g. beach seines)
- Unsustainable harvesting (commercial)
- Competition between artisanal and recreational fishers
- Competition between artisanal and commercial
- Mortality as a result of boat strikes and ship collisions
- Coral bleaching and a reduction in live coral cover and complexity of habitats

To Do List…

GROUP WORK SESSION 2

- Identify environmental impacts (ecosystem services)
- Identify socio-economic consequences for different stakeholder groups (economic - welfare, social - wellbeing and sustainability - ecological)

REPORT BACK

- Review the prioritisation of issues.

To Do List…

GROUP WORK SESSION 3

- Causal Chain Analysis for priority transboundary issues

CCA Workshop Agenda

GROUP WORK SESSION 1
Identification and initial prioritisation of transboundary problems

GROUP WORK SESSION 2
Environmental impacts and socio-economic consequences of issues

REPORT BACK 1
Review of priority transboundary problems

GROUP WORK SESSION 3 & 4
Causal chain analysis (including root causes)

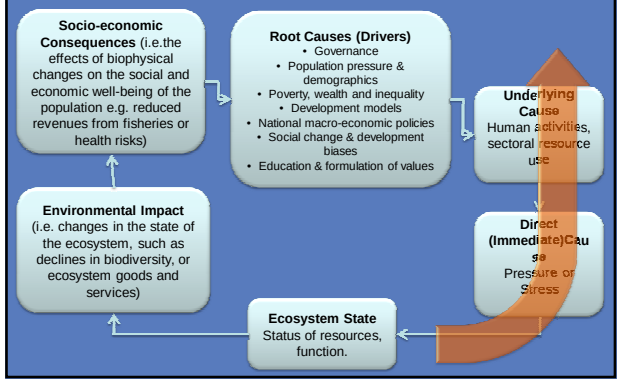
REPORT BACK 2
Report back on causal chain analyses

Causal Chain Analysis Workshop

The Agulhas and Somali Current Large Marine Ecosystems Project

GROUP WORK SESSION 3
Causal Chain Analysis

Causal Chain Analysis



Direct Causes

Direct Causes are:

- The direct technical causes of the problem.
- They typically have a distinct areas of impact
- Can be quantified and geographically located using maps

Examples of Direct Causes

Direct causes of pollution from diffuse sources

- Runoff
- Release from storage of chemical products
- Solid waste
- Liquid wastes
- Release from transport
- Accidental releases (e.g. shipping, industry)

Underlying Causes

- Underlying causes contribute to the direct causes
  - Resource uses and practices, AND
  - Social, economic, political and legal causes

RESOURCES USES AND PRACTICES can include:	SOCIAL AND ECONOMIC CAUSES can include:
Poor land use practices Waste discharges Damaging practices Unsustainable Diversion of water (storage etc)	Increased development Limited investment Poor maintenance Lack of waste management Lack of technology Limited technical capacity Increased demand, etc

Examples of Underlying Resource Uses and Practices.

e.g. Nutrient enrichment and eutrophication could include:

- Inefficient agricultural practices
- Inadequate waste management
- Lack of storage facilities for liquid and solid wastes
- Lack of cultivation margins
- Over application/ incorrect use of fertilisers in agriculture
- Over ploughing
- Concentration of agro-industrial facilities and Intensive livestock production

Examples of Social, Economic, Legal and Political Causes.

…..that contribute to eutrophication (from agriculture and a number of other sectors) could include:

- Lack of human/ technical capacity
- Limited capital Investment
- Lack of land tenure
- Lack of incentives (subsidies)
- Inadequate economic sanctions (taxes)
- Deficiencies in implementation of regulations, monitoring and enforcement
- Ineffective national/regional policies/management plans
- Deficiencies in institutional capacity
- Deficiencies in legislation

Root Causes

- Root causes are often related to fundamental aspects of macro-economy, demography, consumption patterns, environmental values, and access to information and democratic processes
- Root causes can generally be divided into the following categories
  - Governance
  - Population pressure and demographic change
  - Poverty, wealth and inequality
  - Development models and national macro-economic policies
  - Social change and development biases
  - Education and formulation of values

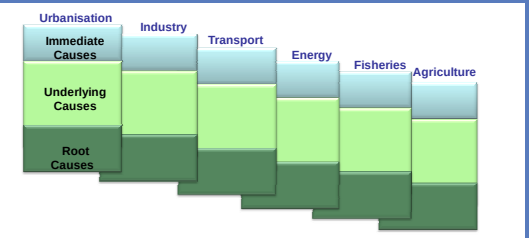
The 3 Dimensions of a Causal Chain Analysis

DIMENSION 1	DIMENSION 2	DIMENSION 3
A series of statements linking the causes of a problem with its effects	Interlinking between several causes and the same effect; OR the same cause producing several different effects	Sectoral: each sector has its own set of causes and effects, but these interact with other sectors

The Sector Dimension

In Theory……

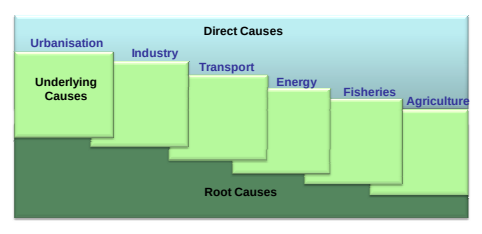
for each of the sector there will be a sectoral causal chain, which may be connected at some points to the chain of another sector



The Sector Dimension

However……

Immediate causes, and root causes, may span several sectors. It is often only at the **underlying causes level** that there is a clear sectoral distinction



Generic Sectors

- Agriculture
- Fisheries and aquaculture
- Urbanisation
- Industry
- Mining
- Energy Production
- Transport/infrastructure
- Tourism, leisure and recreation
- Defence

Why Sectoral Analysis?

Because……that is the way modern society is organised and governed

However……

- Sectors interact
- Sectors may share root causes
- One sector may cause effects in other sectors

A Holistic Approach

'Environmental problems should be dealt with at their roots, *irrespective* of sectoral or geographical boundaries'

1992 UN Conference on Environment and Development

The Challenge…

…… is how to analyse problems both sectorally and holistically; then develop strategies holistically

and finally…….

Find responses which act within the sectoral and geographical boundaries of society

CCA responds to this challenge.

It transcends sectoral and geographical boundaries, to achieve a holistic result.

It examines the separate role of various economic sectors in a given region and then integrates the results in a single framework

GEF Intervention?

Most of the root are beyond the scope of GEF intervention, but it is useful to document them for two reasons:

REASON 1.	REASON 2.
Some solutions may be unworkable if the root causes of the problem are overwhelming	Actions taken nearer to the root causes are more likely to have a lasting impact on the issue / multiple issues

Example of a Root Cause

A root cause of eutrophication e.g. a cultural change in diet because an increase in the consumption of meat, leads to a market demand for cheap meat, and the intensification of animal farming resulting in high nitrogen and phosphorus emissions.

CAUSAL CHAIN ANALYSIS

1. Identify the **direct causes** of each issue
2. Identify the **sectors** that contribute to the issue
3. **Link** the **sectors** to the **direct** causes
4. For each sector, identify all the **underlying resource uses and practices** that contribute to each direct cause
5. For each sector, identify the **underlying social, economic, legal and political causes** of each immediate cause.
6. **Link** the resource uses and practices, and social, economic, legal and political causes
7. Determine the **root causes**

This should be done in parallel to the identification of the directcauses

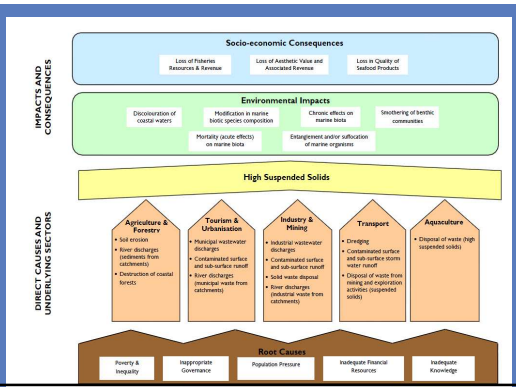
Many causes will have been identified during impact analysis

For each transboundary problem and direct cause

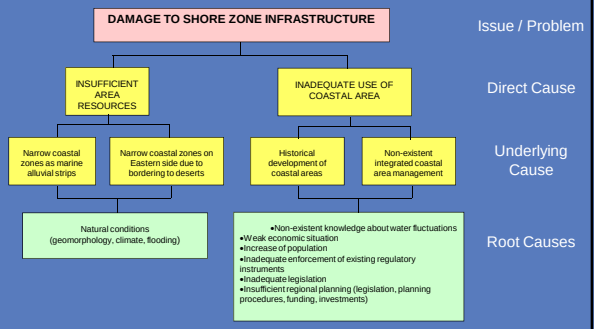
Sectorally or inter-sectorally

A CAUSAL CHAIN !

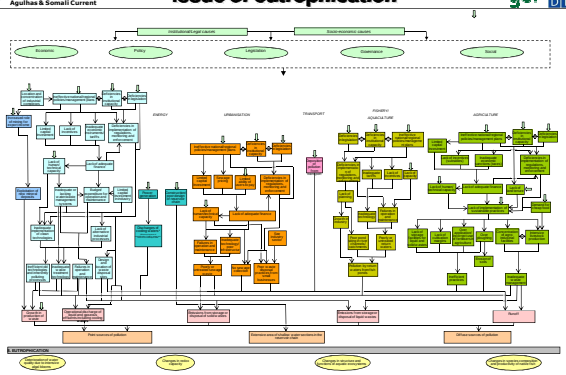
WIO-Lab High Suspended Solids



CASPIAN SEA CAUSAL CHAIN



Dnipro Basin Causal Chain for the issue of eutrophication



Benguela Current Analysis

Tabular approach with 3 synthesis matrix tables:

- Table 1: 7 Major Problems and 3 Main Root Causes
- Table 2: Areas Where Action is Proposed
- Table 3: Analysis Table of Causes, Impacts and Solutions of Identified Problems

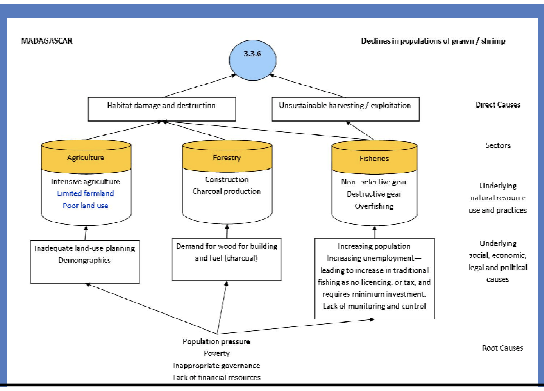
Benguela Current- Tabular

Major Problems	Main Root Cause
Complexity of ecosystem and high degree of variability (resources and environment)	•Changing state of the Benguela •Inadequate information and understanding •Difficulty in monitoring and assessment •Poor predictability
Inadequate capacity development (human and infrastructure) and training	•Colonial/political past •Institutional downsizing and brain drain •Limited inter-country exchange (training)
Poor legal framework at the regional and national levels	•Regionally incompatible laws and regulations •Ineffective environmental laws and regulations
Inadequate implementation of available regulatory instruments	•Inadequate compliance and enforcement (over fishing, pollution) •Indifference and poor communication •Posts not filled (some inappropriately)
Inadequate planning at all levels	•Inadequate intersectoral coordination •Poorly planned coastal developments •Limited time horizon of planners •Rapid urbanisation and informal settlements
Insufficient public involvement Inadequate financial mechanisms and support	•Lack of awareness and public apathy •Conflicts about rights of access •Low country GDPs •Ineffective economic instruments •Insufficient funding for infrastructure and management; poor salaries

Challenges in developing causal chains

CAUSAL CHAIN TYPE	ADVANTAGES AND DISADVANTAGES
Table or matrix	✓ Simpler to produce ✓ Conceptually easy for the expert to produce × Provide less information × Difficult to show linkages between causes × Conceptually difficult for the reader to understand × More difficult to identify SAP interventions
Flow diagram	✓ Generally more informative ✓ Show linkages between causes ✓ Work well using the sectoral approach ✓ Conceptually easy for the reader to understand × Difficult to construct × Conceptually difficult for the expert to produce × Time consuming

Decline in prawn



Point of Advice

A simple chain that clearly reflects the situation will be more useful than a complicated chain that is difficult to understand.

Policy & Governance Analysis and the CCA and TDA

Development of Causal Chains

Detailed Governance Analysis

Dynamics between the causes of transboundary problems and failures in governance need feedback between those carrying out the CCA and P & G.

Annex 6: National Causal Chain Meeting Results

A6.1 Madagascar – National Causal Chain Meeting Results

Table A6.1.1: Madagascar Prioritisation 1 Results

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	R	HP	NT	Yes	Ministère Eau - Mitio - CNRE	No		
1.2.	Degradation of ground and surface water quality	R	HP	NT	No		No		
1.3.	Degradation of coastal and marine water quality	R	HP						
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	R	HP	T	Yes	Project 1990(?)	No		
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	R	HP	T	Yes	GEF-UNDP	Yes	GEF/ UNDP 2007 onwards, côte ouest to Morondare	
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	R	MP	T	No	No	Yes	Starting with COI and East Africa	
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	R	HP	NT	No	No	No		
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	R	HP	FT	Yes	Etudes GAPCM limited decets a bord de chelutes	Yes	Alaspol a bord des bateaux	
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	R	HP	T	Yes	OLEP	Yes	OLEP	
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	R	HP	NT	Yes	MORONDAVA, MAHAJANGA, by FTM and PRE COI	No		

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats	R	HP						
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	R	HP	NT	Yes	WS de l'Onilahy by: Universities, Ministry of Environment and Forests, Ministry of Agriculture	?		
2.2.2.	Disturbance, damage and loss of coastal forest habitats	R	HP	NT	Yes	by: Universities, Ministry of Environment and Forests, Ministry of Agriculture, environmental NGOs	Yes	Universities, Ministry of Environment and Forests, Ministry of Agriculture, environmental NGOs	
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	R	HP	NT	?	?	?		
2.2.4.	Disturbance, damage and loss of wetland habitats	R	MP	NT	Yes	Eastern wetlands ? Universities	?		
2.2.5.	Disturbance, damage and loss of estuarine habitats	R	HP	NT	Yes	BETSIBOKA ESTUARY Ministry of Transport	?		Added after meeting
2.2.6.	Disturbance, damage and loss of mangrove habitats	R	HP	T	Yes	West Coast by Universities, NGOs, Ministries, Research Centres, local communities	Yes	Universities, NGOs, Ministries, Research Centres, local communities	
2.3.	Disturbance, damage and loss of subtidal benthic habitats	R	HP						
2.3.1.	Disturbance, damage and loss of coral reef habitats	R	HP	T	Yes	Universities, research centres, NGOs, CORDIO and GCRMN	Yes	Universities, research centres, NGOs, CORDIO and GCRMN	

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
2.3.2.	Disturbance, damage and loss of seagrass habitats								As associated to coral reef ecosystem
2.3.3.	Disturbance, damage and loss of macroalgal habitats	R	MP	NT	Yes	Trawling grounds	?		
2.3.4.	Disturbance, damage and loss of soft sediment habitats								
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)	FR	HP	T	Yes	Oil prospectors	?		
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	R	HP	T	Yes	Ministry of Transport OLEP, ONE	Yes	OLEP, ONE	Pollution
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)	R	HP	T	Yes	Ministry of Health, Institut Pasteur, Universities and research centres	Yes	Ministry of Health (veille sanitaire)	
2.6.	Introduction of exotic non-native species, invasives and nuisance species	R	HP	T					Ballast waters
3.1.	Decline in populations of focal species	R	HP	T	No		No		
3.1.1.	Decline in populations of marine mammals	R	MP	NT	No	Student projects	No		
3.1.2.	Decline in populations of cetaceans	FR	HP	T	No		No		
3.1.3.	Decline in populations of seabirds	FR	LP	T	Yes	Ongoing project	Yes	Ongoing	
3.1.4.	Decline in populations of turtles	R	HP	T	Yes	10 year project.	Yes	Protocol. IHSM	

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
3.2.	Decline in populations of commercial fish stocks	R	HP	NT / T	Yes	Ongoing	Yes	Ongoing	
3.2.1.	Decline in populations of sharks and rays	R	HP	NT	Yes	Student project.	No		
3.2.2.	Decline in populations of large pelagics	R	HP	T	Yes		Yes	USTA	
3.2.3.	Decline in populations of small pelagics	FR	HP	T	Yes	Ongoing.	Yes	Ongoing. AMSED.	
3.2.4.	Decline in populations of deep water demersals	NR							
3.2.5.	Decline in populations of reef and demersal fish	R	HP	NT	Yes	Ongoing in South West	Yes	Ongoing. MoE / MoF/ WWF	
3.3.	Decline in populations of commercial invertebrates	R	HP	NT	Yes	Commercial	Yes	Commercial	There is no ecological monitoring but the commercial sector will have data for their exports
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)	FR	MP	NT	No		No		
3.3.2.	Decline in populations of abalone	NR							
3.3.3.	Decline in populations of cephalopods	R	HP	NT	Yes	Commercial	No	Commercial	There is no ecological monitoring but the commercial

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
									sector will have data for their exports
3.3.4.	Decline in populations of sea cucumbers	R	HP	NT	Yes	Student project stock appraisal, commercial.	No		
3.3.5.	Decline in populations of sea urchins	FR	LP	NT	No	No.	No		
3.3.6.	Decline in populations of prawns and shrimp	R	HP	NT	Yes		Yes	PNRC / OEFC	
3.3.7.	Decline in populations of lobsters	R	HP	FT	Yes	Historical data	Yes	FAO project based at MoF	
3.3.8.	Decline in populations of crayfish	NR							
3.3.9.	Decline in populations of crabs	R	HP	NT	Yes	Commercial	No	Commercial	
3.4.	Excessive bycatch and discards	R	HP	T	Yes	Prawns and tuna	Yes	USTA / PRRC / OEFC	There is no ecological monitoring but the commercial sector will have data for their exports
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)	R	HP	NT	Yes	Macroalgae and prawns	Yes	MoF/MoE	

Table A6.1.2: Madagascar Prioritisation 2 Results

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	VH	H	H	H	L	M	M	M	H
1.2.	Degradation of ground and surface water quality	M	H	M	M	VH	VH	VH	VH	H
1.3.	Degradation of coastal and marine water quality									
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	VH	VH	VH	VH	VH	VH	VH	VH	VH
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	L	H	L	L	VH	VH	M	VH	H
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	M	H	H	H	VH	VH	M	VH	H
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	H	M	M	M	VH	VH	M	VH	H
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	M	M	M	M	VH	VH	M	VH	H
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	H	H	H	H	VH	VH	H	VH	H
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	M	M	M	M	LR	LR	VH	M	M
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats									
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	VH	VH	VH	VH	LR	LR	VH	M	H
2.2.2.	Disturbance, damage and loss of coastal forest habitats	VH	VH	VH	VH	LR	VH	VH	H	VH

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	M	M	M	M	LR	LR	H	M	M
2.2.4.	Disturbance, damage and loss of wetland habitats	H	H	M	H	LR	H	M	M	H
2.2.5.	Disturbance, damage and loss of estuarine habitats	M	LR	M	L	H	LR	LR	M	M
2.2.6.	Disturbance, damage and loss of mangrove habitats	VH	VH	VH	VH	VH	VH	VH	VH	VH
2.3.	Disturbance, damage and loss of subtidal benthic habitats									
2.3.1.	Disturbance, damage and loss of coral reef habitats	M	H	M	M	VH	VH	VH	VH	VH
2.3.2.	Disturbance, damage and loss of seagrass habitats									
2.3.3.	Disturbance, damage and loss of macroalgal habitats									
2.3.4.	Disturbance, damage and loss of soft sediment habitats	LR	H	M	M	LR	LR	LR	LR	M
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)	M	H	H	H	H	H	M	H	H
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	H	H	LR	M	VH	VH	VH	VH	H
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)	M	H	LR	M	M	LR	LR	LR	M
2.6.	Introduction of exotic non-native species, invasives and nuisance species	LR	LR	LR	LR	VH	VH	VH	VH	M
3.1.	Decline in populations of focal species									

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
3.1.1.	Decline in populations of marine mammals	M	M	LR	M	LR	LR	VH	M	M
3.1.2.	Decline in populations of cetaceans	M	H	H	H	VH	H	LR	H	H
3.1.3.	Decline in populations of seabirds									
3.1.4.	Decline in populations of turtles	M	VH	VH	VH	VH	M	H	H	VH
3.2.	Decline in populations of commercial fish stocks									
3.2.1.	Decline in populations of sharks and rays	M	VH	VH	VH	LR	M	LR	L	M
3.2.2.	Decline in populations of large pelagics									
3.2.3.	Decline in populations of small pelagics									
3.2.4.	Decline in populations of deep water demersals									
3.2.5.	Decline in populations of reef and demersal fish									
3.3.	Decline in populations of commercial invertebrates									
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)									
3.3.2.	Decline in populations of abalone									
3.3.3.	Decline in populations of cephalopods									

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
3.3.4.	Decline in populations of sea cucumbers									
3.3.5.	Decline in populations of sea urchins									
3.3.6.	Decline in populations of prawns and shrimp	H	VH	VH	VH	LR	LR	VH	M	H
3.3.7.	Decline in populations of lobsters									
3.3.8.	Decline in populations of crayfish									
3.3.9.	Decline in populations of crabs									
3.4.	Excessive bycatch and discards									
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)									

Figure 6.1.1: Madagascar MAC01 Causal Chain Analysis for Issue (1.1) Alteration of natural river flow and changes in freshwater input and sediment load.

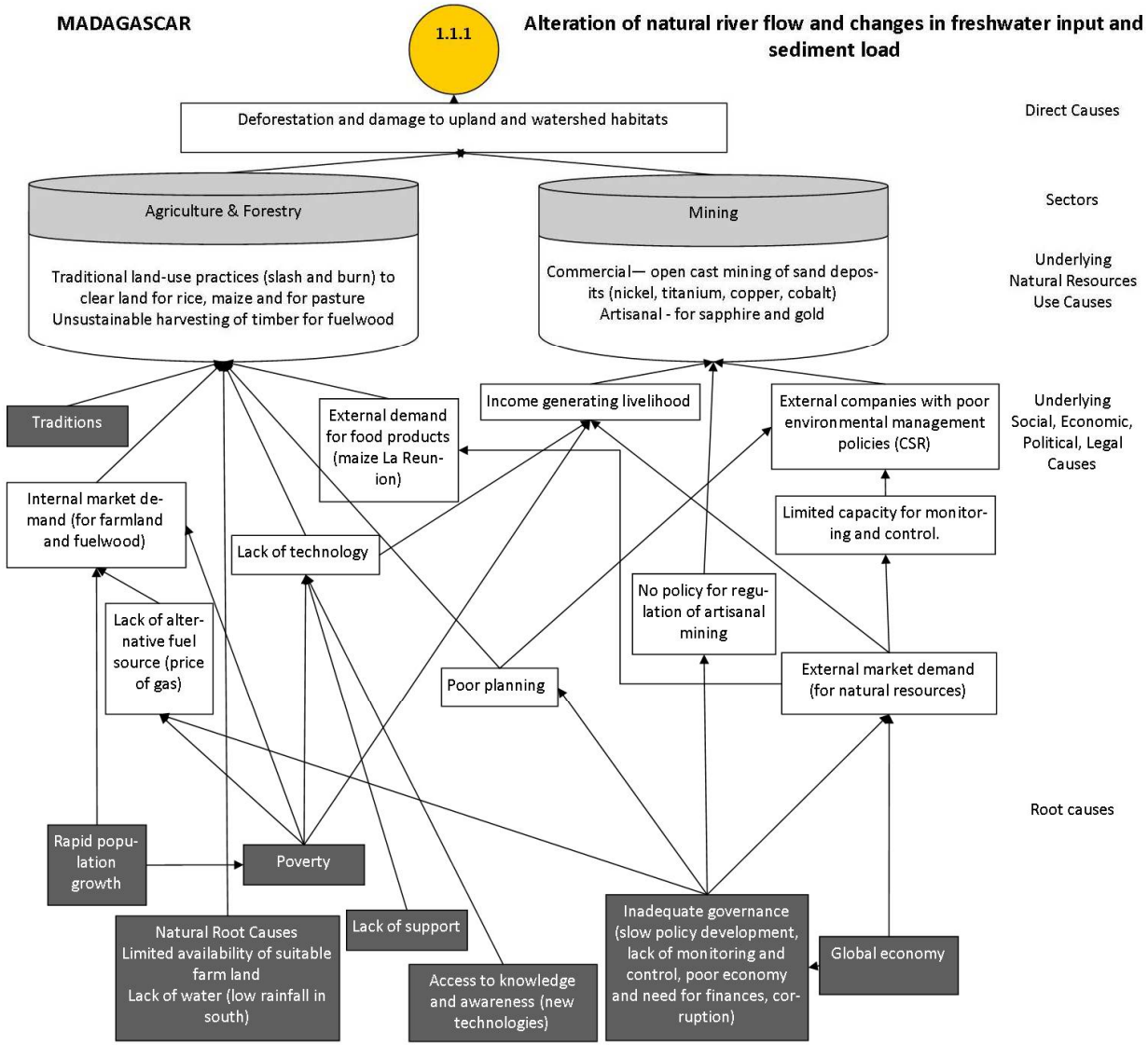


Figure 6.1.2: Madagascar MAC01 Causal Chain Analysis for Issue (1.3.6) Oil spills

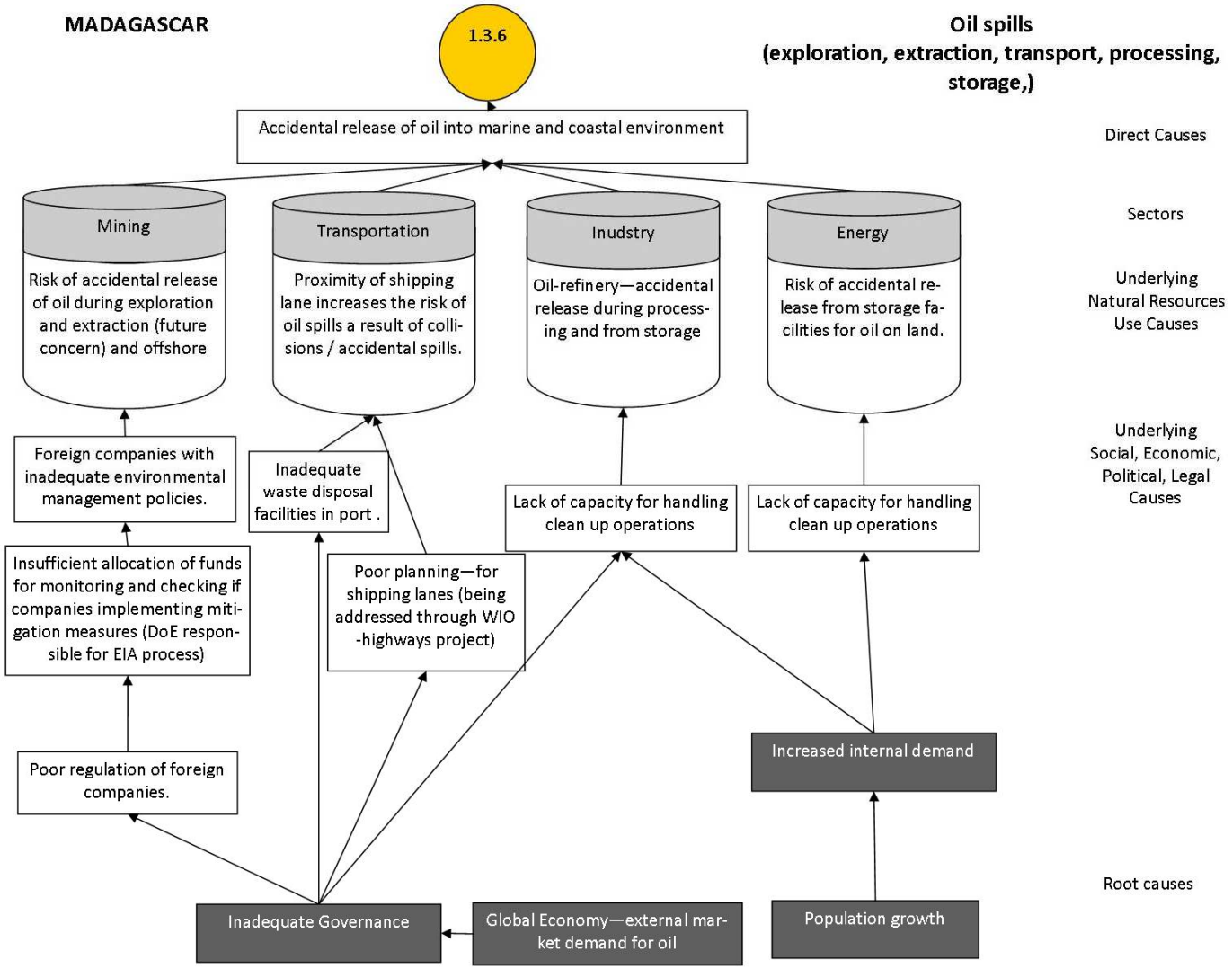


Figure 6.1.3: Madagascar MAC02 Causal Chain Analysis for Issue (2.2.2) Disturbance, damage and loss of coastal forests

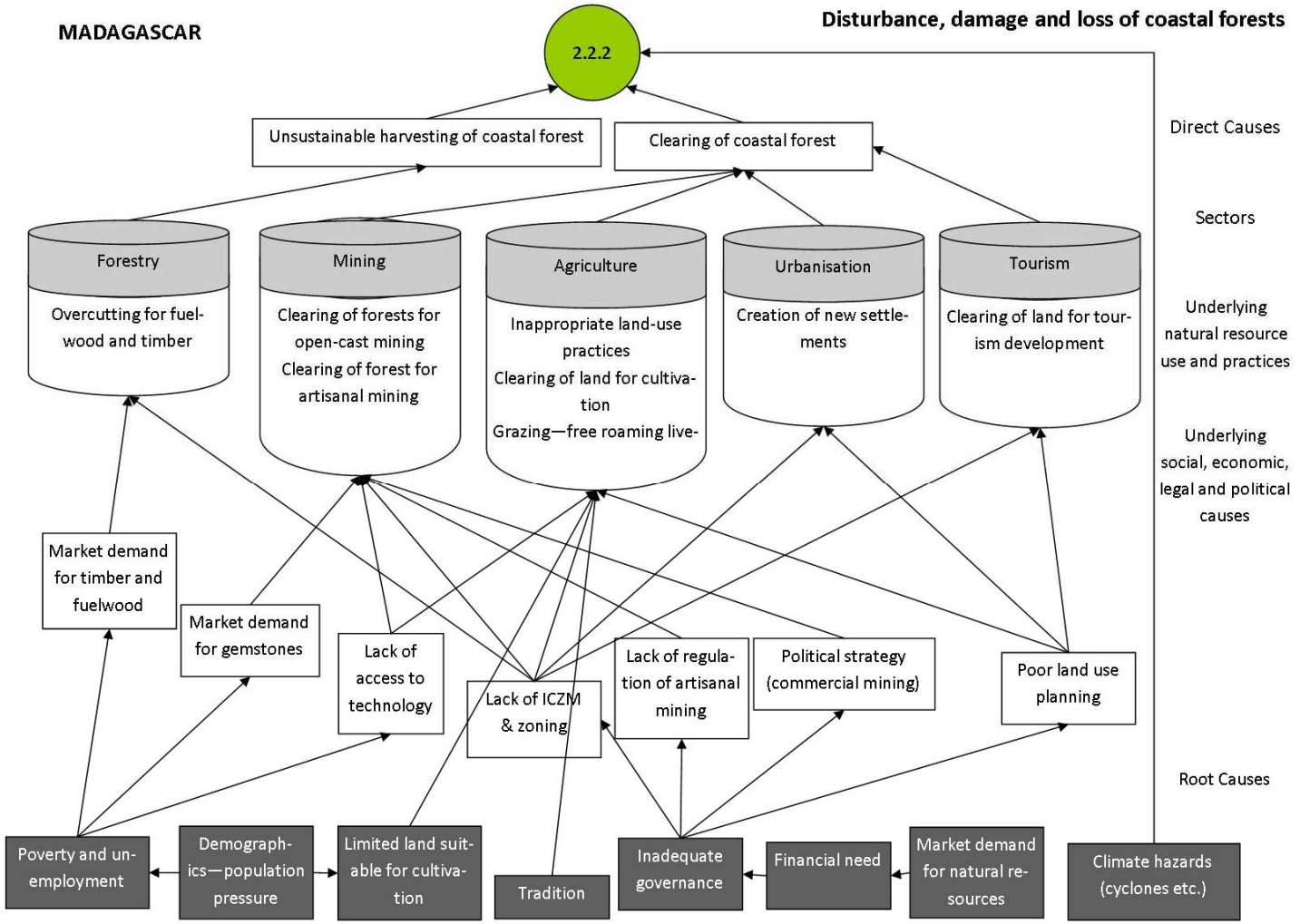


Figure 6.1.4: Madagascar MAC02 Causal Chain Analysis for Issue (2.2.6) Disturbance, damage and loss of mangrove habitats.

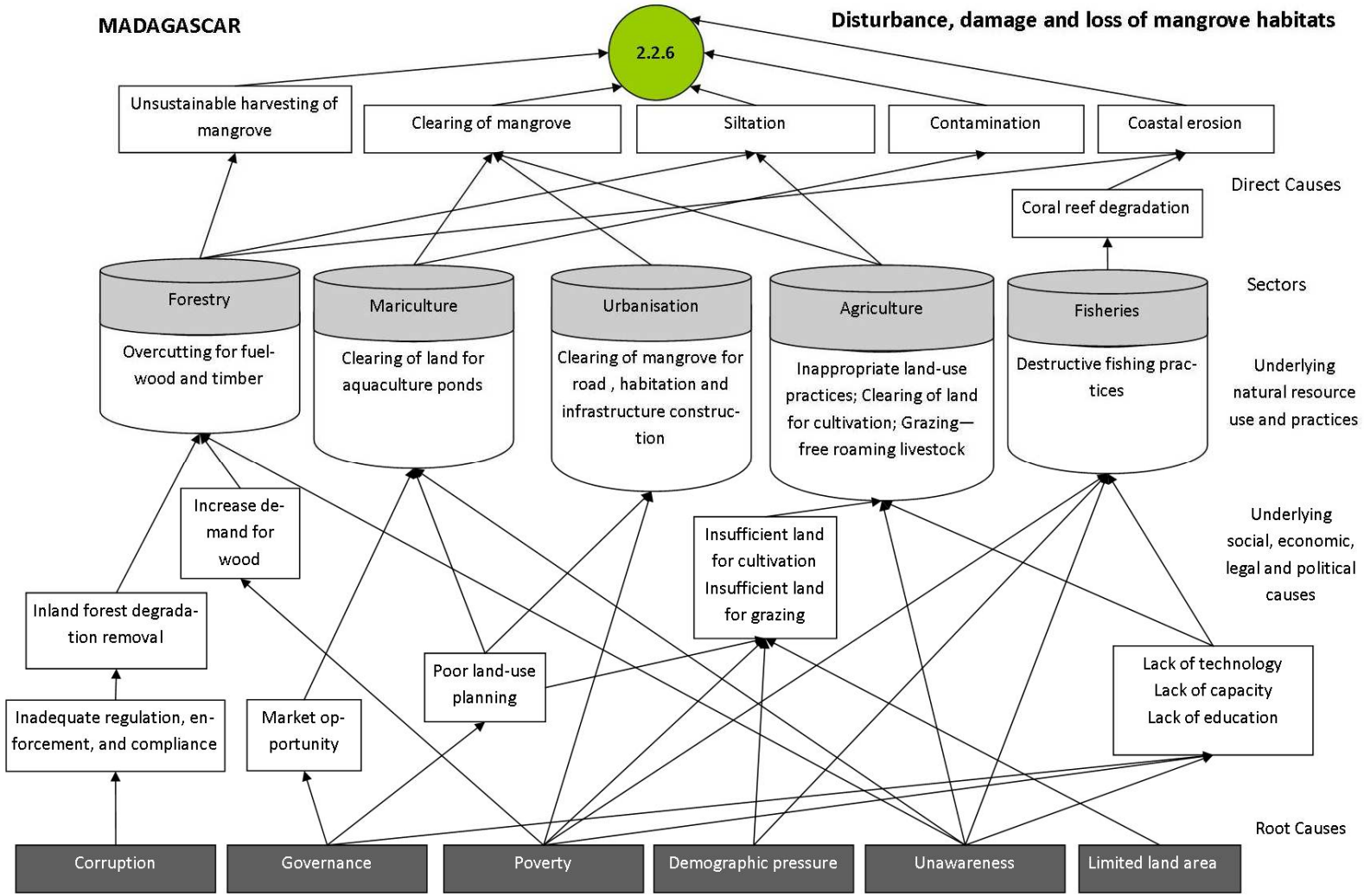


Figure 6.1.5: Madagascar MAC02 Causal Chain Analysis for Issue (2.3.1) Disturbance, damage and loss of coral reef habitats.

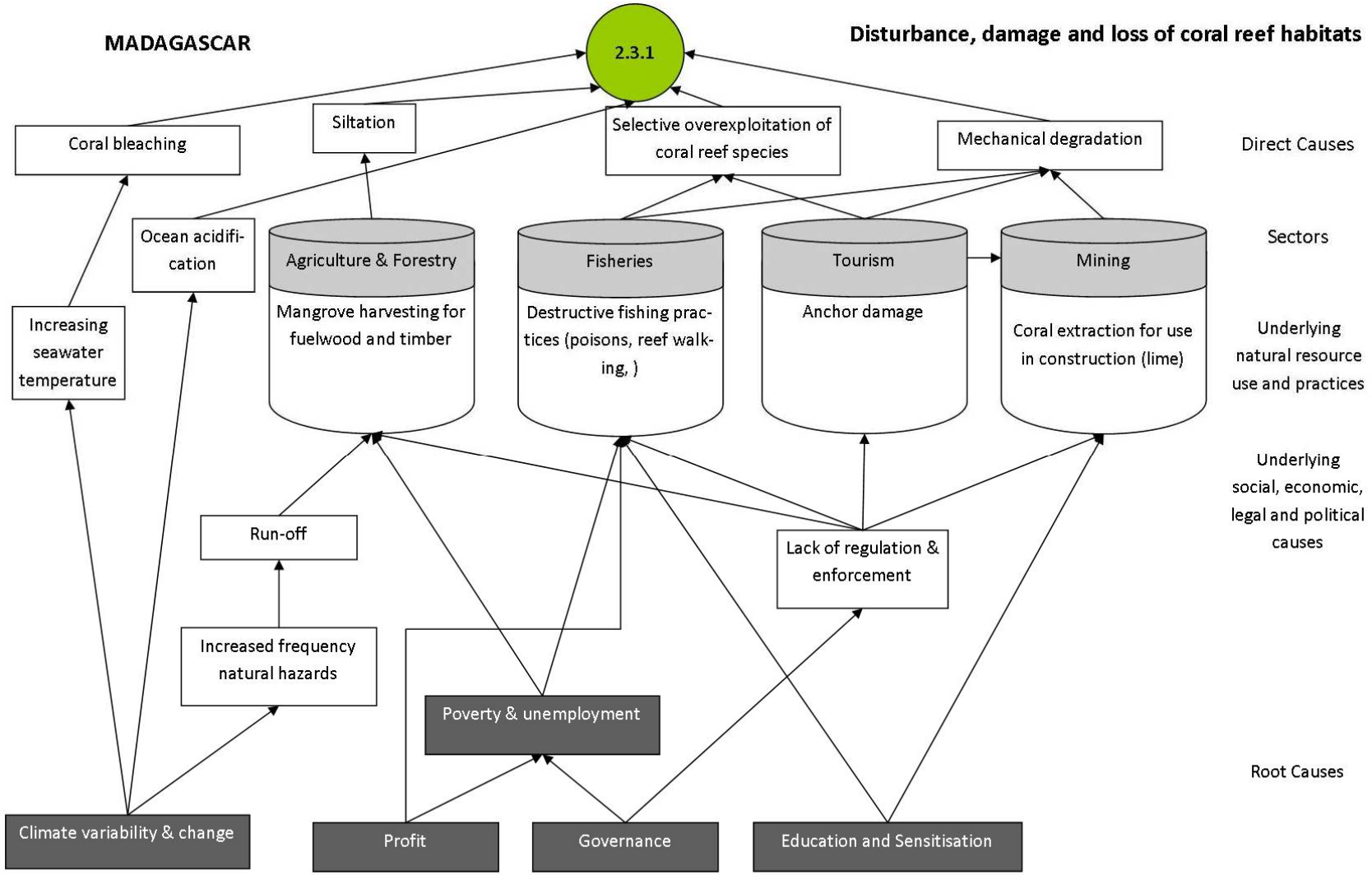


Figure 6.1.6: Madagascar MAC02 Causal Chain Analysis for Issue (2.4) Disturbance, damage and loss of pelagic habitats.

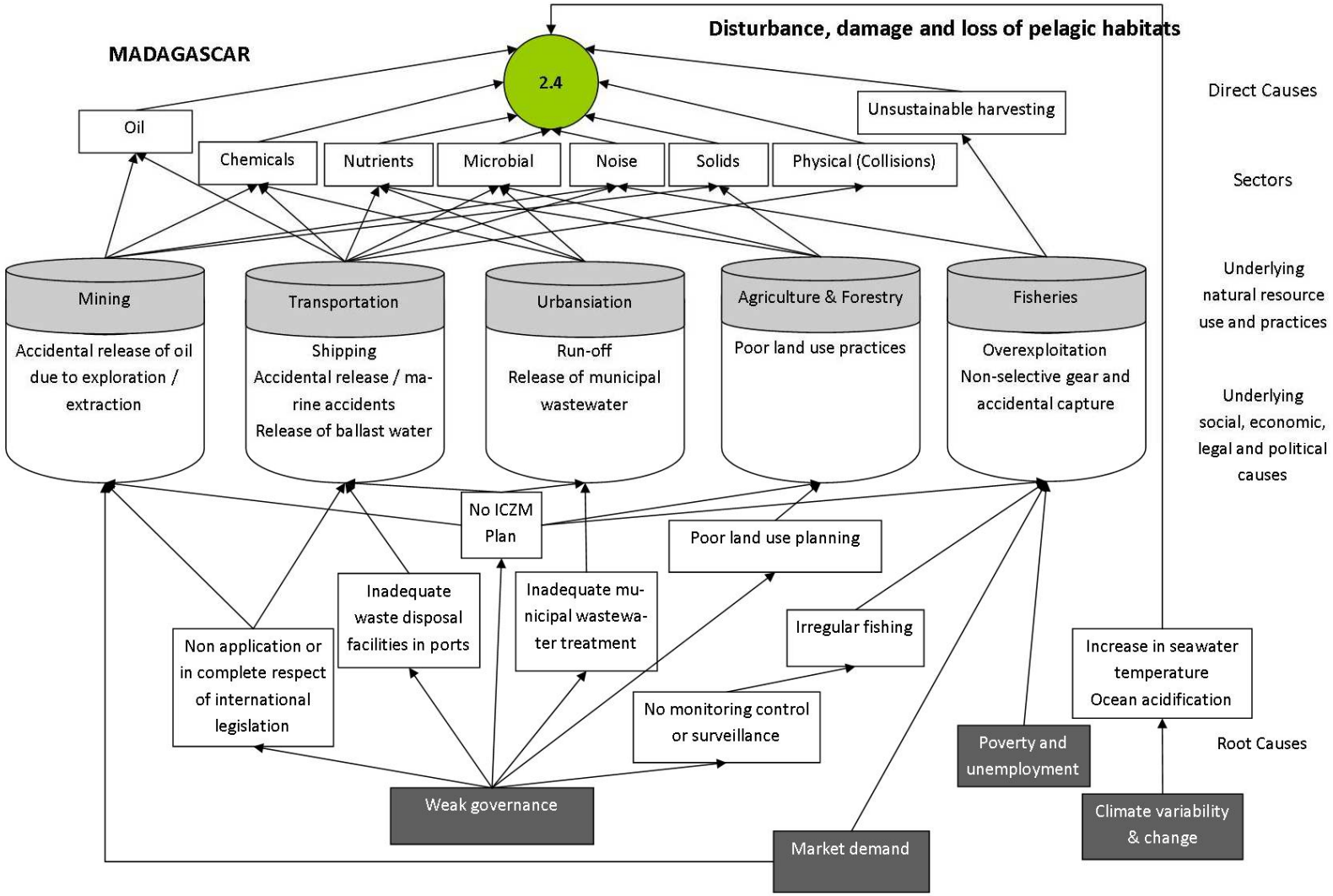


Figure 6.1.7.a: Madagascar MAC03 Impact Analysis for Issue (3.1.1) Declines in populations of marine mammals.

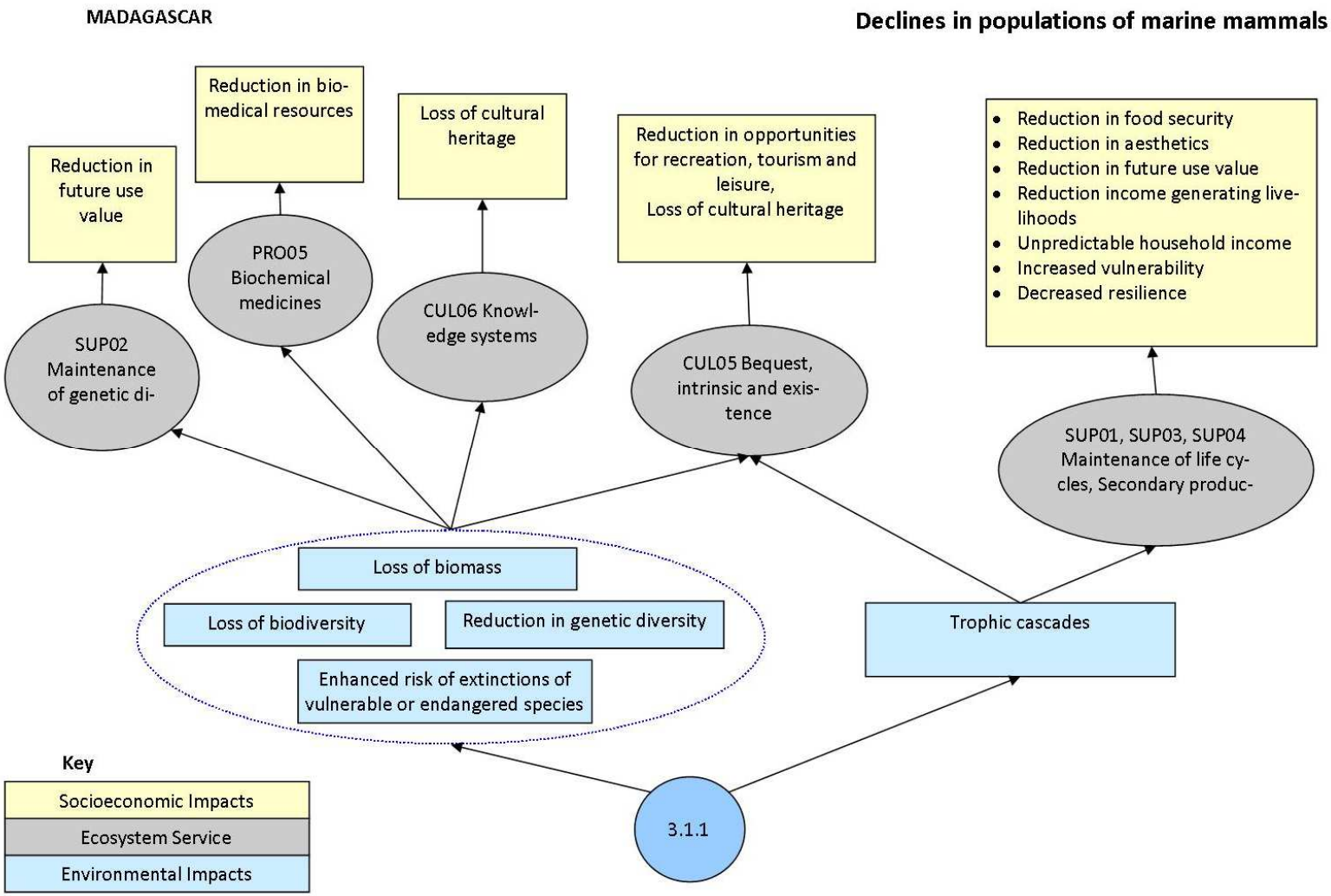


Figure 6.1.7.b: Madagascar MAC03 Causal Chain Analysis for Issue (3.1.1) Declines in populations of marine mammals.

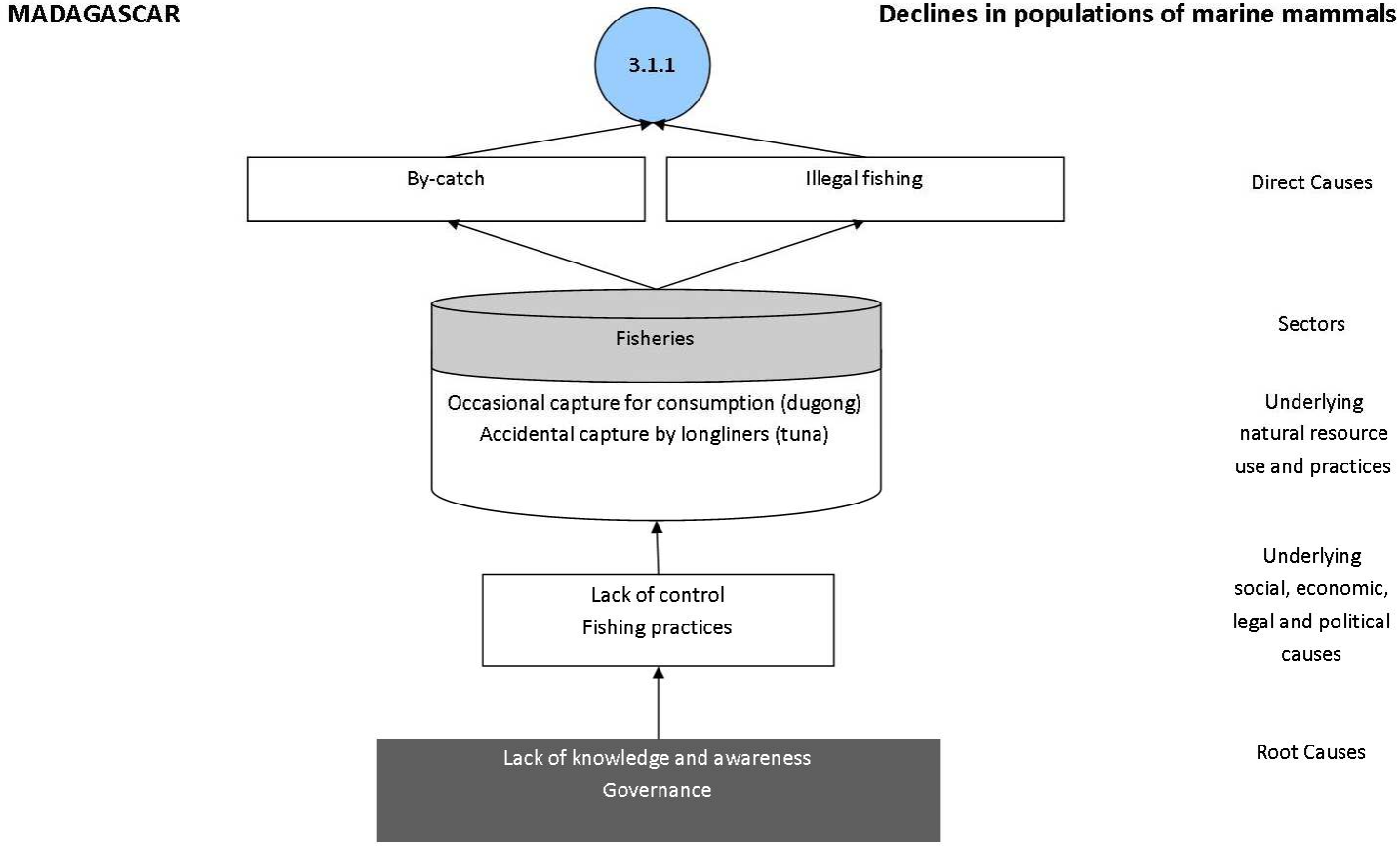


Figure 6.1.8.a: Madagascar MAC03 Impact Analysis for Issue (3.1.2) Declines in populations of cetaceans.

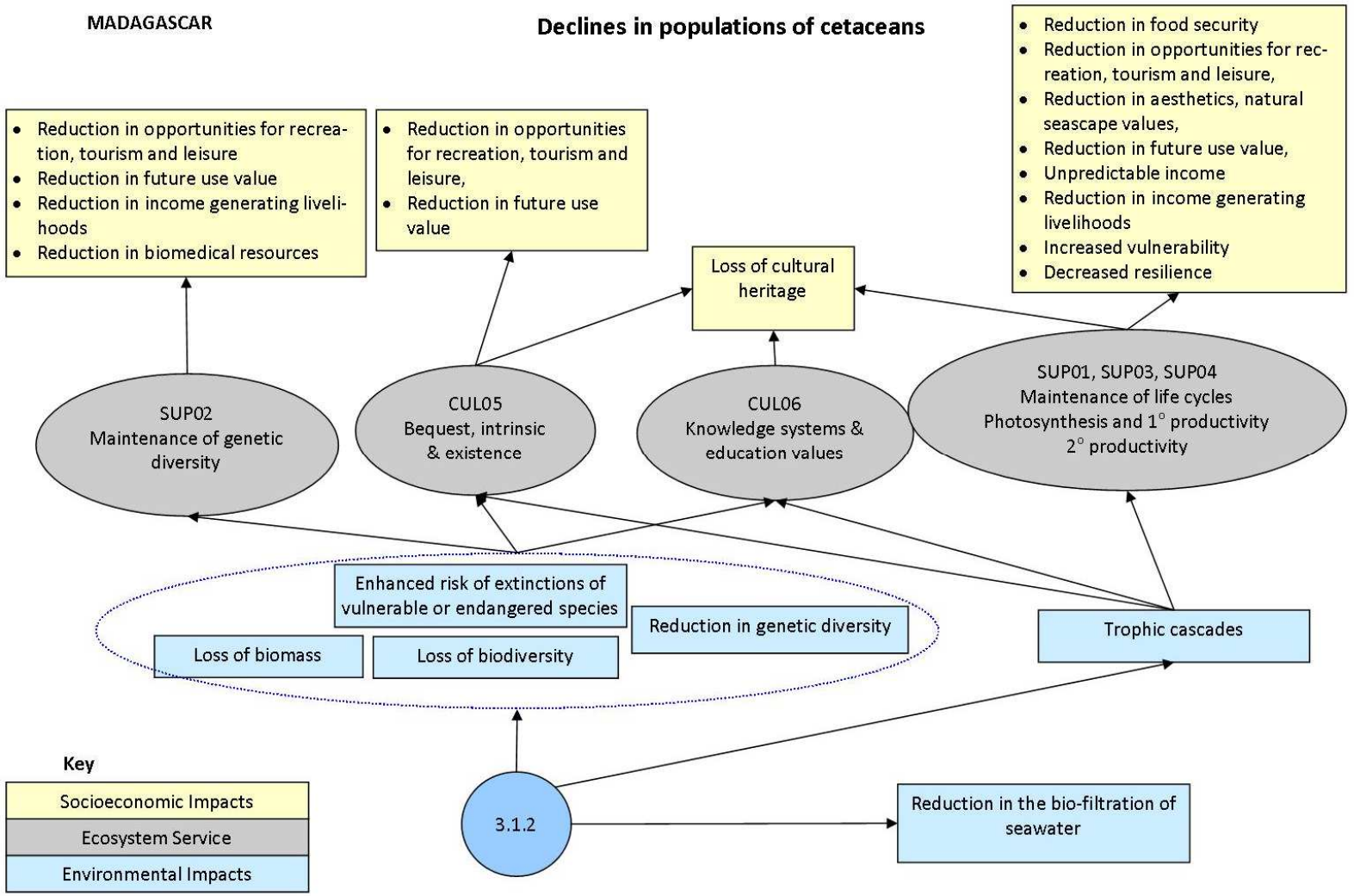


Figure 6.1.8.b: Madagascar MAC03 Causal Chain Analysis for Issue (3.1.2) Declines in populations of cetaceans.

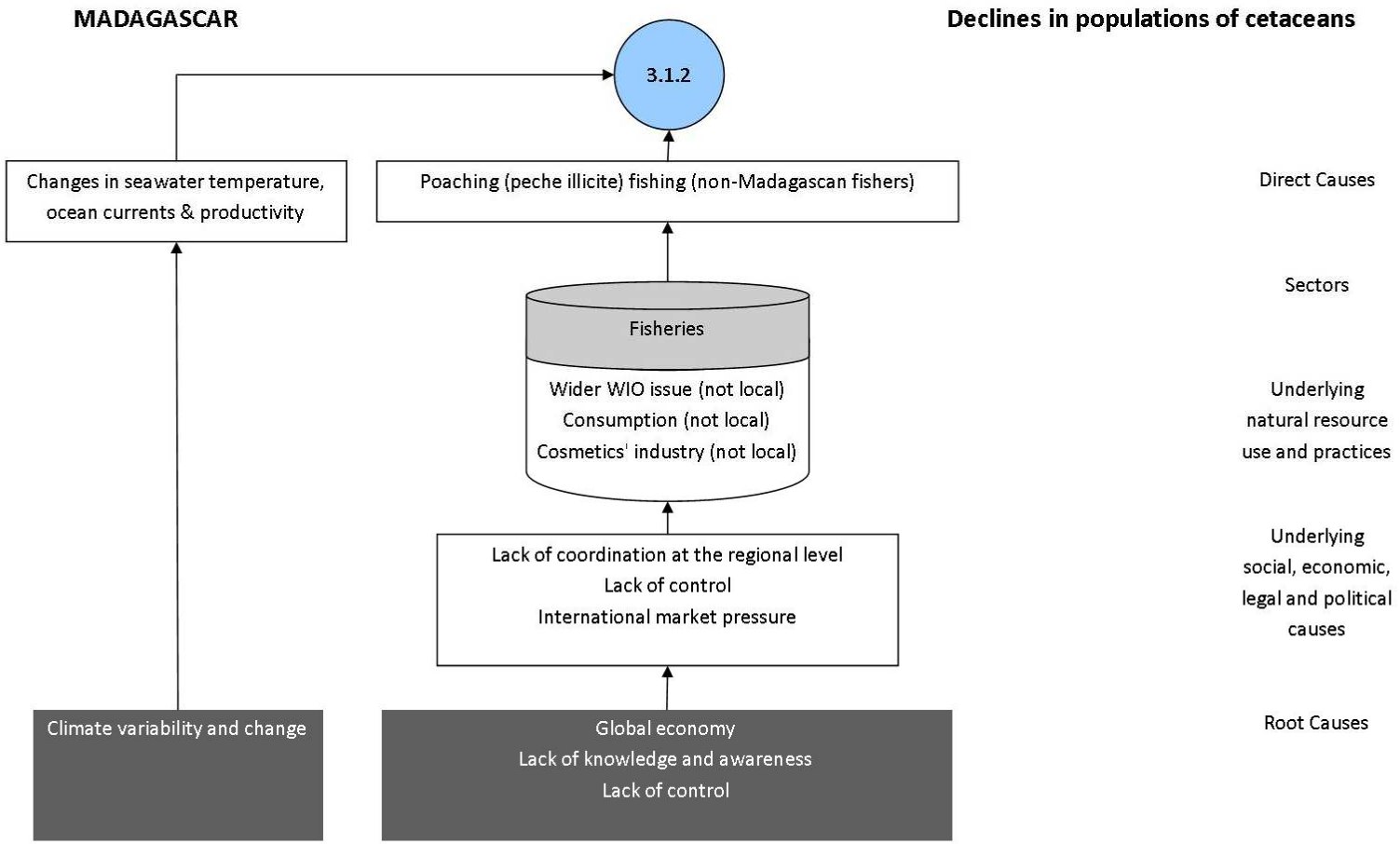


Figure 6.1.9.a: Madagascar MAC03 Impact Analysis for Issue (3.1.4) Declines in populations of sea turtles.

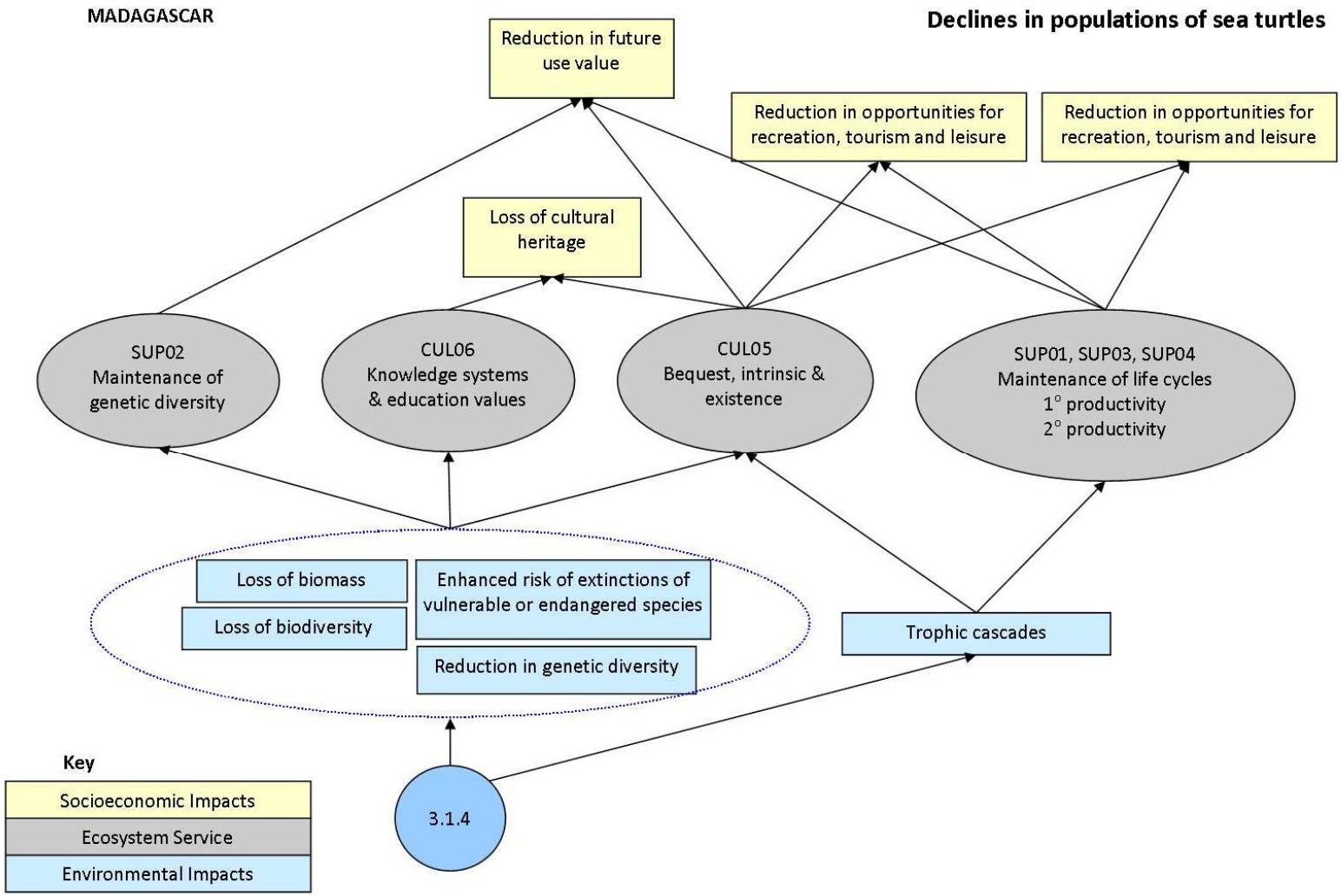


Figure 6.1.9.b: Madagascar MAC03 Causal Chain Analysis for Issue (3.1.4) Declines in populations of sea turtles.

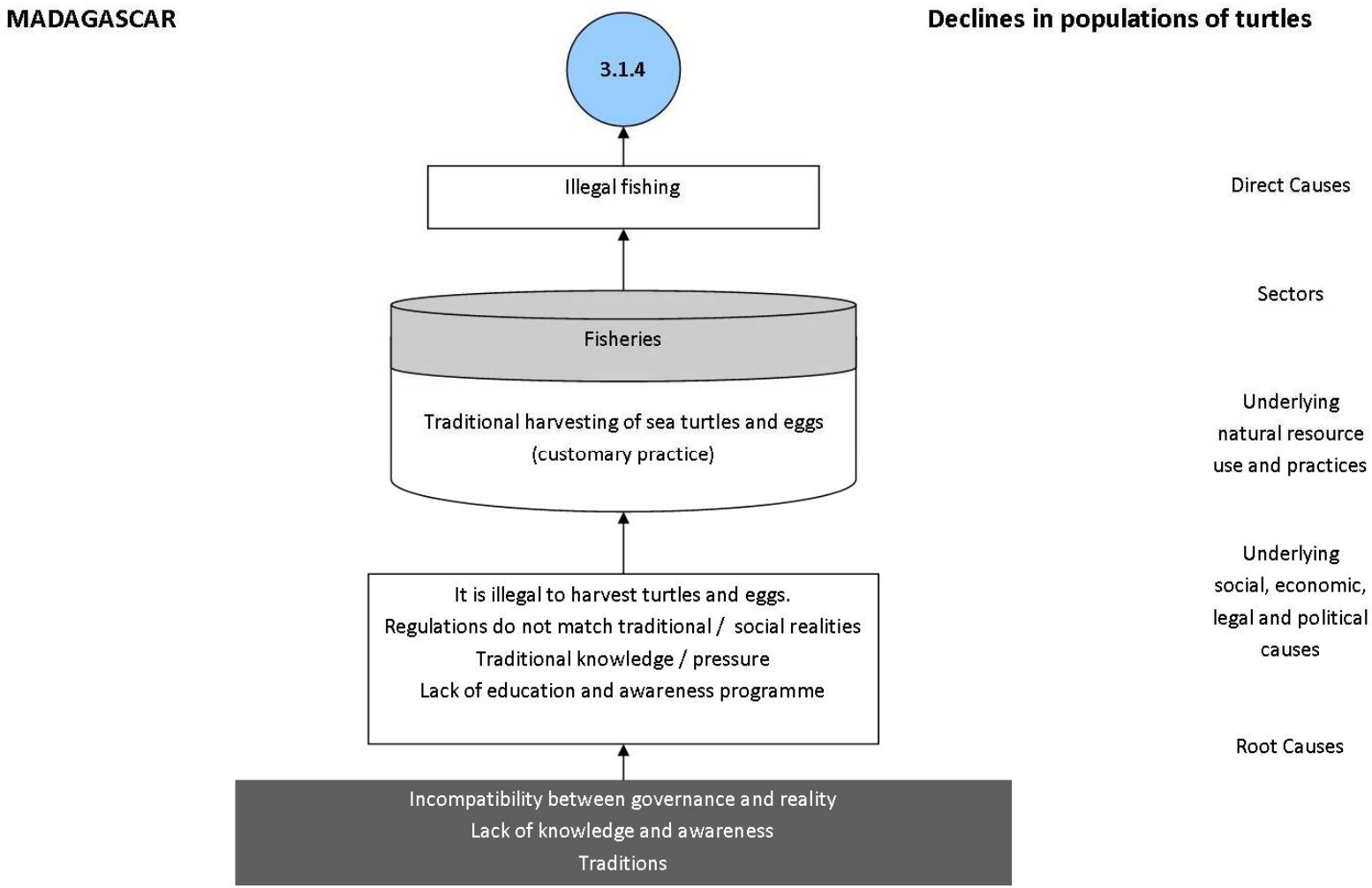


Figure 6.1.10.a: Madagascar MAC03 Impact Analysis for Issue (3.2.1) Declines in populations of sharks and rays.

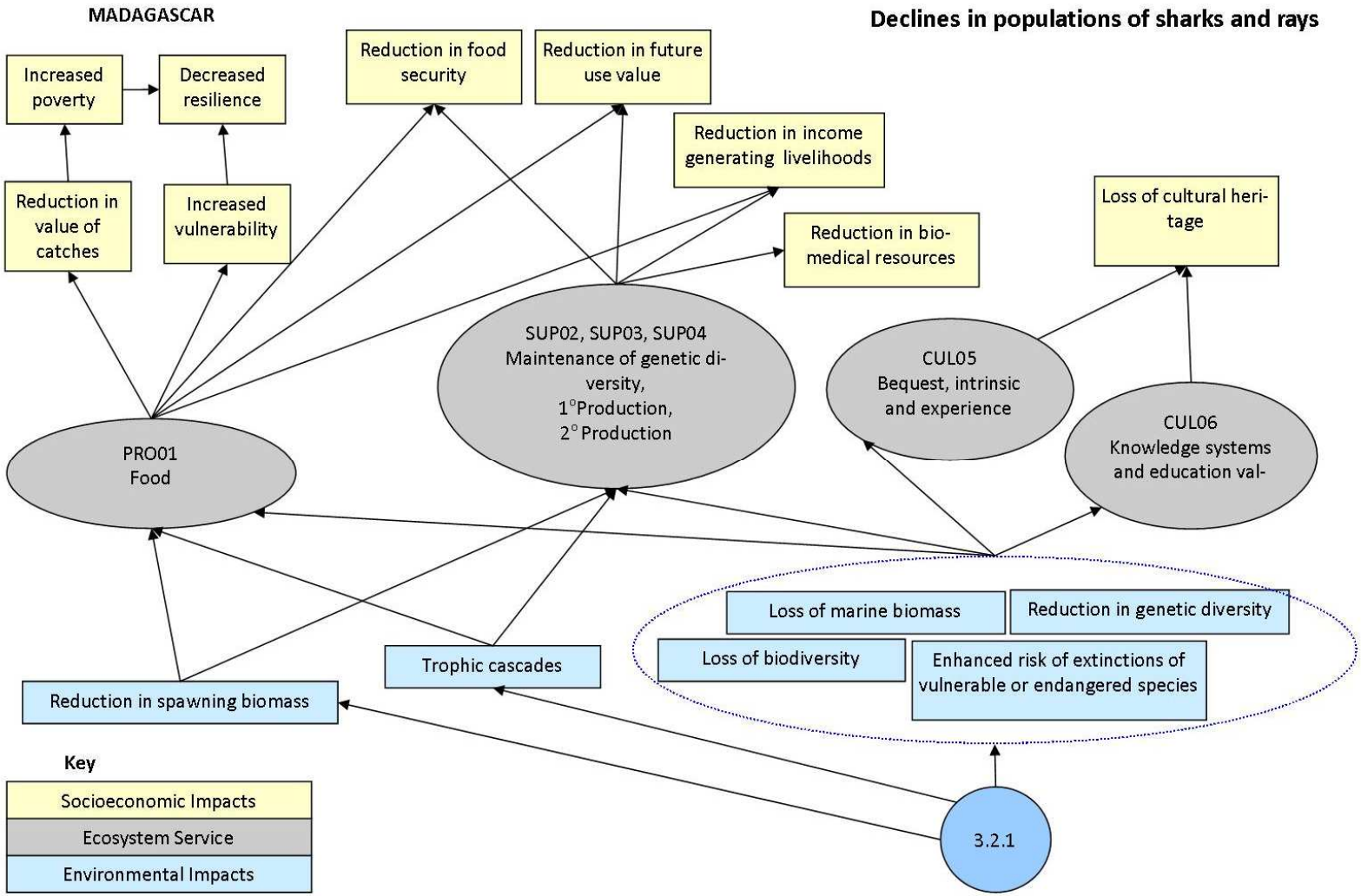


Figure 6.1.10.b: Madagascar MAC03 Causal Chain Analysis for Issue (3.2.1) Declines in populations of sharks and rays.

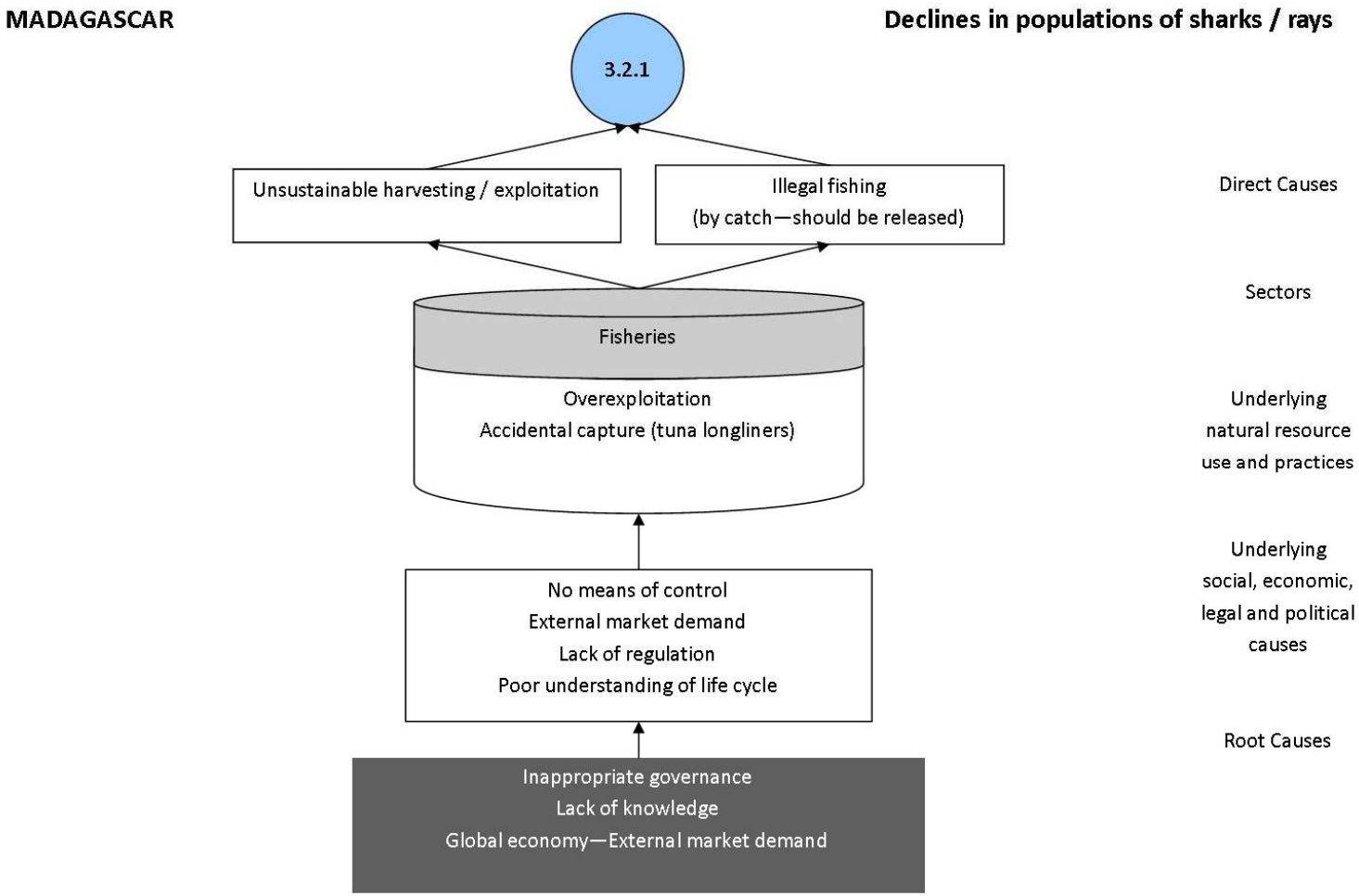


Figure 6.1.11: Madagascar MAC03 Causal Chain Analysis for Issue (3.2.4) Declines in populations of sea cucumbers.

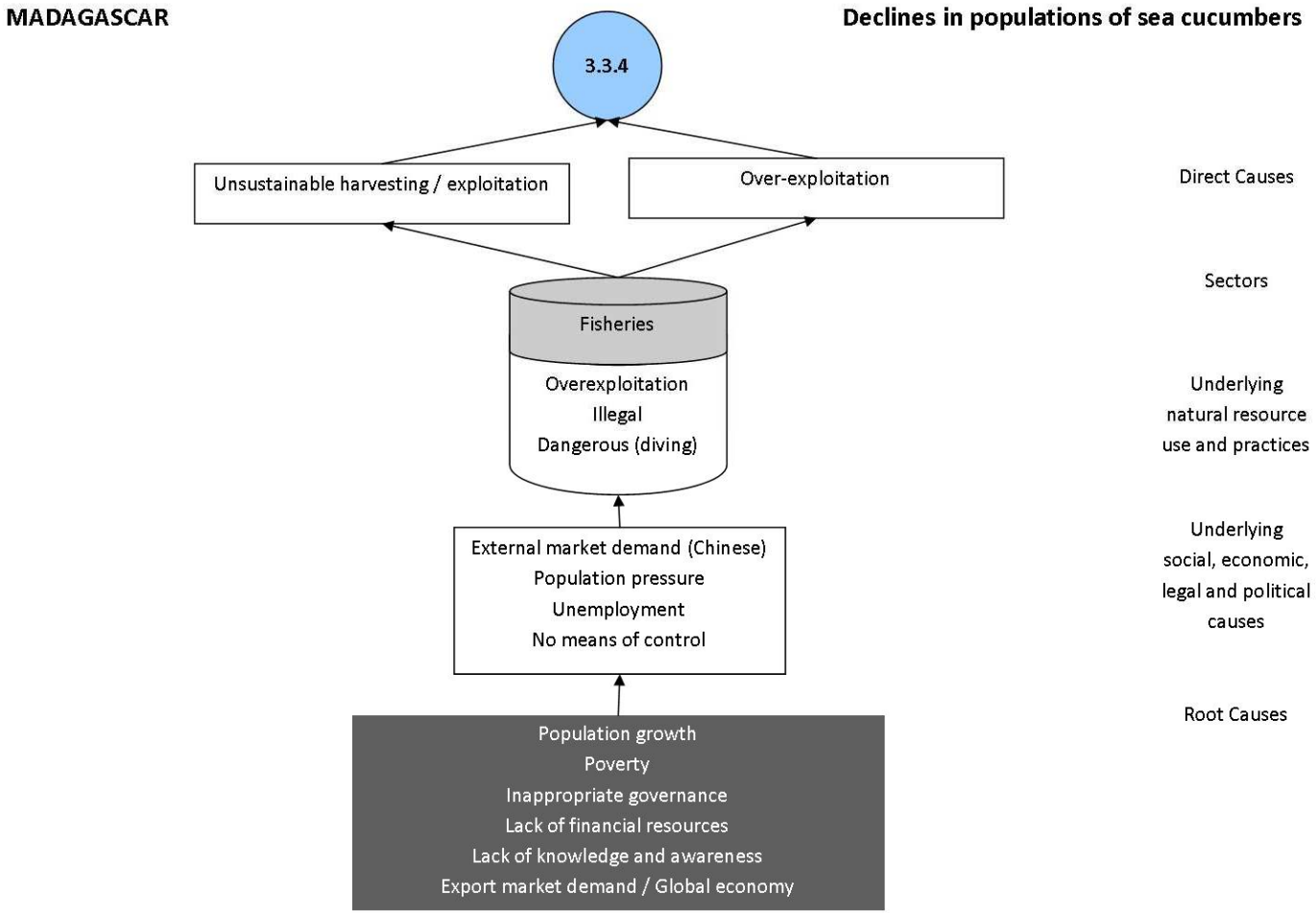


Figure 6.1.12.a: Madagascar MAC03 Impact Analysis for Issue (3.3.6) Declines in populations of prawns and shrimp.

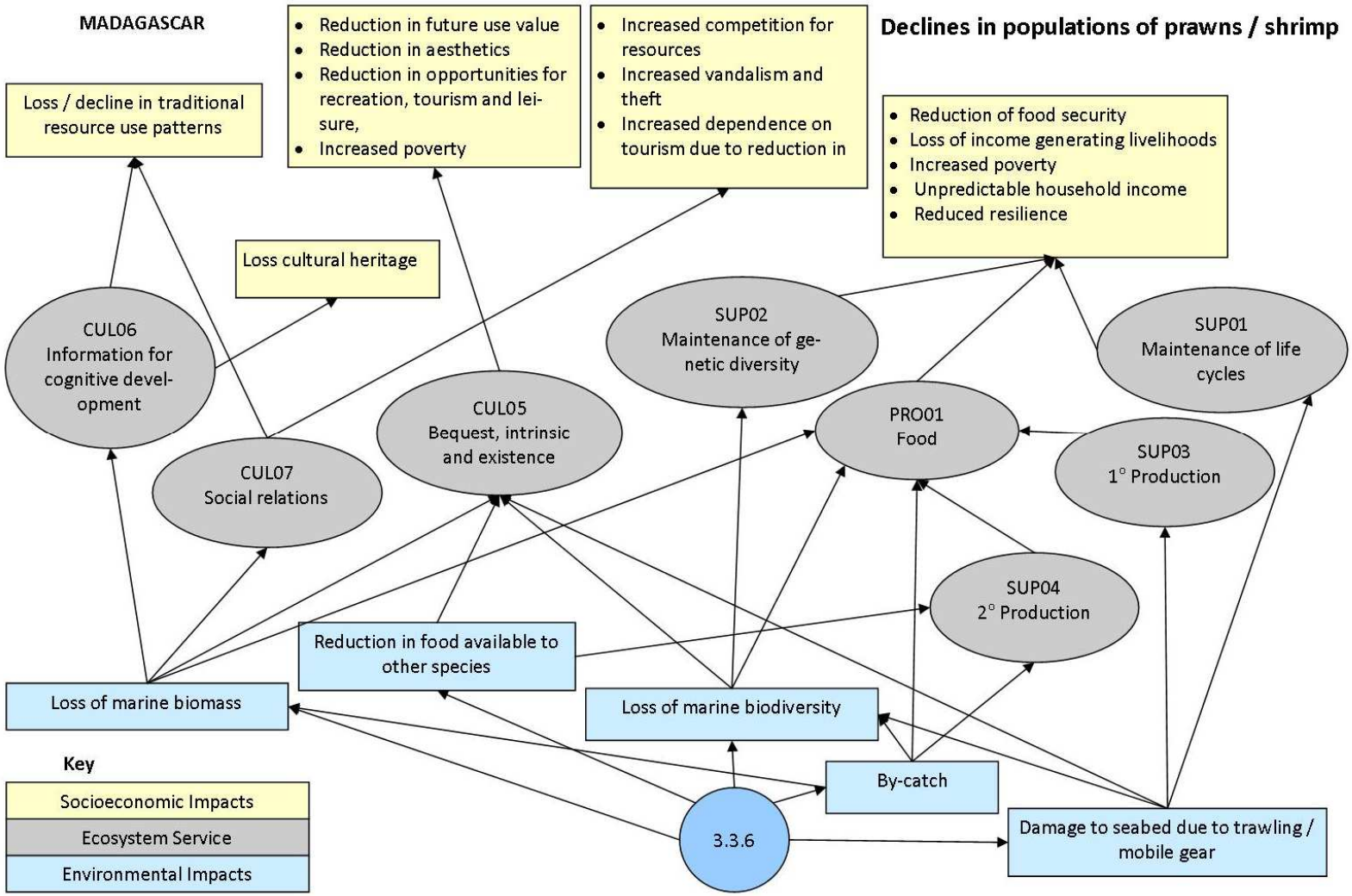
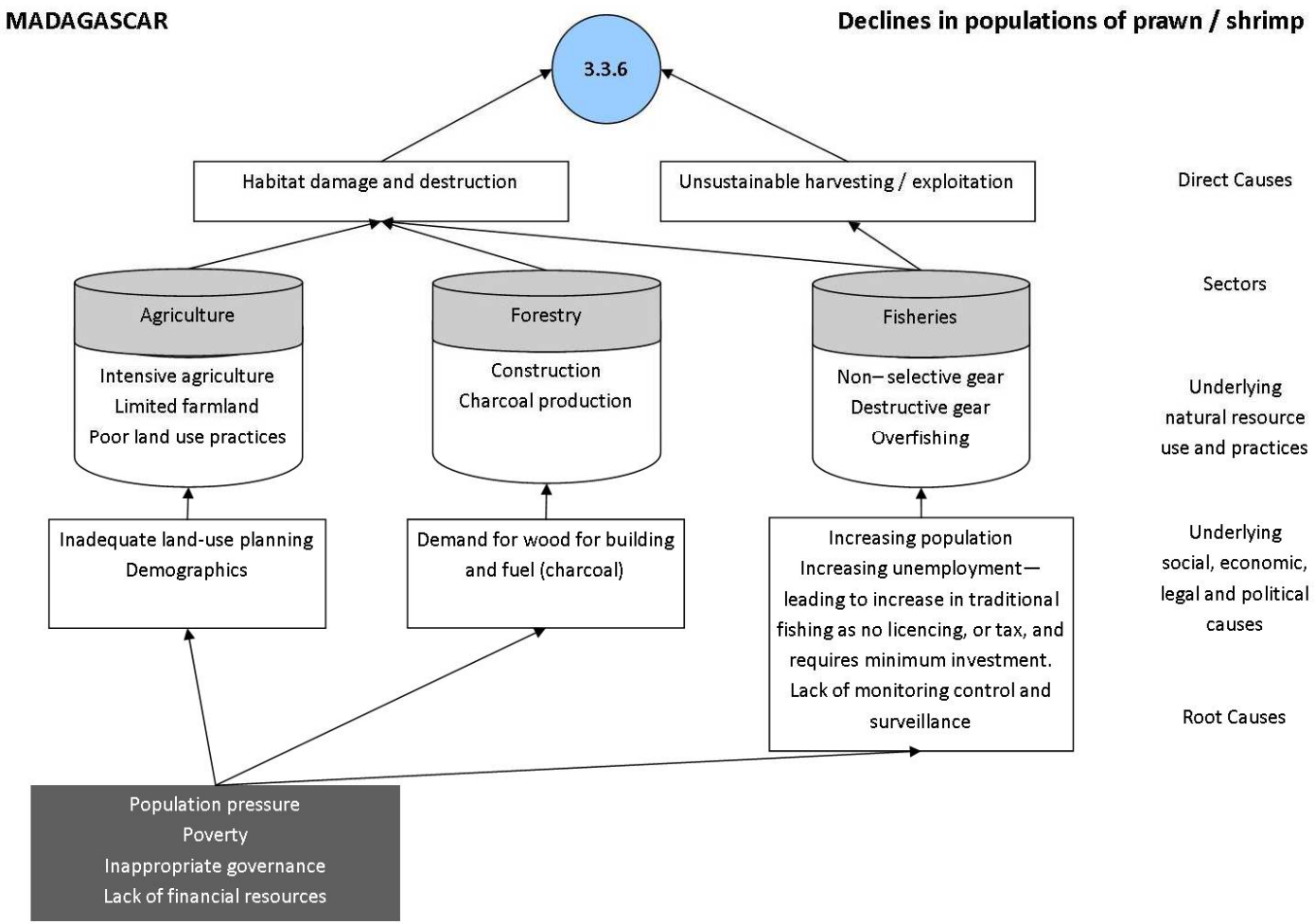


Figure 6.1.12.b: Madagascar MAC03 Causal Chain Analysis for Issue (3.3.6) Declines in populations of prawns and shrimp.



A6.2 Seychelles – National Causal Chain Meeting Results

Table A6.2.1: Seychelles Prioritisation 1 Results

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	R	H/M	NT	Yes	Monthly flow recorded by the utilities corporation	yes	Monthly flow	
1.2.	Degradation of ground and surface water quality	R	L/M	NT	No		No	only ad-hoc / event-based	
1.3.	Degradation of coastal and marine water quality	R	H/M	T					
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	R	L/M	FT	No		No	Ad-hoc	
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	R	L/M	NT	No		No	Ad-hoc	
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	R	L/M	T	No		No	Ad-hoc	
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	R	M	NT	No		No	Ad-hoc	
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	R	M	T	No		No	Ad-hoc	
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	R	L	T	No		No	Ad-hoc	
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	R	HP	T	Yes	Sandwatch programme. Baseline mapping.	Yes	NGOs and Gov Sey. Site specific monitoring.	Jica mapping. 1996 satellite

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
									images and new images now available not processed - no body to dedicate the time to do this work
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats	R	HP	T	Yes	Habitats mapped	No	No consistent monitoring.	
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	NR							In the Seychelles the upland watersheds are protected
2.2.2.	Disturbance, damage and loss of coastal forest habitats	R	MP	T	Yes	Habitats mapped	Yes (partial)	NGO projects - not consistent	Issues with NGO projects generally with regards data transfer and data management
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	R	HP	T	Yes	Habitats mapped	No		
2.2.4.	Disturbance, damage and loss of wetland habitats	R	MP	T	Yes	Habitats mapped	No	NGOs and Gov. Sey. Not consistent	

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
2.2.5.	Disturbance, damage and loss of estuarine habitats	NR							
2.2.6.	Disturbance, damage and loss of mangrove habitats	R	LP	T	Yes	Habitats mapped	Yes	Monitoring and education	
2.3.	Disturbance, damage and loss of subtidal benthic habitats								
2.3.1.	Disturbance, damage and loss of coral reef habitats	R	HP	T	Yes	NGO and Gov. Sey.	Yes	Global Vision International monitoring (30+ sites Mahe and 20+ sites Praslin - 10 years of data)	Monitoring used to be done by rangers not now.
2.3.2.	Disturbance, damage and loss of seagrass habitats	R	LP	T	Yes	Seagrass habitats mapped during Shoals of Capricorn and by Univ. Cambridge.	No	No consistent monitoring	
2.3.3.	Disturbance, damage and loss of macroalgal habitats	NR							
2.3.4.	Disturbance, damage and loss of soft sediment habitats	R	MP	T	No	Some grab samples taken during IUCN study on invasives	No	No consistent monitoring	IUCN study invasives
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)	NR							
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	FR	LP	T	No		No		
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)	NR							
2.6.	Introduction of exotic non-native species, invasives and nuisance species	NR							

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
3.1.	Decline in populations of focal species								
3.1.1.	Decline in populations of marine mammals	R	H	T	No	Fragmented project activities	No	Fragmented (onboard observations)	Combined 3.1.1 and 3.1.2
3.1.2.	Decline in populations of cetaceans	R	H	T	No	Fragmented project activities	No	Fragmented (onboard observations)	
3.1.3.	Decline in populations of seabirds	R	H	T	Yes	Reasonable baseline on nesting sites but not on foraging	Yes	Ongoing by different institutions - fragmented	
3.1.4.	Decline in populations of turtles	R	H	T	No	Fragmented and project based	Yes	Ongoing - but fragmented.	
3.2.	Decline in populations of commercial fish stocks								
3.2.1.	Decline in populations of sharks and rays	R	H	T	No	Some catch data and occurrence. Underwater visual census surveys.	No	Very fragmented and project based.	
3.2.2.	Decline in populations of large pelagics	R	H	T	Yes	Very good (IOTC and SFA -IRD)	Yes	Stock assessment and catch monitoring	
3.2.3.	Decline in populations of small pelagics	NR							
3.2.4.	Decline in populations of deep water demersals	R	H	NT	Yes	Good catch data (Seychelles Fisheries Authority)	Yes	Good catch and landing sites (SFA)	
3.2.5.	Decline in populations of reef and demersal fish	R	H	FT	Yes	Good catch data (SFA)	Yes	Good catch and landing sites (SFA) and UVC from projects.	
3.3.	Decline in populations of commercial invertebrates								

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)	NR							
3.3.2.	Decline in populations of abalone	NR							
3.3.3.	Decline in populations of cephalopods	R	H	FT	No	Very little (SFA)	No	Very little (SFA)	
3.3.4.	Decline in populations of sea cucumbers	R	H	FT	Yes	Good (SFA)	Yes	Good (SFA)	
3.3.5.	Decline in populations of sea urchins	NR							
3.3.6.	Decline in populations of prawns and shrimp	NR							
3.3.7.	Decline in populations of lobsters	R	H	T	Yes	Good (SFA)	Yes	Good (SFA)	Combined 3.3.7 and 3.3.8
3.3.8.	Decline in populations of crayfish	NR							
3.3.9.	Decline in populations of crabs	NR							
3.4.	Excessive bycatch and discards	R	H	T	No	Limited (SFA)	No	Limited (SFA)	
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)	R	H	FT	No	Very limited (SFA)	No	Very limited (SFA)	Future issue

Table A6.2.2: Seychelles Prioritisation 2 Results

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	VH	H	H	H	H	VH	L	H	H
1.2.	Degradation of ground and surface water quality	H	M	M	M	VH	H	M	H	H
1.3.	Degradation of coastal and marine water quality	VH	VH	VH	VH	VH	VH	L	H	VH
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	H	H	M	H	M	M	M	M	H
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	H	H	H	H	H	H	M	H	H
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	M	M	M	M	VH	VH	L	H	H
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	H	H	H	H	VH	H	L	H	H
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	VH	H	H	H	VH	VH	L	H	H
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	VH	VH	VH	VH	VH	VH	M	H	VH
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	VH	VH	VH	VH	VH	VH	VH	VH	VH
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats									
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)									
2.2.2.	Disturbance, damage and loss of coastal forest habitats	M	L	L	L	L	L	L	L	L

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	H	L	L	M	L	L	VH	L	M
2.2.4.	Disturbance, damage and loss of wetland habitats	M	L	L	L	M	H	H	H	M
2.2.5.	Disturbance, damage and loss of estuarine habitats									
2.2.6.	Disturbance, damage and loss of mangrove habitats	L	L	H	M	VH	VH	VH	VH	H
2.3.	Disturbance, damage and loss of subtidal benthic habitats									
2.3.1.	Disturbance, damage and loss of coral reef habitats	VH	VH	VH	VH	VH	VH	VH	VH	VH
2.3.2.	Disturbance, damage and loss of seagrass habitats	L	L	L	L	M	L	VH	M	M
2.3.3.	Disturbance, damage and loss of macroalgal habitats									
2.3.4.	Disturbance, damage and loss of soft sediment habitats	L	L	L	L	L	L	H	M	M
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)	L	VH	VH	H	L	L	H	M	M
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	L	VH	VH	H	VH	VH	L	H	H
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)									
2.6.	Introduction of exotic non-native species, invasives and nuisance species									
3.1.	Decline in populations of focal species									

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
3.1.1.	Decline in populations of marine mammals	L	L	L	L	VH	H	L	H	M
3.1.2.	Decline in populations of cetaceans	VH	M	L	M	VH	VH	M	VH	H
3.1.3.	Decline in populations of seabirds	VH	H	M	H	VH	M	L	H	H
3.1.4.	Decline in populations of turtles	VH	H	L	H	VH	H	M	H	H
3.2.	Decline in populations of commercial fish stocks									
3.2.1.	Decline in populations of sharks and rays	VH	H	H	H	VH	VH	H	VH	VH
3.2.2.	Decline in populations of large pelagics	VH	H	VH	VH	VH	VH	M	VH	VH
3.2.3.	Decline in populations of small pelagics									
3.2.4.	Decline in populations of deep water demersals	M	H	H	H	M	H	M	M	H
3.2.5.	Decline in populations of reef and demersal fish	VH	VH	H	VH	M	H	L	M	H
3.3.	Decline in populations of commercial invertebrates									
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)									
3.3.2.	Decline in populations of abalone									
3.3.3.	Decline in populations of cephalopods	M	M	L	M	L	M	M	M	M

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
3.3.4.	Decline in populations of sea cucumbers	VH	VH	H	VH	L	L	H	M	H
3.3.5.	Decline in populations of sea urchins									
3.3.6.	Decline in populations of prawns and shrimp									
3.3.7.	Decline in populations of lobsters	M	M	L	M	L	L	H	M	M
3.3.8.	Decline in populations of crayfish									
3.3.9.	Decline in populations of crabs									
3.4.	Excessive bycatch and discards	H	H	H	H	VH	VH	M	VH	VH
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)	VH	H	H	H	L	M	H	M	H

Figure 6.2.1.a: Seychelles MAC01 Impact Analysis for Issue (1.1) Alteration of natural river flow and changes in freshwater input and sediment load.

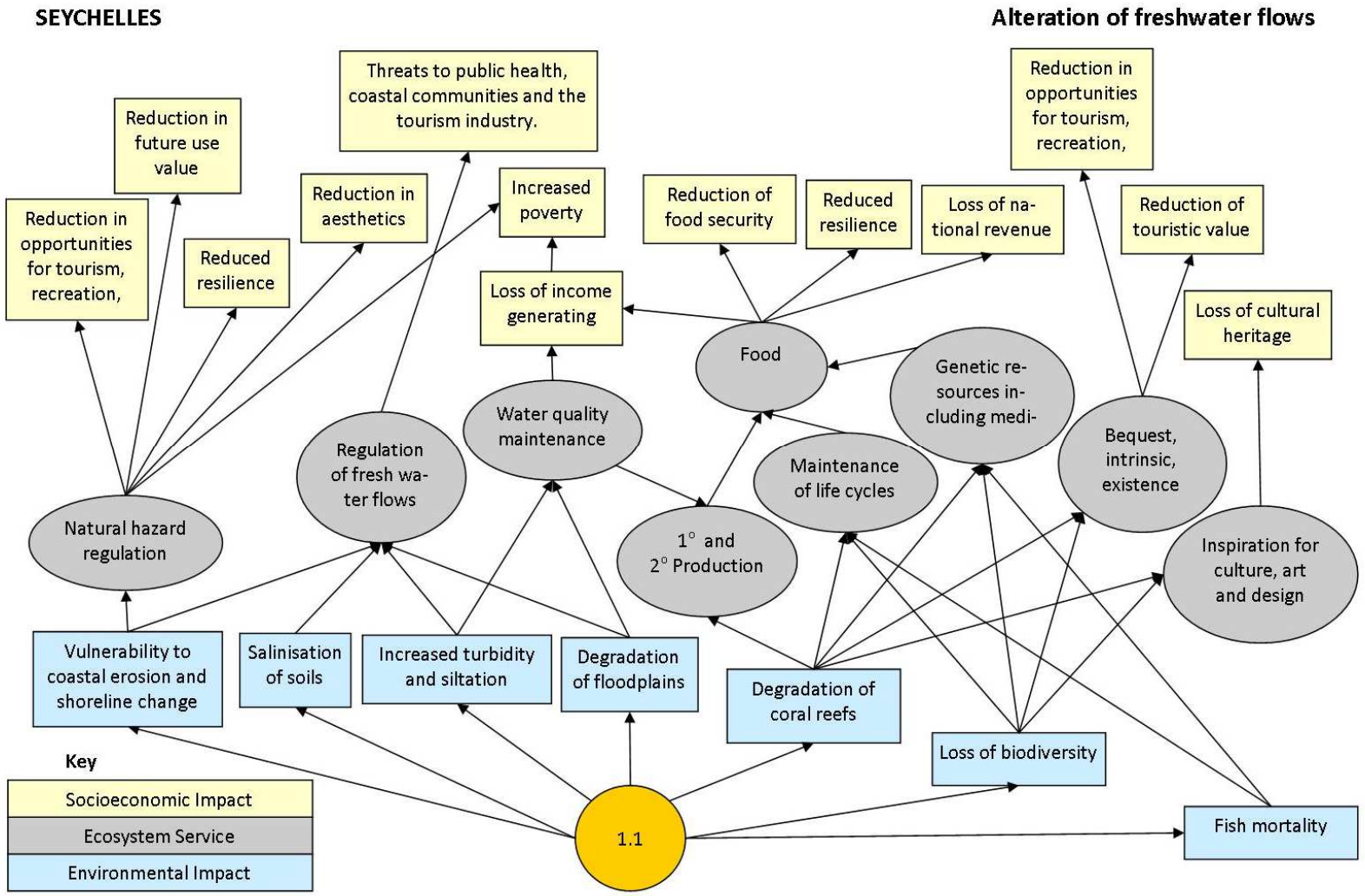


Figure 6.2.1.b: Seychelles MAC01 Causal Chain Analysis for Issue (1.1) Alteration of natural river flow and changes in freshwater input and sediment load.

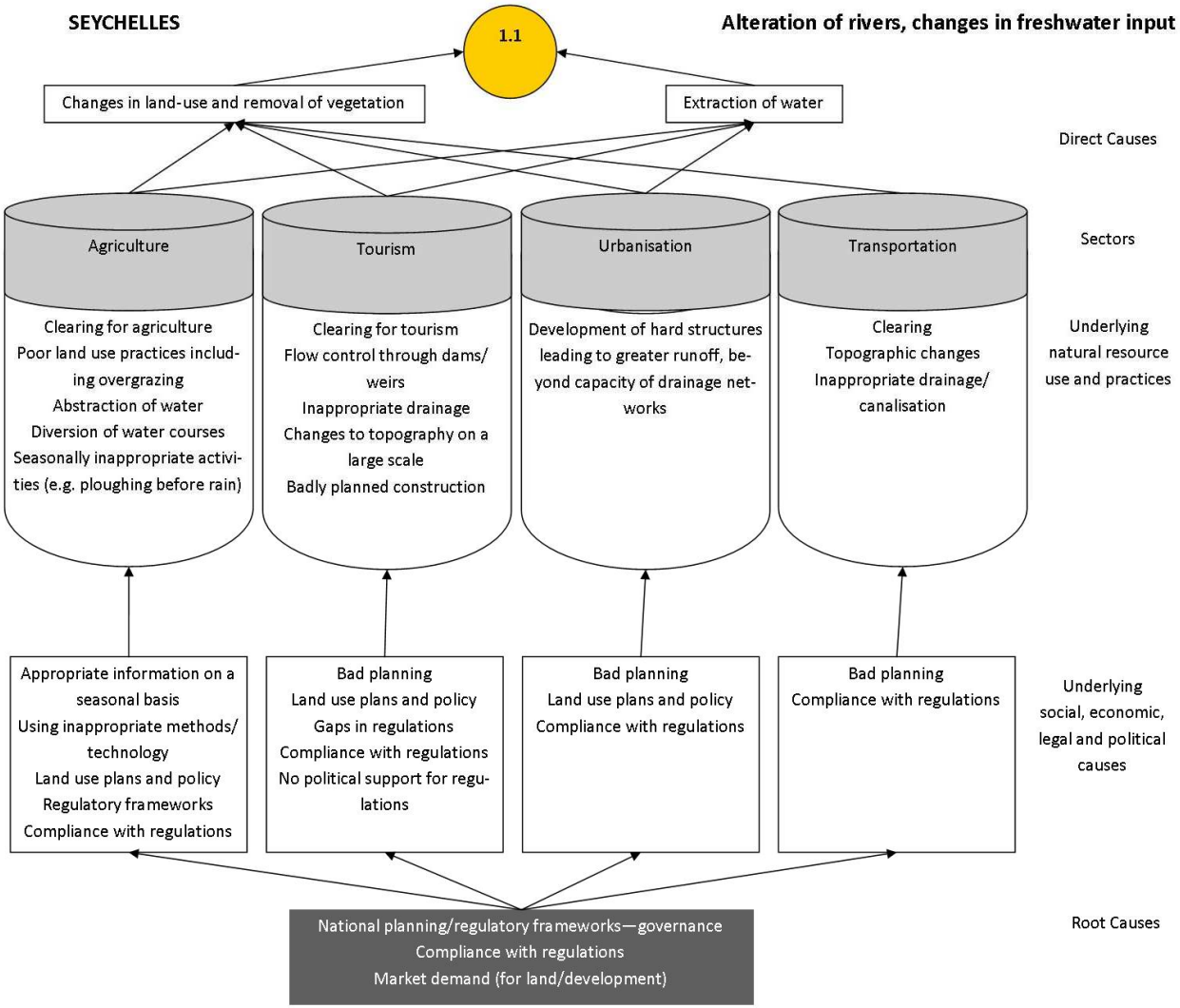


Figure 6.2.2.a: Seychelles MAC01 Impact Analysis for Issue (1.3.6) Oil spills.

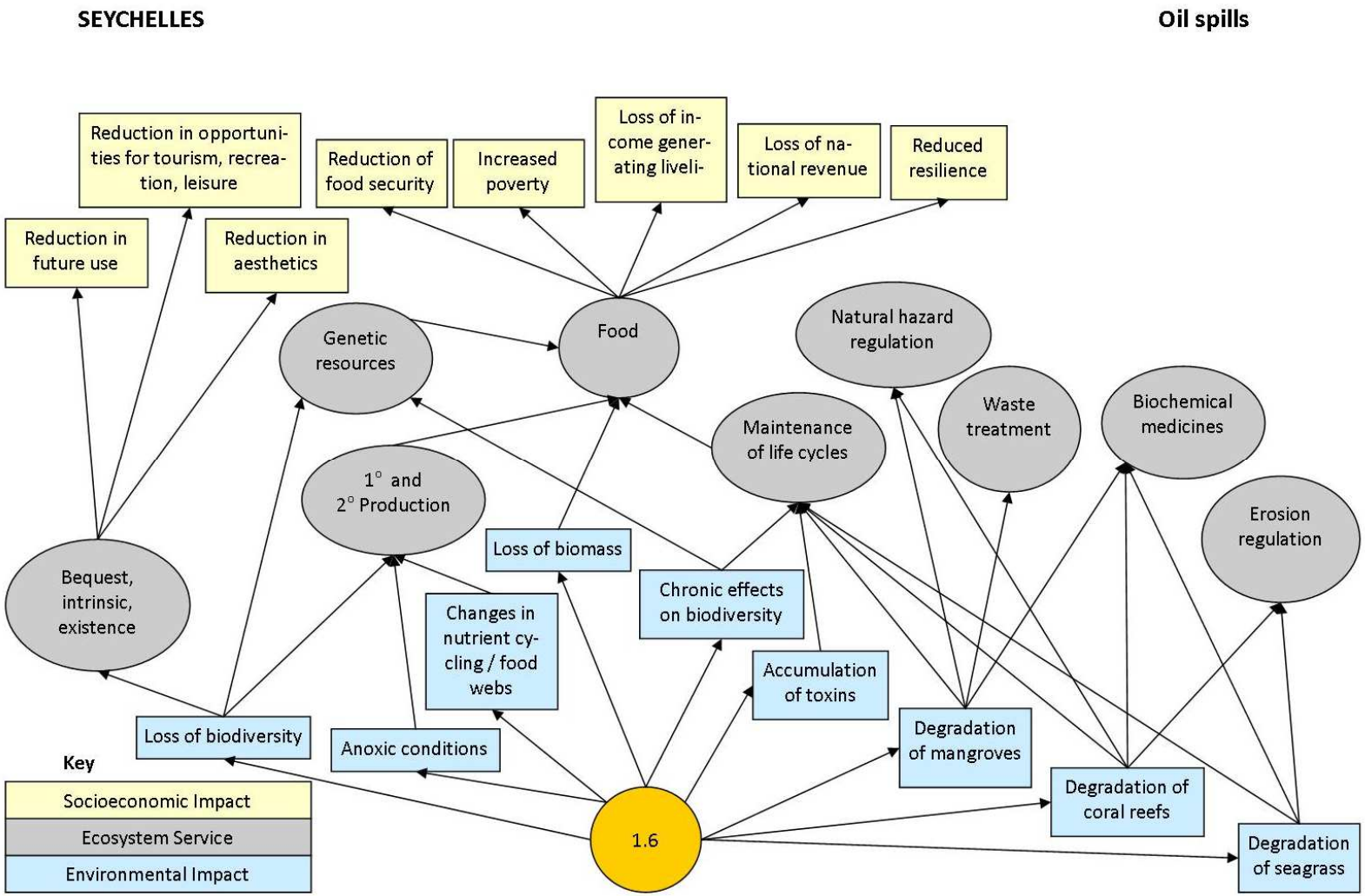


Figure 6.2.2.b: Seychelles MAC01 Causal Chain Analysis for Issue (1.3.6) Oil spills.

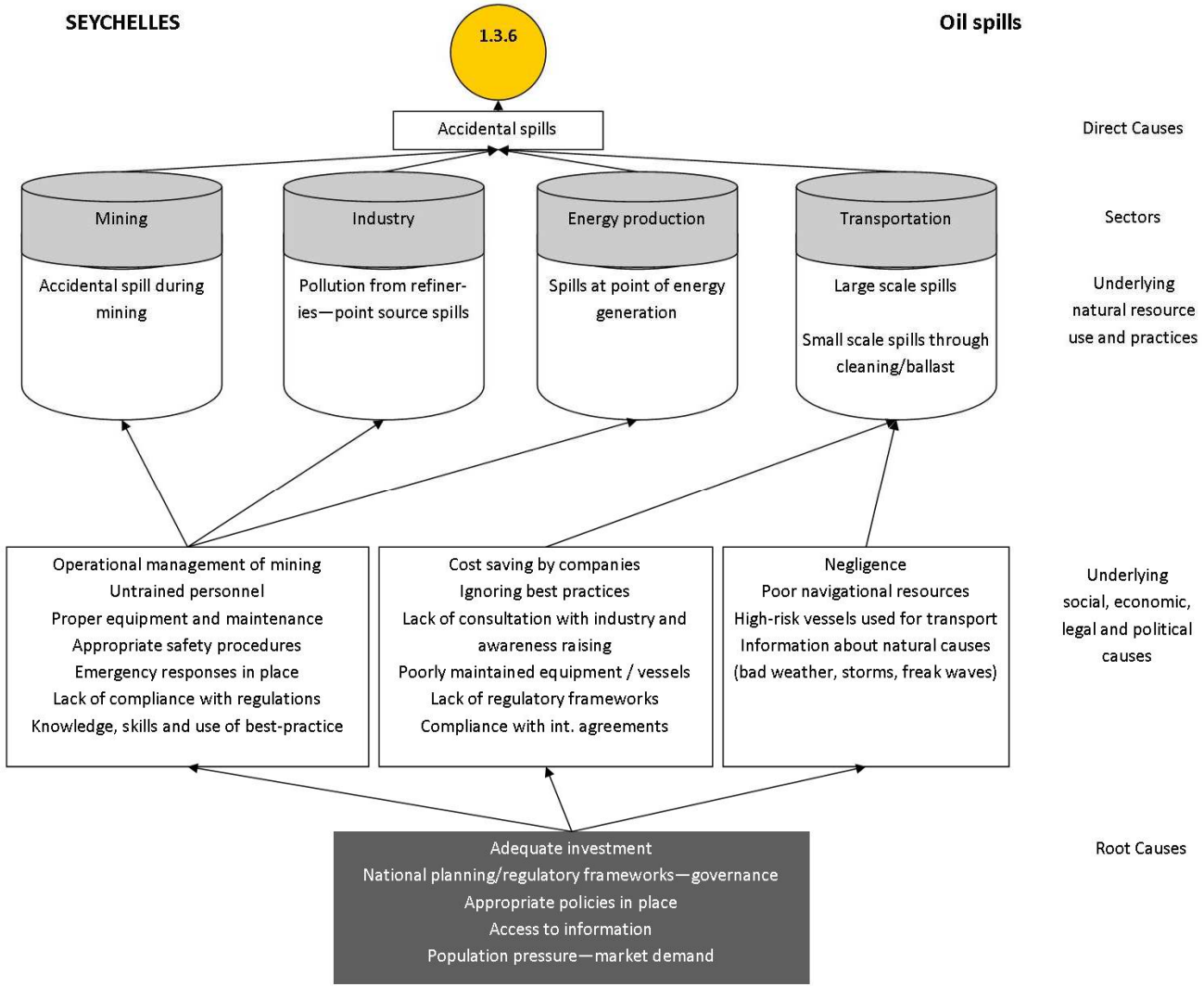


Figure 6.2.3: Seychelles MAC02 Impact Analysis for Issue (2.1) Shoreline change due to modification, land reclamation and coastal erosion.

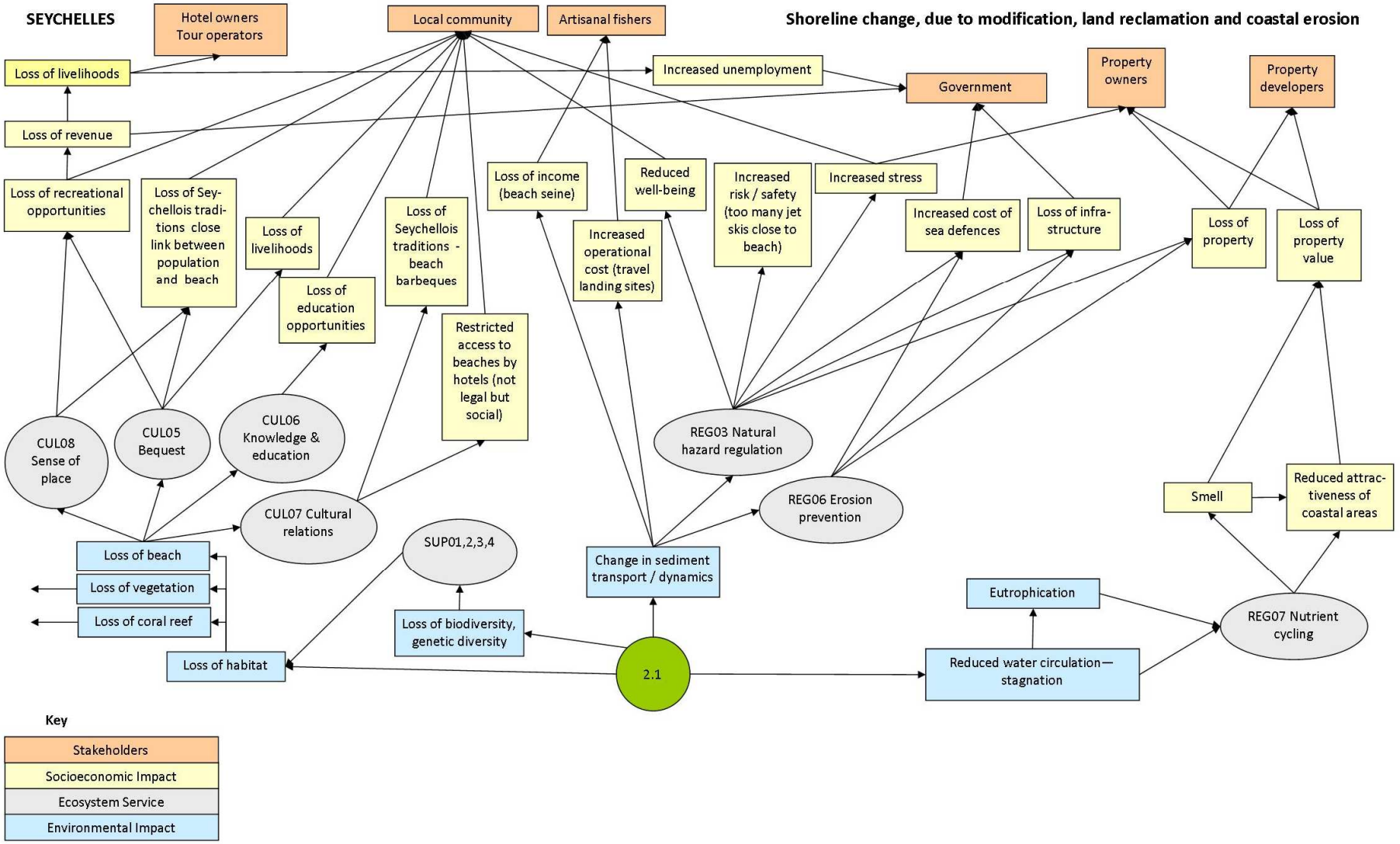


Figure 6.2.4: Seychelles MAC02 Impact Analysis for Issue (2.2.2) Disturbance, damage and loss of coastal forest.

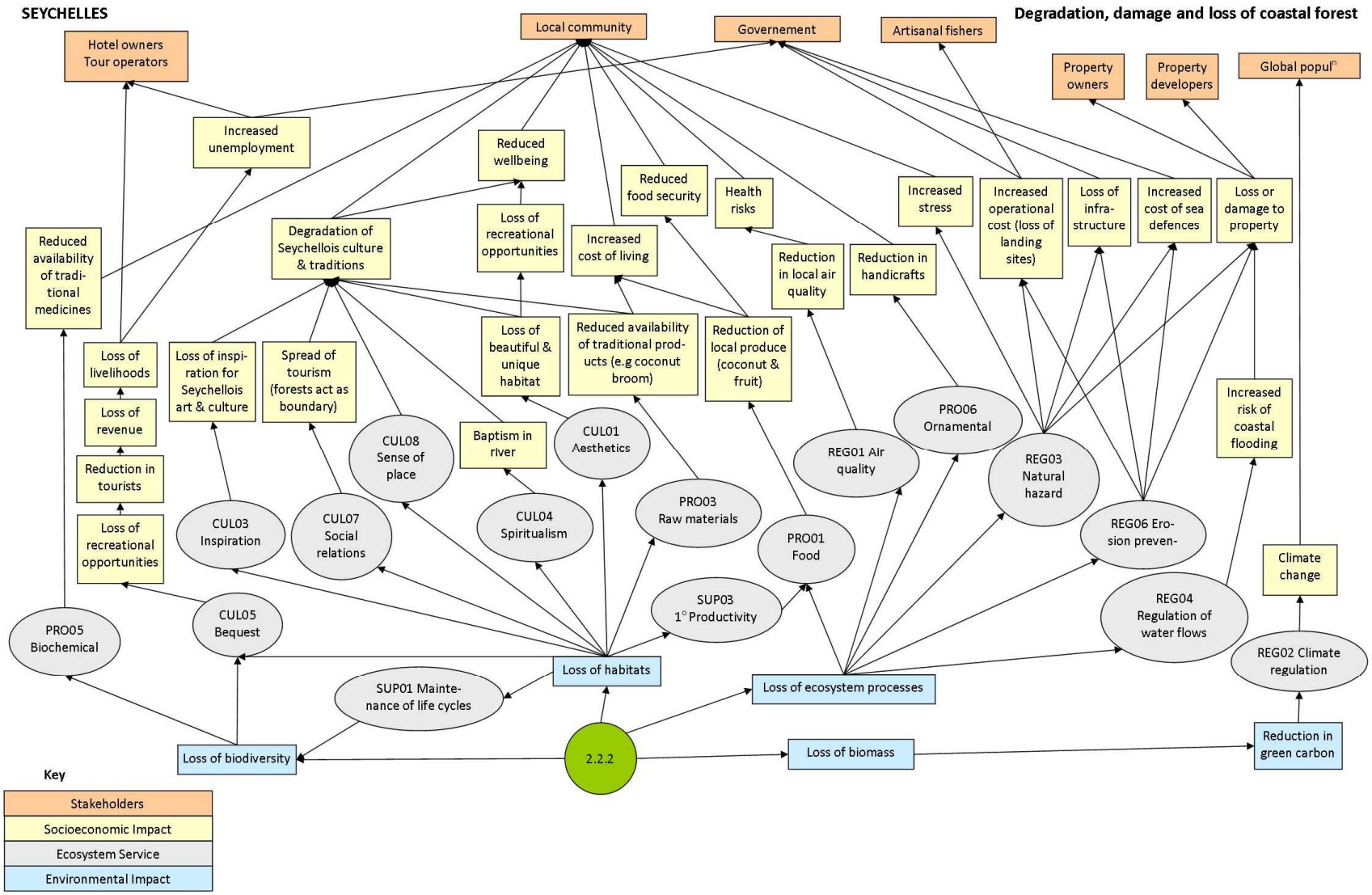


Figure 6.2.5: Seychelles MAC02 Impact Analysis for Issue (2.2.3) Disturbance, damage and loss of coastal habitats.

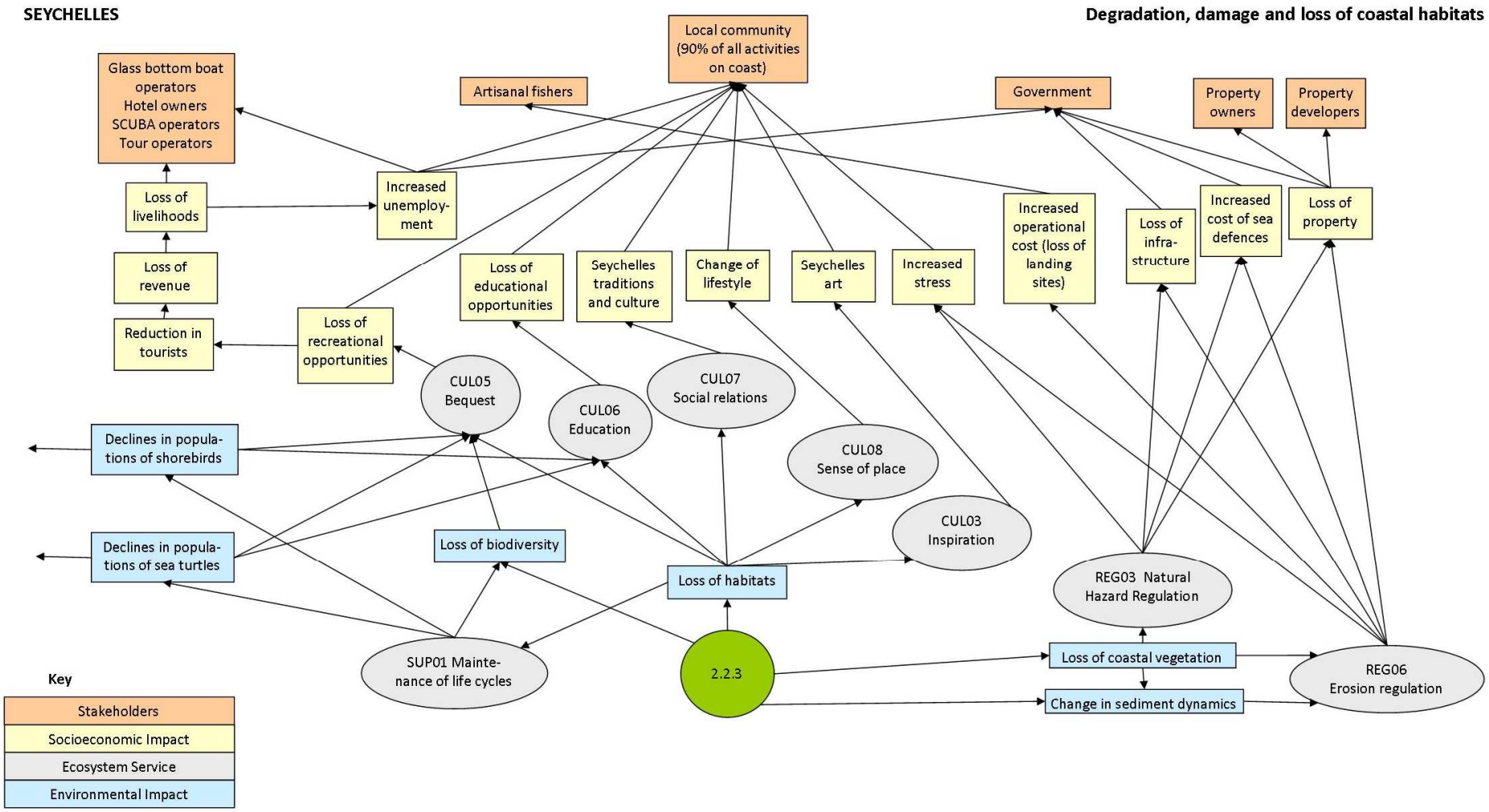


Figure 6.2.6: Seychelles MAC02 Impact Analysis for Issue (2.2.6) Disturbance, damage and loss of mangroves.

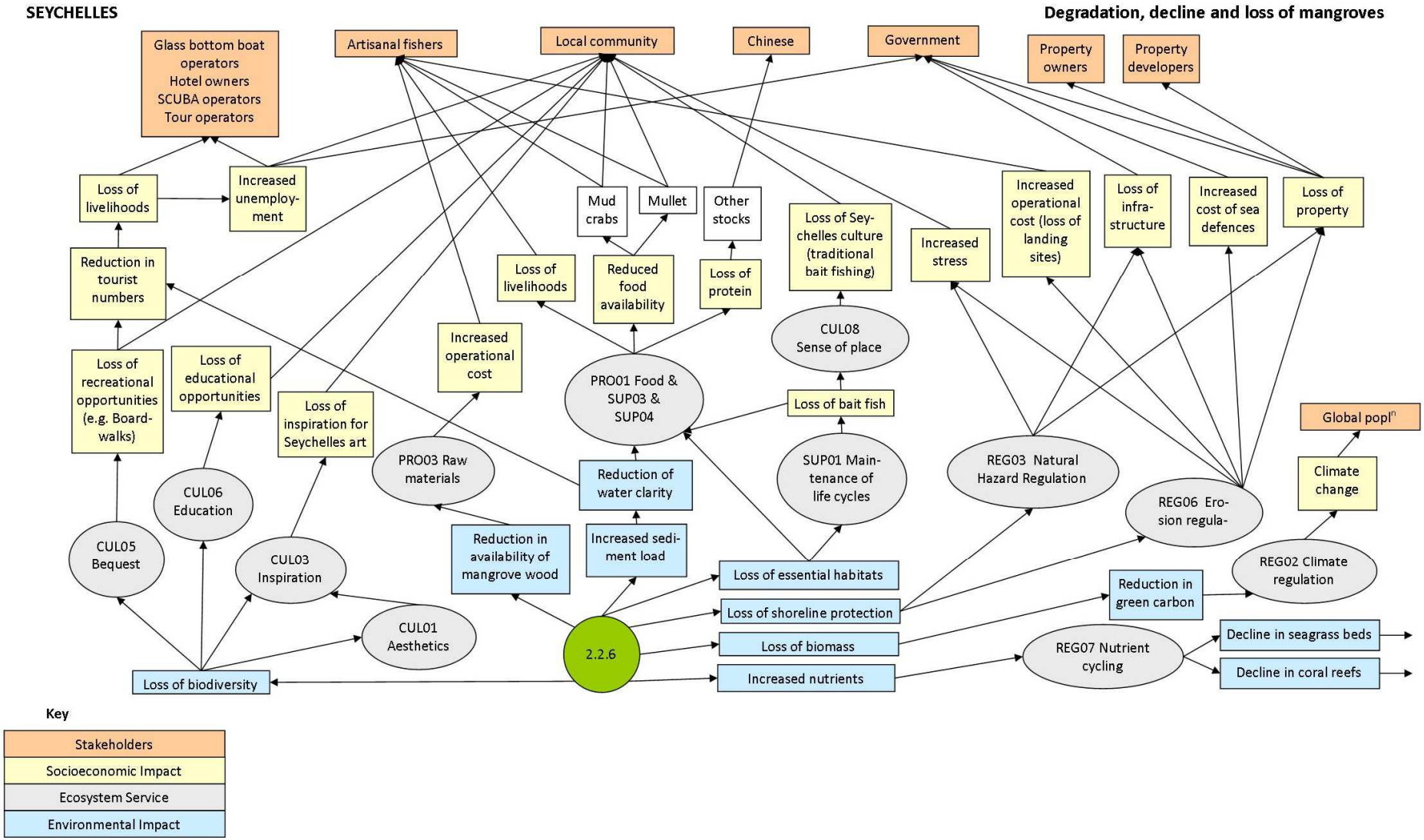


Figure 6.2.7.a: Seychelles MAC02 Impact Analysis for Issue (2.3.1) Disturbance, damage and loss of coral reefs.

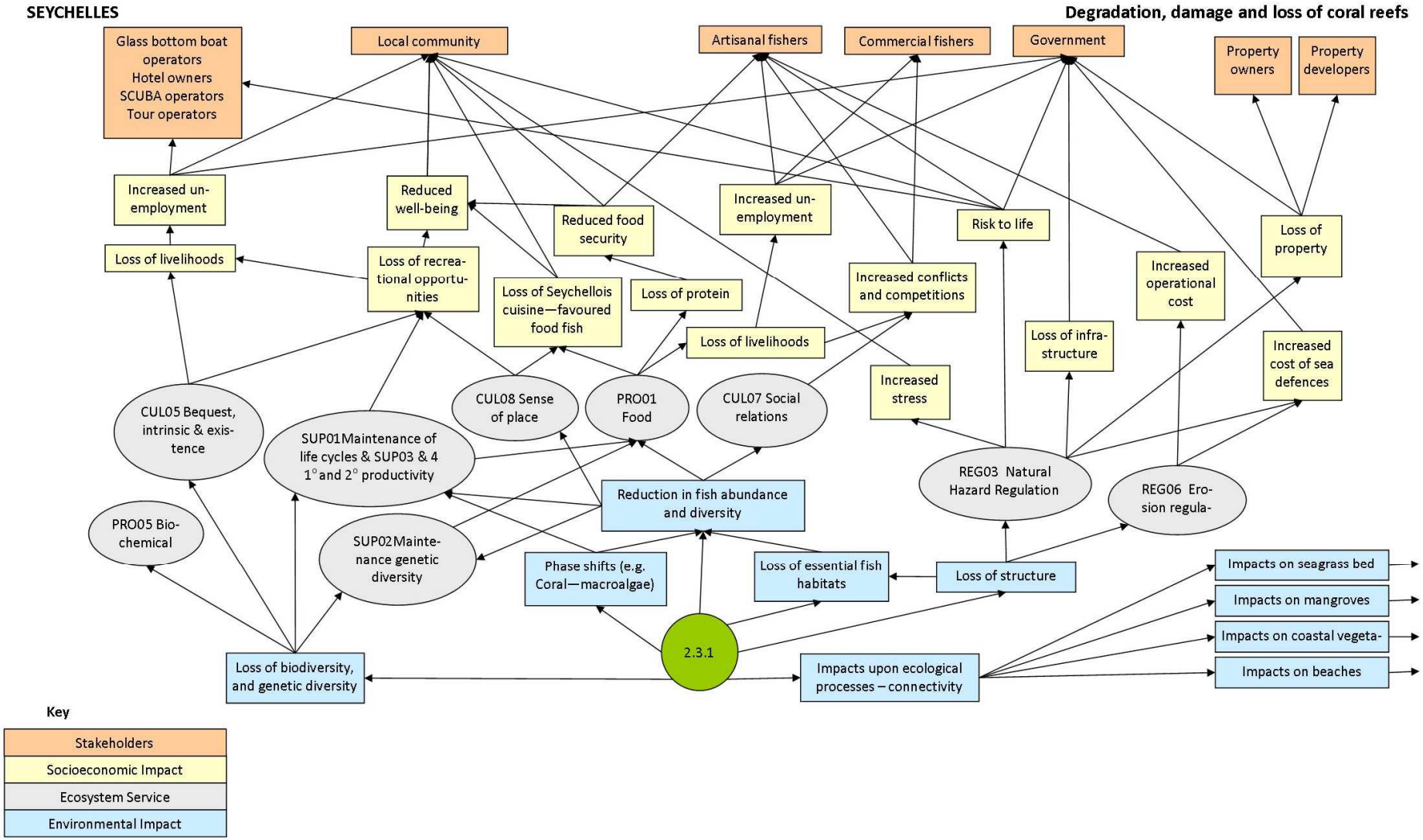


Figure 6.2.7.b: Seychelles MAC02 Causal Chain Analysis for Issue (2.3.1) Disturbance, damage and loss of coral reefs.

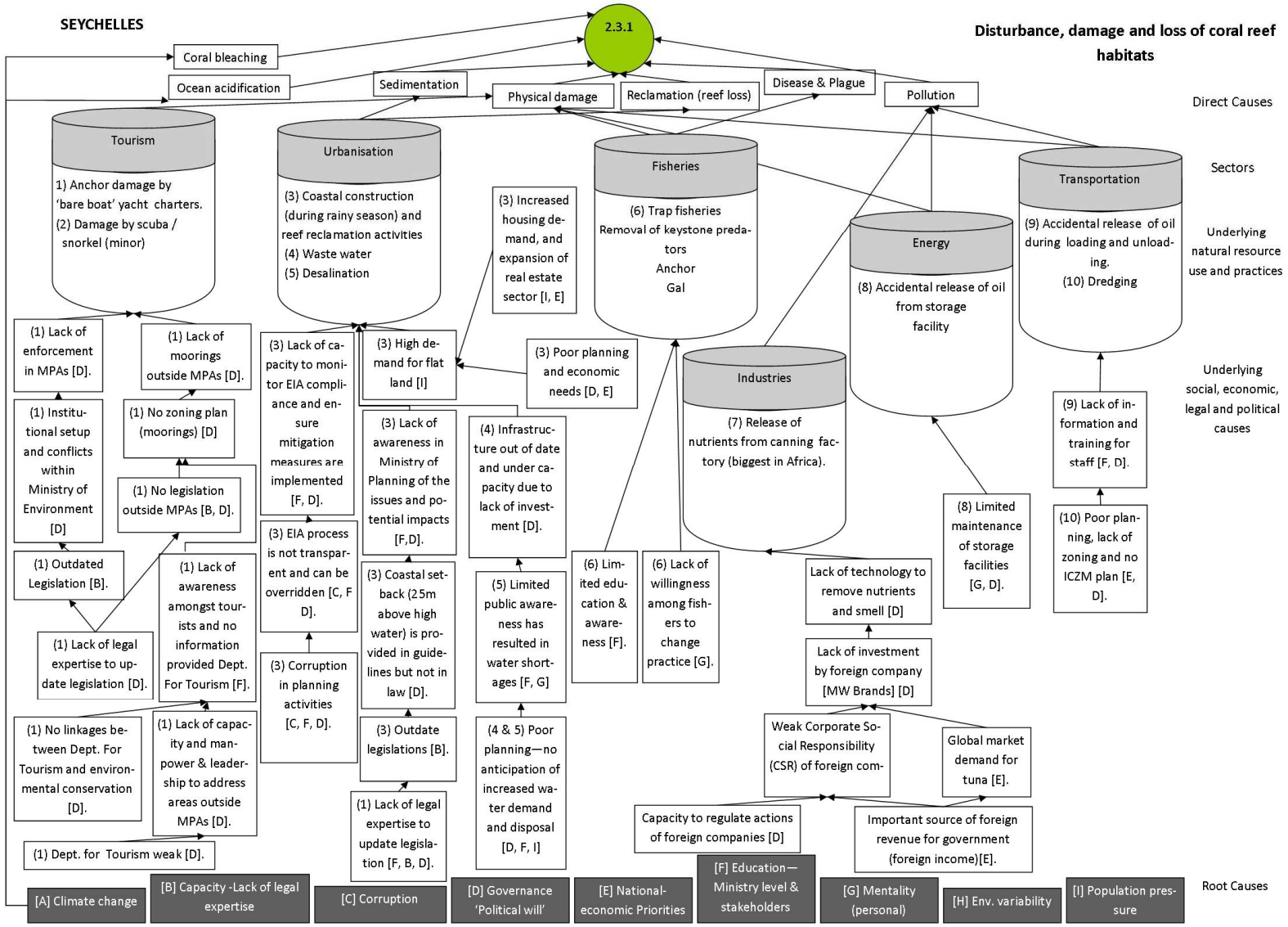


Figure 6.2.8: Seychelles MAC03 Impact Analysis for Issue (3.1.2) Declines in populations of cetaceans.

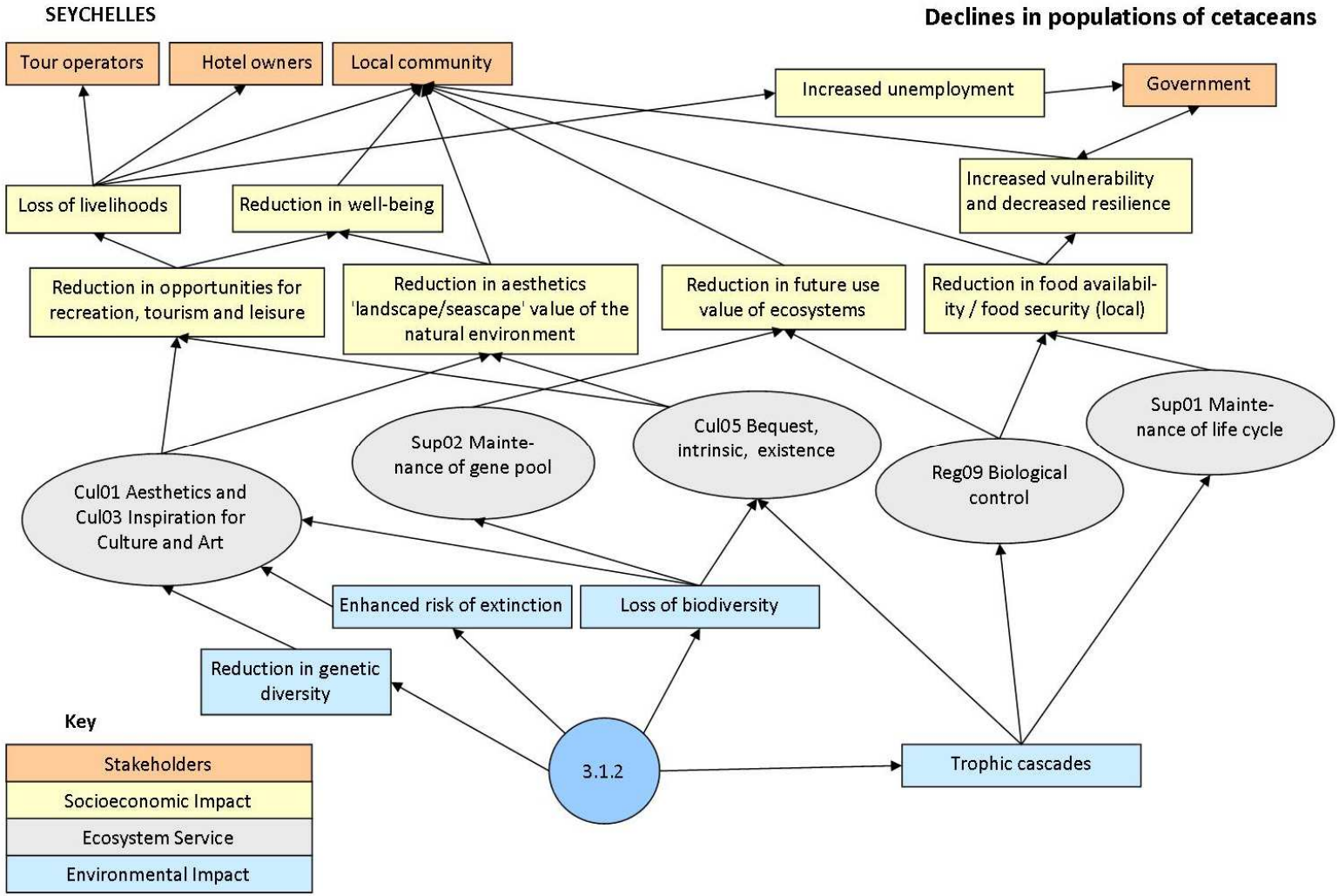


Figure 6.2.9.a: Seychelles MAC03 Impact Analysis for Issue (3.2.2) Declines in populations of large pelagics.

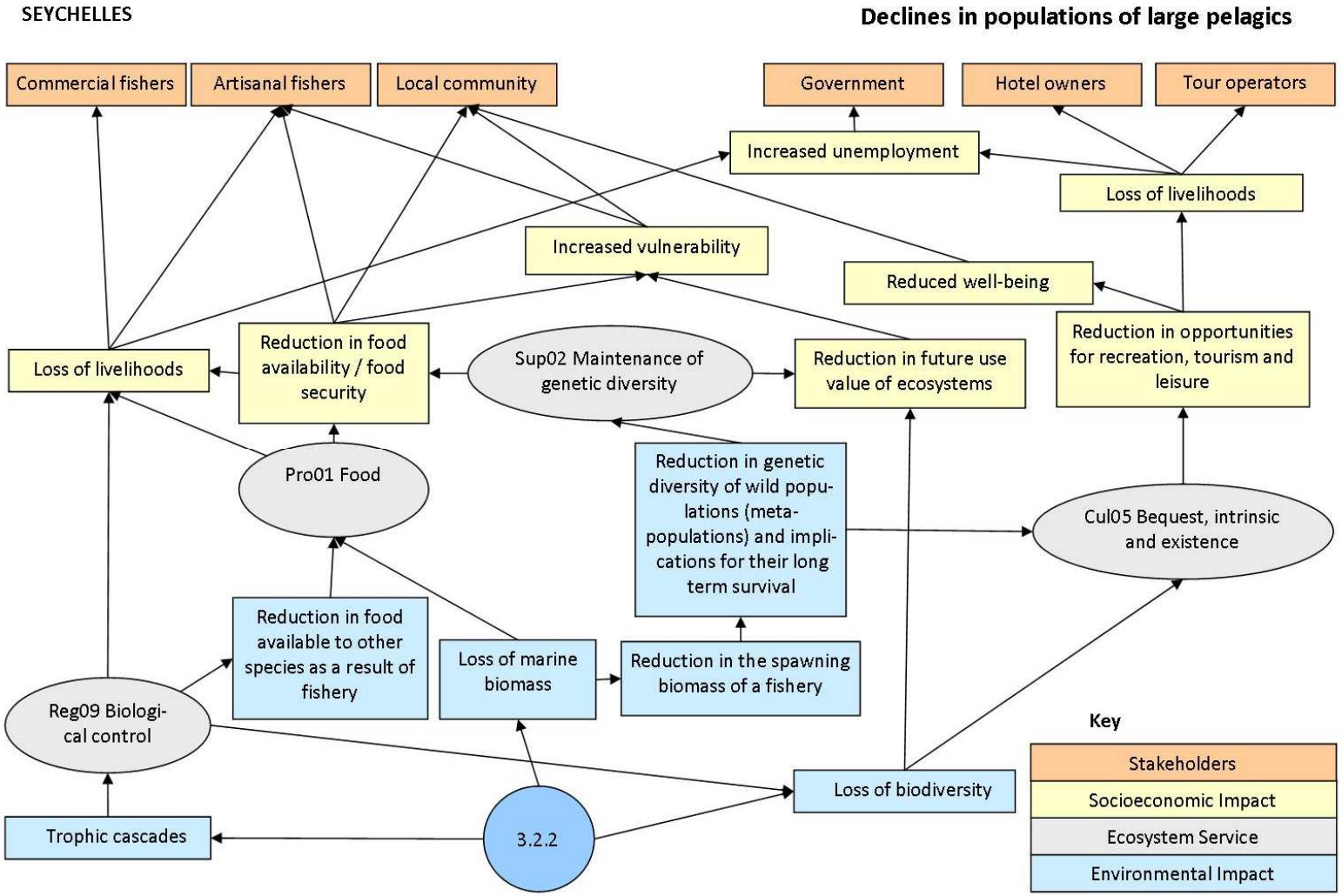


Figure 6.2.9.b: Seychelles MAC03 Causal Chain Analysis for Issue (3.2.2) Declines in populations of large pelagics.

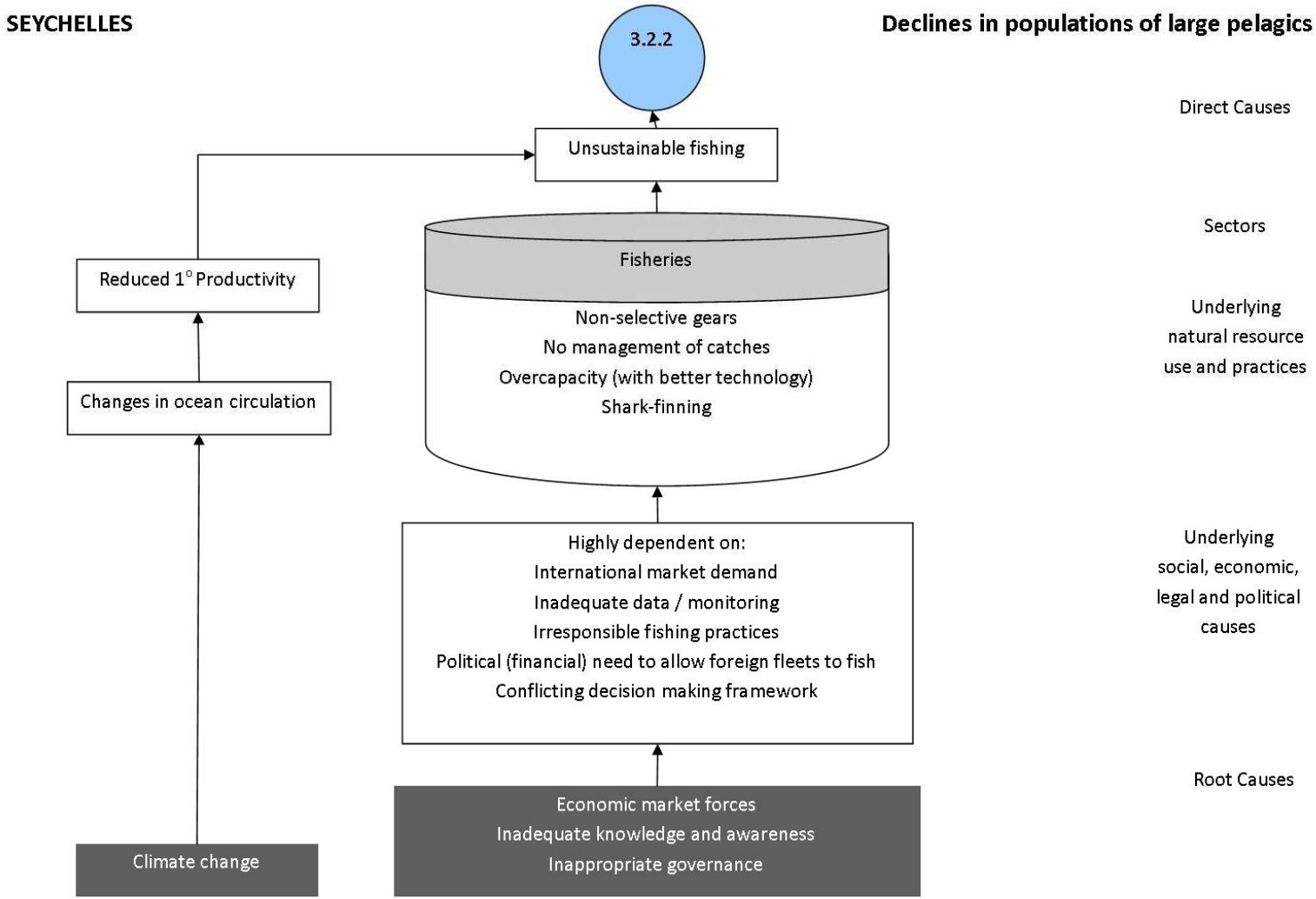


Figure 6.2.10.a: Seychelles MAC03 Impact Analysis for Issue (3.3.4) Declines in populations of sea cucumbers.

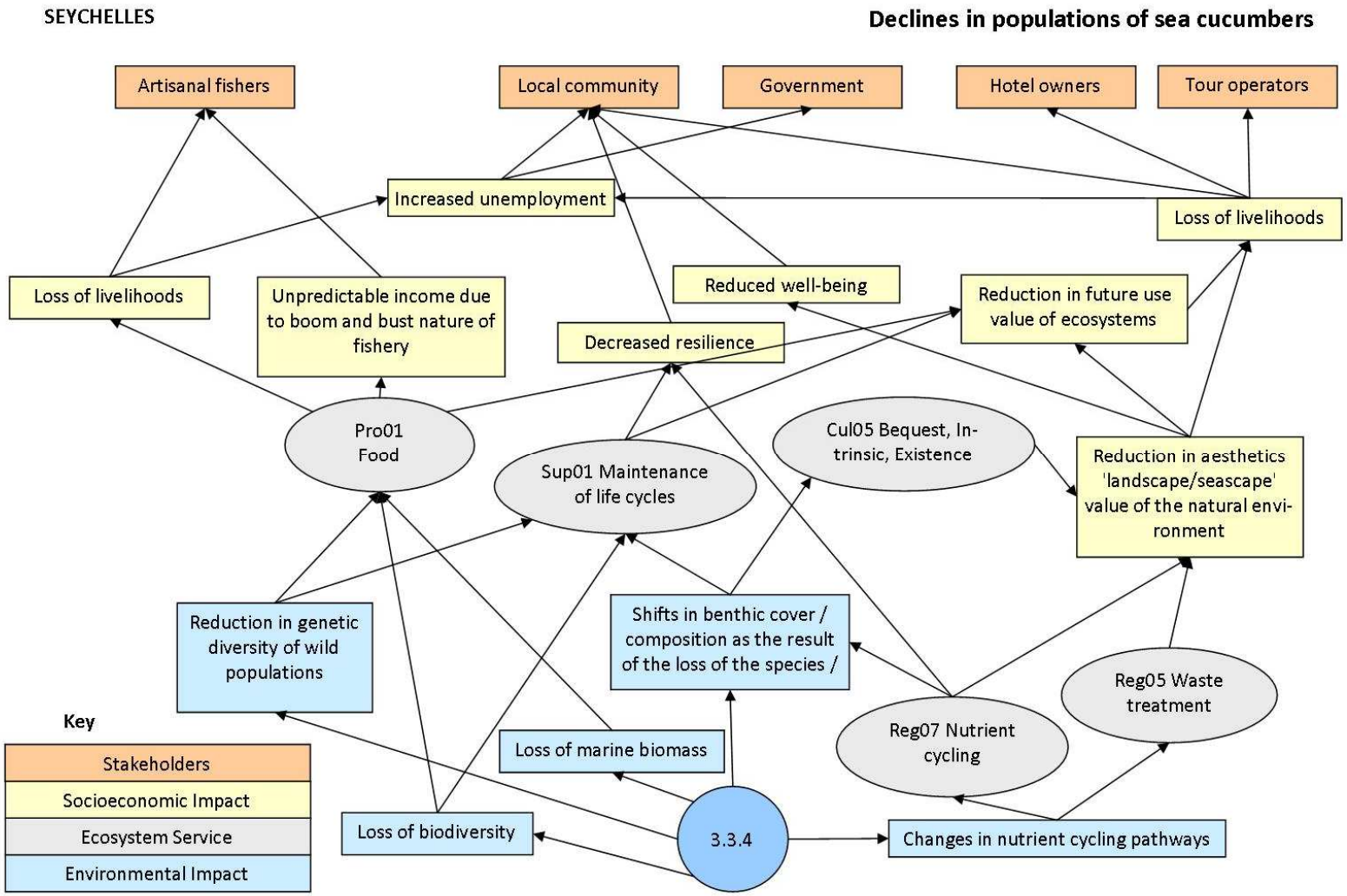


Figure 6.2.10.b: Seychelles MAC03 Causal Chain Analysis for Issue (3.3.4) Declines in populations of sea cucumbers.

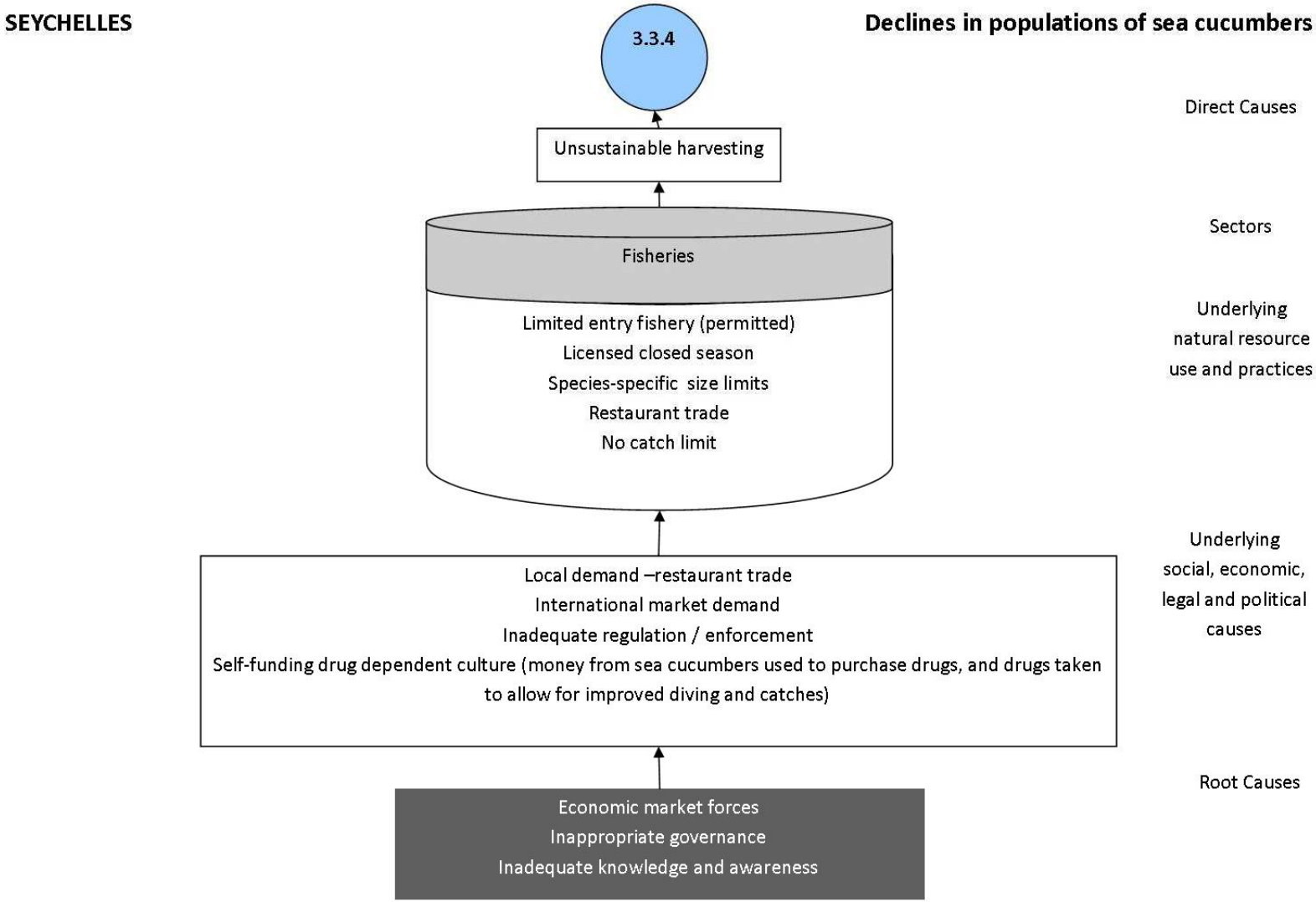


Figure 6.2.11.a: Seychelles MAC03 Impact Analysis for Issue (3.4) Excessive bycatch and discards.

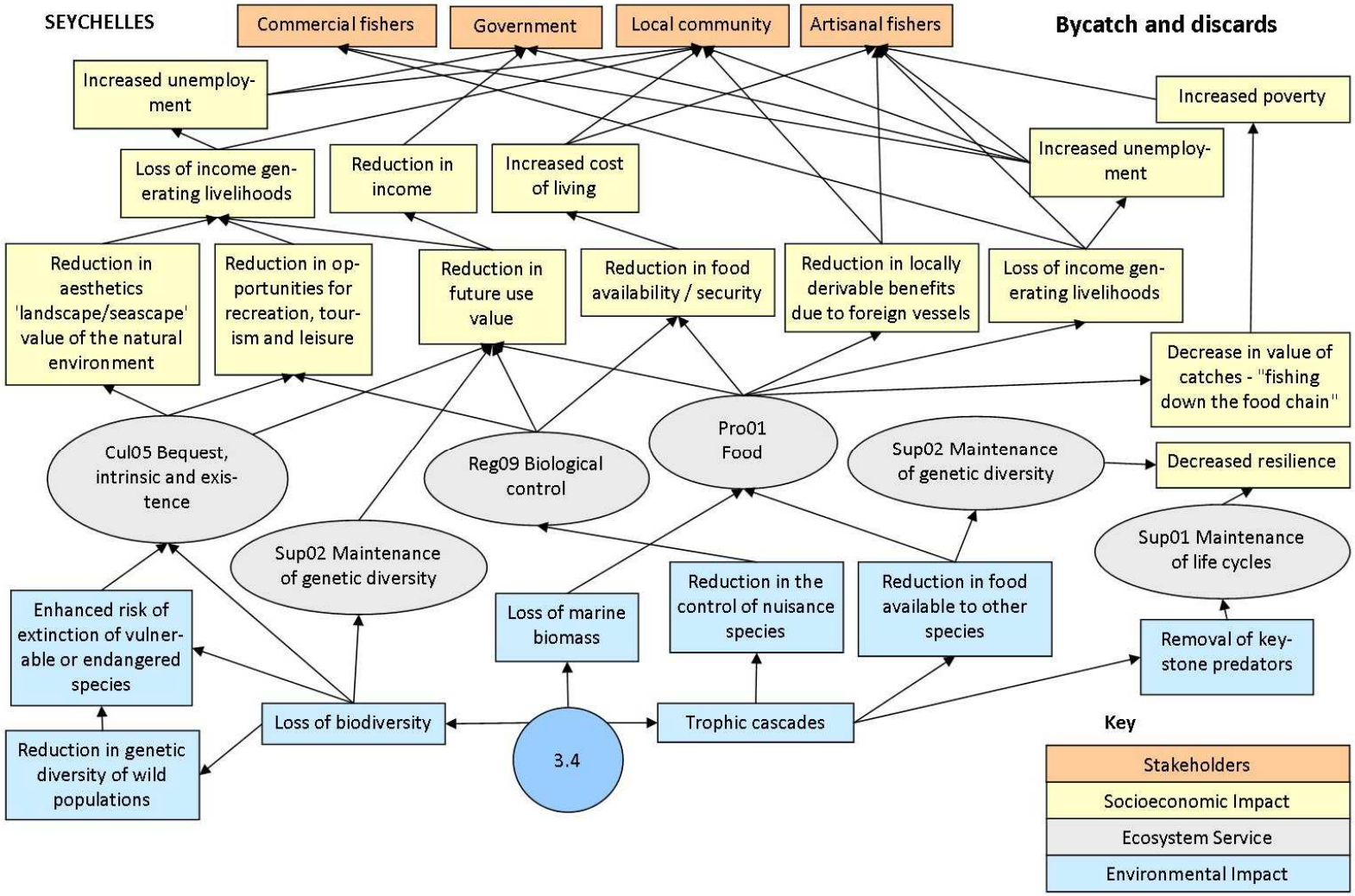


Figure 6.2.11.b: Seychelles MAC03 Causal Chain Analysis for Issue (3.4) Excessive bycatch and discards.

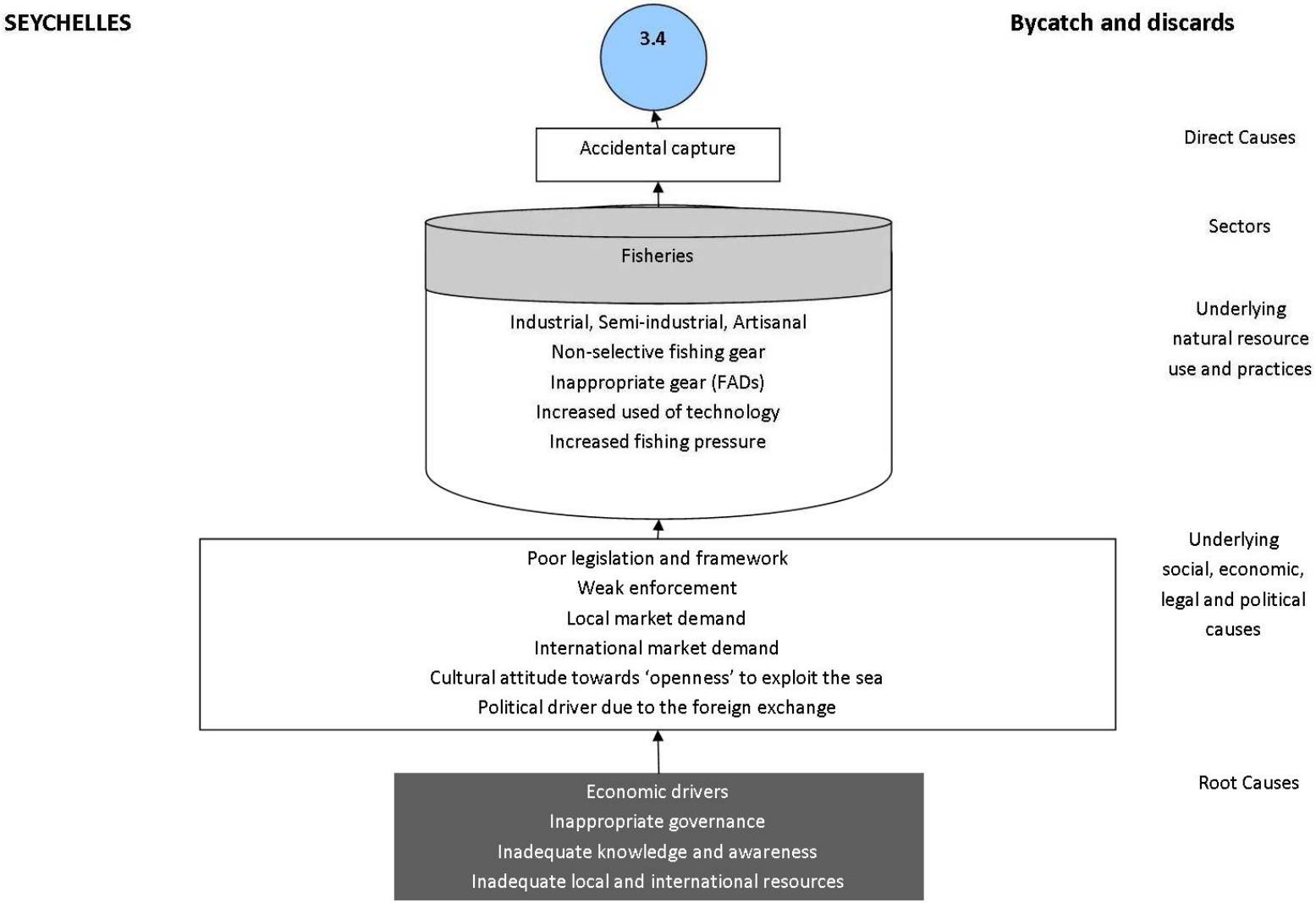
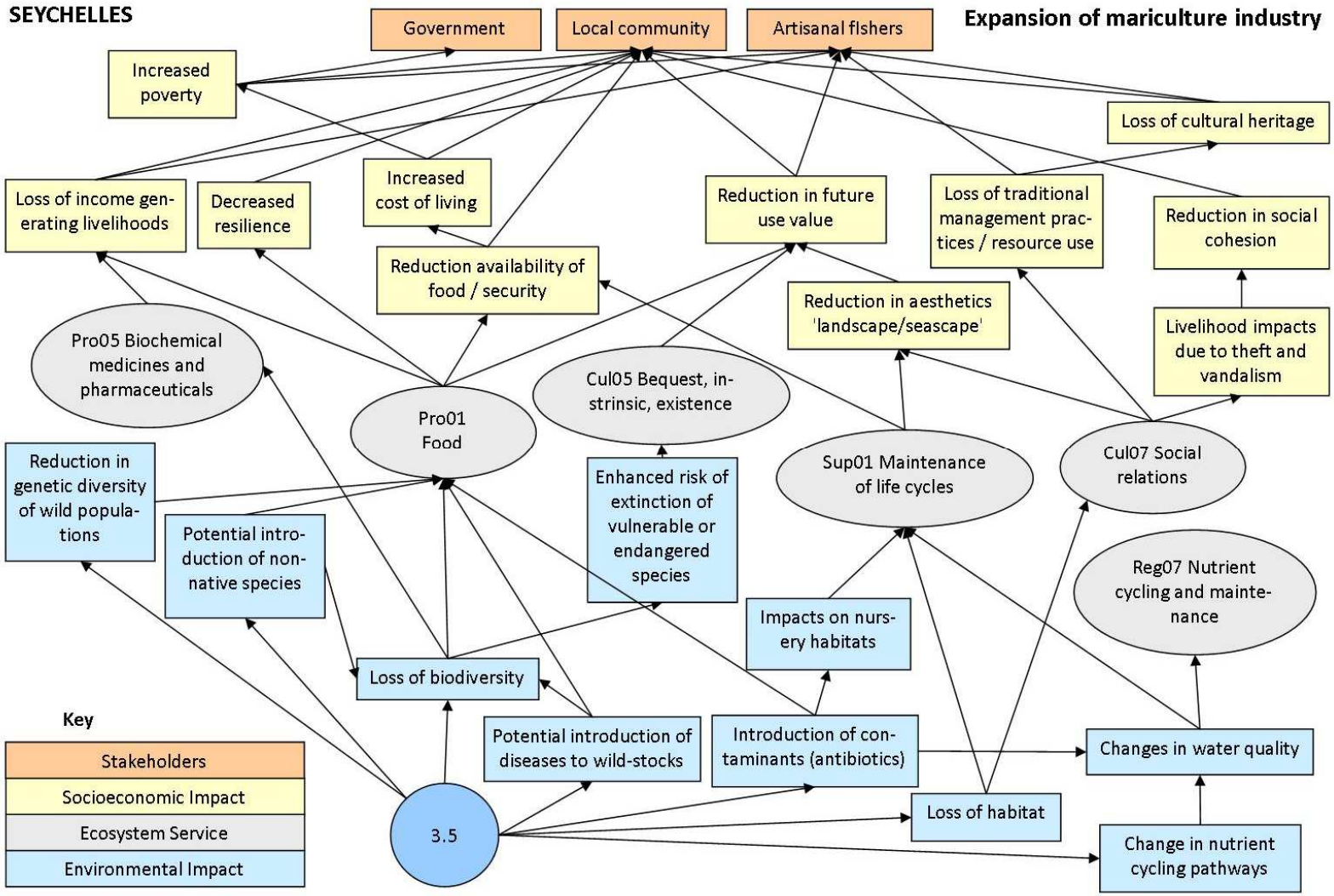


Figure 6.2.12: Seychelles MAC03 Impact Analysis for Issue (3.5) Expansion of mariculture industry.



A6.3 Mauritius – National Causal Chain Meeting Results

Table A6.3.1: Mauritius Prioritisation 1 Results

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	R	L	NT	Yes	Hydrographic data - MOI	Yes - partial	Monitoring of river flow but not sediment loading. By MoE / CWA	The group consulted all considered the impacts of ALL water quality issues to be low priority because they thought they are limited in their extent. Furthermore the government is addressing the issue.
1.2.	Degradation of ground and surface water quality	R	L	T	Yes	MoE	Yes	Ongoing by MoE / CWA	
1.3.	Degradation of coastal and marine water quality								
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	R	L	T	Yes - partial	Site specific studies within lagoons by Ministry of Environment and some studies by University of Mauritius (Daby PhD thesis and papers)	Yes - partial.	Commencing lagoon water quality index and aiming to join Blue Flag scheme.	
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	R	L	T	Yes - partial	Site specific studies within lagoons. Not comprehensive. Data held by AFRC and studies completed through University of Mauritius.	Yes	Ongoing by MoE / AFRC - site specific not systematic.	
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	R	L	T	Yes - partial	Site specific studies within lagoons. Heavy metals and POPs it is thought that there may be studies done by University of Mauritius.	No	No systematic monitoring for heavy metals or POPs	

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	R	L	T	Yes - partial	Site specific studies have been completed in certain lagoons.	No	No systematic monitoring of sediment loads.	
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	R	L	T	Yes - partial	Site specific studies.	No	Beach clean authority removes rubbish from beaches	
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	R	M	T	No	Occasional surveys	No	No ongoing monitoring of hydrocarbons.	
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	R	H	T	Yes	Ministry of lands and housing / remote sensing	not systematic	Planned to be done once a year using SPOT. Pressure zones have been identified.	
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats								
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	R	L/M	NT	Yes	Department of Environment, and the Ministry of housing	not systematic		
2.2.2.	Disturbance, damage and loss of coastal forest habitats	R	L/M	NT	maybe	Department of forestry			
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	R	H	T	No		No		
2.2.4.	Disturbance, damage and loss of wetland habitats	R	H	NT	Yes	National Parks and conservation service	No	Ad-hoc by National Parks and conservation service	
2.2.5.	Disturbance, damage and loss of estuarine habitats	NR							

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
2.2.6.	Disturbance, damage and loss of mangrove habitats	R	H	NT/T	Yes	Ministry of environment	Yes	Ministry of fisheries	
2.3.	Disturbance, damage and loss of subtidal benthic habitats								
2.3.1.	Disturbance, damage and loss of coral reef habitats	R	H	T	Yes	Many data sets	Yes	Too numerous to list	
2.3.2.	Disturbance, damage and loss of seagrass habitats	R	M	NT	No		No		
2.3.3.	Disturbance, damage and loss of macroalgal habitats	NR							
2.3.4.	Disturbance, damage and loss of soft sediment habitats	R/NR	L	NT	No		No		
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)	NR							
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	R	H	T	Yes	Ministry of fisheries, MOI	Yes	Ministry of fisheries, MOI	
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)	R	M/H	T	Yes		Yes	monitoring of SST; ad-hoc for events	
2.6.	Introduction of exotic non-native species, invasives and nuisance species	R	M	T	No		Yes	but localised	
3.1.	Decline in populations of focal species								

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
3.1.1.	Decline in populations of marine mammals	FR	HP	T	Yes	Mauritius Marine Conservation Society (MMCS)	Yes	Ongoing - MMCS	
3.1.2.	Decline in populations of cetaceans	R	HP	T	Yes	Mauritius Marine Conservation Society (MMCS)	Yes	Ongoing - MMCS	
3.1.3.	Decline in populations of seabirds	R	HP	T	Yes	NPCS (?check acronym), Mauritius Wildlife Foundation (MWF)	Yes	Ongoing - MWF and NPCS	
3.1.4.	Decline in populations of turtles	R	HP	T	Yes	?Mauritius Marine Conservation Society (MMCS)		Ongoing - MMCS?	
3.2.	Decline in populations of commercial fish stocks								
3.2.1.	Decline in populations of sharks and rays	R	HP	T	Yes	Mauritius Oceanography Institute (MOI), Albion Fisheries Research Centre (AFRC)	Yes	Ongoing - MOI and AFRC	
3.2.2.	Decline in populations of large pelagics	R	HP	T	Yes	Mauritius Oceanography Institute (MOI), Albion Fisheries Research Centre (AFRC)	Yes	Ongoing - MOI and AFRC	
3.2.3.	Decline in populations of small pelagics	NR							
3.2.4.	Decline in populations of deep water demersals	R	HP	T	Yes	Mauritius Oceanography Institute (MOI), Albion Fisheries Research Centre (AFRC)	Yes	Ongoing - MOI and AFRC	

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
3.2.5.	Decline in populations of reef and demersal fish	R	HP	T	Yes	Mauritius Oceanography Institute (MOI), Albion Fisheries Research Centre (AFRC)	Yes	Ongoing - MOI and AFRC	
3.3.	Decline in populations of commercial invertebrates								
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)	R	HP	T	Yes	Albion Fisheries Research Centre (AFRC), Rodrigues Regional Assembly (RRA), Shoals Rodrigues	Yes	Ongoing	
3.3.2.	Decline in populations of abalone	NR							
3.3.3.	Decline in populations of cephalopods	R	HP	T	Yes	Albion Fisheries Research Centre (AFRC), Rodrigues Regional Assembly (RRA), Shoals Rodrigues	Yes	Ongoing	
3.3.4.	Decline in populations of sea cucumbers	R	HP	NT	Yes	Albion Fisheries Research Centre (AFRC)	Yes	Ongoing	
3.3.5.	Decline in populations of sea urchins	NR							
3.3.6.	Decline in populations of prawns and shrimp	R	HP	T	Yes (limited)	Albion Fisheries Research Centre (AFRC)	Yes	Ongoing	
3.3.7.	Decline in populations of lobsters	R	HP	T	Yes (limited)	Albion Fisheries Research Centre (AFRC)	Yes	Ongoing	
3.3.8.	Decline in populations of crayfish	NR							

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
3.3.9.	Decline in populations of crabs	R	HP	T	Yes (limited)	Albion Fisheries Research Centre (AFRC)	Yes	Ongoing	
3.4.	Excessive bycatch and discards	R	HP	T	Yes (limited)	Albion Fisheries Research Centre (AFRC)	Yes	Ongoing	
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)	R	HP	T	Yes	Albion Fisheries Research Centre (AFRC)	Yes	Ongoing	

Table A6.3.2: Mauritius Prioritisation 2 Results

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	L	L	L	L	VH	VH	M	H	M
1.2.	Degradation of ground and surface water quality	L	L	L	L	VH	VH	M	H	M
1.3.	Degradation of coastal and marine water quality	L	L	L	L	`				
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	L	L	L	L	VH	VH	H	VH	M
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	L	L	L	L	H	H	M	H	M
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	L	L	L	L	H	H	H	H	M
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	L	L	L	L	H	VH	M	H	M
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	L	L	L	L	H	VH	VH	VH	M
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	L	L	L	L	H	VH	M	H	M
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	VH	VH	VH	VH	VH	VH	M	H	VH
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats									
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	M	M	L	M	M	H	M	M	M
2.2.2.	Disturbance, damage and loss of coastal forest habitats									

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	VH	VH	M	H	H	VH	M	H	H
2.2.4.	Disturbance, damage and loss of wetland habitats	VH	M	M	M	M	VH	M	H	H
2.2.5.	Disturbance, damage and loss of estuarine habitats									
2.2.6.	Disturbance, damage and loss of mangrove habitats	VH	VH	M	H	H/VH	VH	M	H	H
2.3.	Disturbance, damage and loss of subtidal benthic habitats									
2.3.1.	Disturbance, damage and loss of coral reef habitats	VH	VH	VH	VH	VH	VH	VL	H	VH
2.3.2.	Disturbance, damage and loss of seagrass habitats	H	M	L	M	M	M	M	M	M
2.3.3.	Disturbance, damage and loss of macroalgal habitats									
2.3.4.	Disturbance, damage and loss of soft sediment habitats	?	?	?	?	M	M	M	M	M
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)									
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	H	H	L	M	VH	VH	M	H	H
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)	H	H	L	M	H	H	M	H	H
2.6.	Introduction of exotic non-native species, invasives and nuisance species	H	H	M	H	VH	VH	M/L	H	H
3.1.	Decline in populations of focal species									

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
3.1.1.	Decline in populations of marine mammals	M	L	L	L	VH	VH	H	VH	M
3.1.2.	Decline in populations of cetaceans	H	VH	M	H	VH	VH	H	VH	VH
3.1.3.	Decline in populations of seabirds	H	M	M	M	VH	H	H	H	M
3.1.4.	Decline in populations of turtles	H	H	M	H	VH	VH	H	VH	VH
3.2.	Decline in populations of commercial fish stocks									
3.2.1.	Decline in populations of sharks and rays	H	VH	H	H	VH	VH	H	VH	VH
3.2.2.	Decline in populations of large pelagics	H	VH	VH	VH	VH	VH	VH	VH	VH
3.2.3.	Decline in populations of small pelagics									
3.2.4.	Decline in populations of deep water demersals	VH	VH	VH	VH	VH	VH	VH	VH	VH
3.2.5.	Decline in populations of reef and demersal fish	VH	VH	VH	VH	VH	VH	VH	VH	VH
3.3.	Decline in populations of commercial invertebrates									
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)	VH	H	M	H	VH	VH	VH	VH	VH
3.3.2.	Decline in populations of abalone									
3.3.3.	Decline in populations of cephalopods	M	VH	M	M	M	VH	H	H	M

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
3.3.4.	Decline in populations of sea cucumbers	H	H	M	M	L	VH	H	H	H
3.3.5.	Decline in populations of sea urchins									
3.3.6.	Decline in populations of prawns and shrimp	H	VH	VH	VH	H	VH	H	H	VH
3.3.7.	Decline in populations of lobsters	H	VH	M	H	VH	VH	H	H	H
3.3.8.	Decline in populations of crayfish									
3.3.9.	Decline in populations of crabs	H	M	M	M	M	M	M	M	M
3.4.	Excessive bycatch and discards	VH	VH	M	VH	VH	VH	H	VH	VH
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)	VH	VH	VH	VH	VH (future)	VH	M	VH	VH

Figure 6.3.1.a: Mauritius MAC01 Impact Analysis for Issue (1.3.1) Microbial contamination from land-based and marine sources.

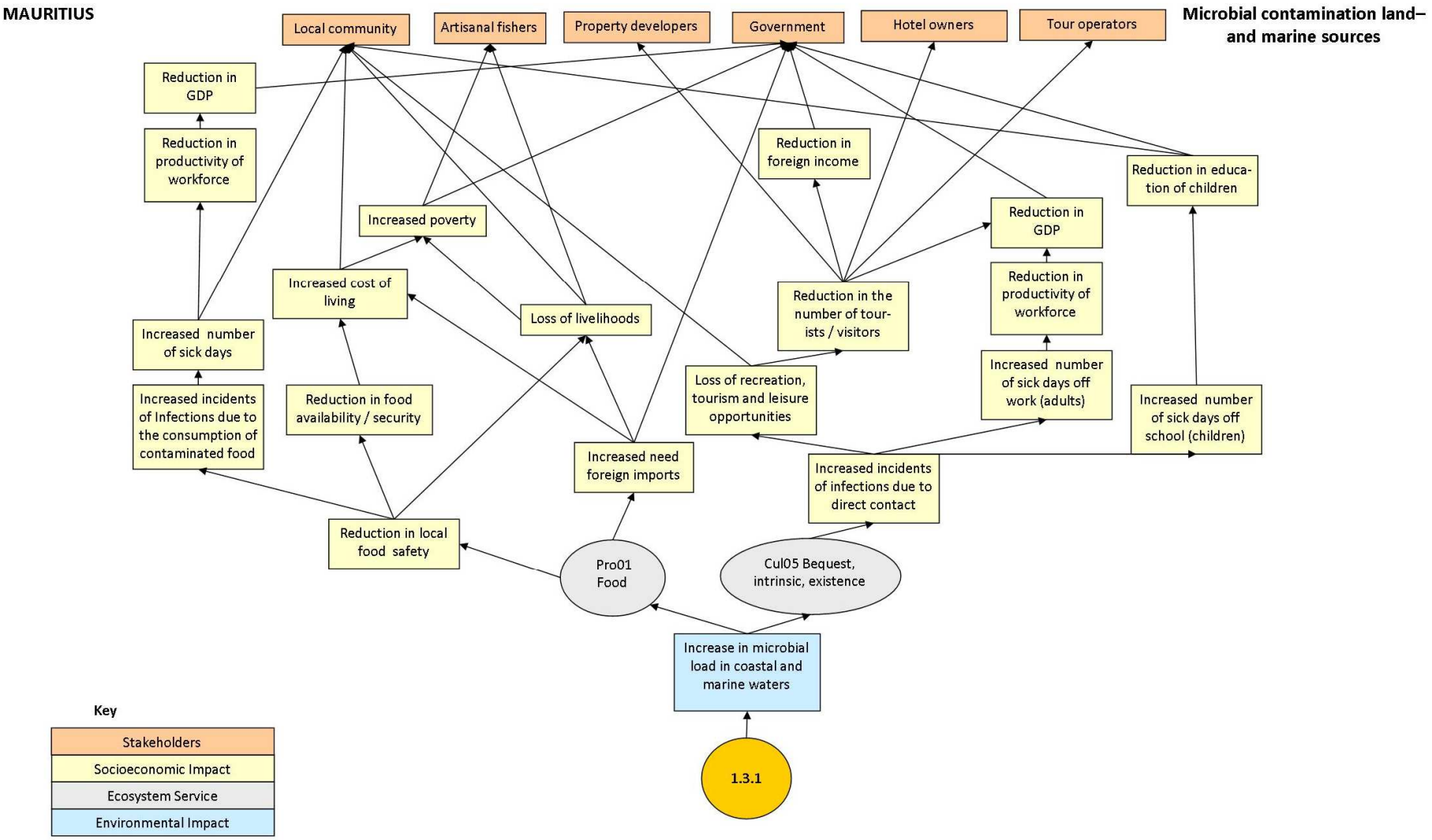


Figure 6.3.1.b: Mauritius MAC01 Causal Chain Analysis for Issue (1.3.1) Microbial contamination from land-based and marine sources.

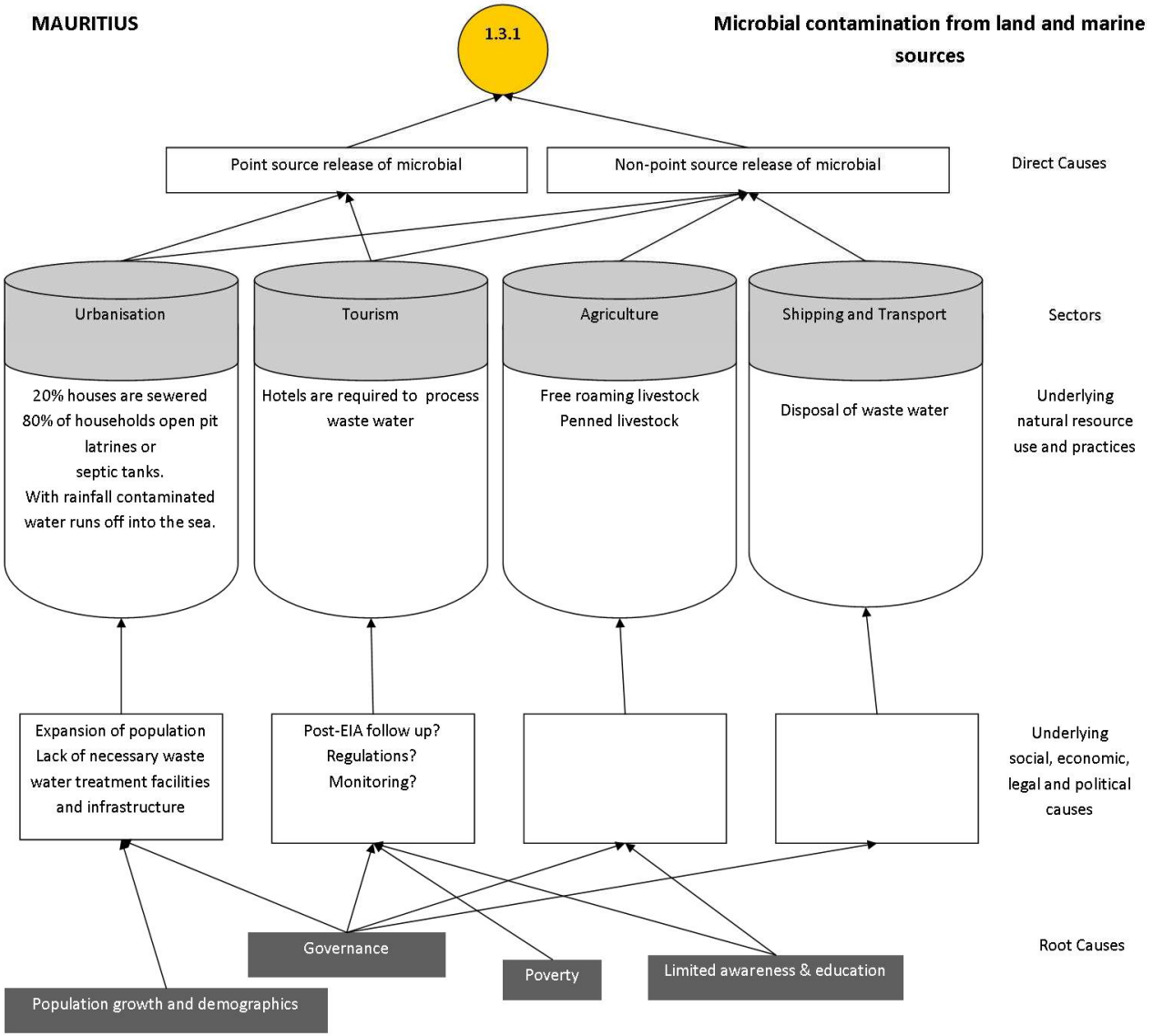


Figure 6.3.2.a: Mauritius MAC01 Impact Analysis for Issue (1.3.2) Nutrient enrichment from land-based and marine sources.

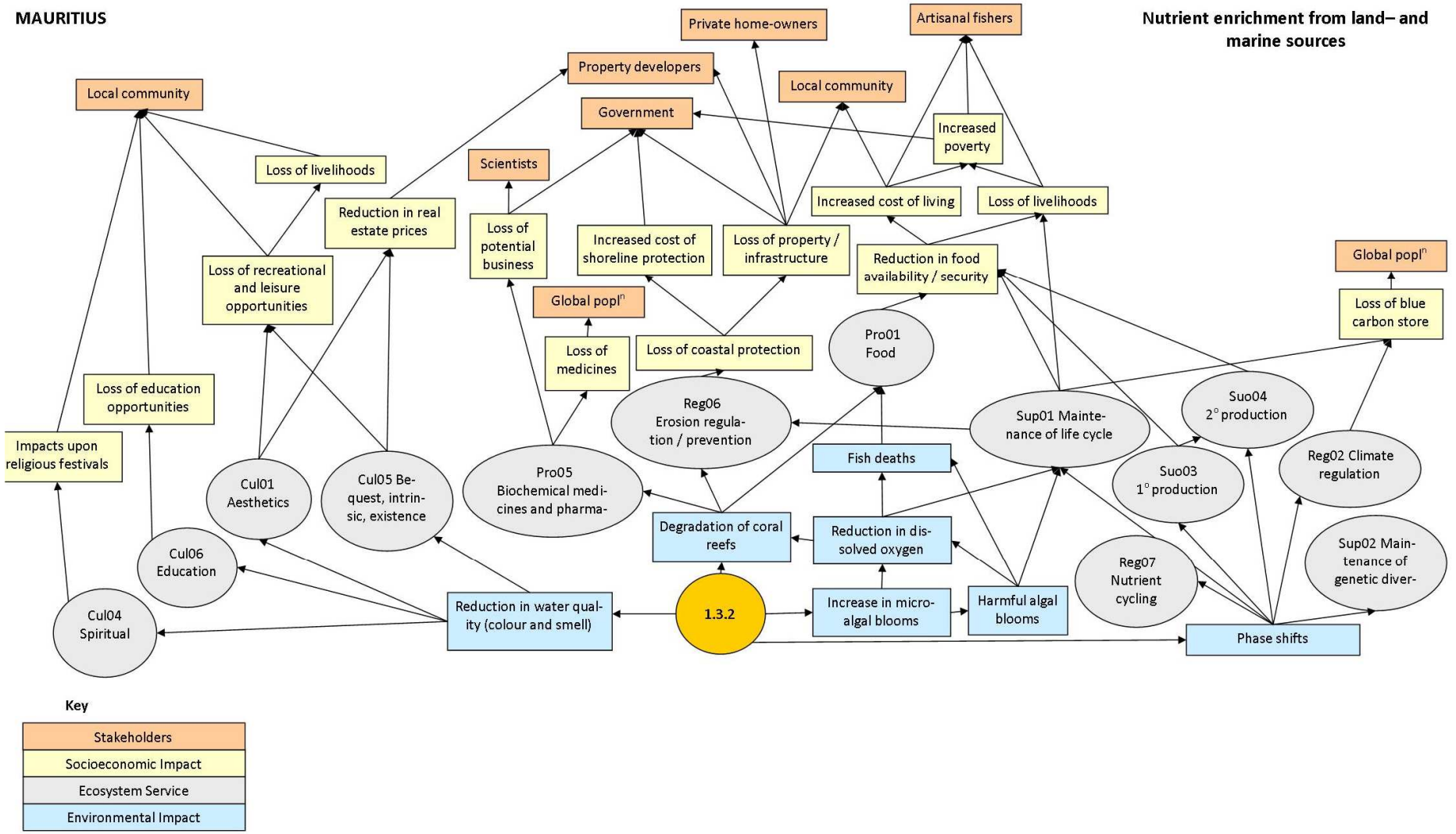


Figure 6.3.2.b: Mauritius MAC01 Causal Chain Analysis for Issue (1.3.2) Nutrient enrichment from land-based and marine sources.

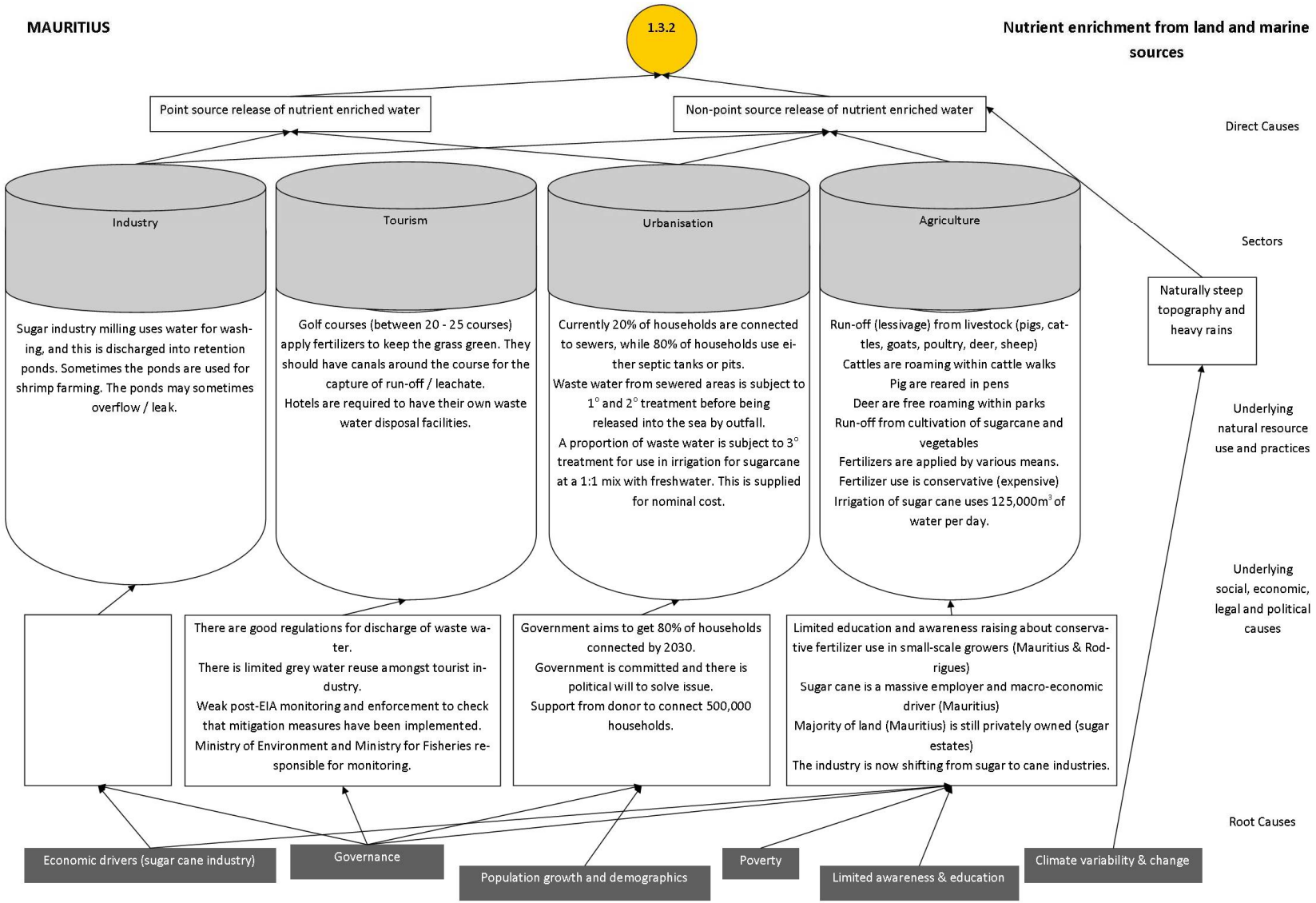


Figure 6.3.3.a: Mauritius MAC01 Impact Analysis for Issue (1.3.3) Chemical contamination from land-based and marine sources.

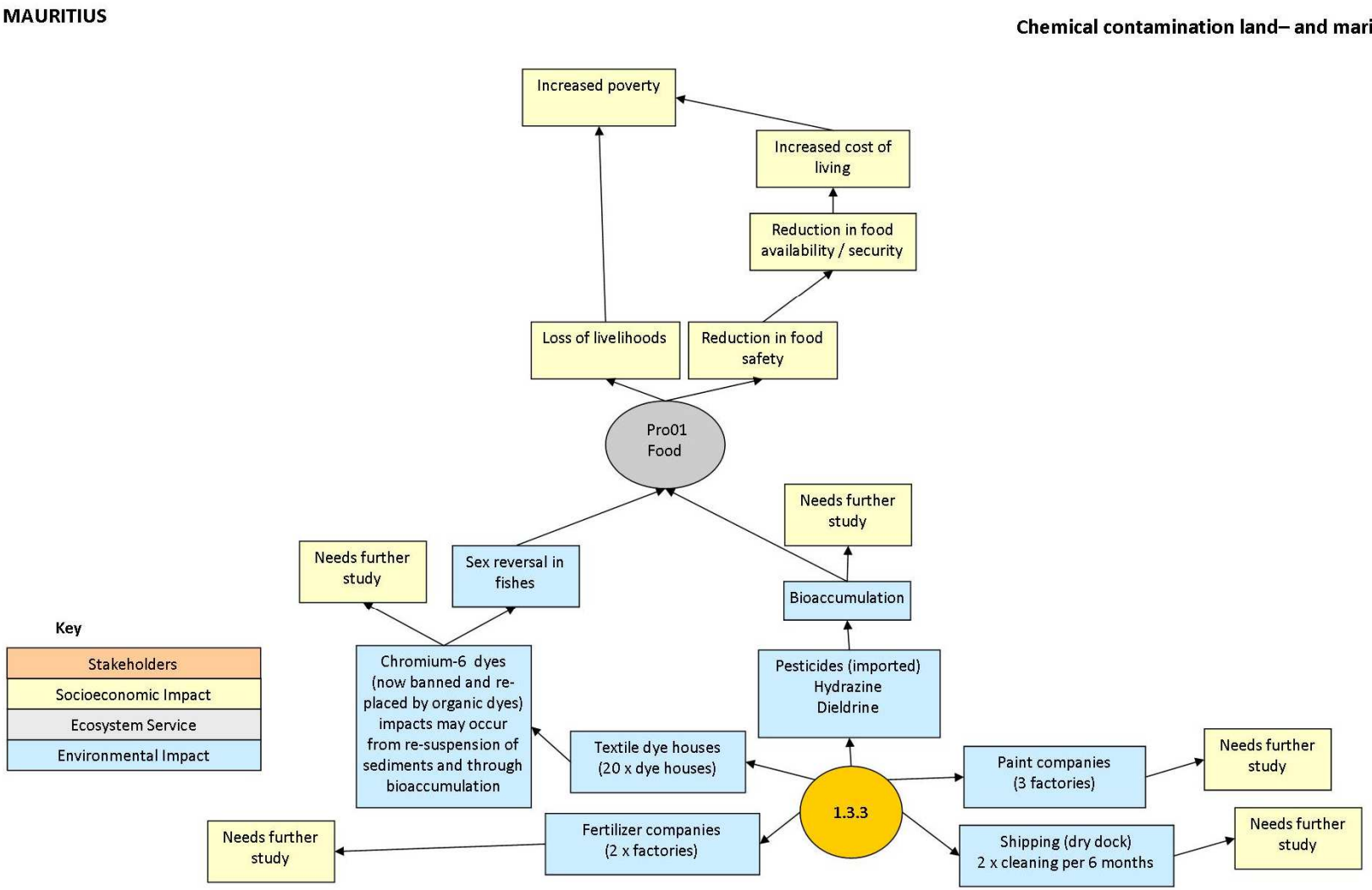


Figure 6.3.3.b: Mauritius MAC01 Causal Chain Analysis for Issue (1.3.3) Chemical contamination from land-based and marine sources.

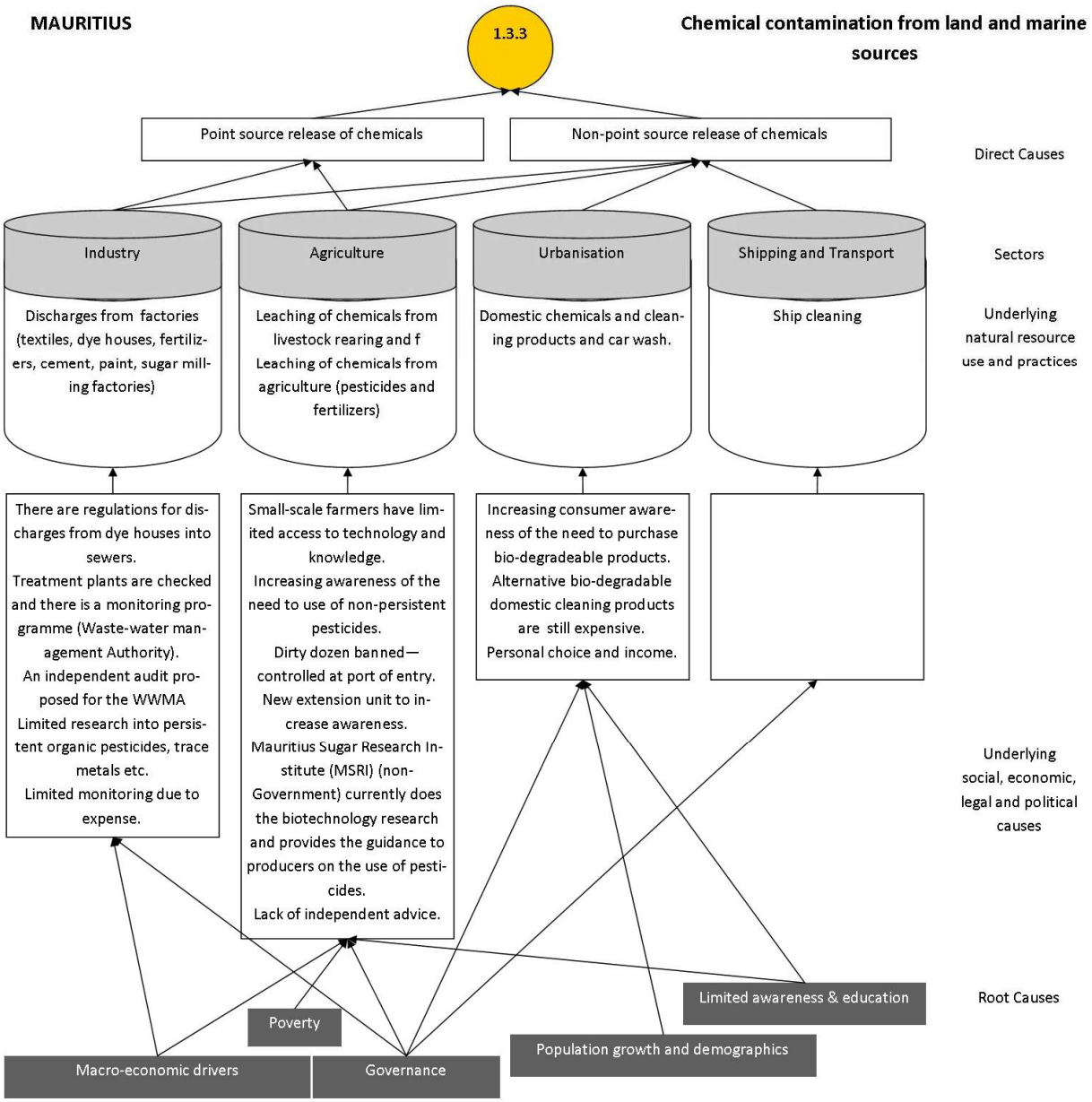


Figure 6.3.4.a: Mauritius MAC02 Impact Analysis for Issue (2.1) Shoreline change due to modification, land reclamation and coastal erosion.

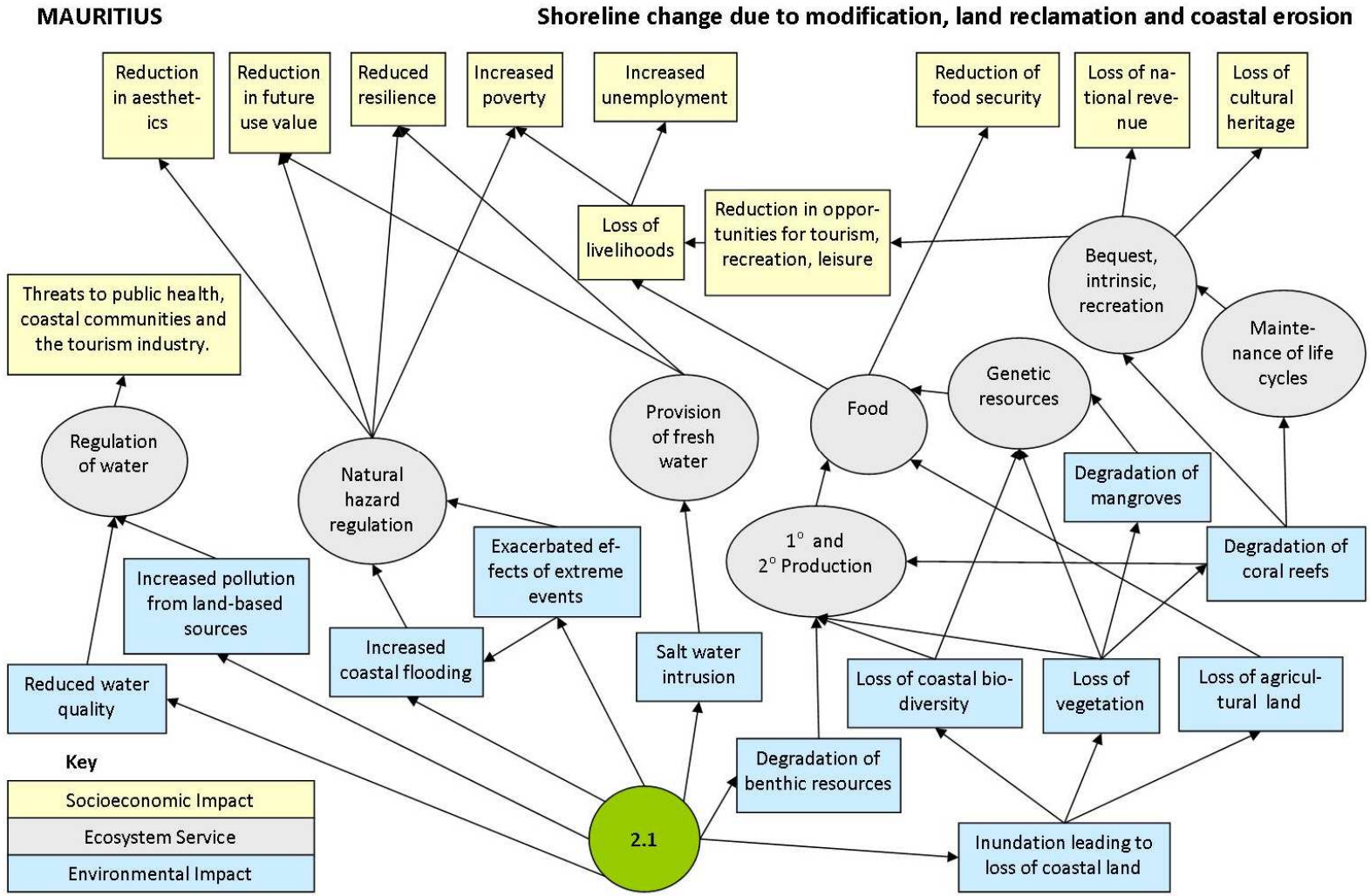


Figure 6.3.4.b: Mauritius MAC02 Casual Chain Analysis for Issue (2.1) Shoreline change due to modification, land reclamation and coastal erosion.

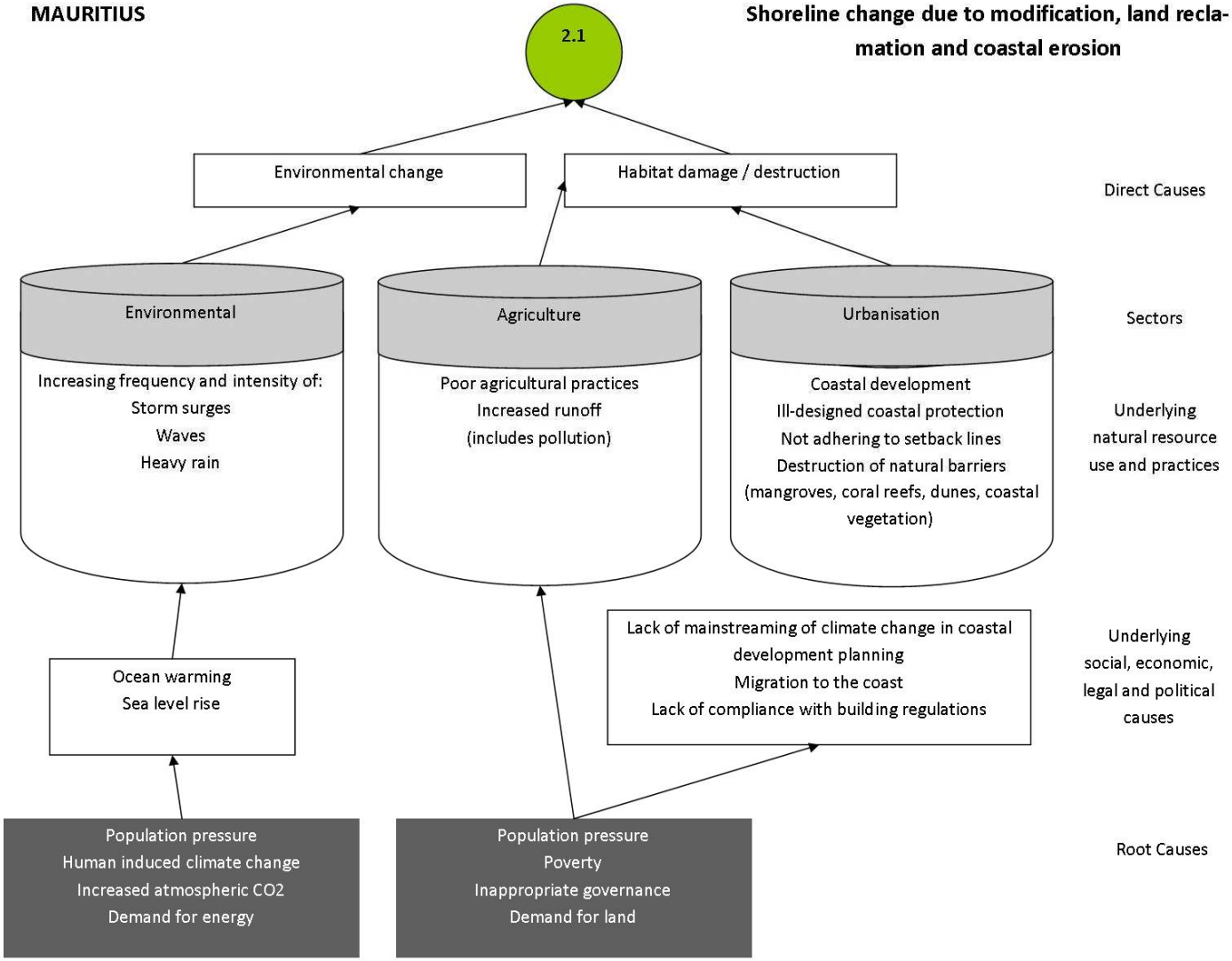


Figure 6.3.5.a: Mauritius MAC02 Impact Analysis for Issue (2.2.6) Disturbance, damage and loss of mangrove habitats.

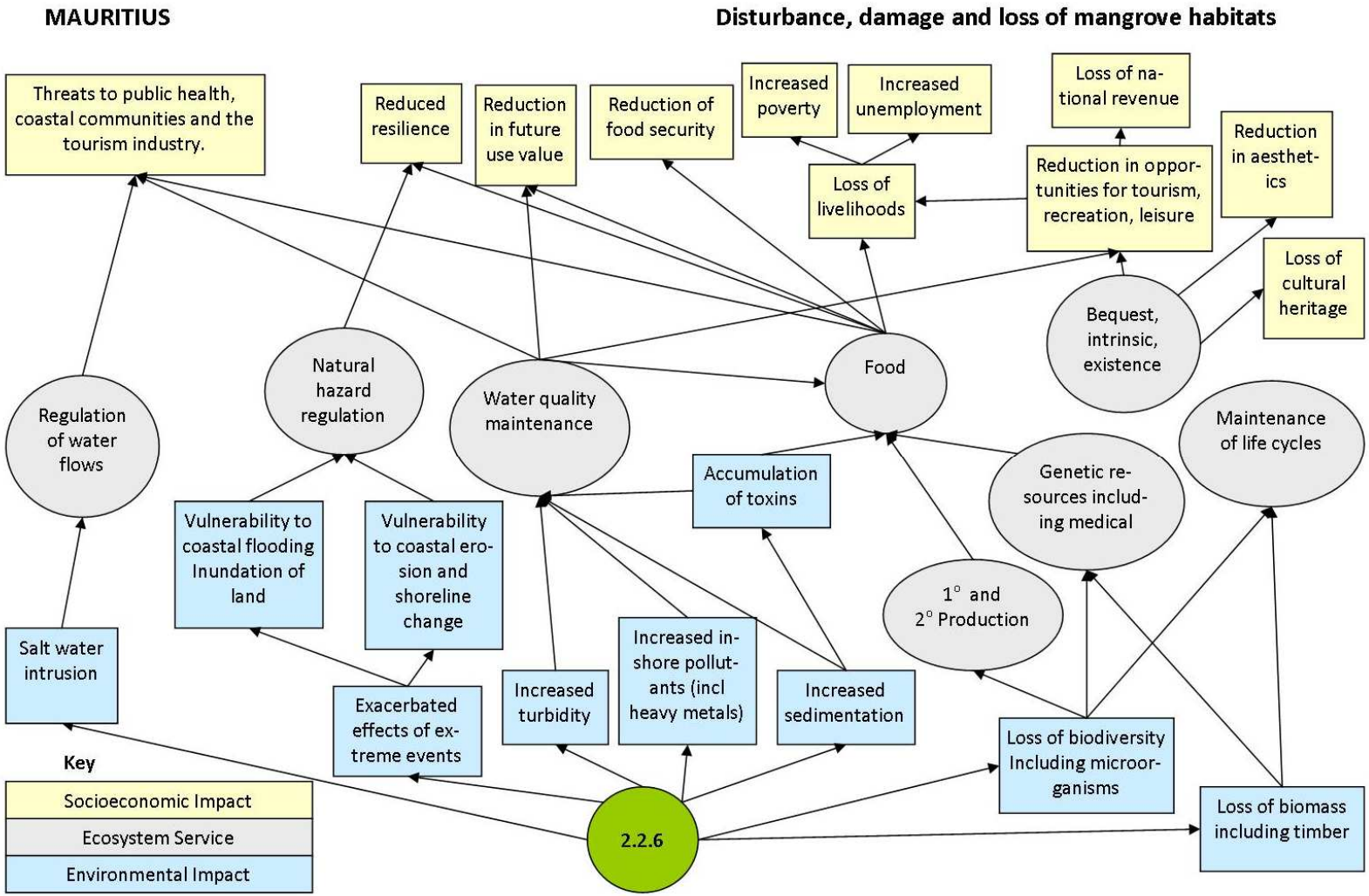


Figure 6.3.5.b: Mauritius MAC02 Causal Chain Analysis for Issue (2.2.6) Disturbance, damage and loss of mangrove habitats.

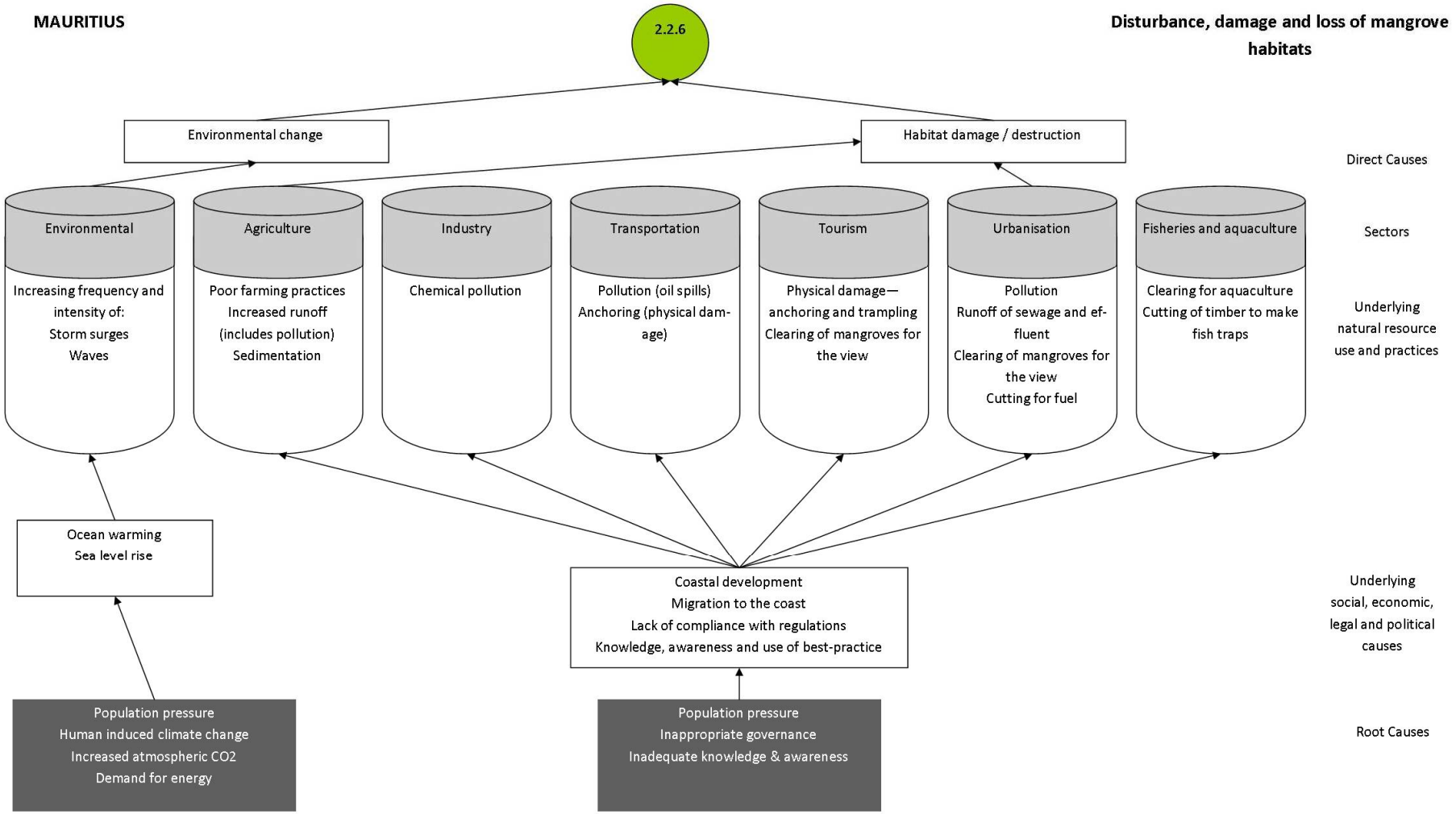


Figure 6.3.6.a: Mauritius MAC02 Impact Analysis for Issue (2.3.1) Disturbance, damage and loss of coral reefs.

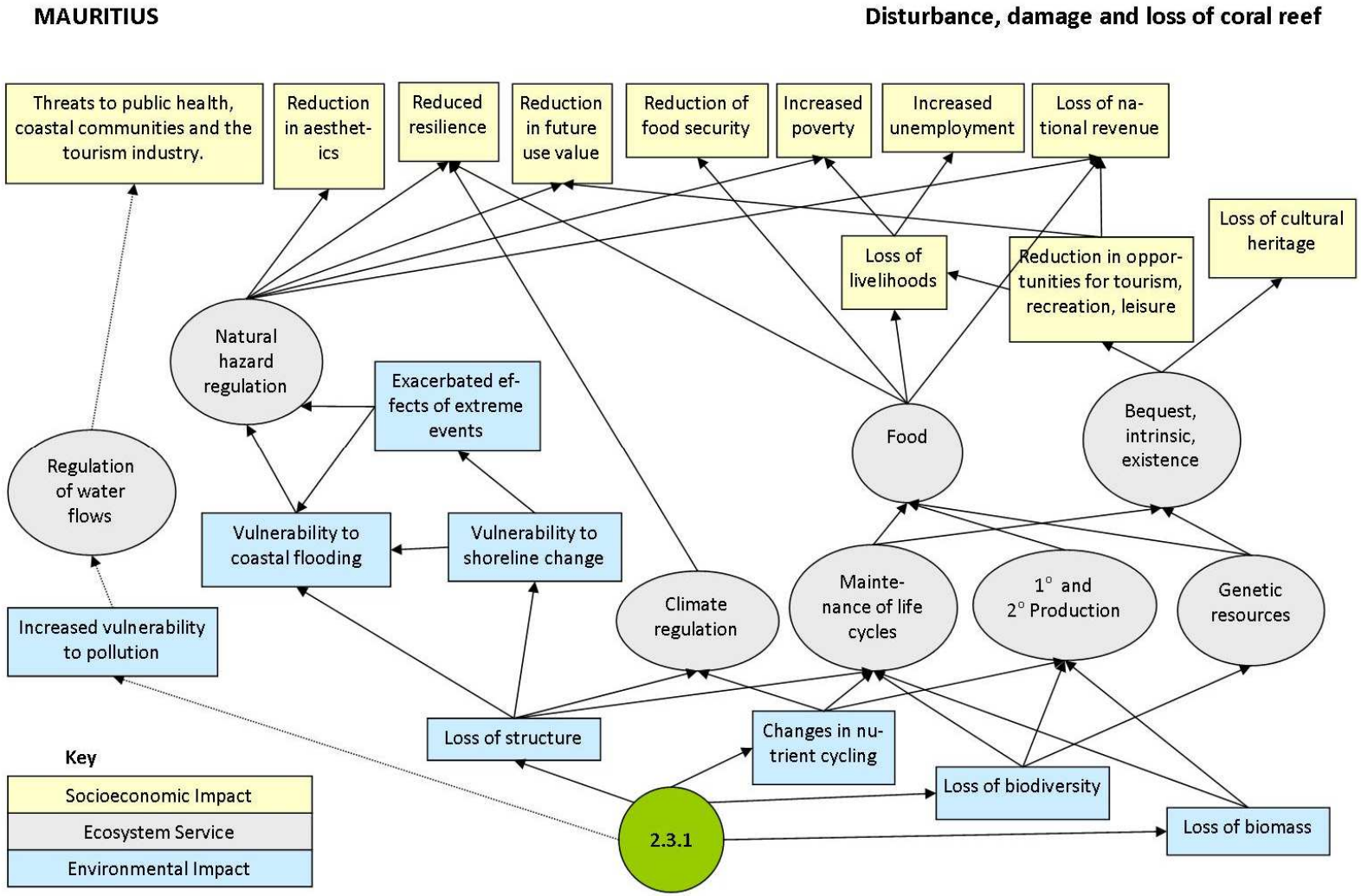


Figure 6.3.6.b: Mauritius MAC02 Causal Chain Analysis for Issue (2.3.1) Disturbance, damage and loss of coral reefs.

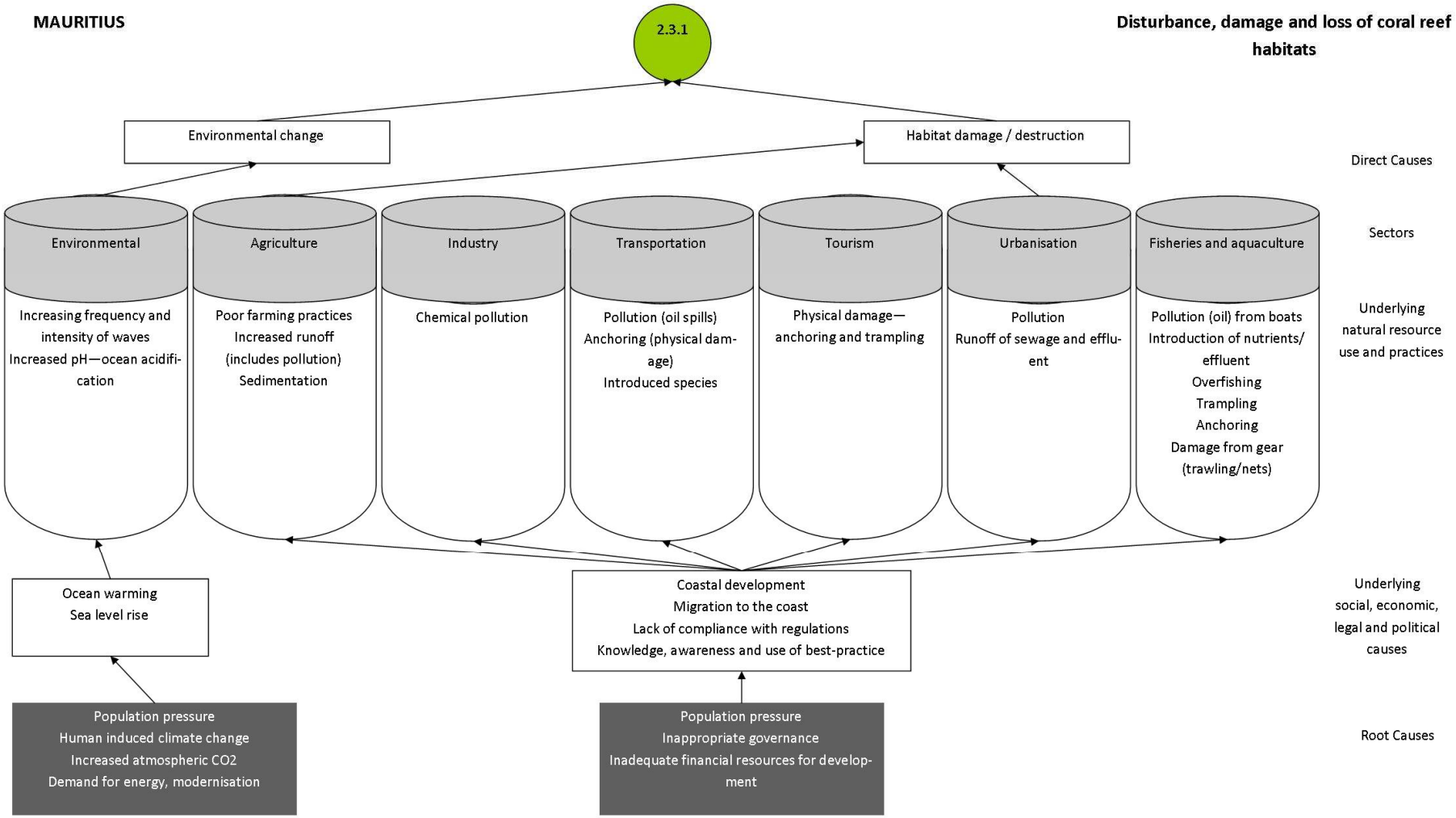


Figure 6.3.7.a: Mauritius MAC02 Impact Analysis for Issue (2.6) Introduction of exotic non-native species, invasives and nuisance species.

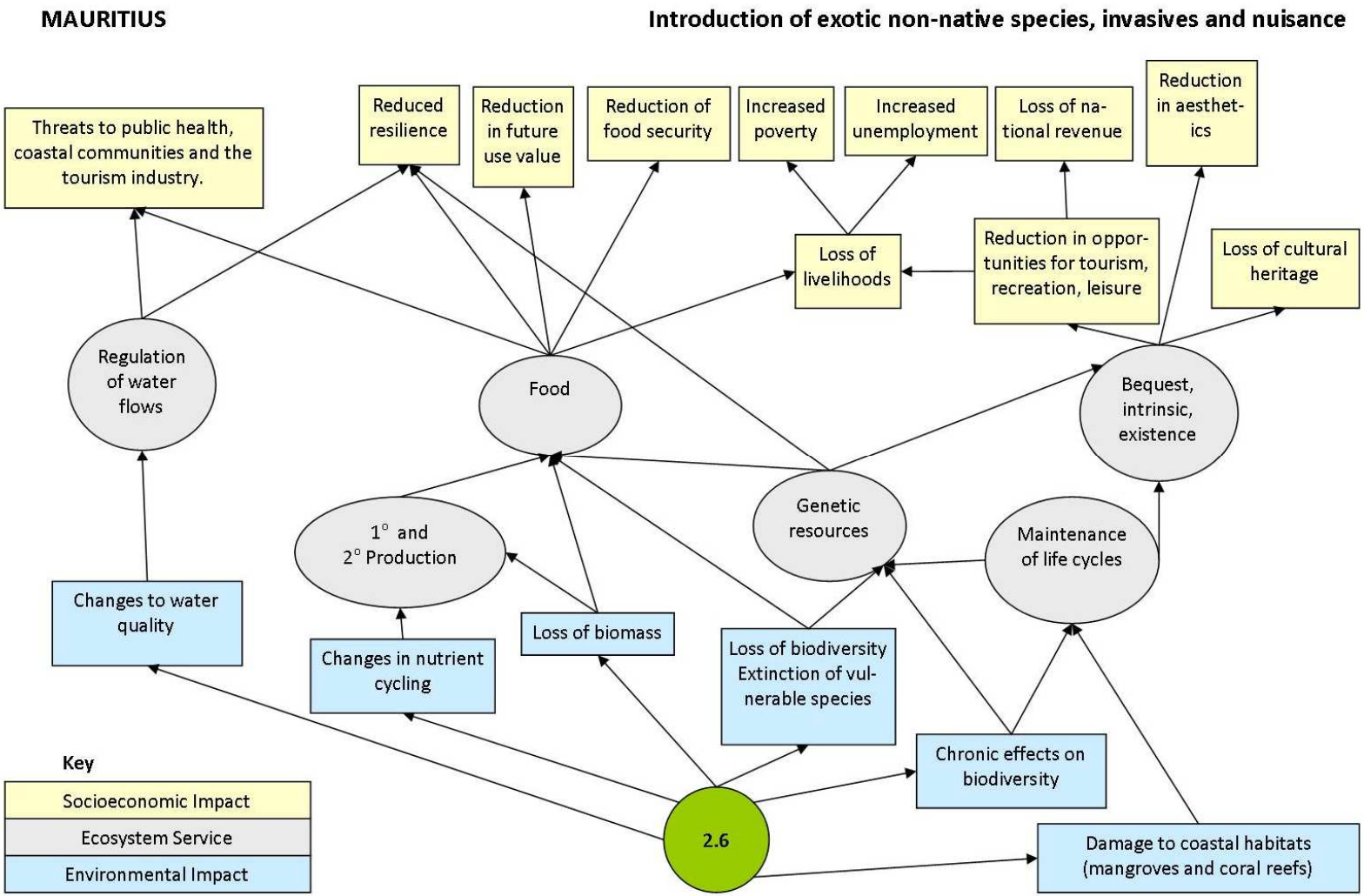


Figure 6.3.7.b: Mauritius MAC02 Causal Chain Analysis for Issue (2.6) Introduction of exotic non-native species, invasives and nuisance species.

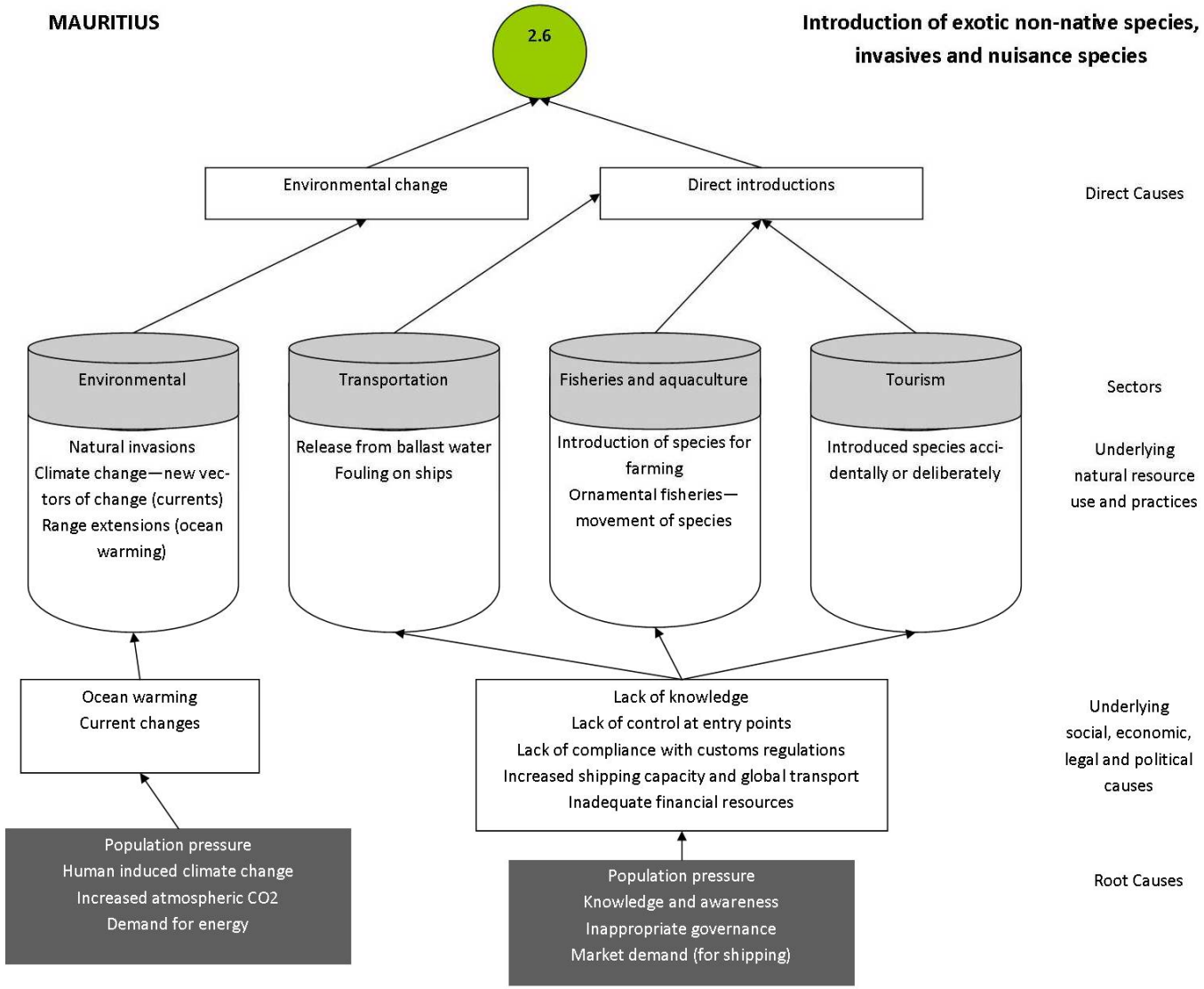


Figure 6.3.8.a: Mauritius MAC03 Impact Analysis for Issue (3.1.2) Declines in populations of cetaceans.

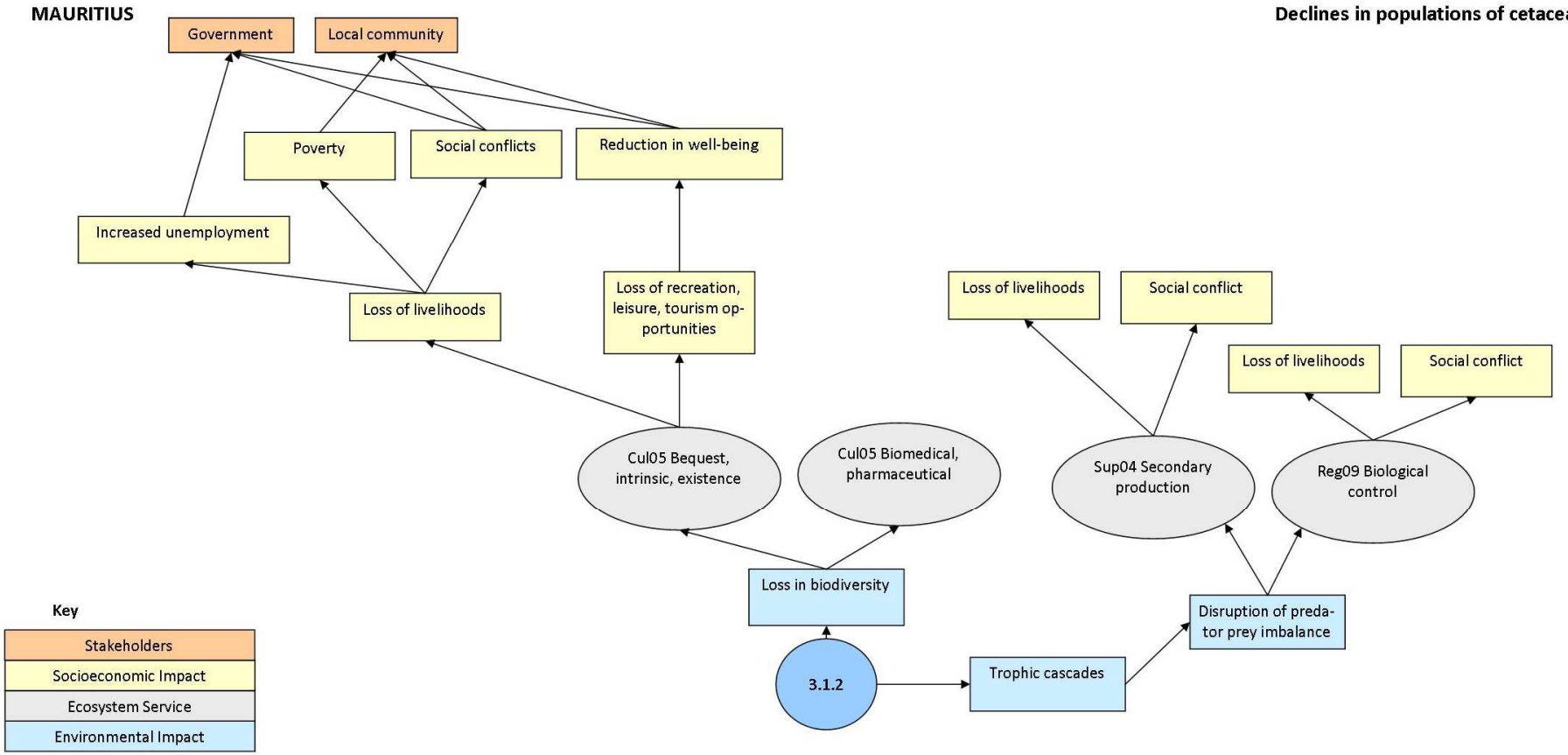


Figure 6.3.8.b: Mauritius MAC03 Causal Chain Analysis for Issue (3.1.2) Declines in populations of cetaceans.

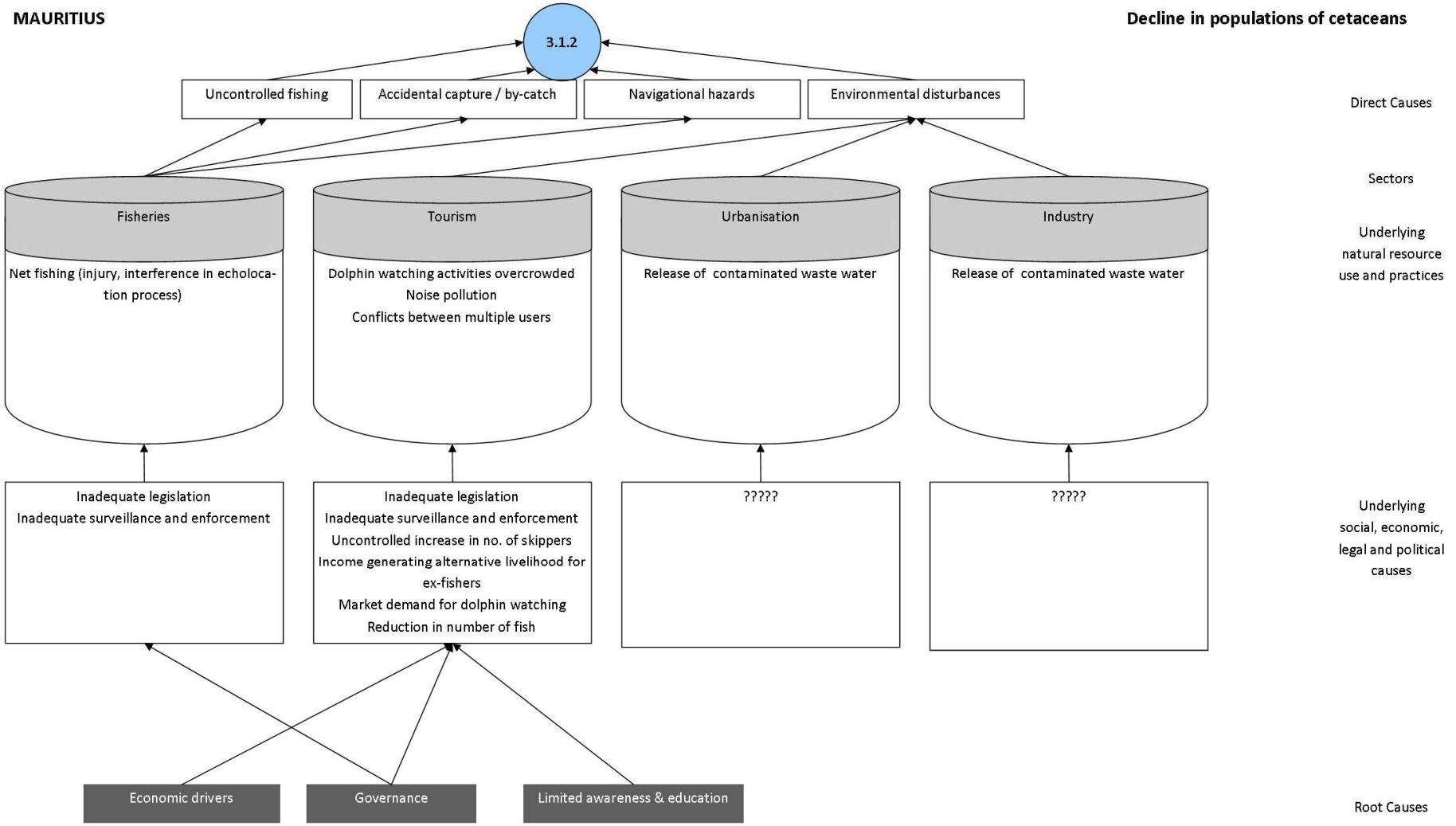


Figure 6.3.9.a: Mauritius MAC03 Impact Analysis for Issue (3.2.2) Declines in populations of large pelagics.

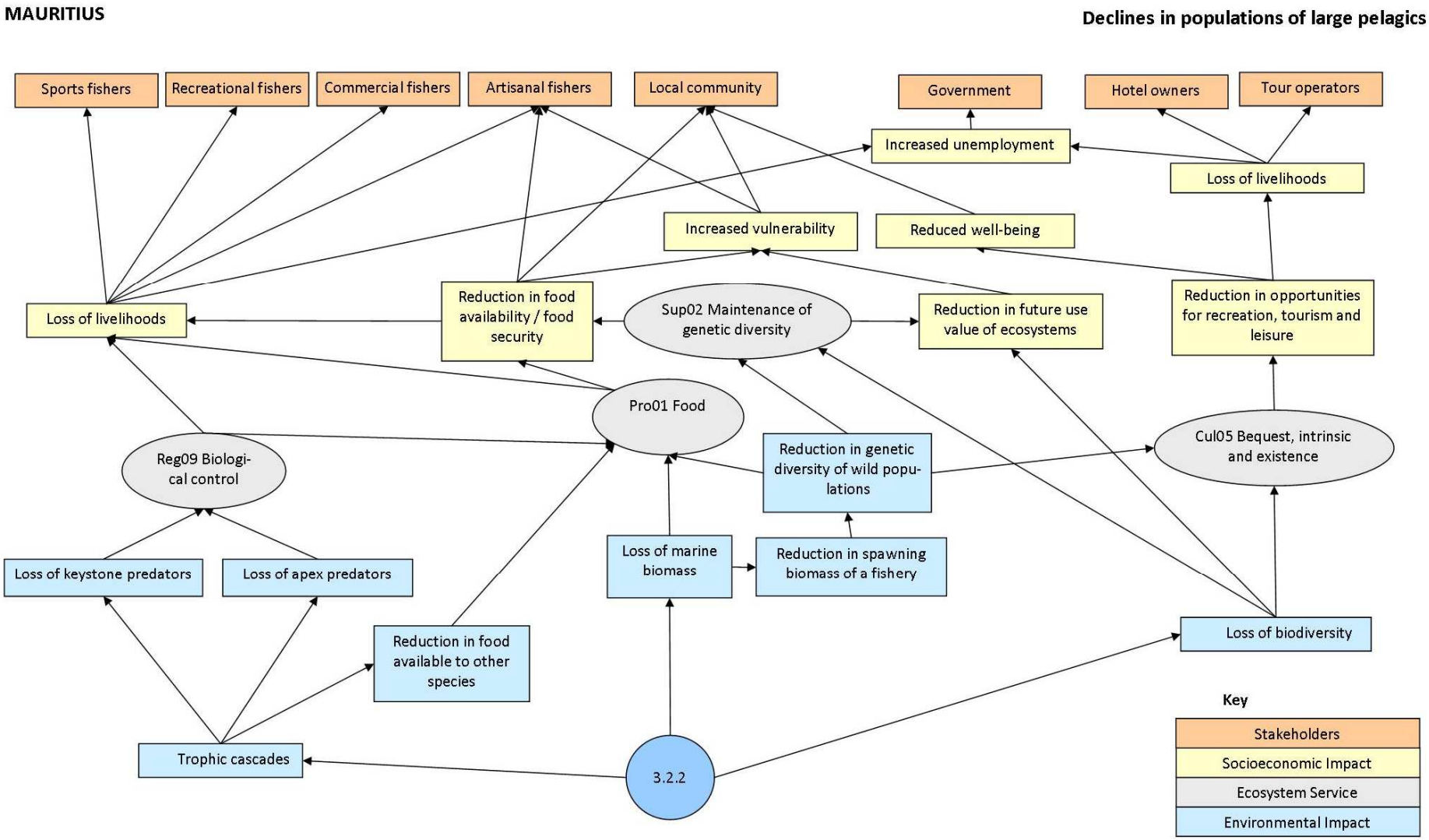


Figure 6.3.9.b: Mauritius MAC03 Causal Chain Analysis for Issue (3.2.2) Declines in populations of large pelagics.

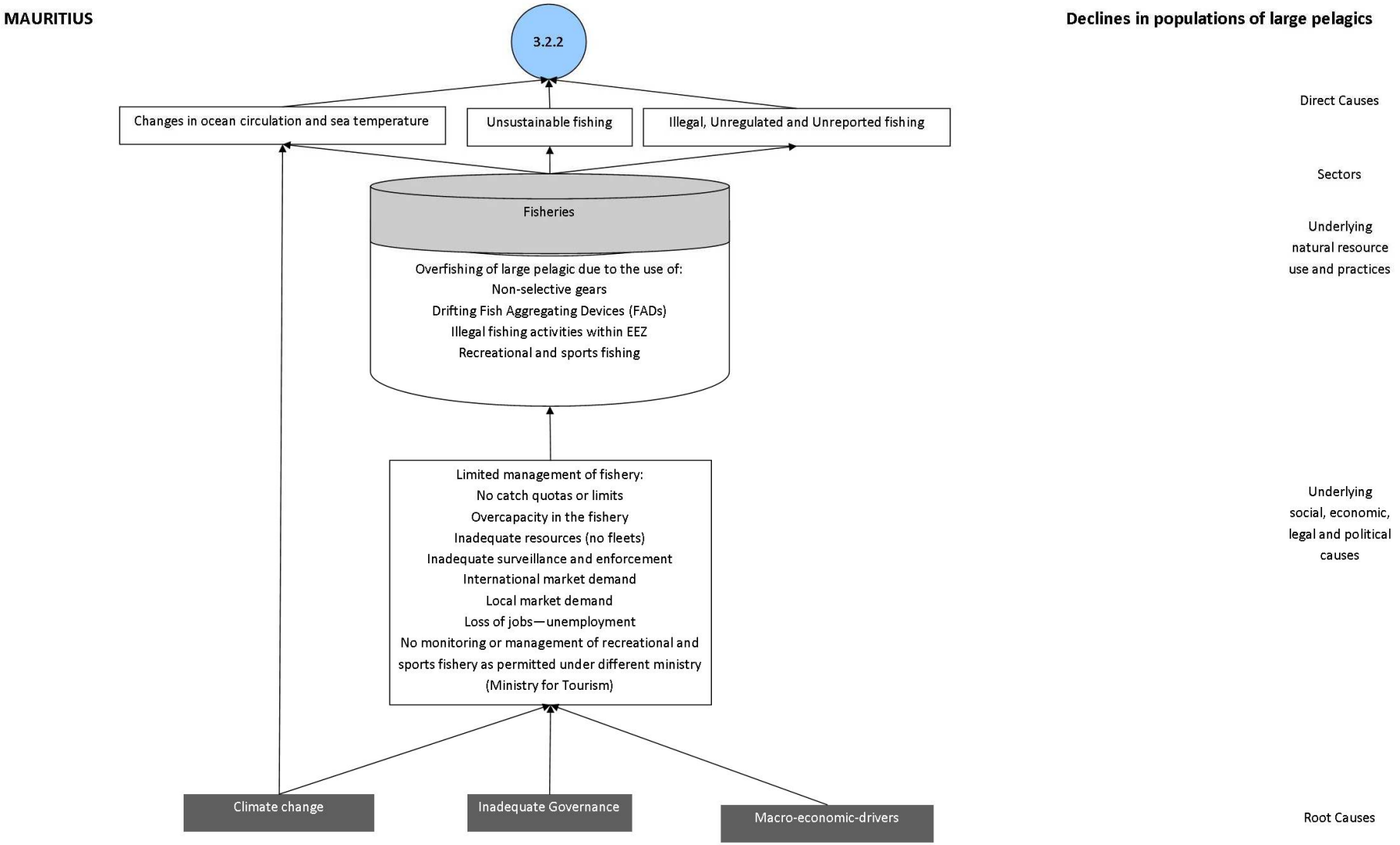


Figure 6.3.10.a: Mauritius MAC03 Impact Analysis for Issue (3.2.5) Declines in populations of reef and demersal fish.

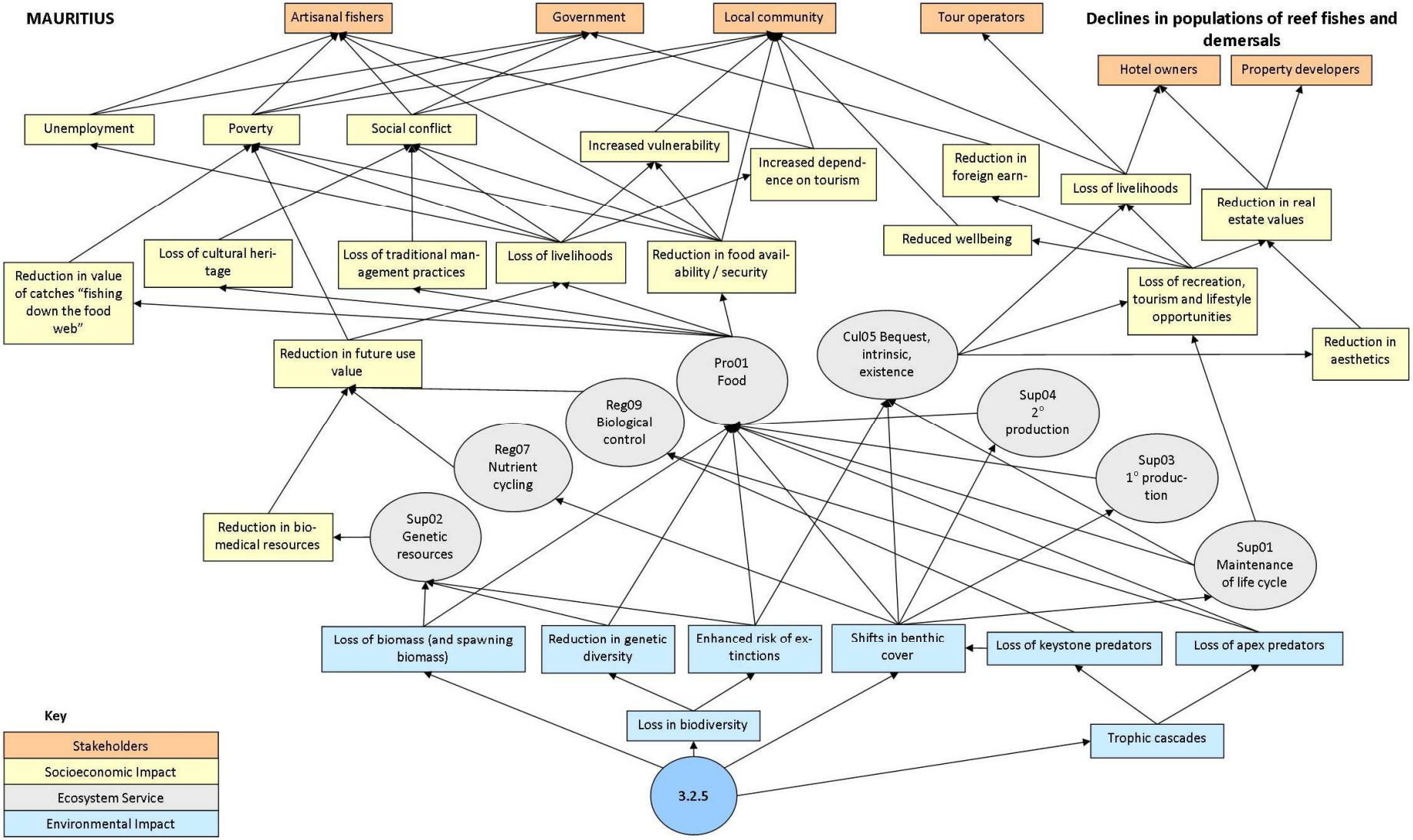


Figure 6.3.10.b: Mauritius MAC03 Causal Chain Analysis for Issue (3.2.5) Declines in populations of reef and demersal fish.

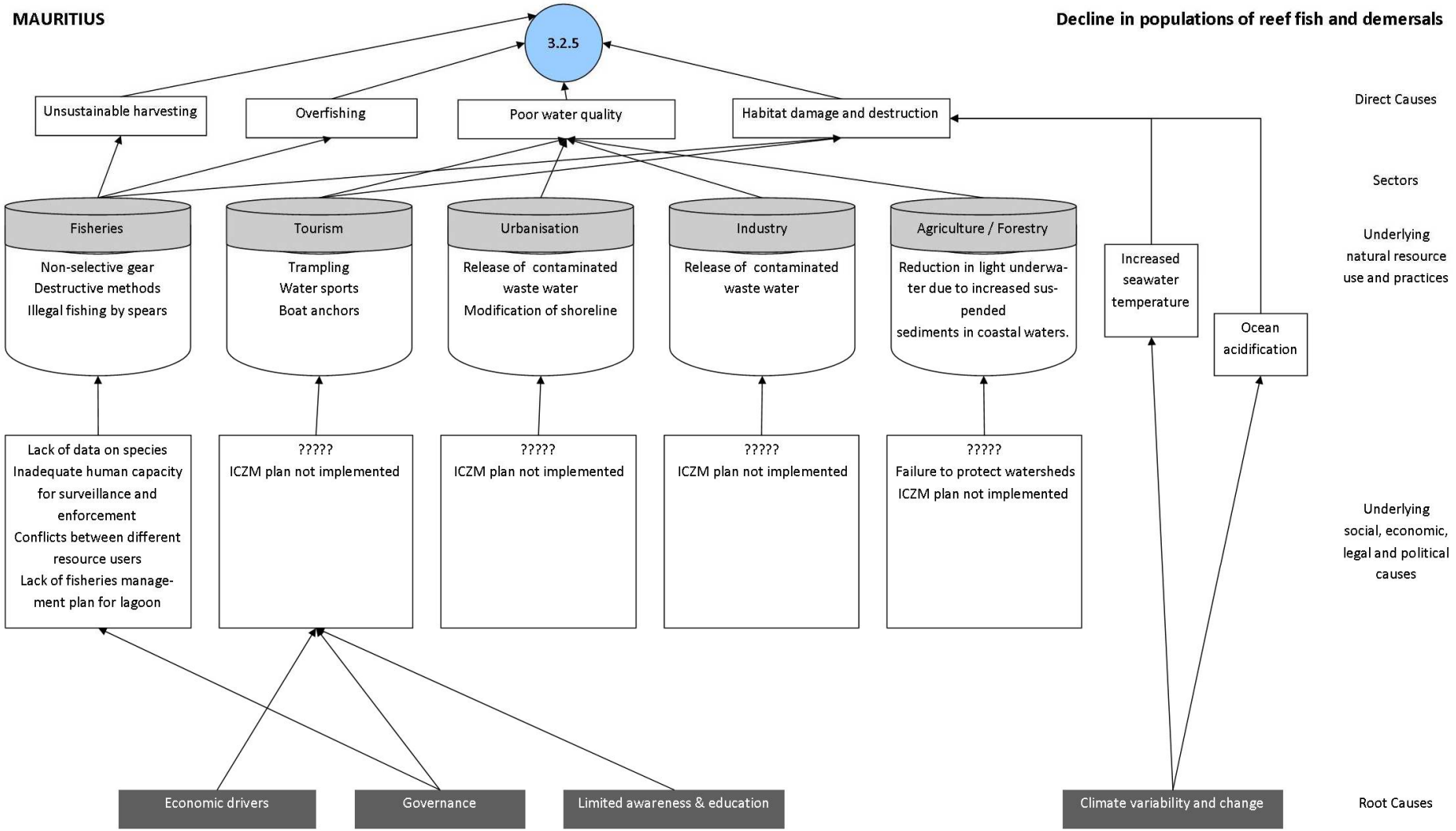


Figure 6.3.11.a: Mauritius MAC03 Impact Analysis for Issue (3.3.4) Declines in populations of sea cucumbers.

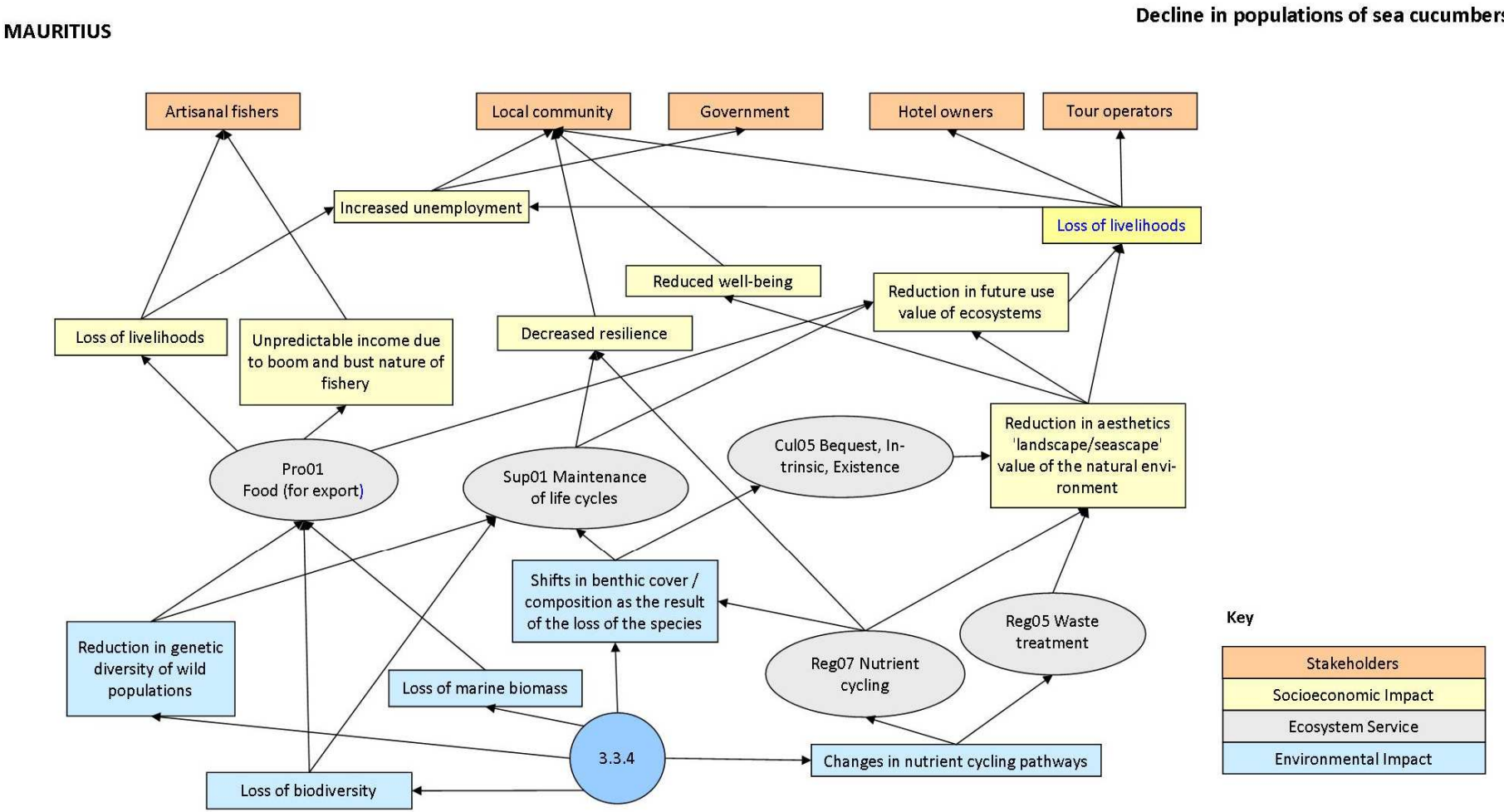


Figure 6.3.11.b: Mauritius MAC03 Causal Chain Analysis for Issue (3.3.4) Declines in populations of sea cucumbers.

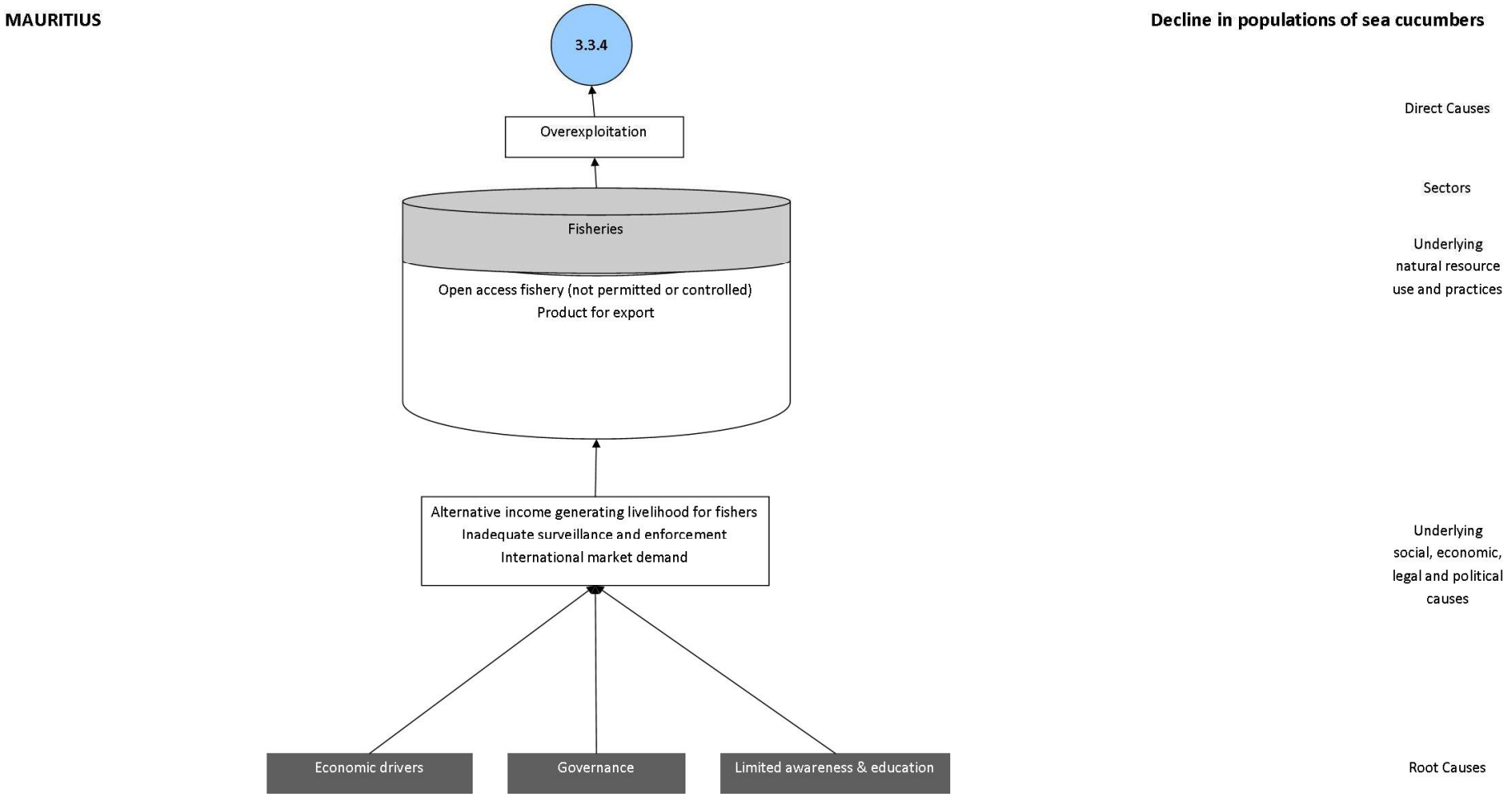


Figure 6.3.12.a: Mauritius MAC03 Impact Analysis for Issue (3.5) Expansion of mariculture industry.

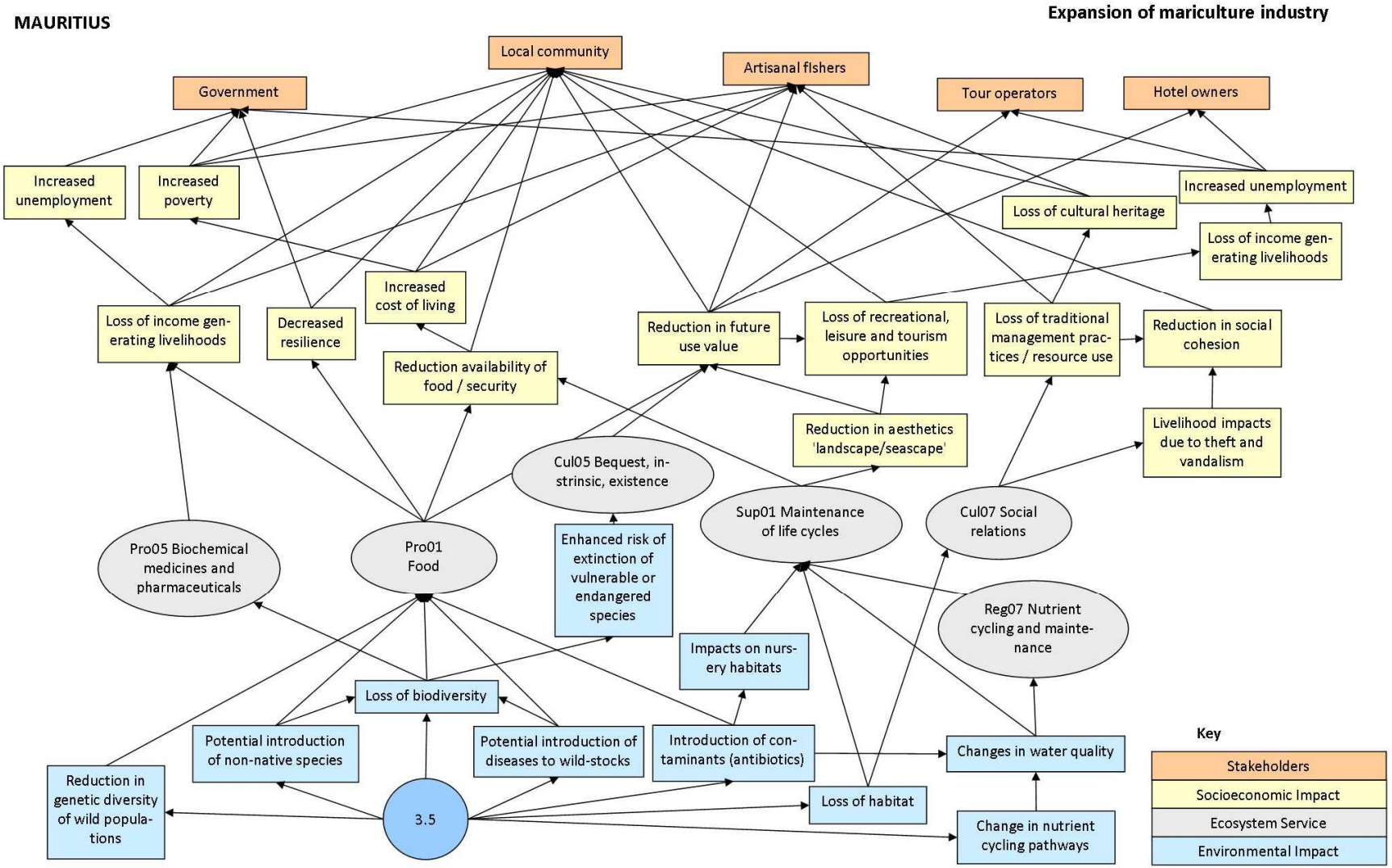
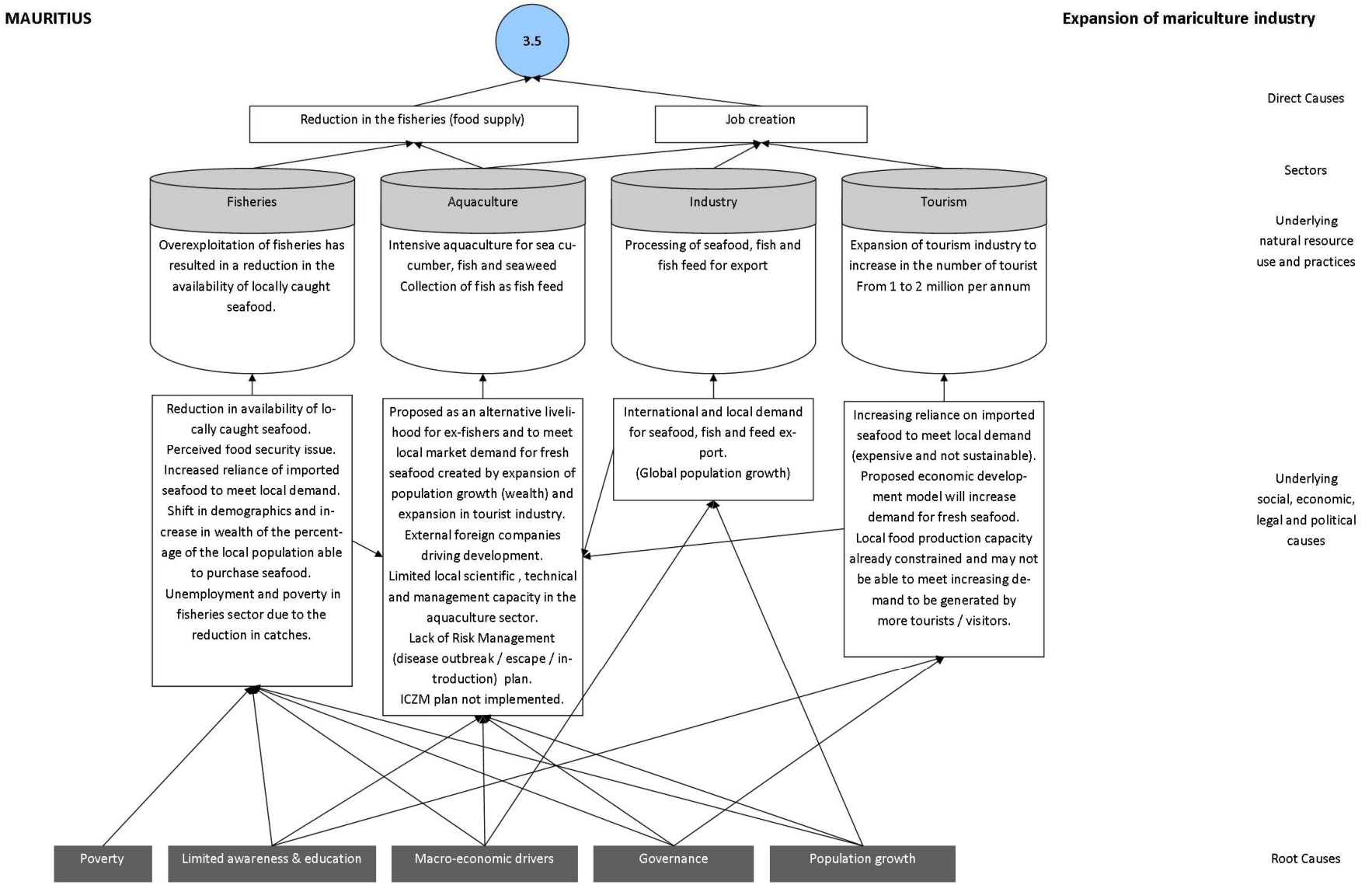


Figure 6.3.12.b: Mauritius MAC03 Causal Chain Analysis for Issue (3.5) Expansion of mariculture industry.



A6.4 Kenya – National Causal Chain Meeting Results

Table A6.4.1: Kenya Prioritisation 1 Results

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	R	HP	T	Yes	WARMA, Kenya Marine Fisheries Research Institute (KMFRI)	No	Periodic	
1.2.	Degradation of ground and surface water quality								
1.3.	Degradation of coastal and marine water quality	R	HP	T	Yes	KMFRI, WARMA, MOPHS, GC ,	No	Periodic	
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	R	MP	T	Yes	KMFRI	No	Periodic	
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	R	HP	T	Yes	KMFRI, Universities.	No	Periodic	
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	R	MP	T	Yes	KMFRI, Universities,	No	Periodic	
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	R	HP	T	Yes	KMFRI	No	Periodic	
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	R	HP	T	Yes	KMFRI, Municipality,	No	Periodic	
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	R	HP	T	Yes	KMFRI, KMA, KPA, Oil Spill Response Committee.	No	Periodic	
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	R	H		Yes / Site specific	MASMA projects on South coast of Kenya at border with	Yes	Partial e.g. Starting for the Malindi project.	

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
						Tanzania.			
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats								
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	R	H	T	Yes / Site specific	Site specific. GIWA report. UNEP regional report on catchments.	No	Partial sporadic monitoring	
2.2.2.	Disturbance, damage and loss of coastal forest habitats	R	H	T	Yes	WWF Nairobi mapping data	Yes	Kenya Forest Services (KFS) and National Museums of Kenya (NMK)	
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	R	H	T	?	Not sure	Yes / site specific	Yes for Mombasa. Monitoring shore profiles, how beaches change and solid waste.	
2.2.4.	Disturbance, damage and loss of wetland habitats	R	H	T	Yes	Scattered datasets from different sources. Tana Delta Development Authority may have some, as might NMK and KWS.	Yes / sporadic	Sporadic monitoring	
2.2.5.	Disturbance, damage and loss of estuarine habitats	R	M	T	Yes	Fragmented. Publications.	No		
2.2.6.	Disturbance, damage and loss of mangrove habitats	R	H	T	Yes	Baseline maps for acreage and cover. WWF-Nairobi.	No	Not continuous	
2.3.	Disturbance, damage and loss of subtidal benthic habitats								

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
2.3.1.	Disturbance, damage and loss of coral reef habitats	R	H	T	Yes	Baseline habitat maps. Data with CORDIO and CRCB	Yes	CORDIO, CRCB, KWS (MPAs)	
2.3.2.	Disturbance, damage and loss of seagrass habitats	R	H	T	Yes	MASMA project for Kenya, Tanzania, Mozambique and Mauritius	Yes / sporadic	MSc studies and PhD	
2.3.3.	Disturbance, damage and loss of macroalgal habitats								Group not sure about this issue
2.3.4.	Disturbance, damage and loss of soft sediment habitats	R	M	T	No	Some sediment samples taken in port area, dredging spoils.	No	Sporadic sampling.	
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)								Group not sure about this issue
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	R	H	T	Yes	Yes - nearshore, less in neritic and oceanic. Tyro expedition (Kenyan-Dutch) 1991-1992	Partial	Nearshore, yes, less in neritic and oceanic	
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)	R	M	T	Yes	UNESCO (2001) found 22 species of HAB, KMFRI (2007-2011) found 38 species. Fish kills in 1992 possibly linked to HABs (no	Yes	KMFRI	

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
						proof), also found Paralytic Shellfish poisoning (PSP), macrocystus, and ciguatera. In 2010 there was an algal bloom and anoxic conditions resulted in fish kill.			
2.6.	Introduction of exotic non-native species, invasives and nuisance species	R	M	T	Yes	KMFRI and Globallast	Yes	CoTs surveys in MPAs, CORDIO for diseases, KWS	
3.1.	Decline in populations of focal species								
3.1.1.	Decline in populations of marine mammals	R	H	T	Y	Limited baseline, SWIOFP will facilitate	y	KWS, WWF	
3.1.2.	Decline in populations of cetaceans	R	H	T	Y	KWS	Y	KWS	
3.1.3.	Decline in populations of seabirds	R	L	T	Y	National Museums of Kenya, Nature Kenya			
3.1.4.	Decline in populations of turtles	R	H	T	Y	KESCOM	y	KESCOM and SWIOFP	
3.2.	Decline in populations of commercial fish stocks								
3.2.1.	Decline in populations of sharks and rays	R	H	T	Y	Fisheries Dept catch stats		Limited, catches only no ecological monitoring	
3.2.2.	Decline in populations of large pelagics	NR							

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
3.2.3.	Decline in populations of small pelagics	NR							
3.2.4.	Decline in populations of deep water demersals	NR							
3.2.5.	Decline in populations of reef and demersal fish	R	H	T	Y	Ministry of fisheries	y	WCS, CORDIO, KMFRI	
3.3.	Decline in populations of commercial invertebrates								
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)	R	H	T	Y	KMFRI, WCS		Ad hoc surveys only, no monitoring	
3.3.2.	Decline in populations of abalone	R	M	T	Y	PhD study only			
3.3.3.	Decline in populations of cephalopods	R	H	T	Y	Ministry of fisheries			
3.3.4.	Decline in populations of sea cucumbers	R	H	T	Y	KMFRI, WCS		Ad-hoc only	
3.3.5.	Decline in populations of sea urchins	NR							
3.3.6.	Decline in populations of prawns and shrimp	R	H	T	Y	Ministry of fisheries, KMFRI	y	SWIOFP, KCDP	
3.3.7.	Decline in populations of lobsters	R	H	T	Y	University of Nairobi		Only catch / export data, statbase	
3.3.8.	Decline in populations of crayfish	NR							
3.3.9.	Decline in populations of crabs	R	H	T	Y	KMFRI, University of Nairobi		Only catch / export data, statbase	
3.4.	Excessive bycatch and discards	R	H	T	Y	For prawns and baseline monitoring (KMFRI)			

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)	R	H	T	y	KMFRI baseline -frame survey every 2 yrs, monitoring of effort			

Table A6.4.2: Kenya Prioritisation 2 Results

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	H	VH	M	H	M	M	VH	M	H
1.2.	Degradation of ground and surface water quality	M	H	LR	M	M	M	M	M	M
1.3.	Degradation of coastal and marine water quality									
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	LR	LR	LR	LR	LR	M	VH	M	M
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	H	M	LR	M	M	H	VH	H	H
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	M	LR	LR	LR	LR	M	VH	M	M
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	H	M	LR	M	M	H	M	M	M
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	H	H	LR	M	VH	H	VH	VH	H
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	H	M	LR	M	LR	H	M	M	M
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	H	H	H	H	M	H	VH	H	H
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats									
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	VH	VH	VH	VH	VH	VH	VH	VH	VH

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
2.2.2.	Disturbance, damage and loss of coastal forest habitats	H	H	VH	H	M	H	VH	H	H
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	H	H	H	H	M	VH	VH	H	H
2.2.4.	Disturbance, damage and loss of wetland habitats	H	VH	VH	VH	M	VH	VH	H	VH
2.2.5.	Disturbance, damage and loss of estuarine habitats	M	H	H	H	M	M	L	L	H
2.2.6.	Disturbance, damage and loss of mangrove habitats	VH	VH	VH	VH	VH	VH	M	VH	VH
2.3.	Disturbance, damage and loss of subtidal benthic habitats									
2.3.1.	Disturbance, damage and loss of coral reef habitats	VH	VH	VH	VH	VH	VH	M	H	VH
2.3.2.	Disturbance, damage and loss of seagrass habitats	L	L	L	L	L	L	VH	M	
2.3.3.	Disturbance, damage and loss of macroalgal habitats	L	L	L	L	L	L	L	L	L
2.3.4.	Disturbance, damage and loss of soft sediment habitats	LR	LR	M	L	L	M	L	L	L
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)	LR	LR	M	L	L	M	L	L	L
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	VH	VH	M	H	M	M	M	M	H
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)	M	H	L	M	M	H	VH	H	H

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
2.6.	Introduction of exotic non-native species, invasives and nuisance species	H	M	L	M	M	VH	VH	H	H
3.1.	Decline in populations of focal species									
3.1.1.	Decline in populations of marine mammals	M	VH	L	M	H	VH	M	H	H
3.1.2.	Decline in populations of cetaceans	M	M	L	M	H	H	M	H	H
3.1.3.	Decline in populations of seabirds	L	M	L	M	L	H	M	H	H
3.1.4.	Decline in populations of turtles	M	VH	M	H	VH	H	L	H	H
3.2.	Decline in populations of commercial fish stocks									
3.2.1.	Decline in populations of sharks and rays	M	H	M	M	VH	H	L	H	H
3.2.2.	Decline in populations of large pelagics	M	M	M	M	H	H	H	H	H
3.2.3.	Decline in populations of small pelagics	H	H	H	H	M	M	H	M	H
3.2.4.	Decline in populations of deep water demersals	L	L	L	L	L	LR	LR	L	L
3.2.5.	Decline in populations of reef and demersal fish	VH	VH	VH	VH	VH	VH	L	H	VH
3.3.	Decline in populations of commercial invertebrates									

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)	VH	M	L	M	VH	H	L	H	H
3.3.2.	Decline in populations of abalone								H	H
3.3.3.	Decline in populations of cephalopods	VH	VH	H	VH	VH	H	L	H	VH
3.3.4.	Decline in populations of sea cucumbers	VH	VH	H	VH	VH	H	L	H	VH
3.3.5.	Decline in populations of sea urchins	H	H	H	H	L	L	H	L	H
3.3.6.	Decline in populations of prawns and shrimp	VH	VH	H	VH	VH	H	M	H	VH
3.3.7.	Decline in populations of lobsters	H	VH	H	VH	VH	H	L	H	VH
3.3.8.	Decline in populations of crayfish									
3.3.9.	Decline in populations of crabs	H	H	L	H	L	H	L	M	H
3.4.	Excessive bycatch and discards	VH	VH	H	VH	VH	H	L	H	VH
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)	VH	H	H	H	VH	H	M	H	H

Figure 6.4.1.a: Kenya MAC01 Impact Analysis for Issue (1.2) Degradation of surface and ground water quality.

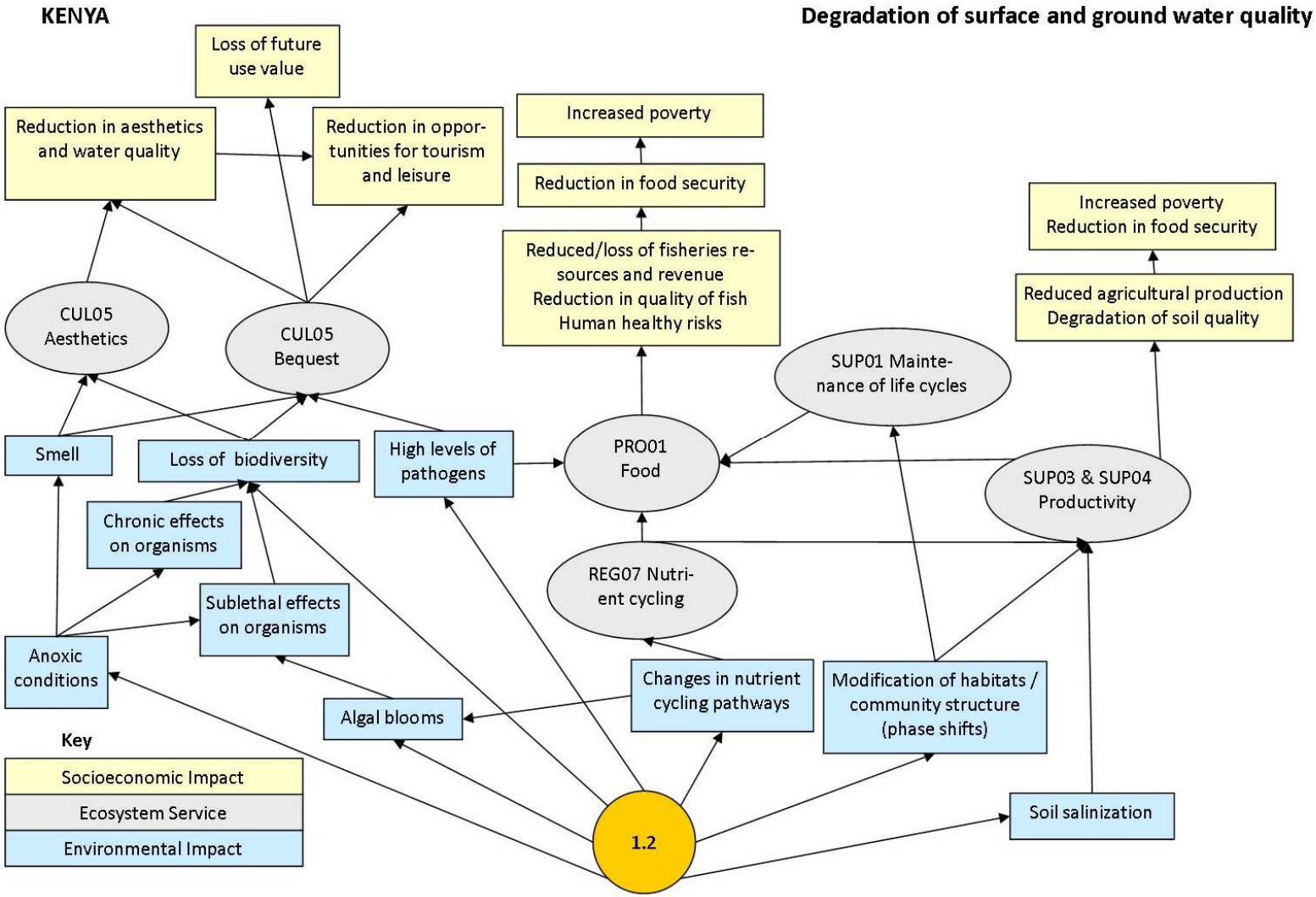


Figure 6.4.1.b: Kenya MAC01 Causal Chain Analysis for Issue (1.2) Degradation of surface and ground water quality.

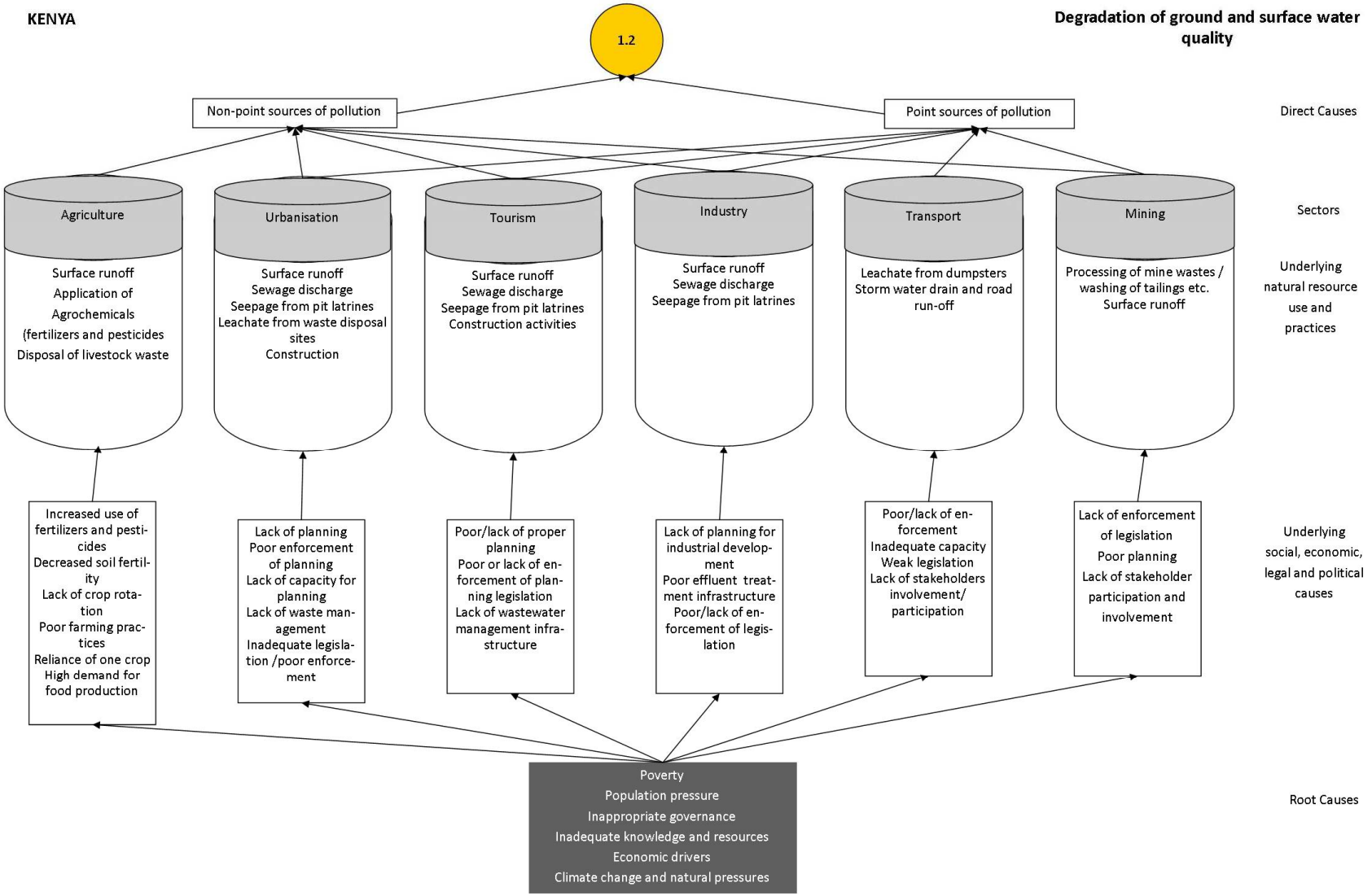


Figure 6.4.2.a: Kenya MAC01 Impact Analysis for Issue (1.3.2) Nutrient enrichment from land-based and marine sources.

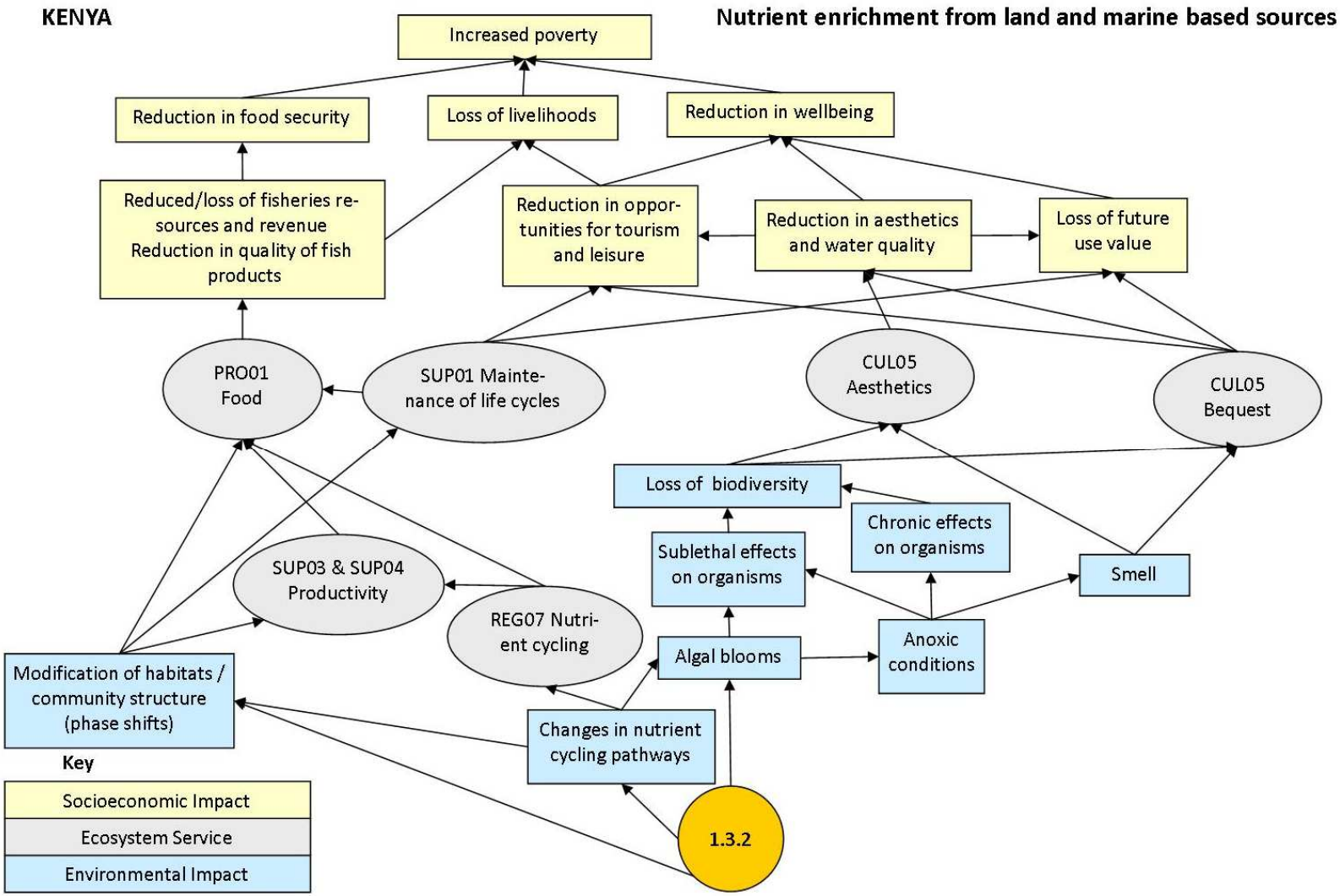


Figure 6.4.2.b: Kenya MAC01 Causal Chain Analysis for Issue (1.3.2) Nutrient enrichment from land-based and marine sources.

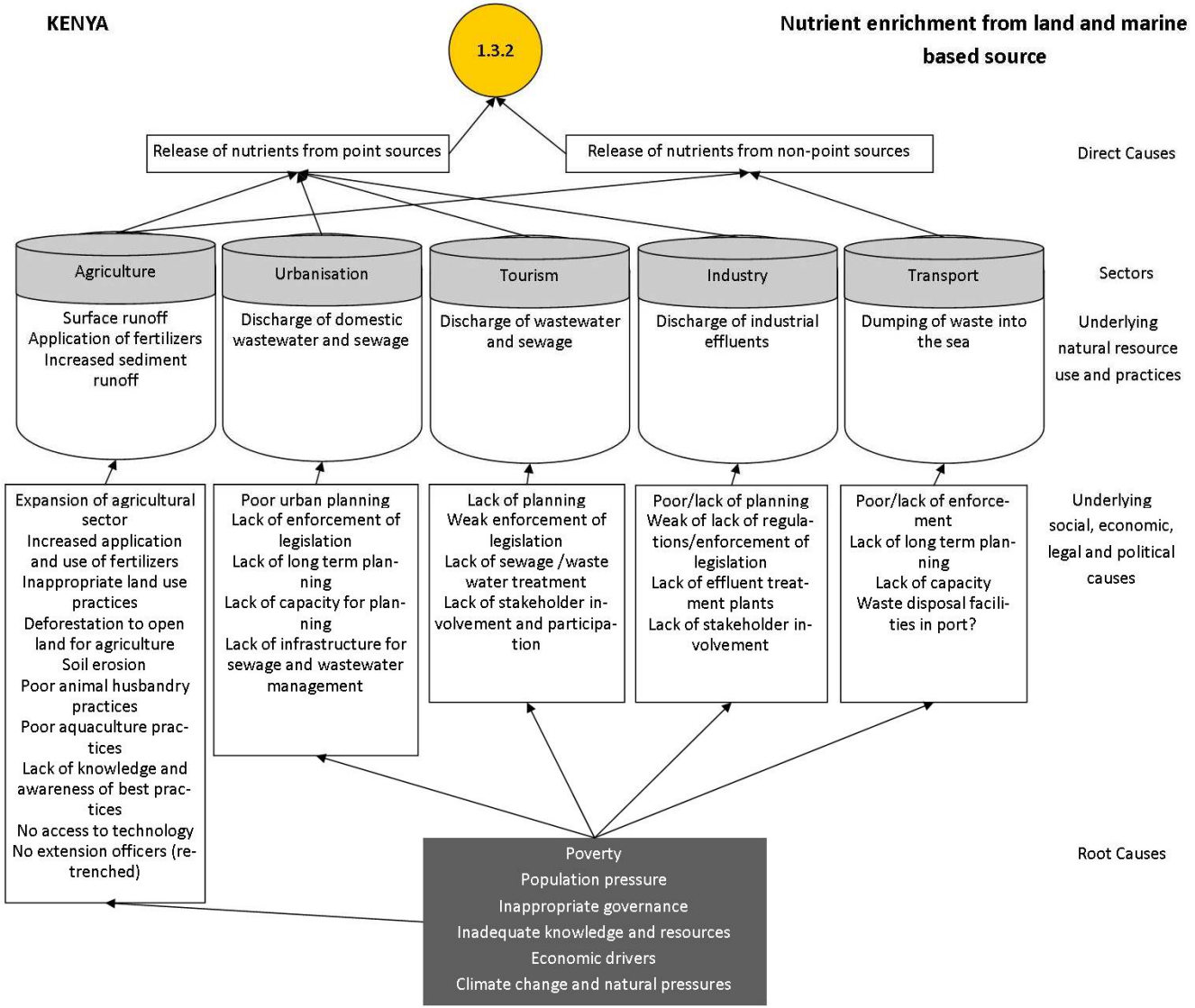


Figure 6.4.3.a: Kenya MAC01 Impact Analysis for Issue (1.3.5) Solid wastes/marine debris from shipping and land-based sources.

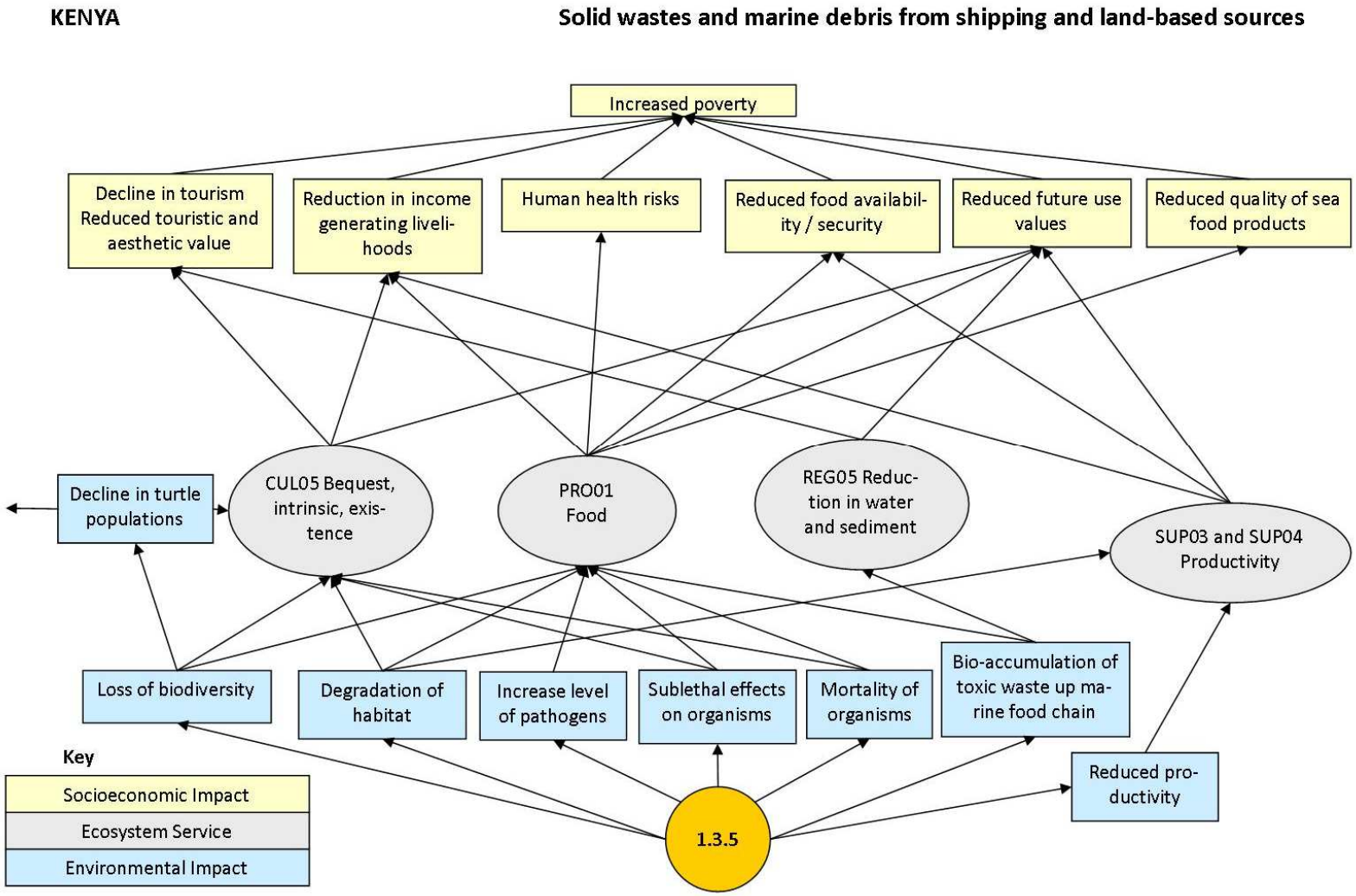


Figure 6.4.3.b: Kenya MAC01 Causal Chain Analysis for Issue (1.3.5) Solid wastes/marine debris from shipping and land-based sources.

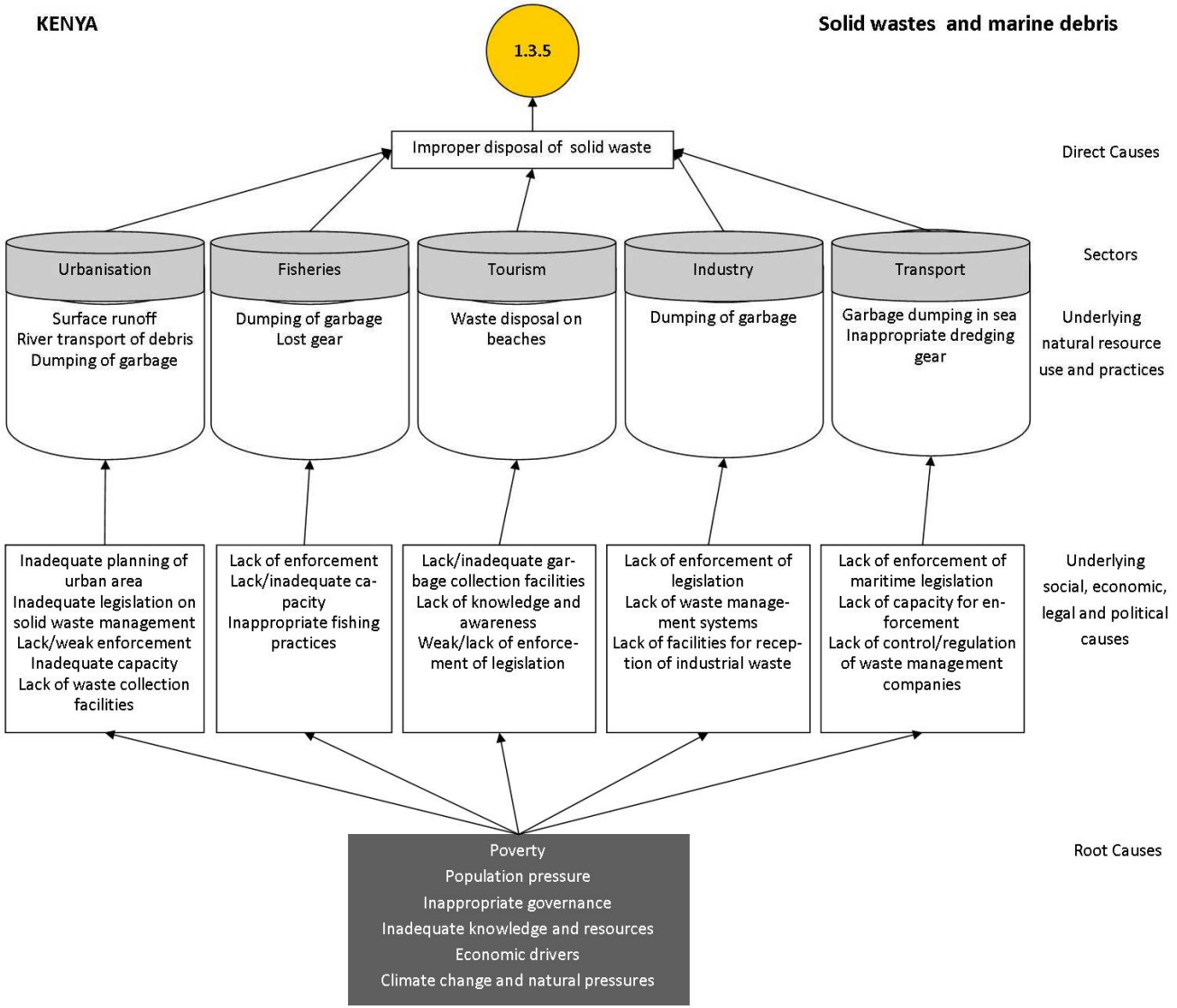


Figure 6.4.4: Kenya MAC02 Impact Analysis for Issue (2.2.6) Disturbance, damage and loss of mangrove habitats.

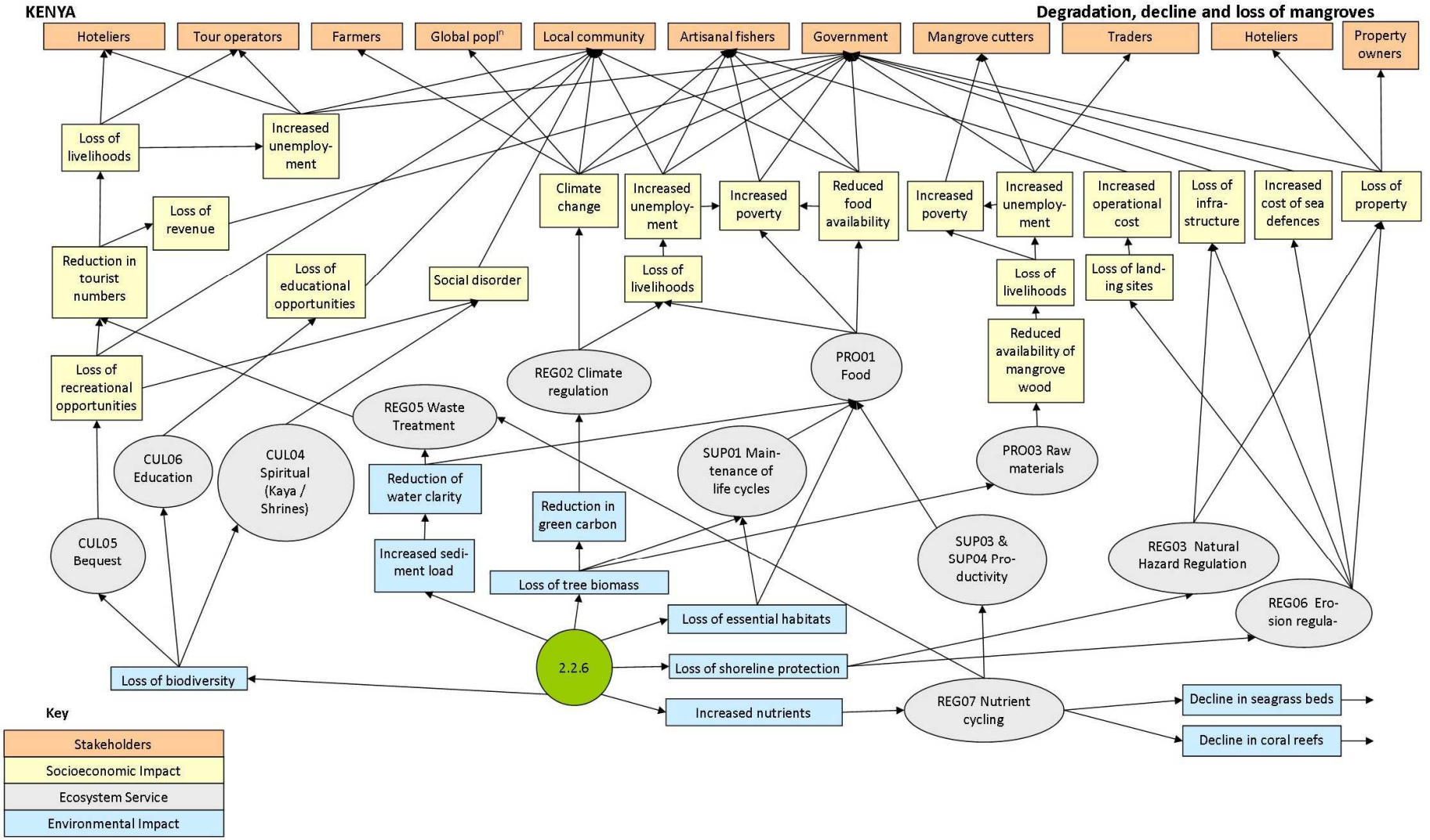


Figure 6.4.5.a: Kenya MAC02 Impact Analysis for Issue (2.3.1) Disturbance, damage and loss of coral reefs.

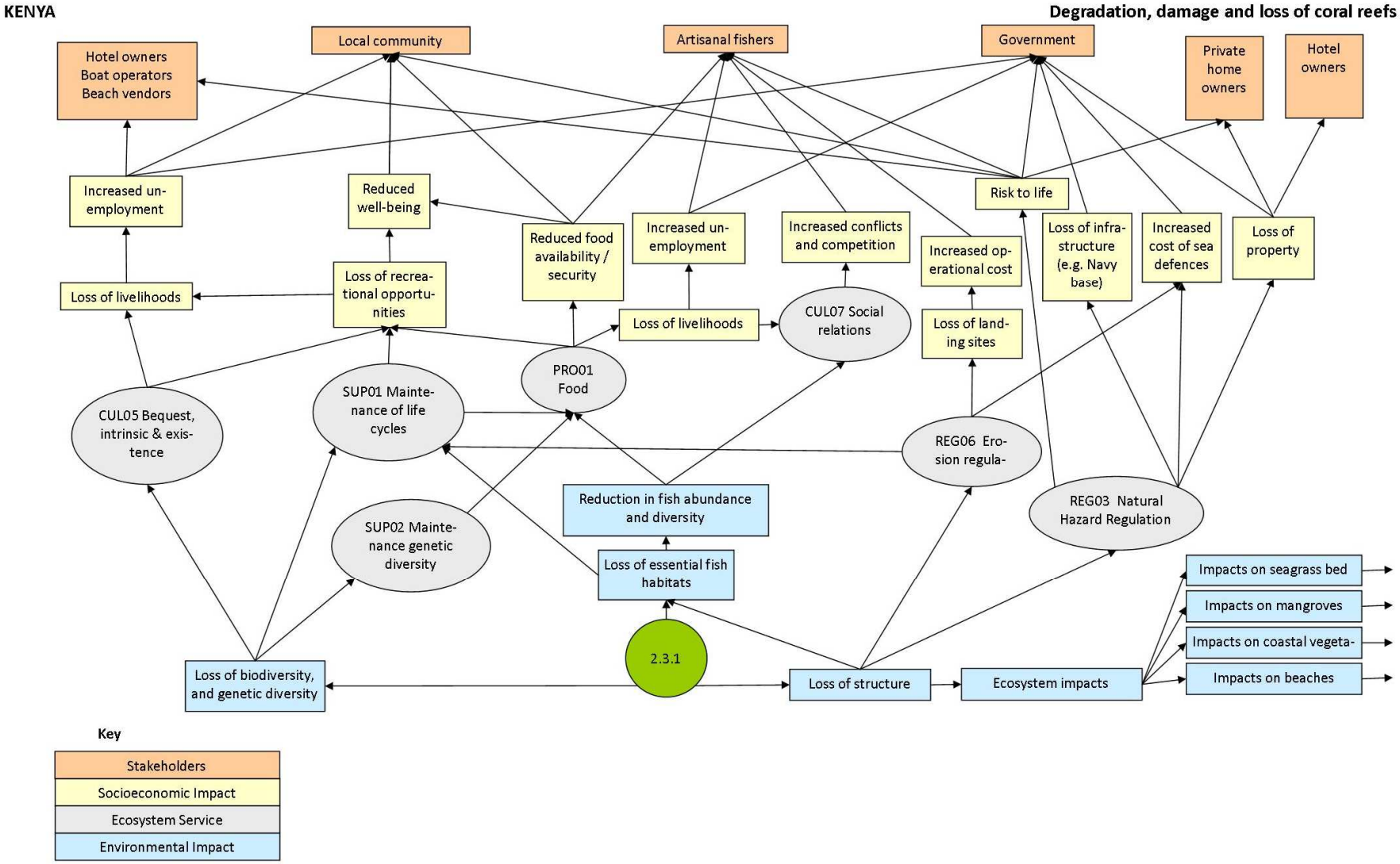


Figure 6.4.5.b: Kenya MAC02 Causal Chain Analysis for Issue (2.3.1) Disturbance, damage and loss of coral reefs.

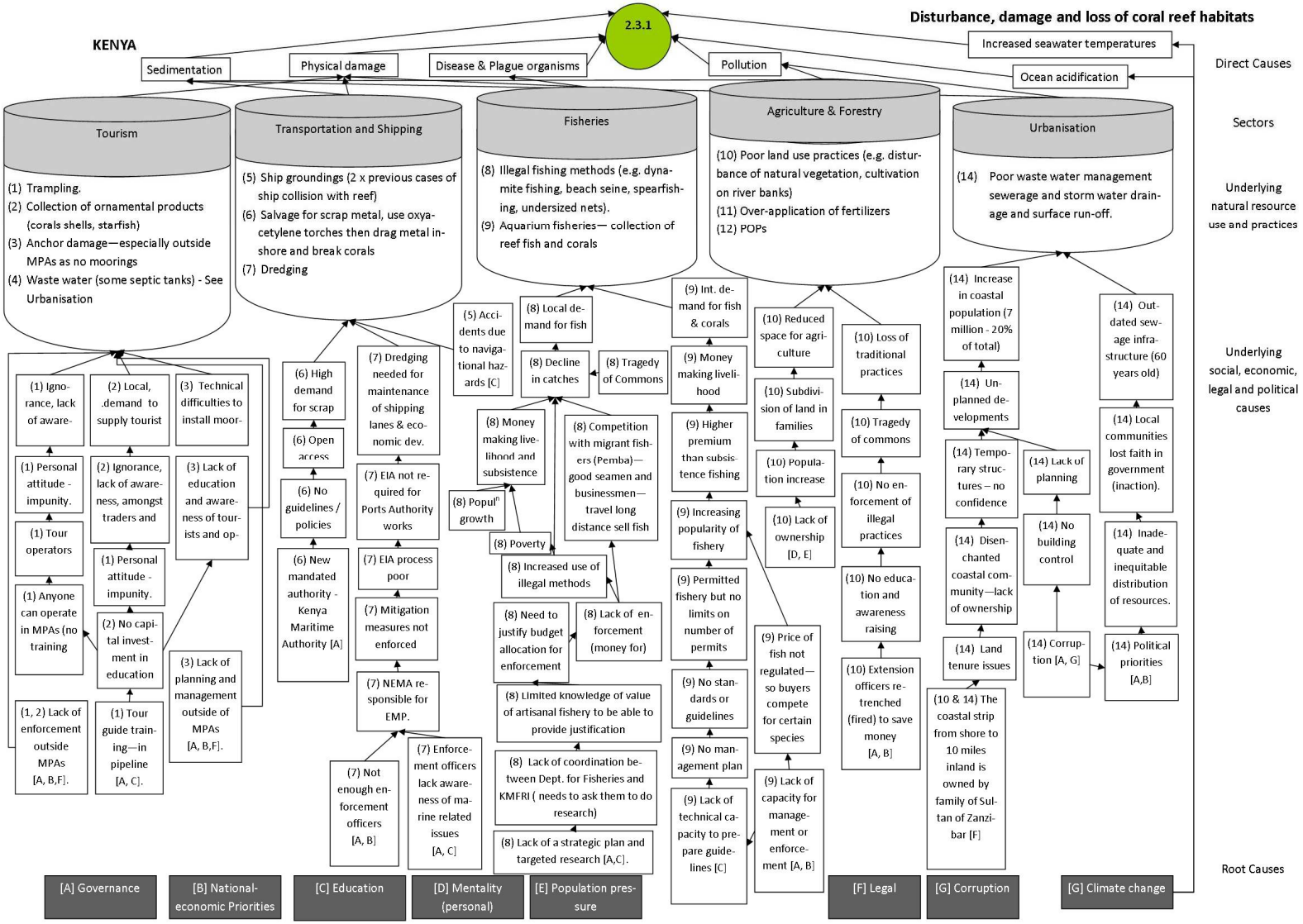


Figure 6.4.6.a: Kenya MAC03 Impact Analysis for Issue (3.2.5) Declines in populations of reef and demersal fish.

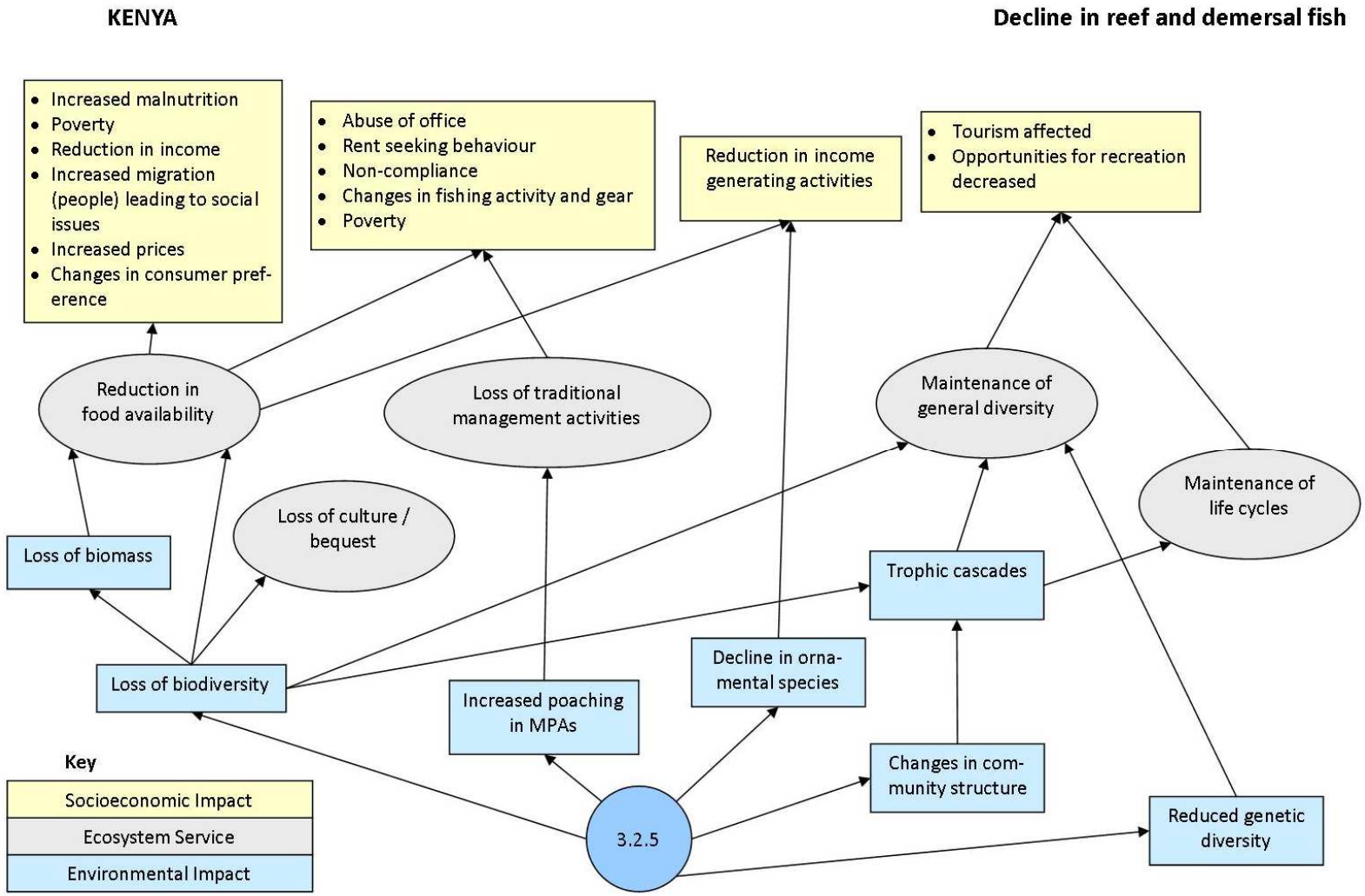


Figure 6.4.6.b: Kenya MAC03 Causal Chain Analysis for Issue (3.2.5) Declines in populations of reef and demersal fish.

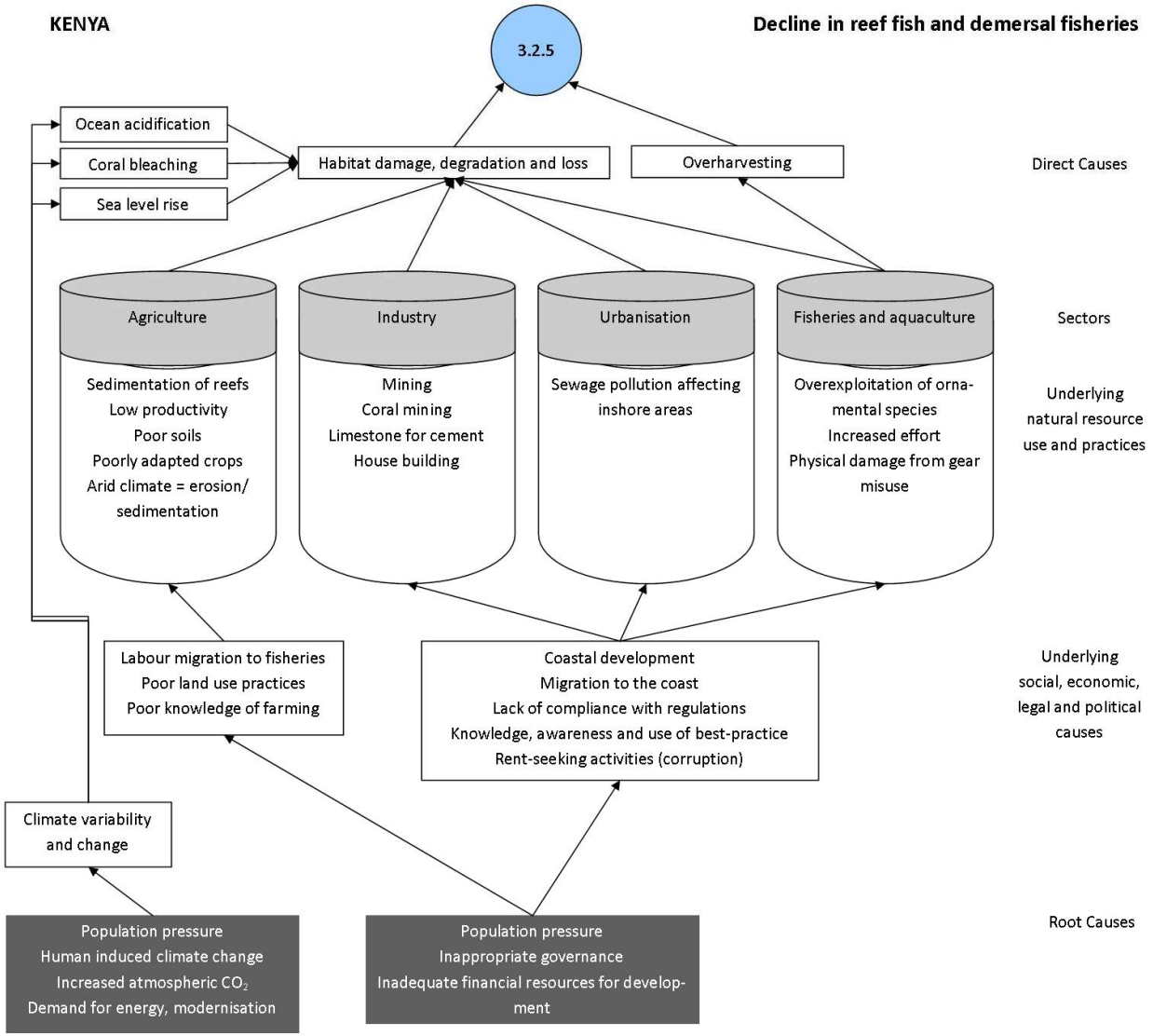


Figure 6.4.7.a: Kenya MAC03 Impact Analysis for Issue (3.3.6) Declines in populations of prawns and shrimps.

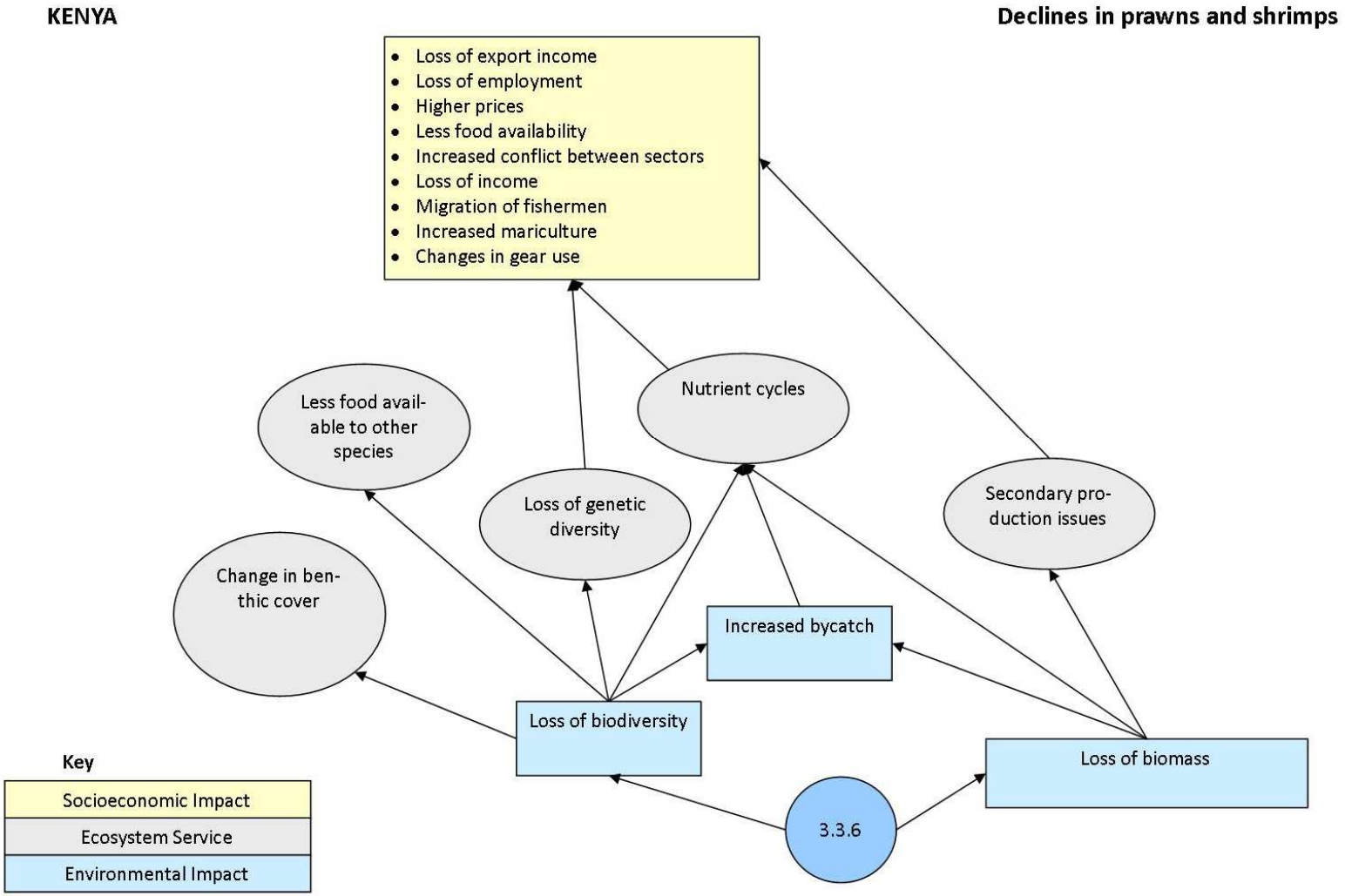


Figure 6.4.7.b: Kenya MAC03 Causal Chain Analysis for Issue (3.3.6) Declines in populations of prawns and shrimps.

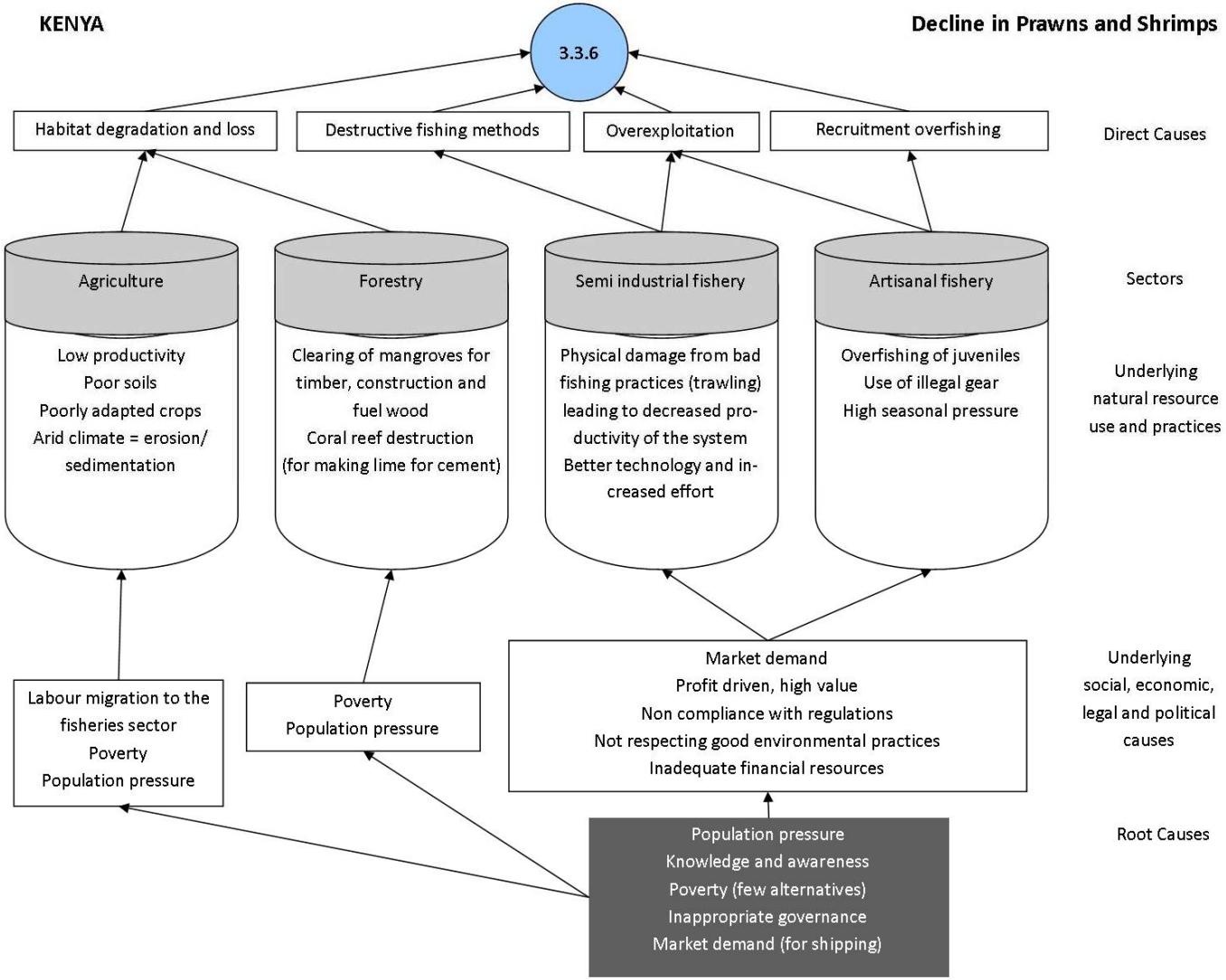


Figure 6.4.8.a: Kenya MAC03 Impact Analysis for Issue (3.4) Excessive bycatch and discards.

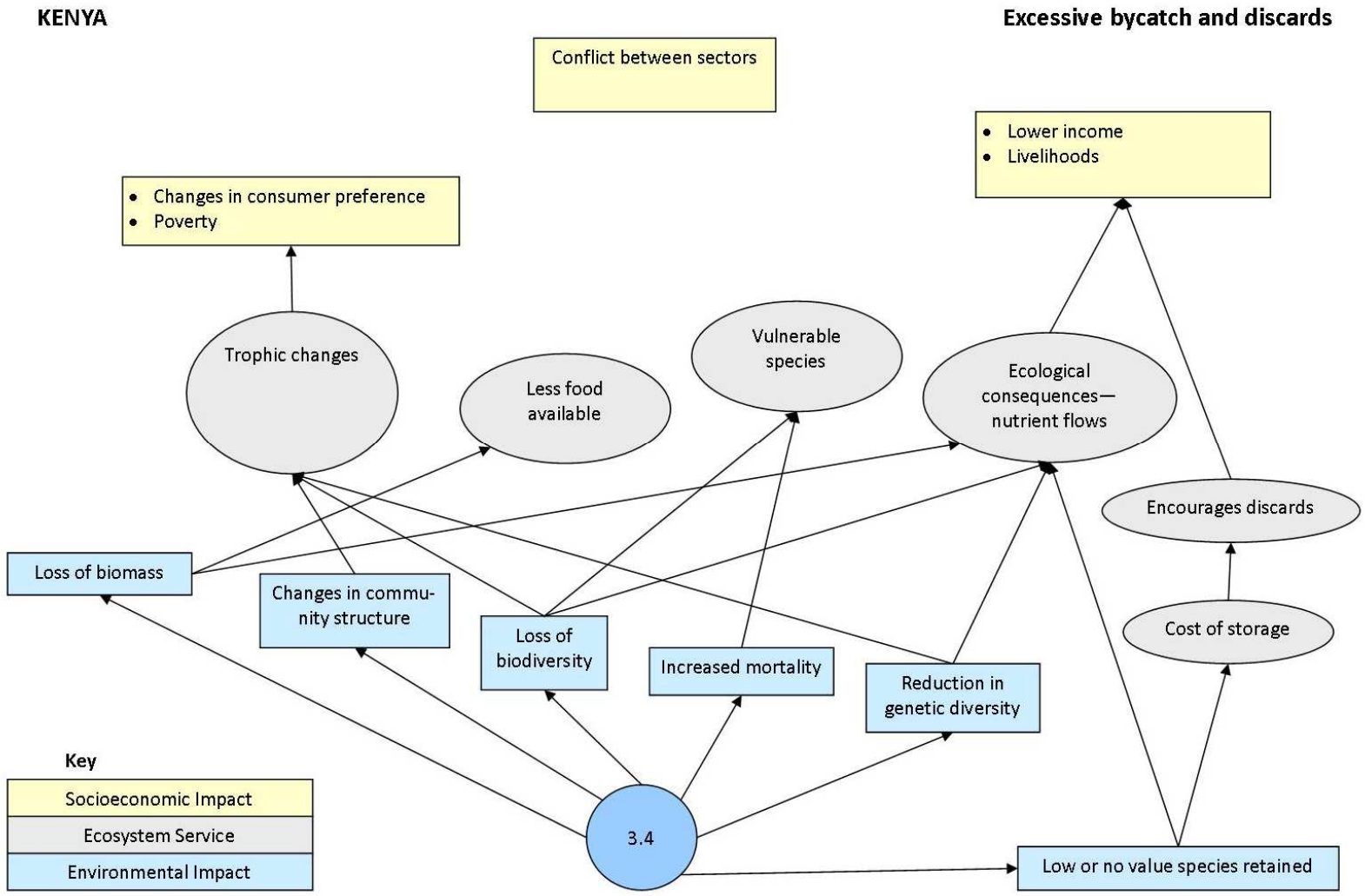


Figure 6.4.8.b: Kenya MAC03 Causal Chain Analysis for Issue (3.4) Excessive bycatch and discards.

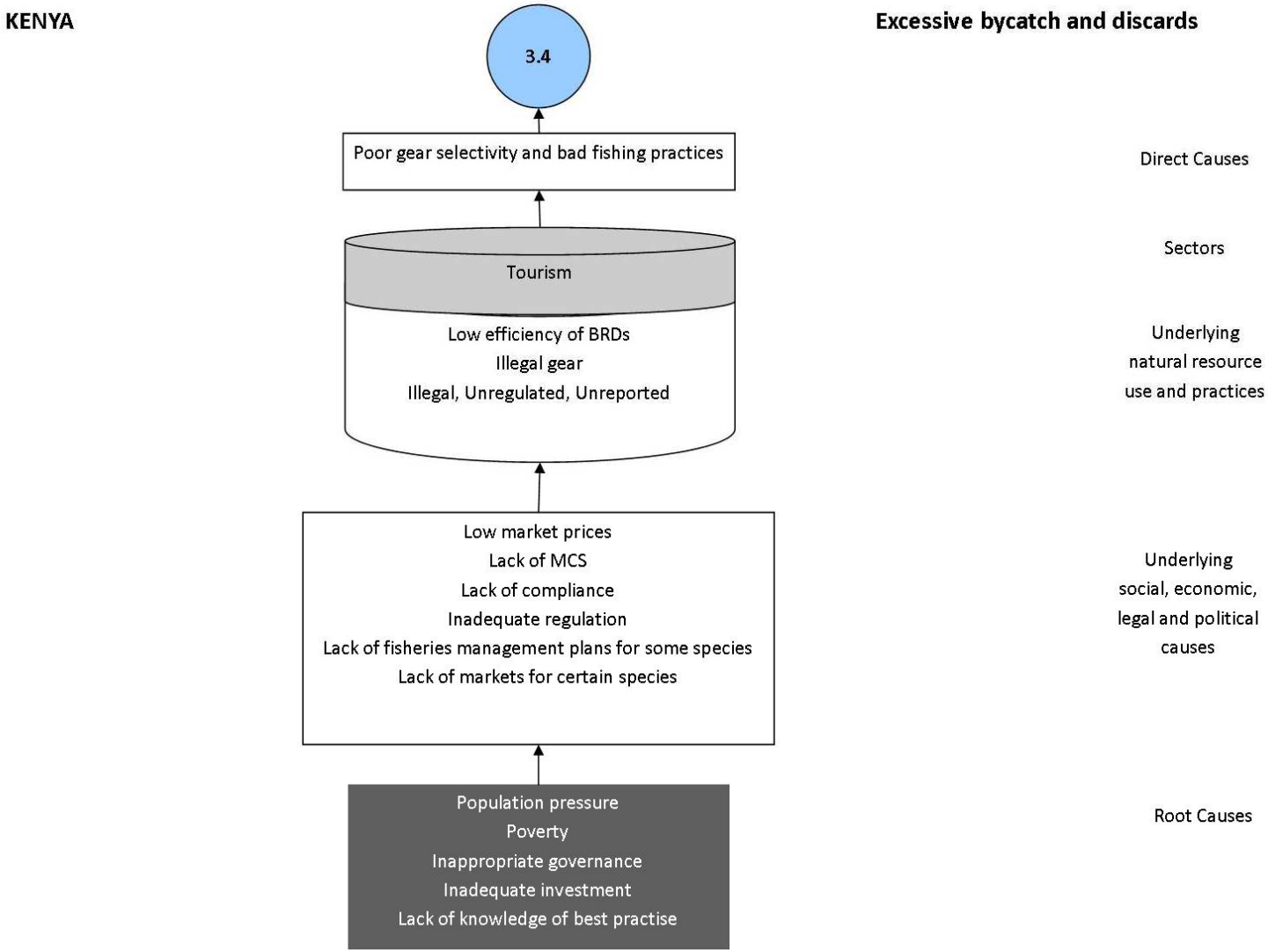


Figure 6.4.9.a: Kenya MAC03 Impact Analysis for Issue (3.5) Expansion of mariculture industry.

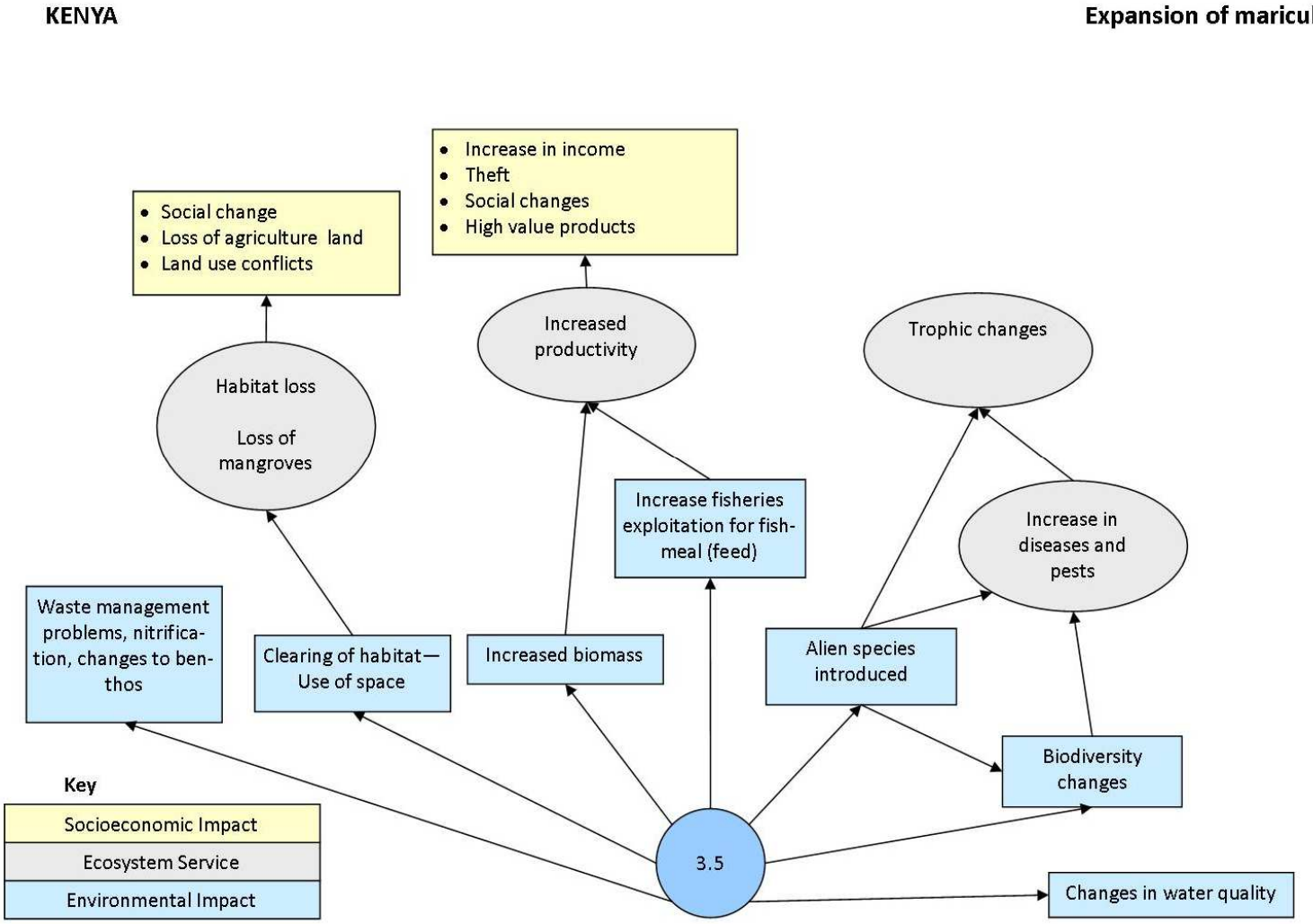
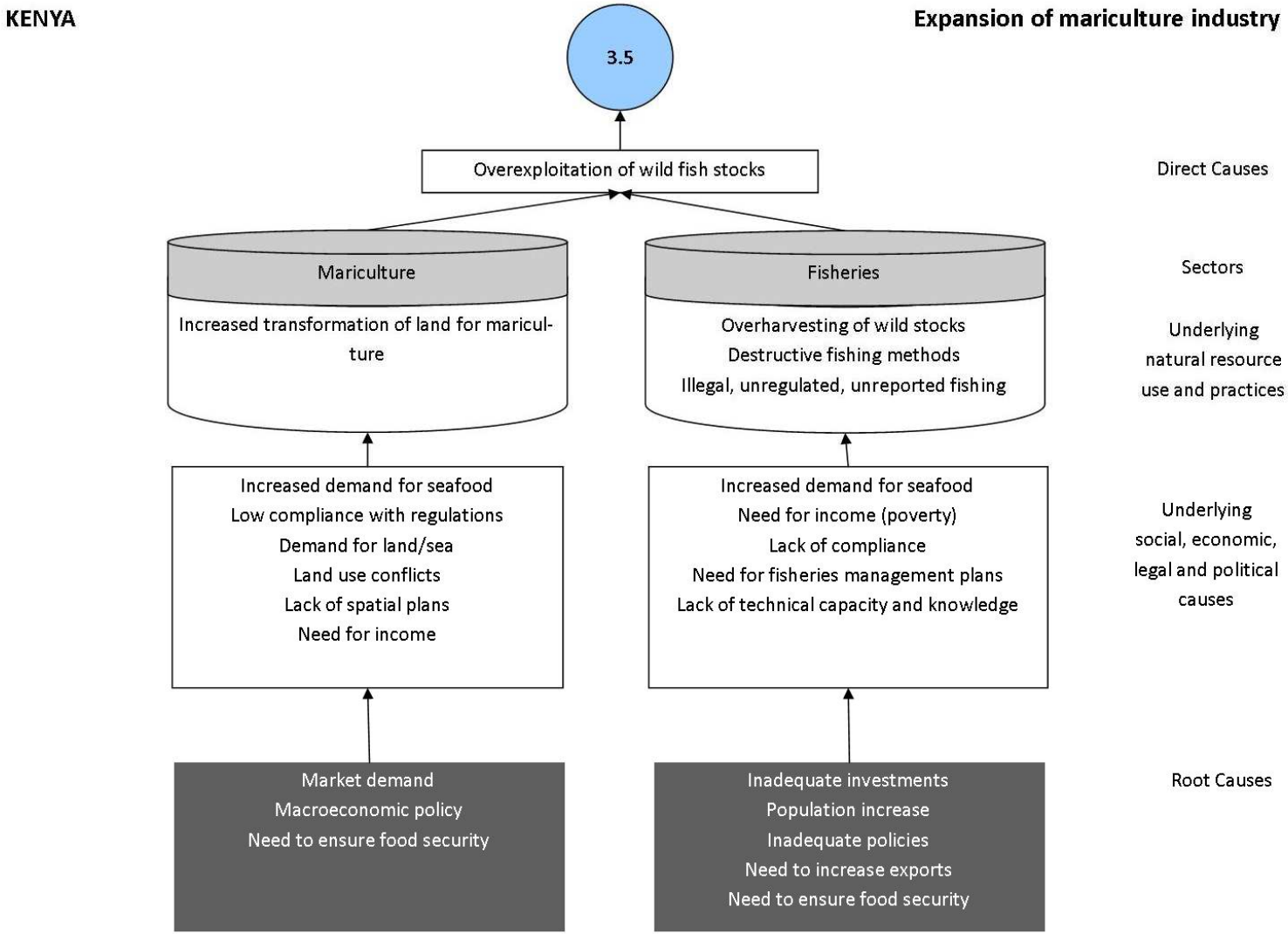


Figure 6.4.9.b: Kenya MAC03 Causal Chain Analysis for Issue (3.5) Expansion of mariculture industry.



A6.5 Comoros – National Causal Chain Meeting Results

Table A6.5.1: Comoros Prioritisation 1 Results

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	R	H	FT	No	Some information - limited with Ministry of Environment	Yes	Not enough by Ministry of Environment	
1.2.	Degradation of ground and surface water quality	FR	H	FT	No		Starting	University of Comoros now has a laboratory	
1.3.	Degradation of coastal and marine water quality	R	H	T	No			University of Comoros now has a laboratory	
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	R	M	NT	No		No		
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	R	L	T	No		No		
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	R	H	T	No		No		
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	R	H	T	No		Yes	Ministry of Fisheries and Agriculture	
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	R	H	T	No		Yes	Ministry of Fisheries and Agriculture	
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	R	H	T	No		No	Very little monitoring. Commune De Moroni. Ministry of Fisheries and Agriculture	
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	R	M	T	Y	National Directorate for the Environment (DNE)			

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats	R	H	T					
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	R	H	NT	Y	National Directorate for the Environment (DNE)			
2.2.2.	Disturbance, damage and loss of coastal forest habitats	R	M	Y	Y	National Directorate for the Environment (DNE)			
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	R	H	Y	Y	National Directorate for the Environment (DNE)			
2.2.4.	Disturbance, damage and loss of wetland habitats	NR							
2.2.5.	Disturbance, damage and loss of estuarine habitats	NR							
2.2.6.	Disturbance, damage and loss of mangrove habitats	R	L	Y	Y	COSEP/PNUD			
2.3.	Disturbance, damage and loss of subtidal benthic habitats								
2.3.1.	Disturbance, damage and loss of coral reef habitats	R	H	Y	Y	AIDE, DGE, COSEP			
2.3.2.	Disturbance, damage and loss of seagrass habitats	R	M	Y	Y	AIDE, Faculty Sciences, University of Comoros			
2.3.3.	Disturbance, damage and loss of macroalgal habitats	R	M	Y	Y	AIDE, Faculty Sciences, University of Comoros			
2.3.4.	Disturbance, damage and loss of soft sediment habitats	NR							
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)	NR							
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	NR							

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)	R	H	Y	Y	OMS			
2.6.	Introduction of exotic non-native species, invasives and nuisance species	FR	L	Y					
3.1.	Decline in populations of focal species								
3.1.1.	Decline in populations of marine mammals	R	MP	T	Yes (Limited)	Duration General Resource Habentigue (DGRH)	No		
3.1.2.	Decline in populations of cetaceans	NR							
3.1.3.	Decline in populations of seabirds	R	HP	T	No	Ministry of Environment	No		
3.1.4.	Decline in populations of turtles	R	HP	T	Yes	DRE (Acronym?)	Yes	DRE	
3.2.	Decline in populations of commercial fish stocks								
3.2.1.	Decline in populations of sharks and rays	R	HP	T	No	Duration General Resource Habentigue (DGRH)	No		
3.2.2.	Decline in populations of large pelagics	R	HP	T	Yes	Duration General Resource Habentigue (DGRH), COI, CTOI	Yes		
3.2.3.	Decline in populations of small pelagics	R	HP	T	No		No		
3.2.4.	Decline in populations of deep water demersals	NR							
3.2.5.	Decline in populations of reef and demersal fish	NR	HP	NT	No		No		

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
3.3.	Decline in populations of commercial invertebrates								
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)	FR	MP	NT	No		No		
3.3.2.	Decline in populations of abalone	NR							
3.3.3.	Decline in populations of cephalopods	R	HP	NT	No		No		
3.3.4.	Decline in populations of sea cucumbers	R	HP	NT	No		No		
3.3.5.	Decline in populations of sea urchins	NR							
3.3.6.	Decline in populations of prawns and shrimp	R	HP	NT	No		No		Freshwater
3.3.7.	Decline in populations of lobsters	NR							
3.3.8.	Decline in populations of crayfish (deep sea lobster)	NR							
3.3.9.	Decline in populations of crabs	R	HP	NT	No		No		
3.4.	Excessive bycatch and discards	R	HP	T	No		No		
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)	R	HP	NT	No		No		

Table A6.5.2: Comoros Prioritisation 2 Results

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	H	M	L	M	H	H	H	H	H
1.2.	Degradation of ground and surface water quality	L	L	L	L	H	H	H	H	M
1.3.	Degradation of coastal and marine water quality									
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	H	M	L	M	H	H	VH	H	H
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	L	L	L	L	M	M	VH	H	M
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	L	L	L	L	M	H	VH	H	M
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	L	L	L	L	H	M	H	H	M
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	H	L	L	M	M	VH	VH	H	H
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	M	L	L	L	H	VH	VH	VH	M
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	H	H	H	H	H	H	M	H	H
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats									
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	H	H	H	H	H	M	H	H	H
2.2.2.	Disturbance, damage and loss of coastal forest habitats	H	M	L	M	M	M	H	M	M

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	VH	H	VH	VH	M	M	M	M	H
2.2.4.	Disturbance, damage and loss of wetland habitats									
2.2.5.	Disturbance, damage and loss of estuarine habitats									
2.2.6.	Disturbance, damage and loss of mangrove habitats	M	L	L	L	M	M	M	M	M
2.3.	Disturbance, damage and loss of subtidal benthic habitats									
2.3.1.	Disturbance, damage and loss of coral reef habitats	VH	VH	M	H	VH	H	H	H	H
2.3.2.	Disturbance, damage and loss of seagrass habitats	M	L	L	L	M	M	M	M	M
2.3.3.	Disturbance, damage and loss of macroalgal habitats	L	L	L	L	L	L	L	L	L
2.3.4.	Disturbance, damage and loss of soft sediment habitats									
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)	L	L	L	L					
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	L	L	L	L					
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)	M	M	L	M	H	H	H	H	M
2.6.	Introduction of exotic non-native species, invasives and nuisance species	L	L	L	L	H	VH	VH	VH	M
3.1.	Decline in populations of focal species									

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
3.1.1.	Decline in populations of marine mammals	VH	M	L	M	VH	VH	H	VH	H
3.1.2.	Decline in populations of cetaceans									
3.1.3.	Decline in populations of seabirds	VH	M	L	M	VH	VH	H	VH	H
3.1.4.	Decline in populations of turtles	VH	VH	VH	VH	VH	VH	VH	VH	VH
3.2.	Decline in populations of commercial fish stocks									
3.2.1.	Decline in populations of sharks and rays	H	VH	VH	VH	VH	VH	H	VH	VH
3.2.2.	Decline in populations of large pelagics	H	VH	VH	VH	VH	VH	VH	VH	VH
3.2.3.	Decline in populations of small pelagics	H	H	H	H	H	VH	VH	VH	VH
3.2.4.	Decline in populations of deep water demersals									
3.2.5.	Decline in populations of reef and demersal fish	VH	VH	M	H	L	H	H	M	H
3.3.	Decline in populations of commercial invertebrates									
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)	VH	H	L	H	L	H	M	M	H
3.3.2.	Decline in populations of abalone									
3.3.3.	Decline in populations of cephalopods	VH	H	H	H	L	M	M	M	H

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
3.3.4.	Decline in populations of sea cucumbers	VH	VH	H	VH	L	H	M	M	H
3.3.5.	Decline in populations of sea urchins									
3.3.6.	Decline in populations of prawns and shrimp	VH	VH	L	H	L	H	H	M	H
3.3.7.	Decline in populations of lobsters									
3.3.8.	Decline in populations of crayfish									
3.3.9.	Decline in populations of crabs	VH	M	L	M	L	H	H	M	M
3.4.	Excessive bycatch and discards	H	H	H	H	M	H	H	H	H
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)	H	H	H	H	M	H	H	H	H

Figure 6.5.1.a: Comoros MAC01 Impact Analysis for Issue (1.3.5) Solid wastes/marine debris from shipping and land-based sources.

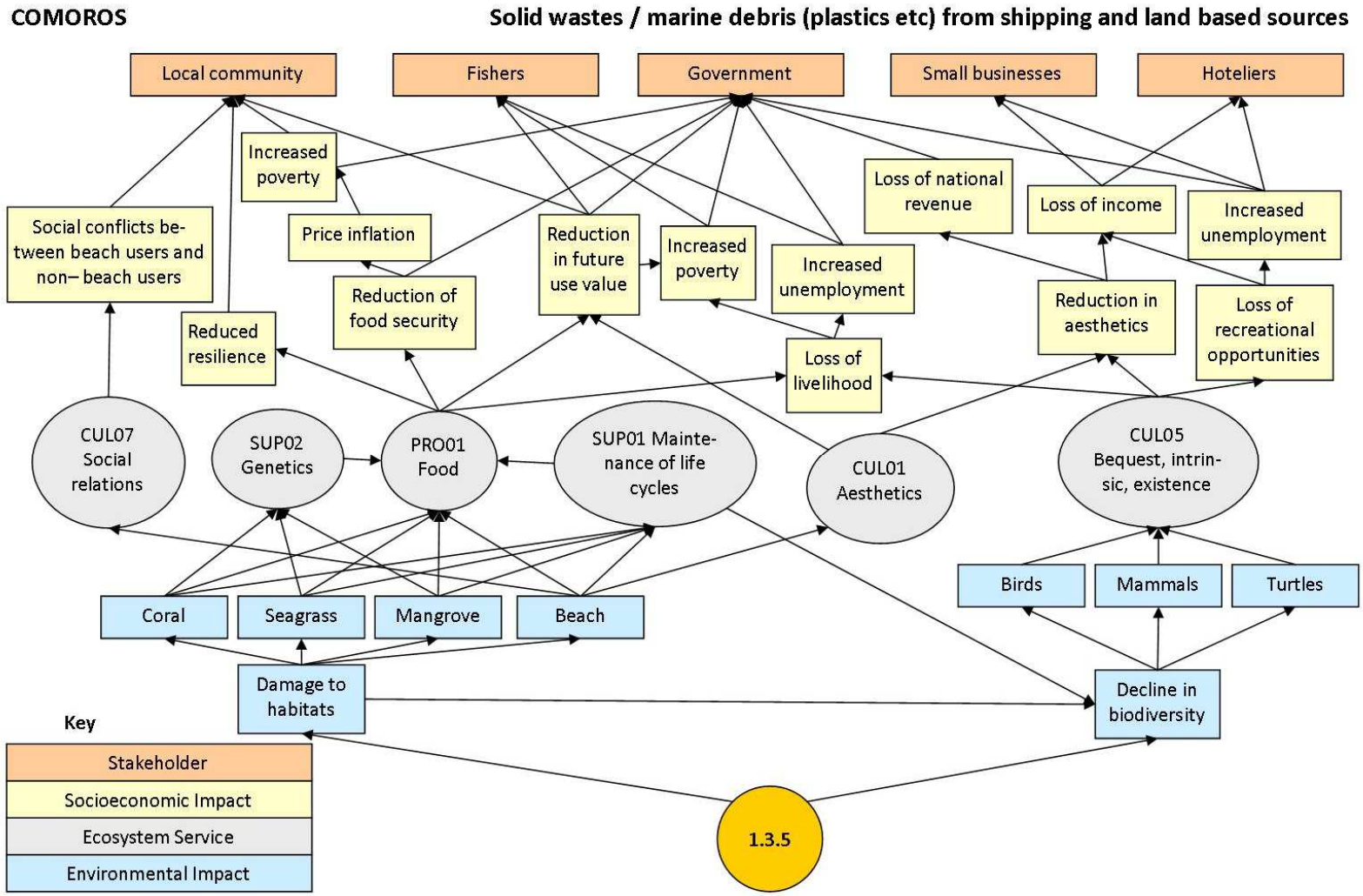


Figure 6.5.1.b: Comoros MAC01 Causal Chain Analysis for Issue (1.3.5) Solid wastes/marine debris from shipping and land-based sources.

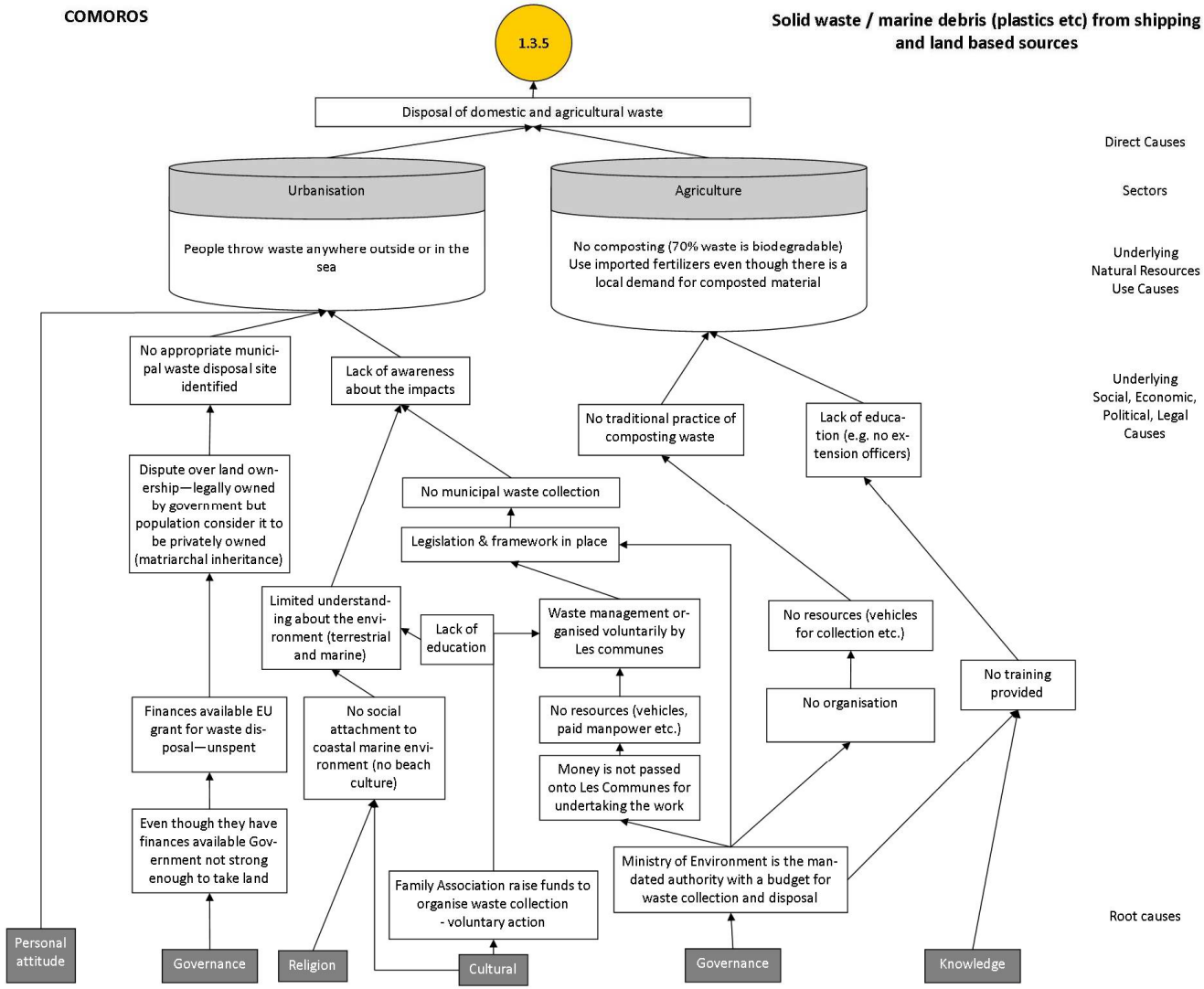


Figure 6.5.2.a: Comoros MAC02 Impact Analysis for Issue (2.3.1) Disturbance, damage and loss of coral reef habitats.

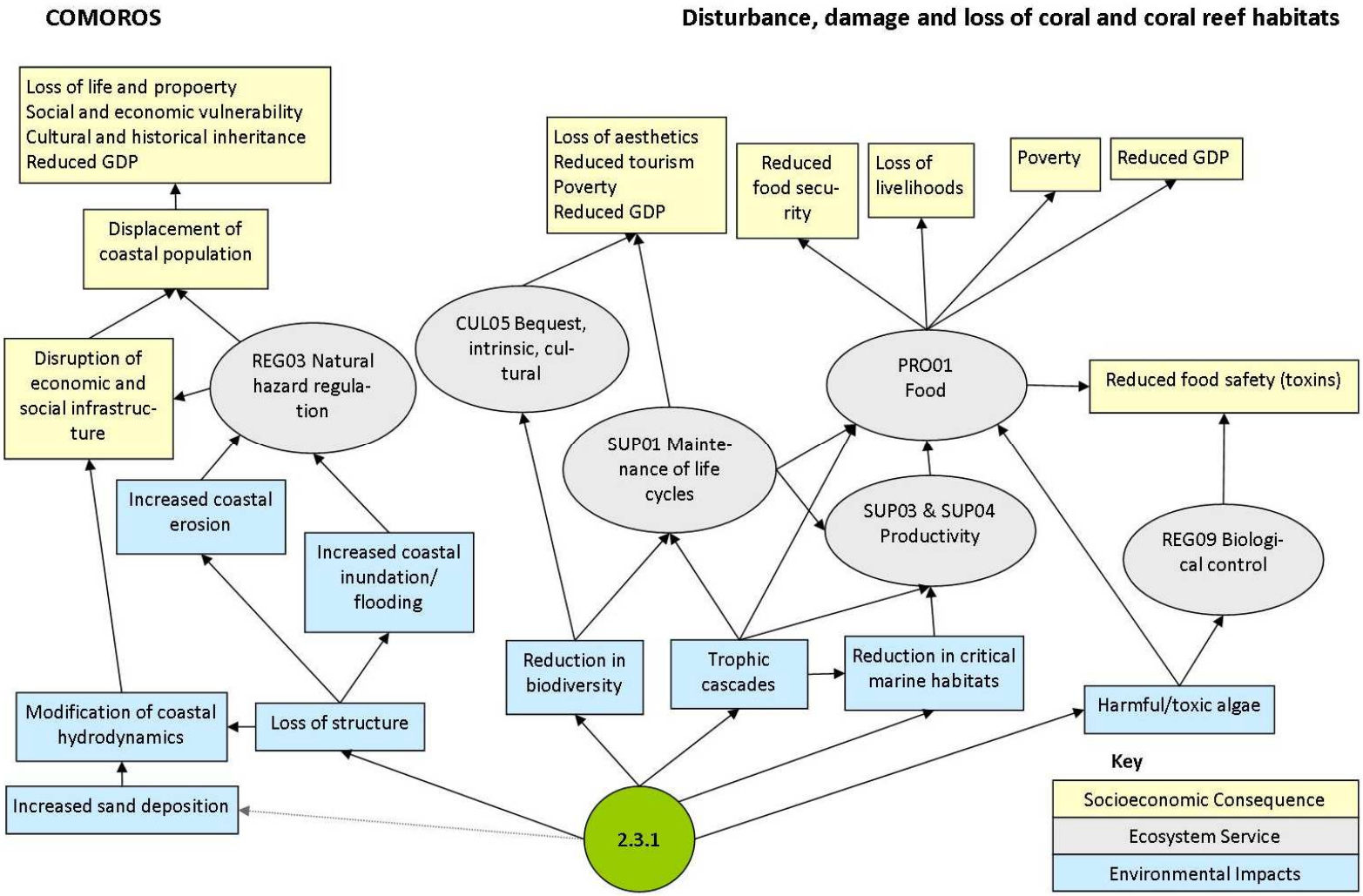


Figure 6.5.2.b: Comoros MAC02 Causal Chain Analysis for Issue (2.3.1) Disturbance, damage and loss of coral reef habitats.

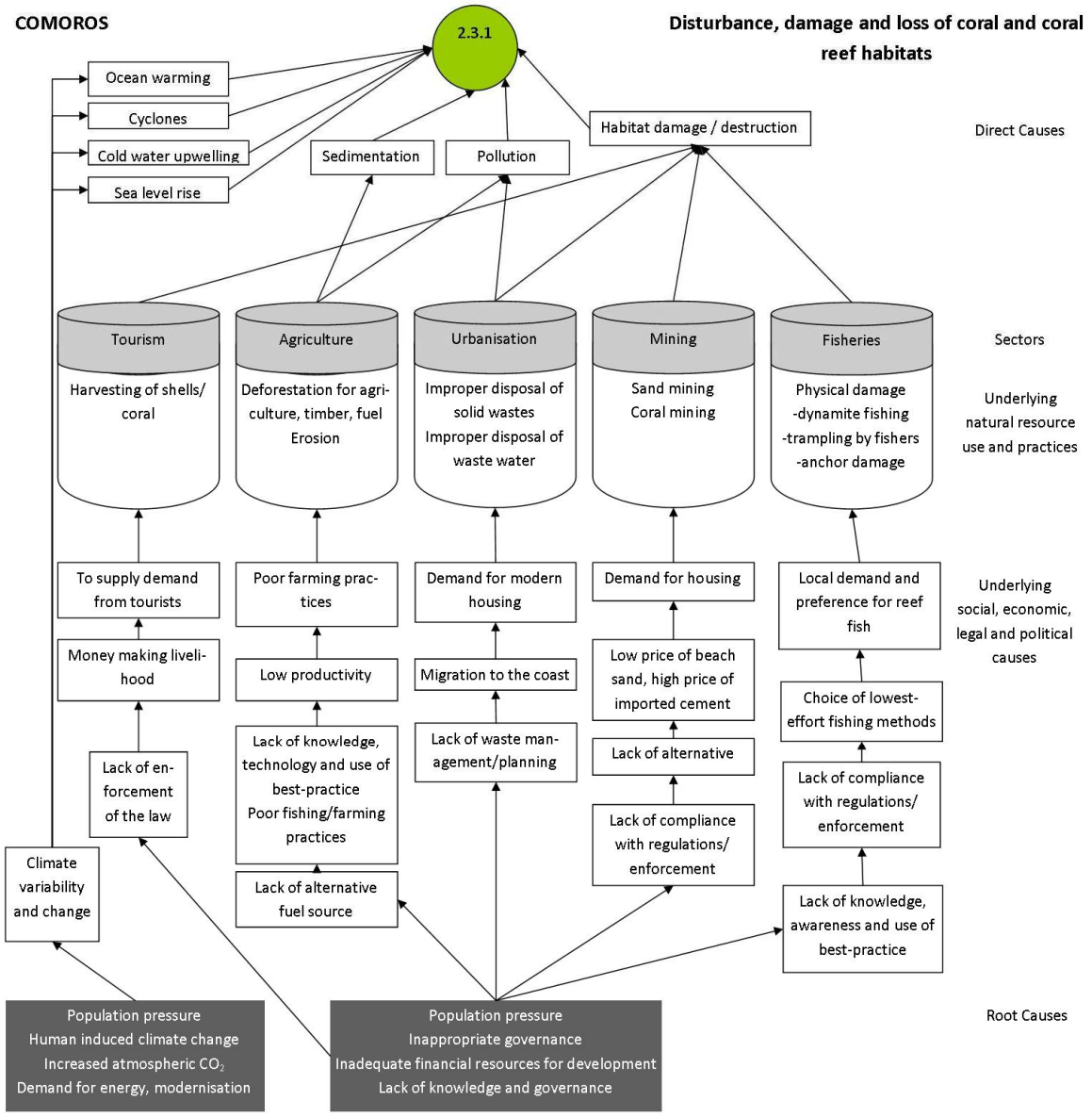


Figure 6.5.3.a: Comoros MAC03 Impact Analysis for Issue (3.2.2) Declines in populations of large pelagics.

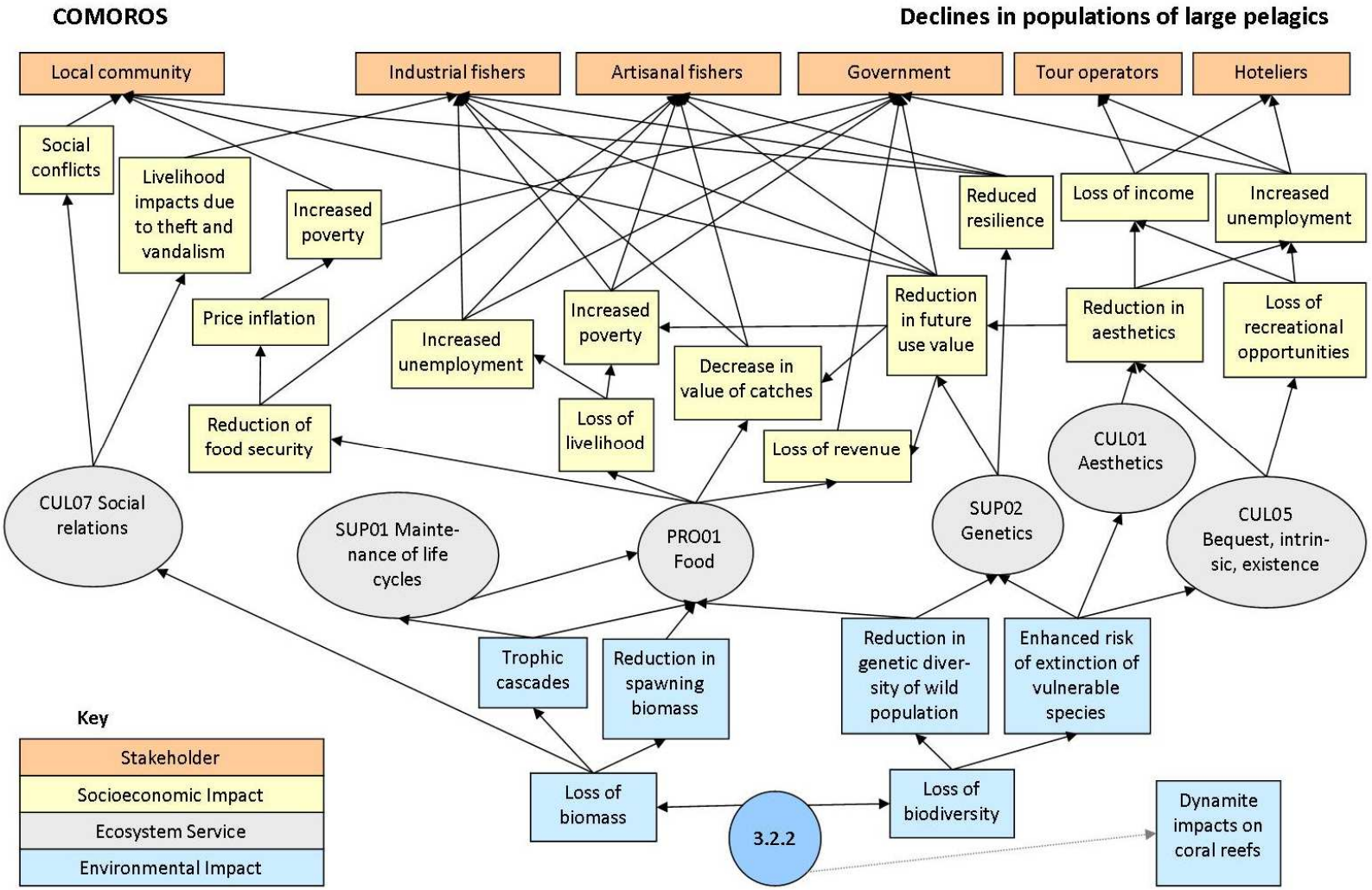
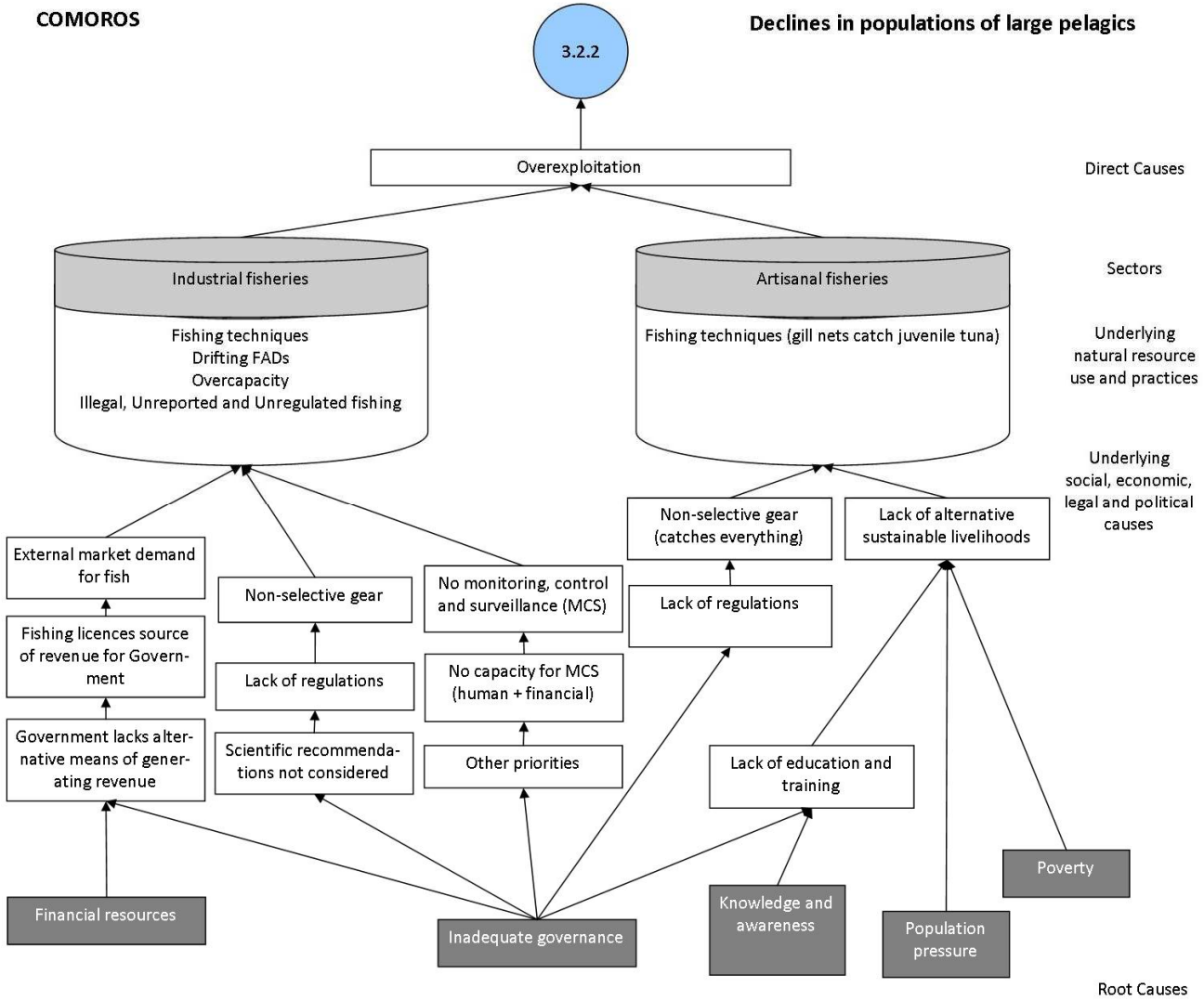


Figure 6.5.3.b: Comoros MAC03 Causal Chain Analysis for Issue (3.2.2) Declines in populations of large pelagics.



A6.6 Somalia – National Causal Chain Meeting Results

Table A6.6.1: Somalia Prioritisation 1 Results

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	R	M	T	Yes	Swalim (Somali water…)	Yes	Swalim (part of FAO)	
1.2.	Degradation of ground and surface water quality	R	M	T	Yes	Swalim, UNEP	Yes	Swalin	Salinisation after the tsunami
1.3.	Degradation of coastal and marine water quality								
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	R	L	T	No		No		Around the cities
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	R	L	T	?	Swalim	?	Swalim	From the rivers
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	R	H	T	Yes	Specific studies, UNEP and FAO	No		Dumping a particular concern
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	R	M	T	No				Particularly cities
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	R	H	T	No				Both sea to land and land to sea
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	R	H	T	No				Shipping and storage, no oil spill contingency plans

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	R	L	T	No				
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats								
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	R	H	T	Yes	FAO FSNAU (Food security nutrition analysis unit) charcoal, UNEP as well	?		
2.2.2.	Disturbance, damage and loss of coastal forest habitats	R	H	T	Yes	FAO FSNAU (Food security nutrition analysis unit) charcoal, UNEP as well	?		
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	R	H	T	?	? Swalim			
2.2.4.	Disturbance, damage and loss of wetland habitats	R	H	T	?	? Swalim			
2.2.5.	Disturbance, damage and loss of estuarine habitats	R	H	T	?	? Swalim			
2.2.6.	Disturbance, damage and loss of mangrove habitats	R	H	T	Yes	Swalim, IUCN			
2.3.	Disturbance, damage and loss of subtidal benthic habitats								
2.3.1.	Disturbance, damage and loss of coral reef habitats	R	H	T	Yes	Specific studies, IUCN general	No		
2.3.2.	Disturbance, damage and loss of seagrass habitats	R	H	T	Yes	IUCN and Carbone	No		
2.3.3.	Disturbance, damage and loss of macroalgal habitats	R	M	T	Yes	IUCN and Carbone	No		

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
2.3.4.	Disturbance, damage and loss of soft sediment habitats	R	M	T	?				
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)	R	L	T	No				
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	R	H	T	Yes	Some historical studies in the past (1974…etc)	No		
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)	R	M	T	yes	Sporadic	No		
2.6.	Introduction of exotic non-native species, invasives and nuisance species	R	L	T	No				
3.1.	Decline in populations of focal species								
3.1.1.	Decline in populations of marine mammals	R	H	T	Yes	Some specific studies	No		
3.1.2.	Decline in populations of cetaceans	R	H	T	Yes	Some specific studies	No		
3.1.3.	Decline in populations of seabirds	R	L	T	No				
3.1.4.	Decline in populations of turtles	R	H	T	Yes	UNEP / IUCN	No		
3.2.	Decline in populations of commercial fish stocks								
3.2.1.	Decline in populations of sharks and rays	R	H	T	Yes	FAO, IOTC	No		
3.2.2.	Decline in populations of large pelagics	R	H	T	Yes	FAO, IOTC	Yes	FAO and IOTIC	
3.2.3.	Decline in populations of small pelagics	R	H	T	Yes	FAO	No		
3.2.4.	Decline in populations of deep water demersals	R	H	T	Yes	Maybe some specific studies	No		

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
3.2.5.	Decline in populations of reef and demersal fish	R	H	T	Yes	Some information available	No		
3.3.	Decline in populations of commercial invertebrates								
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)	NR							
3.3.2.	Decline in populations of abalone	NR							
3.3.3.	Decline in populations of cephalopods	R	H	T	No		No		Squid and octopus
3.3.4.	Decline in populations of sea cucumbers	R	H	T	No		No		
3.3.5.	Decline in populations of sea urchins	NR							
3.3.6.	Decline in populations of prawns and shrimp	R	H	T	Yes	sporadic	No		
3.3.7.	Decline in populations of lobsters	R	H	T	Yes	FAO, IUCN	Yes	Export data	
3.3.8.	Decline in populations of crayfish (deep sea lobster)	R	H	T	No		No		
3.3.9.	Decline in populations of crabs	R	M	T (shared)	No		No		Mangrove, Deepwater crabs
3.4.	Excessive bycatch and discards	R	H	T	Yes	FAO (some on discards)	No		
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)	FR							

Table A6.6.2: Somalia Prioritisation 2 Results

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	M	M	M	M	M	M	M	M	M
1.2.	Degradation of ground and surface water quality	H	H	H	H	L	M	M	M	H
1.3.	Degradation of coastal and marine water quality									
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	H	H	H	H	H	M	M	M	H
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	M	M	H	M	M	VH	M	H	H
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	VH	VH	VH	VH	L	M	M	M	H
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	M	L	L	L	M	M	M	M	M
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	H	M	L	M	H	VH	H	H	H
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	H	M	M	M	M	VH	VH	H	H
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	L	L	L	L	VH	VH	M	H	M
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats									
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	H	H	H	H	H	H	M	H	H
2.2.2.	Disturbance, damage and loss of coastal forest habitats	H	H	M	H	H	H	M	H	H

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	M	M	L	M	H	H	M	H	H
2.2.4.	Disturbance, damage and loss of wetland habitats	M	M	L	M	H	H	M	H	H
2.2.5.	Disturbance, damage and loss of estuarine habitats	M	L	L	L	M	M	M	M	M
2.2.6.	Disturbance, damage and loss of mangrove habitats	H	M	M	M	VH	H	M	H	H
2.3.	Disturbance, damage and loss of subtidal benthic habitats									
2.3.1.	Disturbance, damage and loss of coral reef habitats	VH	VH	M	H	VH	H	M	H	H
2.3.2.	Disturbance, damage and loss of seagrass habitats	H	H	L	M	H	H	M	H	H
2.3.3.	Disturbance, damage and loss of macroalgal habitats	M	L	L	L	L	L	M	L	L
2.3.4.	Disturbance, damage and loss of soft sediment habitats	M	L	L	L	H	M	M	M	M
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)	L	L	L	L	M	M	M	M	M
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	H	H	M	H	H	H	M	H	H
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)	L	L	L	L	L	M	L	L	L
2.6.	Introduction of exotic non-native species, invasives and nuisance species	L	L	L	L	M	M	M	M	M
3.1.	Decline in populations of focal species									

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
3.1.1.	Decline in populations of marine mammals	H	L	L	M	H	H	M	H	H
3.1.2.	Decline in populations of cetaceans	?	L	L	L	H	H	M	H	M
3.1.3.	Decline in populations of seabirds	?	L	L	L	M	M	M	M	M
3.1.4.	Decline in populations of turtles	VH	H	L	M	H	H	M	H	H
3.2.	Decline in populations of commercial fish stocks									
3.2.1.	Decline in populations of sharks and rays	VH	VH	VH	VH	VH	VH	M	H	VH
3.2.2.	Decline in populations of large pelagics	VH	VH	VH	VH	VH	VH	M	H	VH
3.2.3.	Decline in populations of small pelagics	H	H	H	H	H	H	M	H	H
3.2.4.	Decline in populations of deep water demersals	L	L	L	L	M	M	M	M	M
3.2.5.	Decline in populations of reef and demersal fish	VH	H	H	H	VH	VH	M	H	H
3.3.	Decline in populations of commercial invertebrates									
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)									
3.3.2.	Decline in populations of abalone									
3.3.3.	Decline in populations of cephalopods	L	L	L	L	H	H	H	H	M

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
3.3.4.	Decline in populations of sea cucumbers	L	L	L	L	H	H	M	H	M
3.3.5.	Decline in populations of sea urchins									
3.3.6.	Decline in populations of prawns and shrimp	H	M	M	M	H	H	M	H	H
3.3.7.	Decline in populations of lobsters	VH	VH	H	VH	H	H	M	H	VH
3.3.8.	Decline in populations of crayfish	VH	H	VH	VH	M	M	M	M	H
3.3.9.	Decline in populations of crabs	M	L	L	L	H	M	M	M	M
3.4.	Excessive bycatch and discards	VH	H	H	H	VH	VH	H	VH	VH
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)									

Figure 6.6.1.a: Somalia MAC03 Impact Analysis for Issue (3.3.7) Declines in populations of lobster.

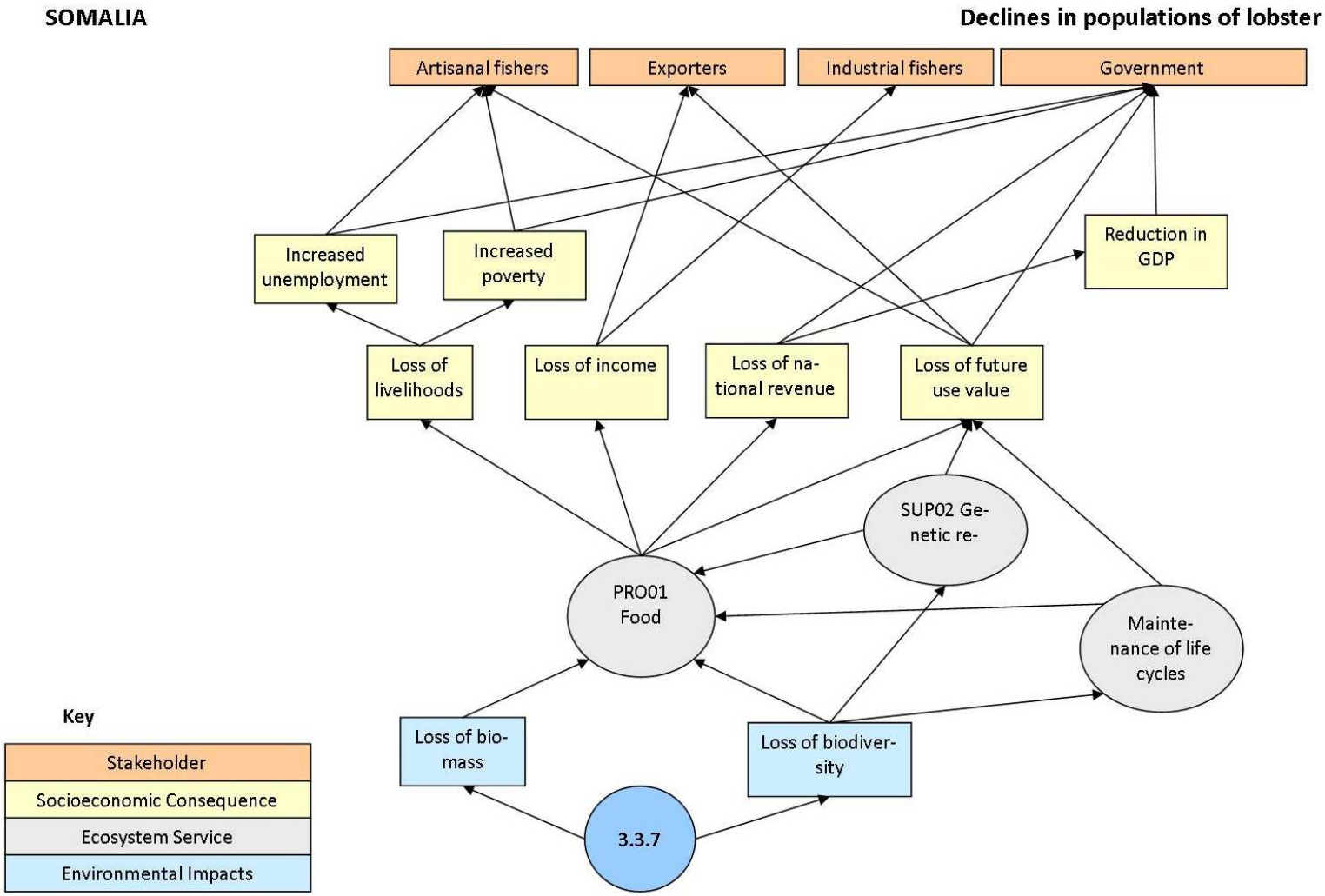
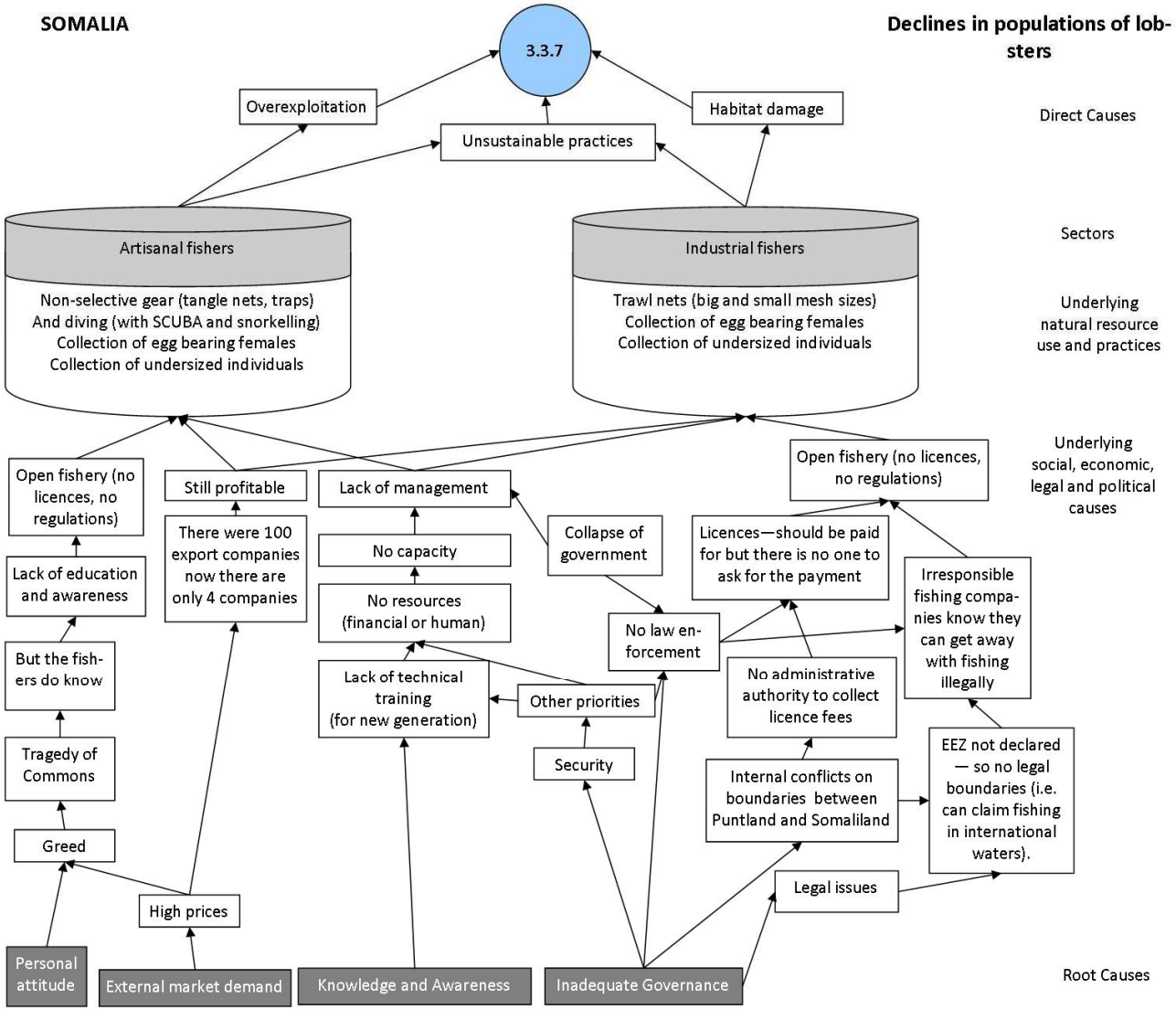


Figure 6.6.1.b: Somalia MAC03 Causal Chain Analysis for Issue (3.37) Declines in populations of lobster.



A6.7 Tanzania – National Causal Chain Meeting Results

Table A6.7.1: Tanzania Prioritisation 1 Results

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	R	HP	T	Yes	IMS, UDM, WIOMSA, Ardhi University, Ministry responsible for water, RUBADA, Local Governments Authority, Pangani Basin Development Authority, NEMC, TCMP.	Periodic Monitoring		
1.2.	Degradation of ground and surface water quality	R	HP	T	Yes	IMS, UDSM, WIOMSA, Ardhi University, Ministry of Water, RUBADA, Pangani Basin Development Authority, Sokoine University. NEMC, TCMP,	Periodic Monitoring		
1.3.	Degradation of coastal and marine water quality								
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	R	MP	T(Commo n)	Yes	IMS, NEMC, TCMP, Ministry of Health, UDSM	Periodic Monitoring		
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	R	HP	T(Commo n)	Yes	IMS, NEMC, TCMP, Ministry of Health, UDSM	Periodic		
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	R	MP	T(Commo n)	Yes	IMS, NEMC, TCMP, Ministry of Health, UDSM	Periodic		

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	R	MP	T(Commo n)	Yes	IMS, NEMC, TCMP, Sokoine University, Wami-Ruvu River Basin Office, RUBADA, Rufiji River Basin Office, Pangani River Basin Office, UDSM	Periodic		
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	R	HP	T(Commo n)	Yes	WIOMSA, IMS, NEMC, UDSM, Local Government Authorities (Municipalities), ICM Projects,	Periodic		
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	R	MP	T(Commo n)	Yes	Tanzania Ports Authority, Zanzibar Ports Authority, Maritime Affairs/Transport Department, Dar es Salaam Maritime Institute, NEMC, TCMP, IMS, Tanzania Petroleum Development Corporation, Surface and Marine Transport Regulatory Authority (SUMATRA), Energy Water Utility Regulatory Authority (EWURA)			
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	R	H	T	Yes (specific sites)	Institute for Marine Science (IMS) has done specific studies; NEMC (satellite habitat mapping)	Yes (site specific)	Projects and research only. No routine monitoring.	
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats								

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	R	H	T	Yes (site specific)	Ministry of Natural Resources and Tourism (MNRT) Forest and Beekeeping Division (FBD) will hold some information and Ministry of Agriculture and Ministry Lands and Human Settlements (MLHS) will hold information on land-use.	Don't know	?	
2.2.2.	Disturbance, damage and loss of coastal forest habitats	R	H	T	Yes	FBD and WWF (baseline habitat mapping)	Don't know	?FBD	
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	R	H	T	Yes (site specific)	Through research Ministry of Lands and Human Settlement (MLHS) may hold some information on land use, Ministry of Natural Resources and Tourism will have data on hotels.	Don't know	?NEMC	
2.2.4.	Disturbance, damage and loss of wetland habitats	R	H	T	Yes (site specific)	NEMC, MNRT Forest and Beekeeping Division (FBD) and Water Division (WD) - signatory for RAMSAR Convention - but this may change.	Don't know	?	
2.2.5.	Disturbance, damage and loss of estuarine habitats	R	M	T	Yes (site specific)	IMS research projects and MLFD?	Don't know	?MLFD	
2.2.6.	Disturbance, damage and loss of mangrove habitats	R	H	T	Yes (site specific)	FBD and WWF (baseline habitat mapping)	Don't know	?FBD	

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
2.3.	Disturbance, damage and loss of subtidal benthic habitats								
2.3.1.	Disturbance, damage and loss of coral reef habitats	R	H	T	Yes (site specific)	NEMC and IMS	Yes	IMS	
2.3.2.	Disturbance, damage and loss of seagrass habitats	R	H	T	Yes (site specific)	NEMC and IMS	Yes	IMS and University of Dar es Salaam, Department for Aquatic Fisheries Science (DAFS)	
2.3.3.	Disturbance, damage and loss of macroalgal habitats	R	L	NT	Yes	University of Dar es Salaam	No		
2.3.4.	Disturbance, damage and loss of soft sediment habitats	R	H	T	Yes (site specific)	IMS	No		
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)	R	H	T	Yes (site specific)	Deep Sea Authority, Tanzanian Petroleum Development Company (TPDC)	No		
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	R	H	T	Yes (site specific)	Deep Sea Authority, Tanzanian Petroleum Development Company (TPDC)	No		
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)	R	M	T	Yes (site specific)	IMS	Don't know		
2.6.	Introduction of exotic non-native species, invasives and nuisance species	R	H	T	Yes (site specific)	IMS for Crown-of-Thorns	Don't know	?IMS	
3.1.	Decline in populations of focal species								
3.1.1.	Decline in populations of marine mammals	NR							

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
3.1.2.	Decline in populations of cetaceans	NR							
3.1.3.	Decline in populations of seabirds	NR							
3.1.4.	Decline in populations of turtles	R	M	T	Y	UDSM (IMS, DASF), WIOMSA, NEMC, TAFIRI, WWF, MPRU, Department of Fisheries Zanzibar.	Periodic	seasense, SWIOFP tagging	
3.2.	Decline in populations of commercial fish stocks								
3.2.1.	Decline in populations of sharks and rays	NR							
3.2.2.	Decline in populations of large pelagics	R	H	T	Y	DSFA, IOTC	N	no/limited	
3.2.3.	Decline in populations of small pelagics	R	H	T	Y	UDSM (IMS, DASF), WIOMSA, NEMC, TAFIRI, WWF, MPRU, Department of Fisheries Zanzibar.	Periodic	TAFIRI - frame surveys, catch stats	
3.2.4.	Decline in populations of deep water demersals	R	H	T	Y	UDSM (IMS, DASF), WIOMSA, NEMC, TAFIRI, WWF, MPRU, Department of Fisheries Zanzibar.	Periodic		
3.2.5.	Decline in populations of reef and demersal fish	R	H	T	Y	UDSM (IMS, DASF), WIOMSA, NEMC, TAFIRI, WWF, MPRU, Department of Fisheries Zanzibar.	Periodic	some catch and frame surveys	
3.3.	Decline in populations of commercial invertebrates								
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)	R	L	T	Y	UDSM (IMS, DASF), WIOMSA, NEMC, TAFIRI, WWF, MPRU, Department	Periodic	no/limited	

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
						of Fisheries Zanzibar.			
3.3.2.	Decline in populations of abalone	NR							
3.3.3.	Decline in populations of cephalopods	R	H	T	Y	UDSM (IMS, DASF), WIOMSA, NEMC, TAFIRI, WWF, MPRU, Department of Fisheries Zanzibar.	Periodic	no/limited	
3.3.4.	Decline in populations of sea cucumbers	R	H	T	Y	UDSM (IMS, DASF), WIOMSA, NEMC, TAFIRI, WWF, MPRU, Department of Fisheries Zanzibar.	Periodic	no/limited	
3.3.5.	Decline in populations of sea urchins	NR							
3.3.6.	Decline in populations of prawns and shrimp	R	H	T	Y	UDSM (IMS, DASF), WIOMSA, NEMC, TAFIRI, WWF, MPRU, Department of Fisheries Zanzibar.	Periodic	TAFIRI - some catch and frame surveys	
3.3.7.	Decline in populations of lobsters	R	M	T	Y	UDSM (IMS, DASF), WIOMSA, NEMC, TAFIRI, WWF, MPRU, Department of Fisheries Zanzibar.	Periodic	TAFIRI - some catch and frame surveys	
3.3.8.	Decline in populations of crayfish (deep sea lobster)	NR							
3.3.9.	Decline in populations of crabs	R	L	T	Y	UDSM (IMS, DASF), WIOMSA, NEMC, TAFIRI, WWF, MPRU, Department of Fisheries Zanzibar.	Periodic		
3.4.	Excessive bycatch and discards	R	H	T	y	UDSM (IMS, DASF), TAFIRI, Fisheries Development Division , Department of	Irregular	SADC observer programme did some - but no	

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
						Fisheries Zanzibar.		longer running	
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)	R	M	T	Y	UDSM (IMS, DASF), TAFIRI, Fisheries Development Division , Department of Fisheries Zanzibar.		Ad hoc, but Fisheries Dept, TAFIRI	

Table A6.7.2: Tanzania Prioritisation 2 Results

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	VH	VH	VH	VH	H	H	M	H	VH
1.2.	Degradation of ground and surface water quality	H	H	H	H	H	VH	M	H	H
1.3.	Degradation of coastal and marine water quality									
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	M	M	M	M	VH	H	M	H	M
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	M	M	M	M	M	M	M	M	M
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	M	M	L	M	M	M	M	M	M
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	H	H	M	H	H	VH	M	H	H
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	H	H	M	H	VH	H	H	H	H
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	M	L	L	L	M	H	H	H	M
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	VH	VH	VH	VH	VH	VH	M	H	VH
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats									
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	H	H	H	H	H	H	H	H	H
2.2.2.	Disturbance, damage and loss of coastal forest habitats	VH	VH	VH	VH	H	H	H	H	VH
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	VH	VH	VH	VH	VH	VH	H	VH	VH

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
2.2.4.	Disturbance, damage and loss of wetland habitats	H	H	H	H	H	H	H	H	H
2.2.5.	Disturbance, damage and loss of estuarine habitats	H	H	M	H	H	H	M	H	H
2.2.6.	Disturbance, damage and loss of mangrove habitats	VH	VH	VH	VH	VH	VH	VH	VH	VH
2.3.	Disturbance, damage and loss of subtidal benthic habitats									
2.3.1.	Disturbance, damage and loss of coral reef habitats	VH	VH	VH	VH	VH	VH	H	VH	VH
2.3.2.	Disturbance, damage and loss of seagrass habitats	VH	VH	VH	VH	H	H	H	H	VH
2.3.3.	Disturbance, damage and loss of macroalgal habitats	L	L	L	L	L	L	H	M	M
2.3.4.	Disturbance, damage and loss of soft sediment habitats	VH	H	VH	VH	H	H	H	H	VH
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)	H	L	VH	H	H	H	H	H	H
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	VH	H	VH	VH	H	VH	H	H	VH
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)	M	M	L	M	H	M	H	H	H
2.6.	Introduction of exotic non-native species, invasives and nuisance species	H	M	M	M	VH	H	M	H	H
3.1.	Decline in populations of focal species									
3.1.1.	Decline in populations of marine mammals									
3.1.2.	Decline in populations of cetaceans									

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
3.1.3.	Decline in populations of seabirds									
3.1.4.	Decline in populations of turtles	H	L	L	L	H	M	M	M	L
3.2.	Decline in populations of commercial fish stocks									
3.2.1.	Decline in populations of sharks and rays									
3.2.2.	Decline in populations of large pelagics									
3.2.3.	Decline in populations of small pelagics	H	VH	L	H	H	VH	H	H	H
3.2.4.	Decline in populations of deep water demersals	H	H	L	H	H	M	M	M	M
3.2.5.	Decline in populations of reef and demersal fish	VH	VH	L	VH	H	H	H	H	VH
3.3.	Decline in populations of commercial invertebrates									
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)	L	L	L	L	L	L	M	L	L
3.3.2.	Decline in populations of abalone									
3.3.3.	Decline in populations of cephalopods	H	VH	H	H	H	H	H	H	H
3.3.4.	Decline in populations of sea cucumbers	H	L	H	H	H	H	H	H	H
3.3.5.	Decline in populations of sea urchins									
3.3.6.	Decline in populations of prawns and shrimp	VH	H	H	H	H	H	H	H	H

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
3.3.7.	Decline in populations of lobsters	L	L	L	L	L	L	M	L	L
3.3.8.	Decline in populations of crayfish									
3.3.9.	Decline in populations of crabs	L	L	L	L	L	L	L	L	L
3.4.	Excessive bycatch and discards	H	H	L	H	H	H	H	H	H
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)									

Figure 6.7.1.a: Tanzania MAC01 Impact Analysis for Issue (1.1.) Alteration of natural river flow and changes in freshwater input and sediment load.

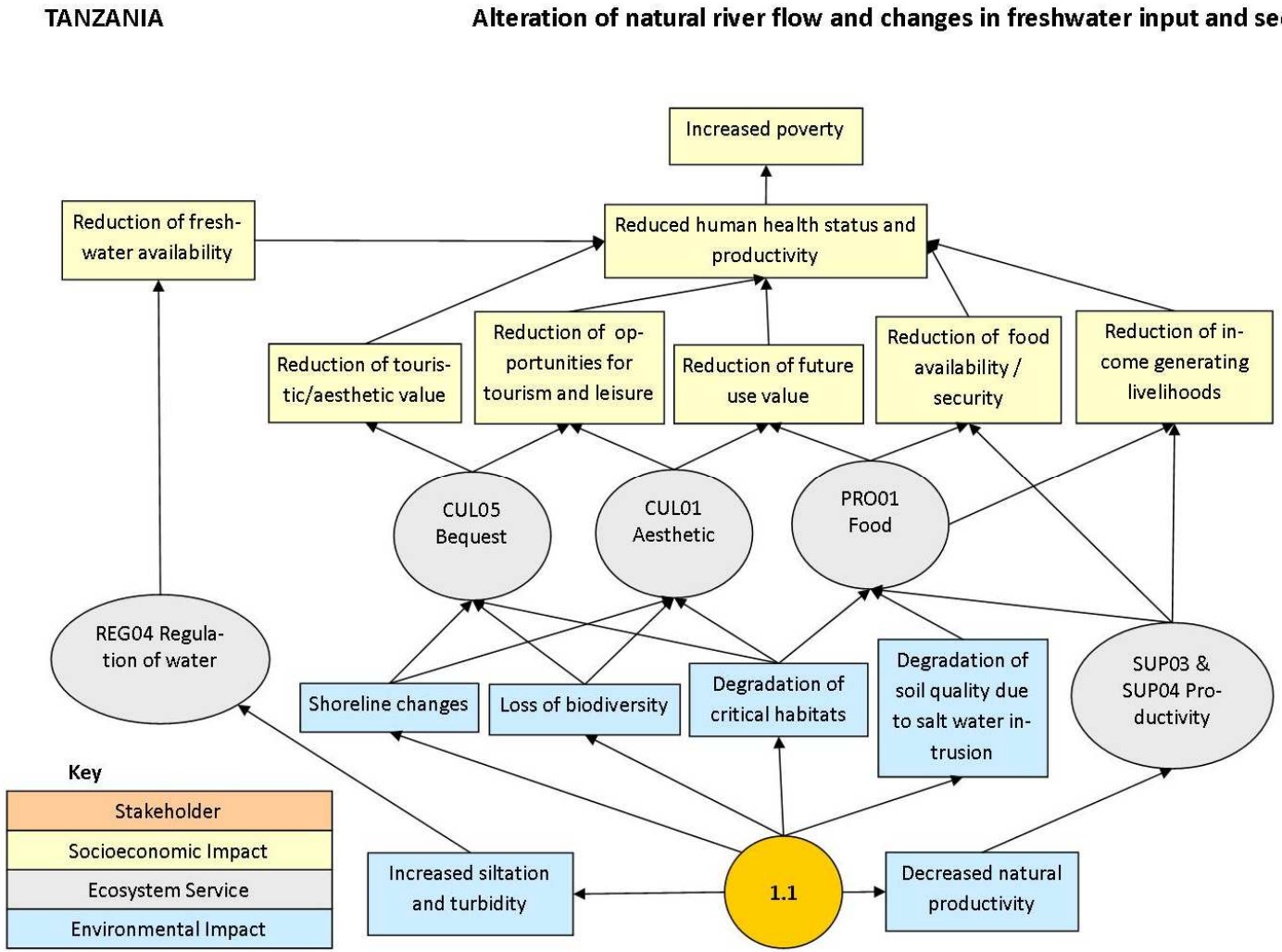


Figure 6.7.1.b: Tanzania MAC01 Causal Chain Analysis for Issue (1.1.) Alteration of natural river flow and changes in freshwater input and sediment load.

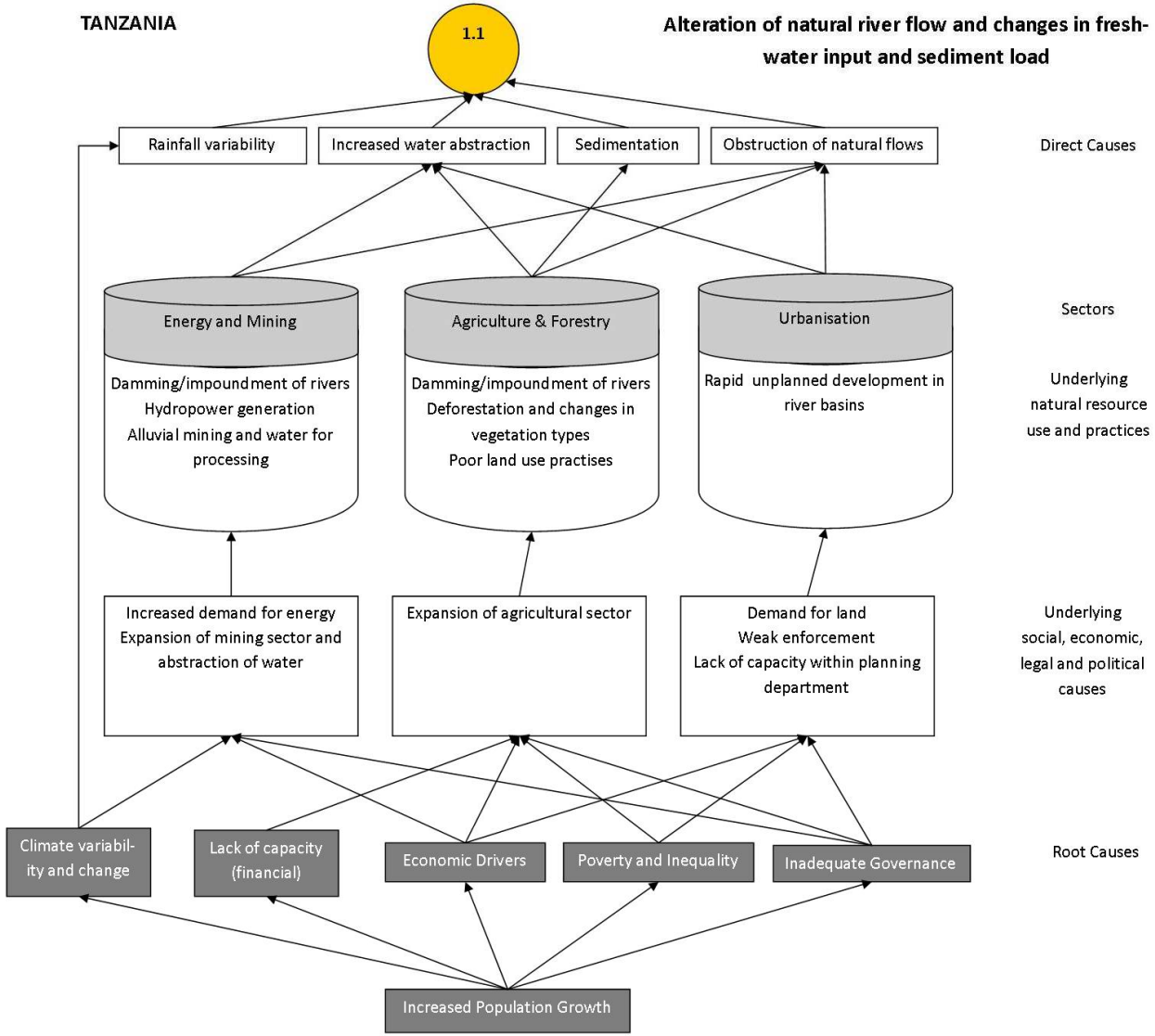


Figure 6.7.2.a: Tanzania MAC02 Impact Analysis for Issue (2.1.) Shoreline change due to modification, land reclamation and coastal erosion.

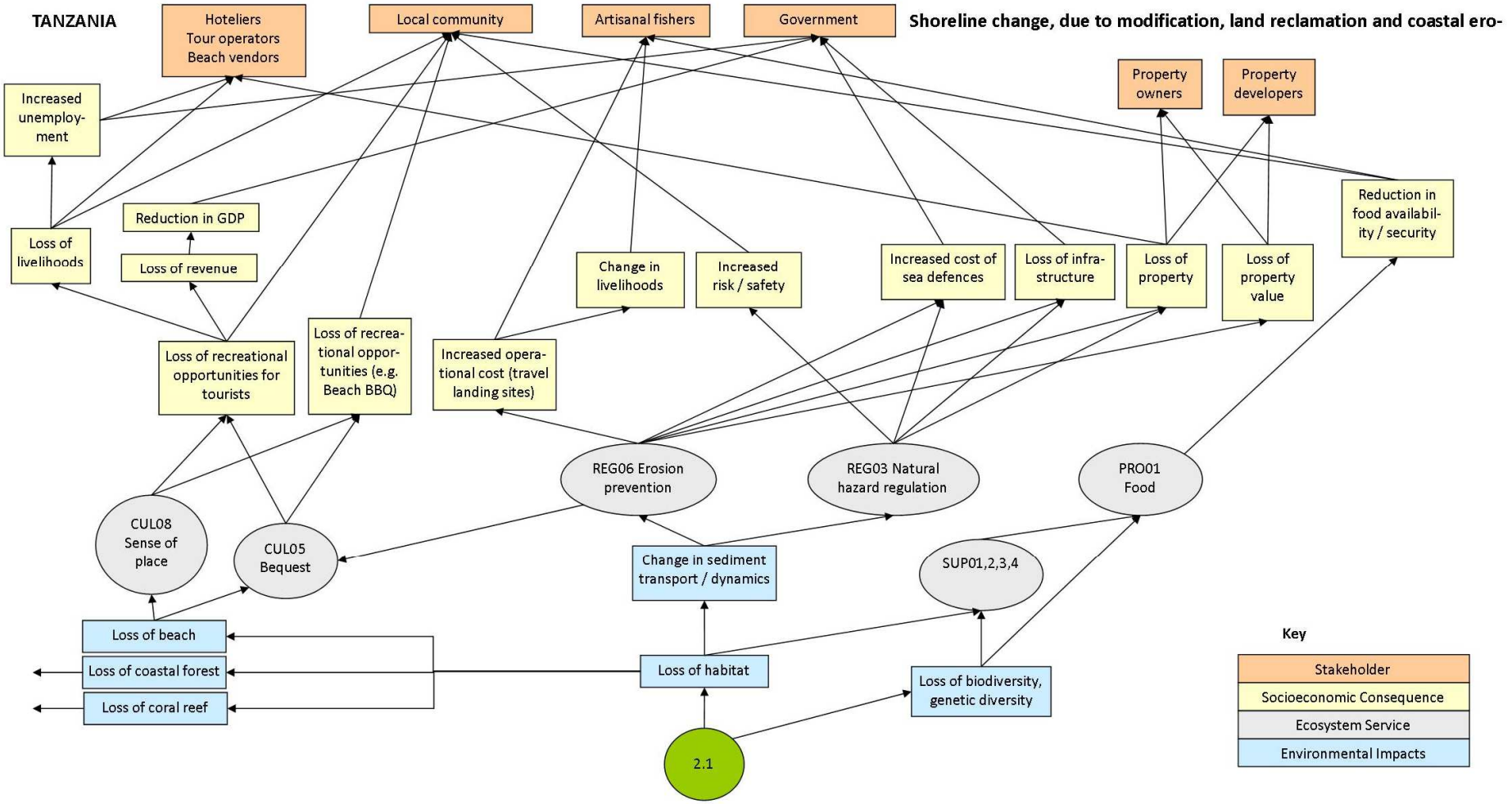


Figure 6.7.2.b: Tanzania MAC02 Causal Chain Analysis for Issue (2.1.) Shoreline change due to modification, land reclamation and coastal erosion.

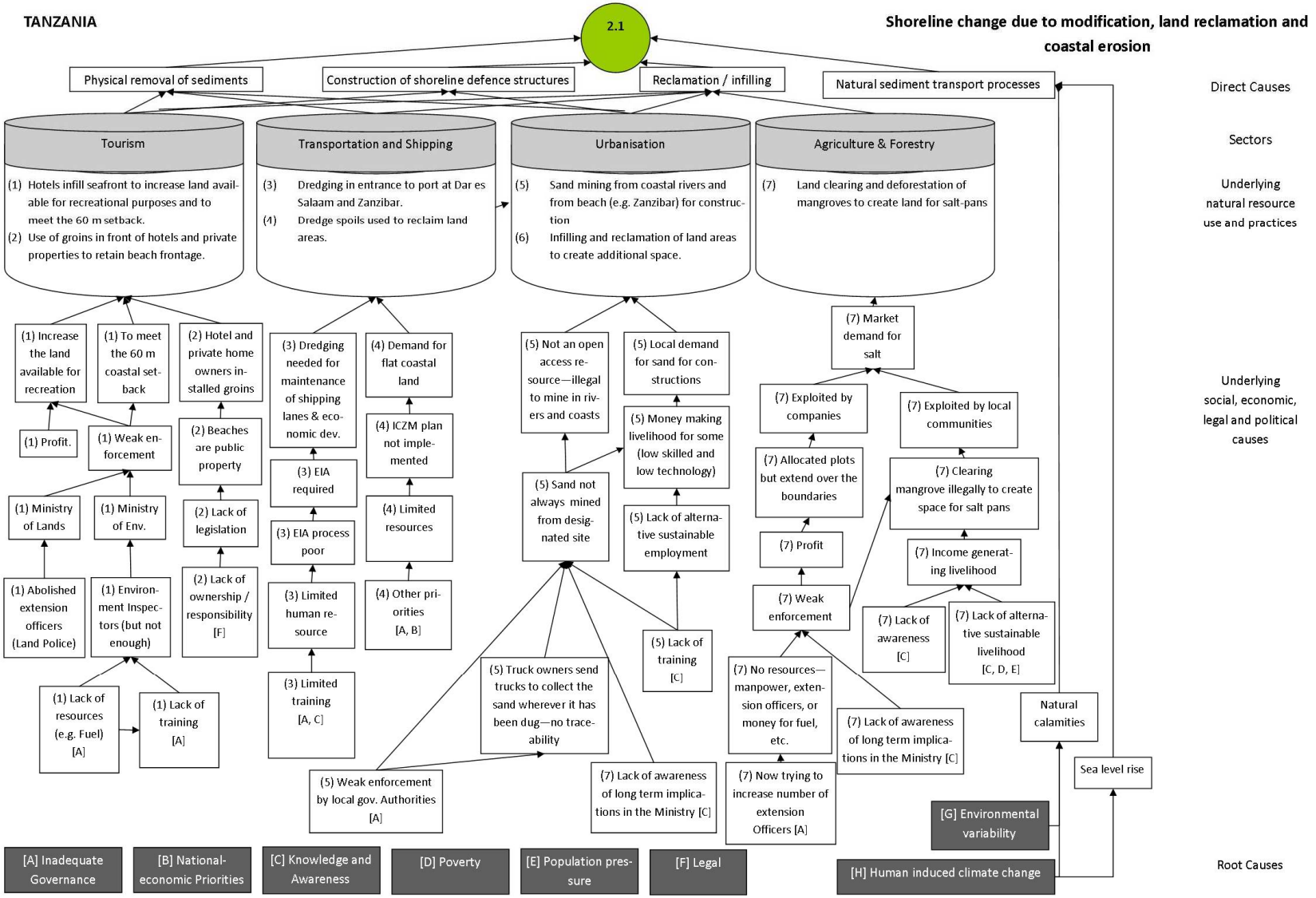


Figure 6.7.3: Tanzania MAC02 Impact Analysis for Issue (2.2.2.) Disturbance, damage and loss of coastal forests.

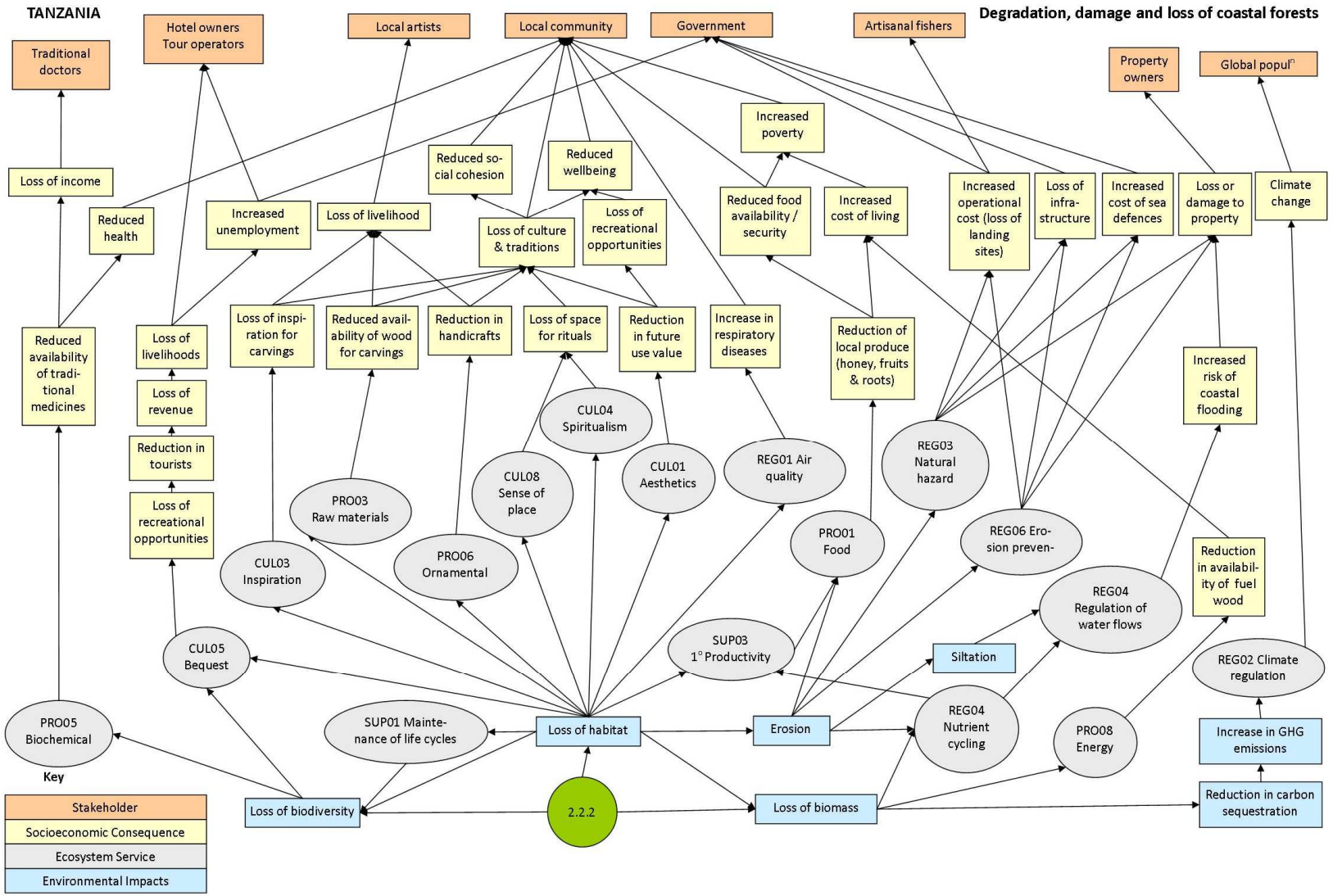


Figure 6.7.4.a: Tanzania MAC02 Impact Analysis for Issue (2.3.1.) Disturbance, damage and loss of coral reefs.

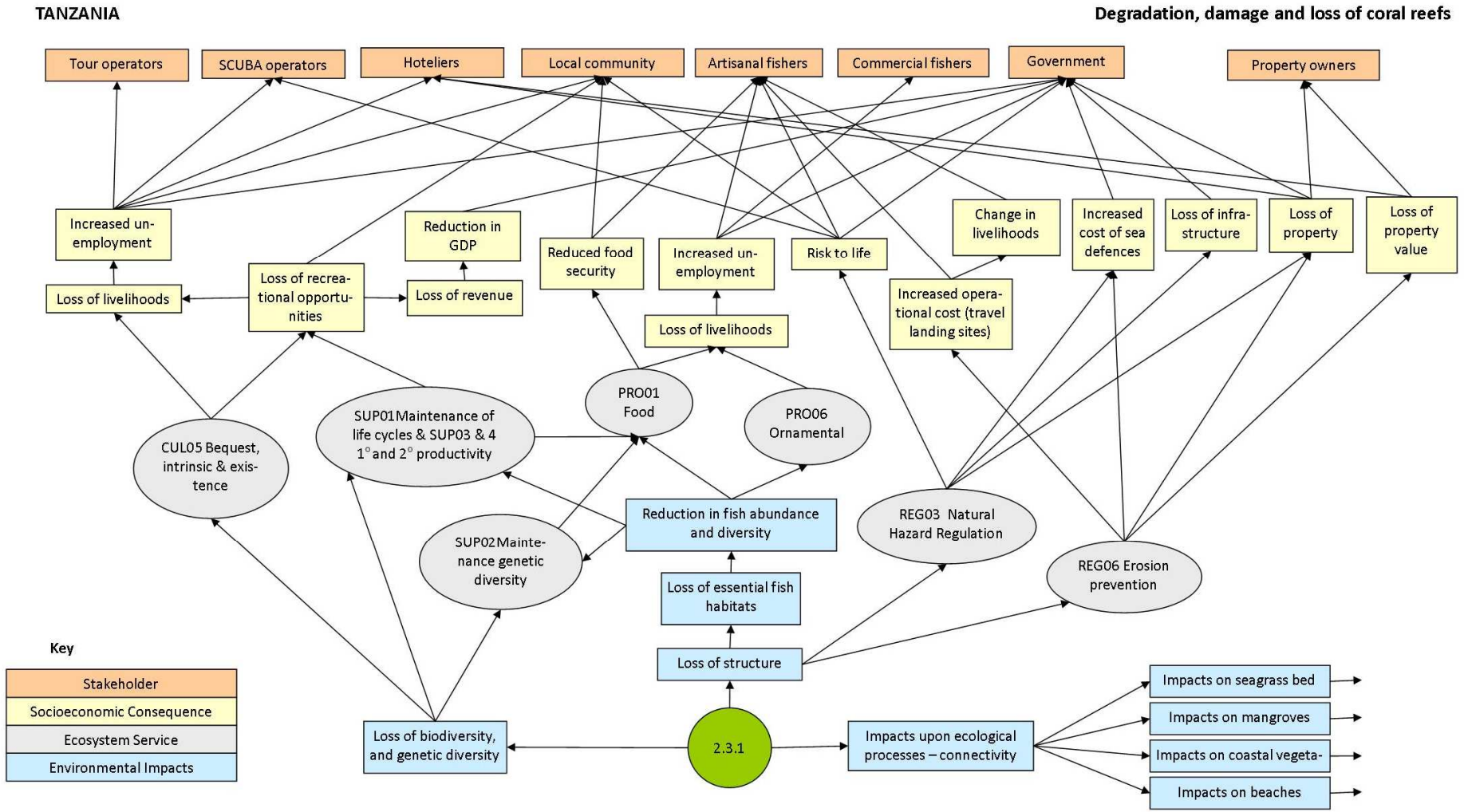


Figure 6.7.4.b: Tanzania MAC02 Causal Chain Analysis for Issue (2.3.1.) Disturbance, damage and loss of coral reefs.

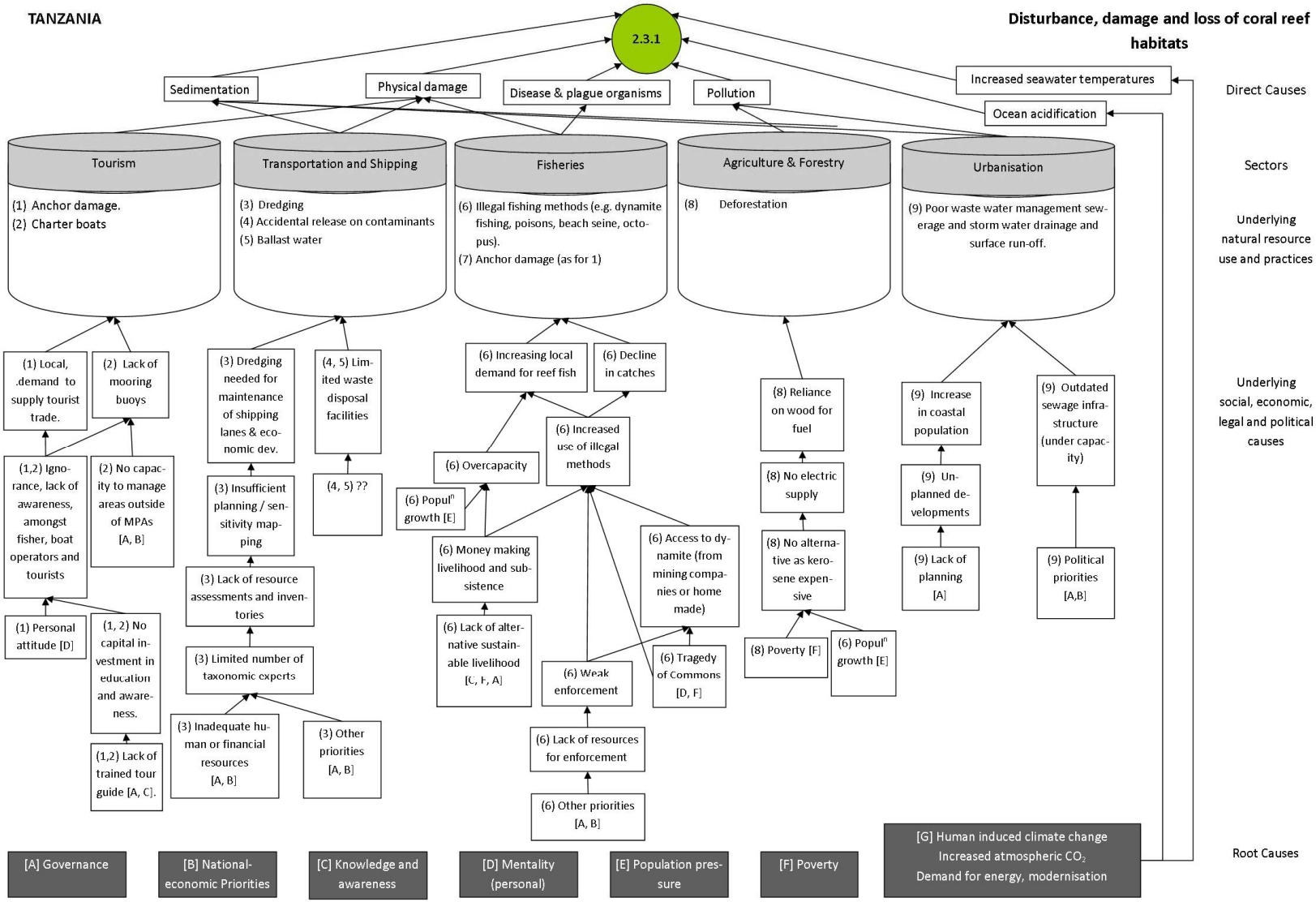


Figure 6.7.5.a: Tanzania MAC03 Impact Analysis for Issue (3.2.3.) Declines in populations of small pelagics.

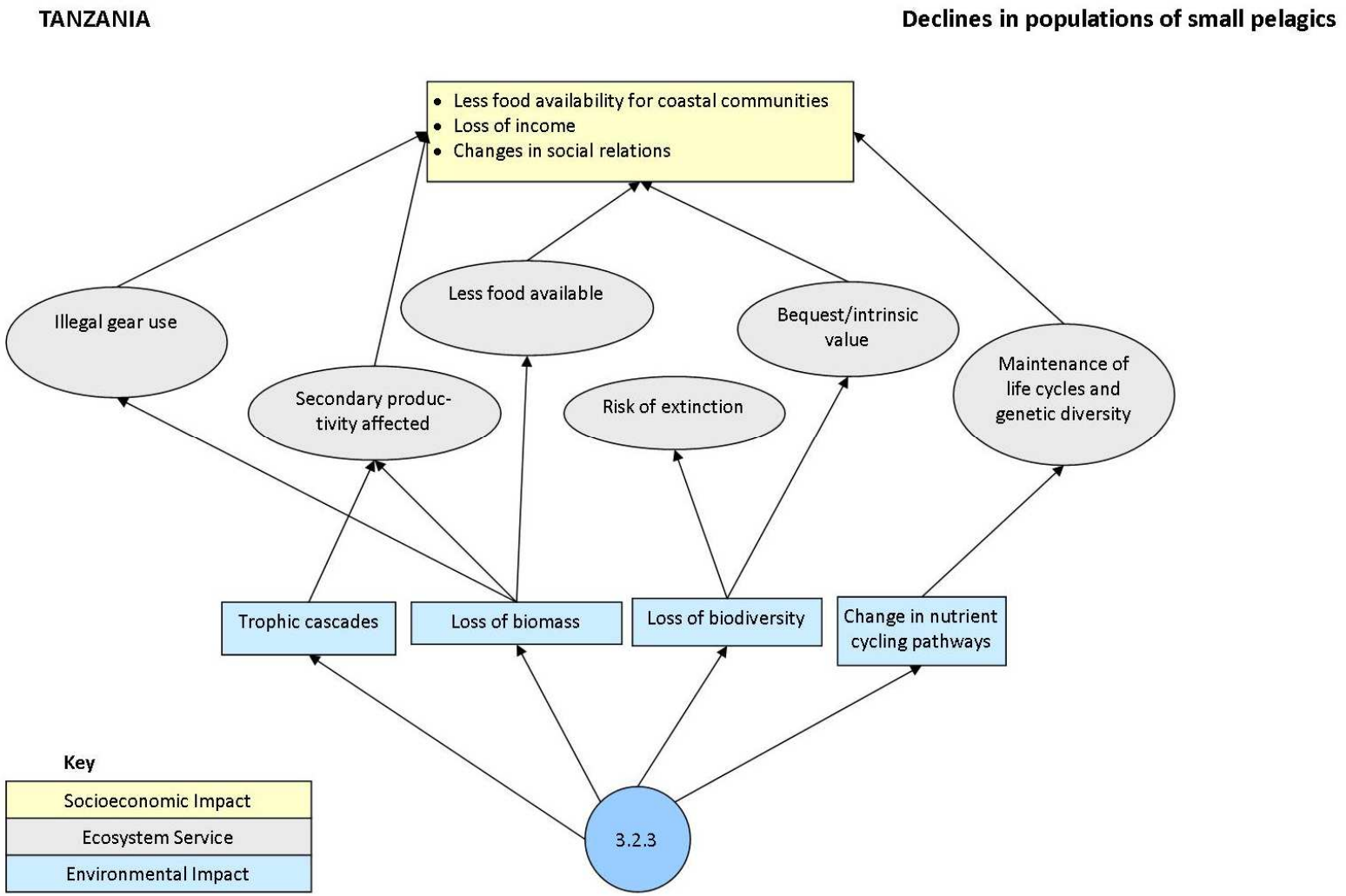


Figure 6.7.5.b: Tanzania MAC03 Causal Chain Analysis for Issue (3.2.3.) Declines in populations of small pelagics.

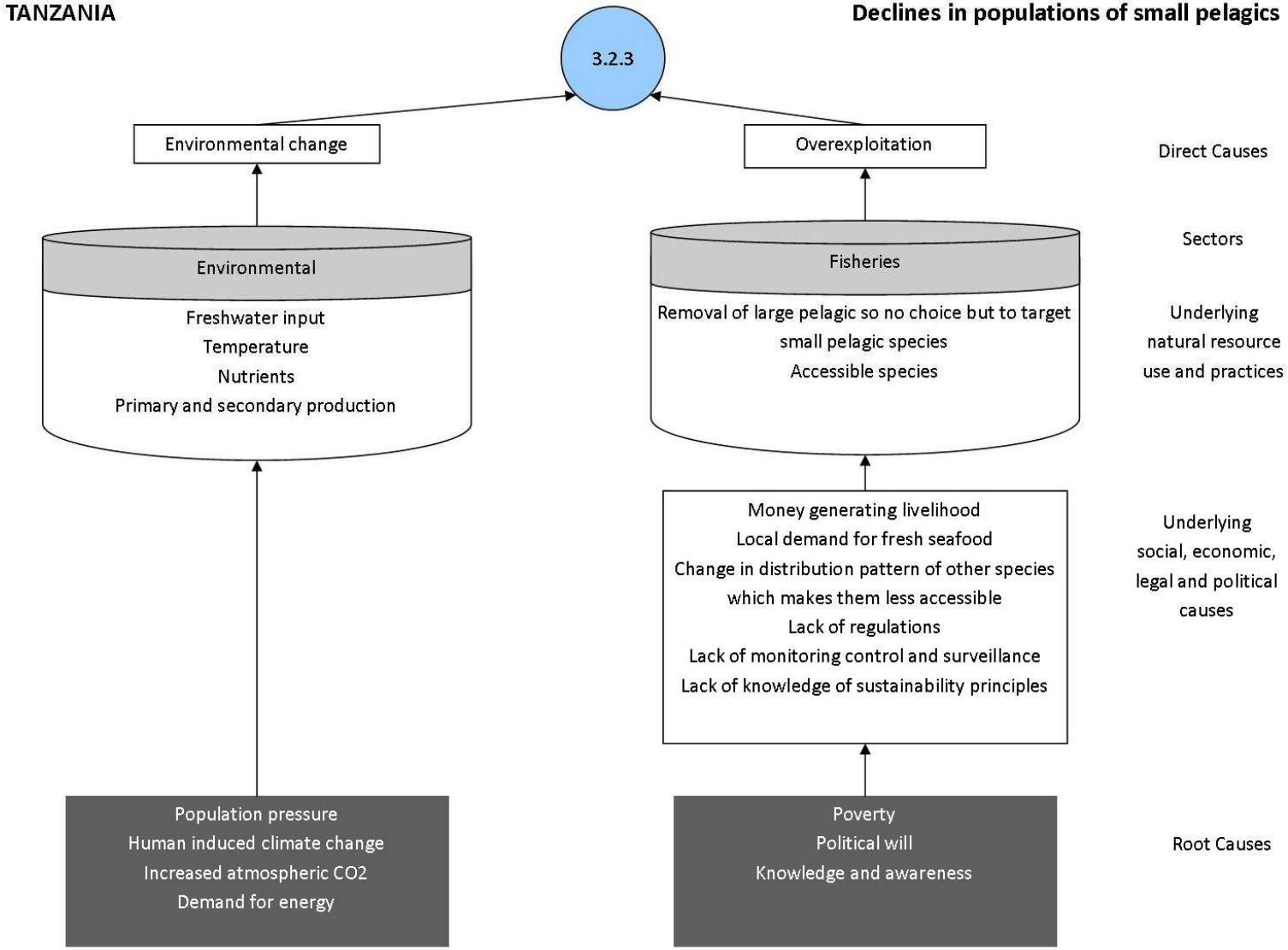


Figure 6.7.6.a: Tanzania MAC03 Causal Chain Analysis for Issue (3.2.5.) Declines in populations of reef and demersal fish.

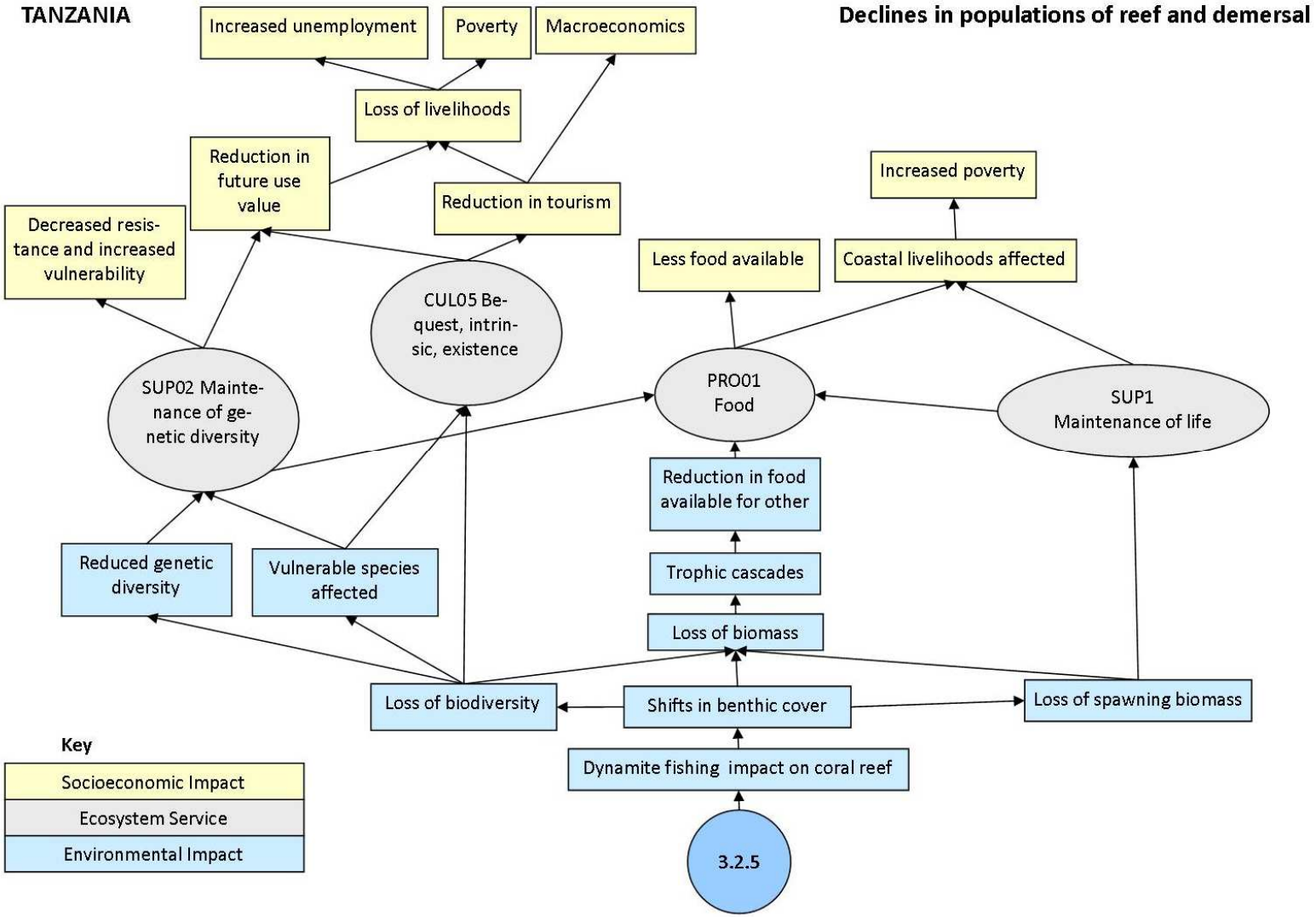


Figure 6.7.6.b: Tanzania MAC03 Causal Chain Analysis for Issue (3.2.5.) Declines in populations of reef and demersal fish.

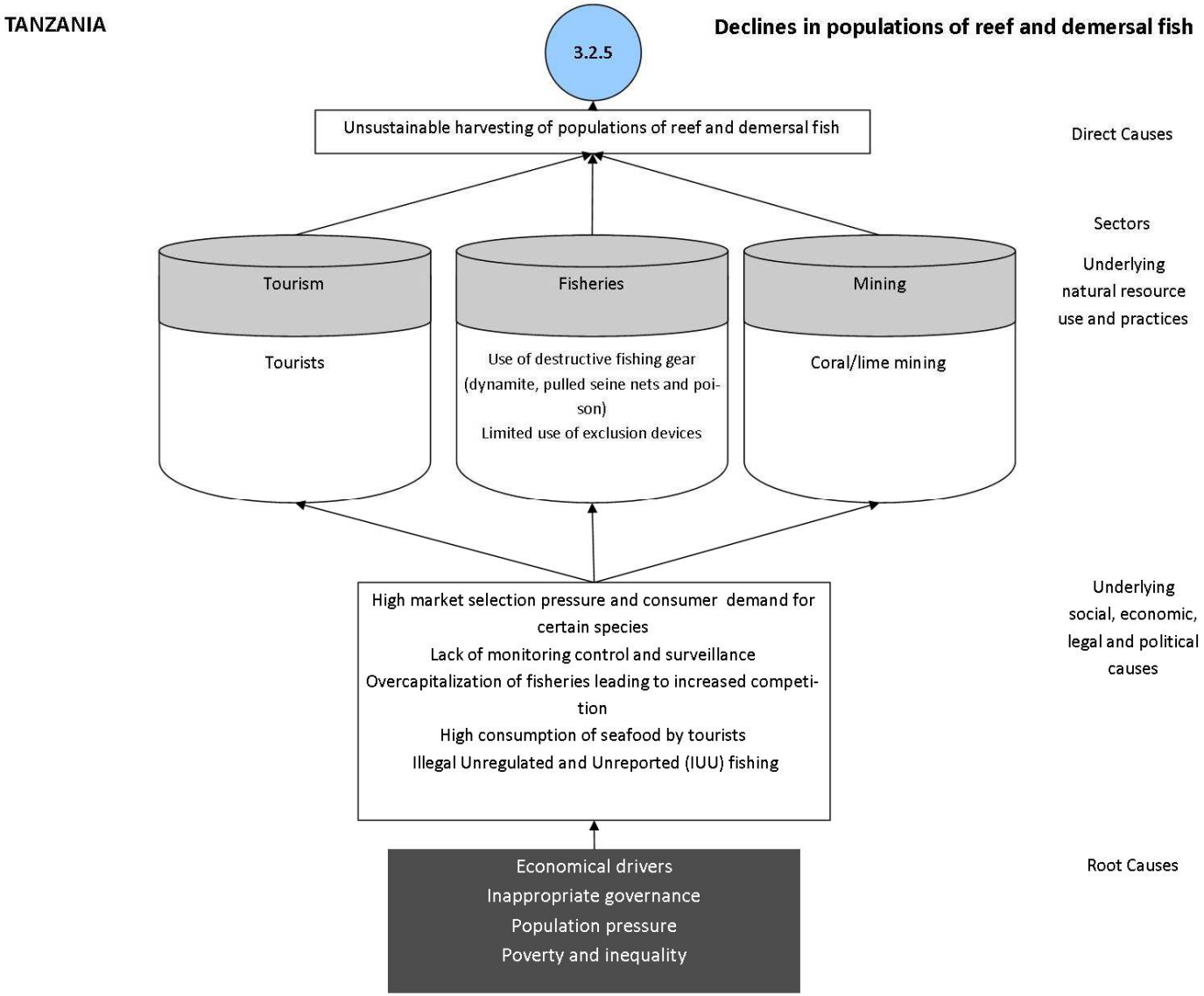


Figure 6.7.7.a: Tanzania MAC03 Impact Analysis for Issue (3.3.3) Declines in populations of cephalopods.

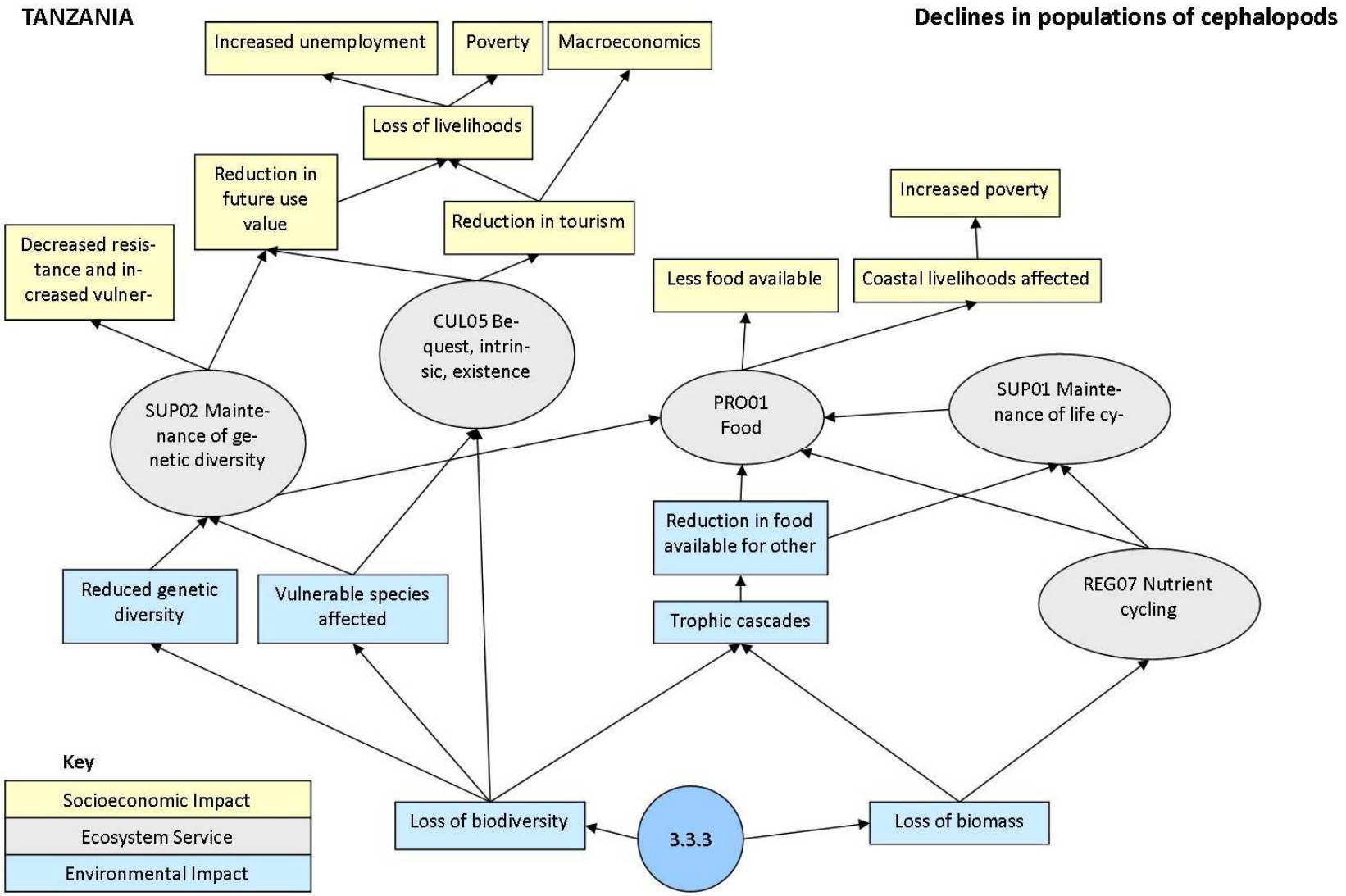


Figure 6.7.7.b: Tanzania MAC03 Causal Chain Analysis for Issue (3.3.3) Declines in populations of cephalopods.

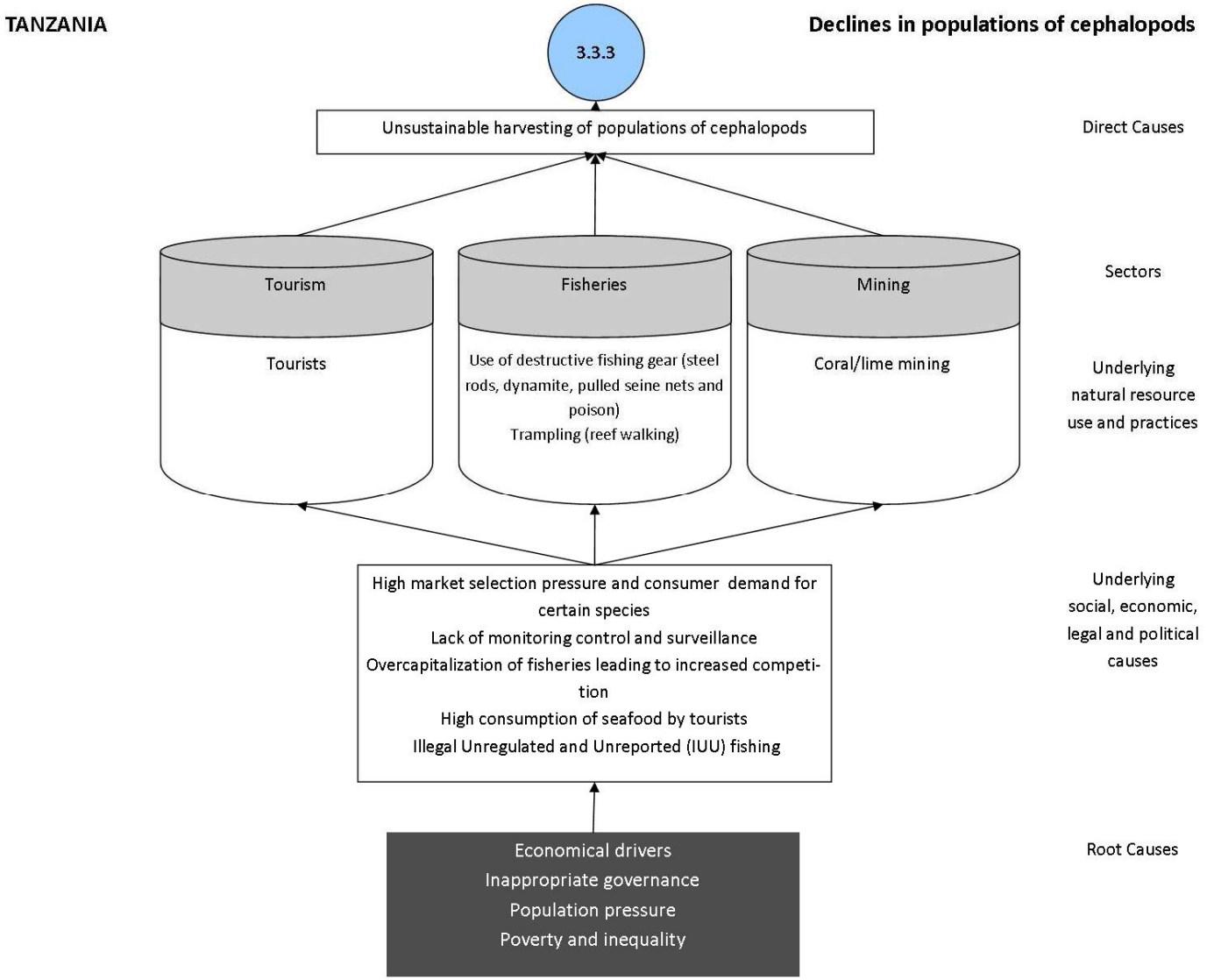


Figure 6.7.8.a: Tanzania MAC03 Impact Analysis for Issue (3.3.4) Declines in populations of sea cucumbers.

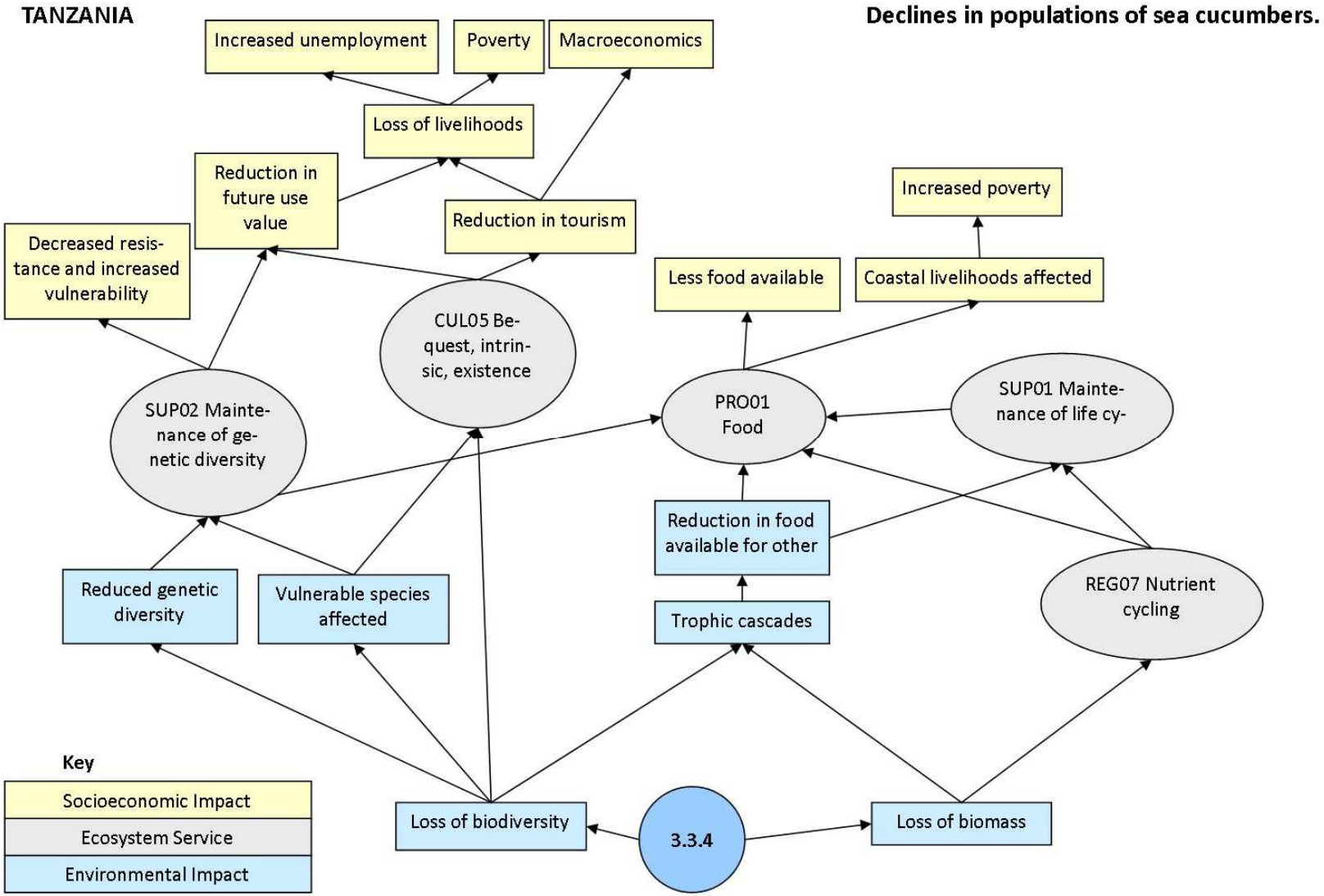


Figure 6.7.8.b: Tanzania MAC03 Causal Chain Analysis for Issue (3.3.4) Declines in populations of sea cucumbers.

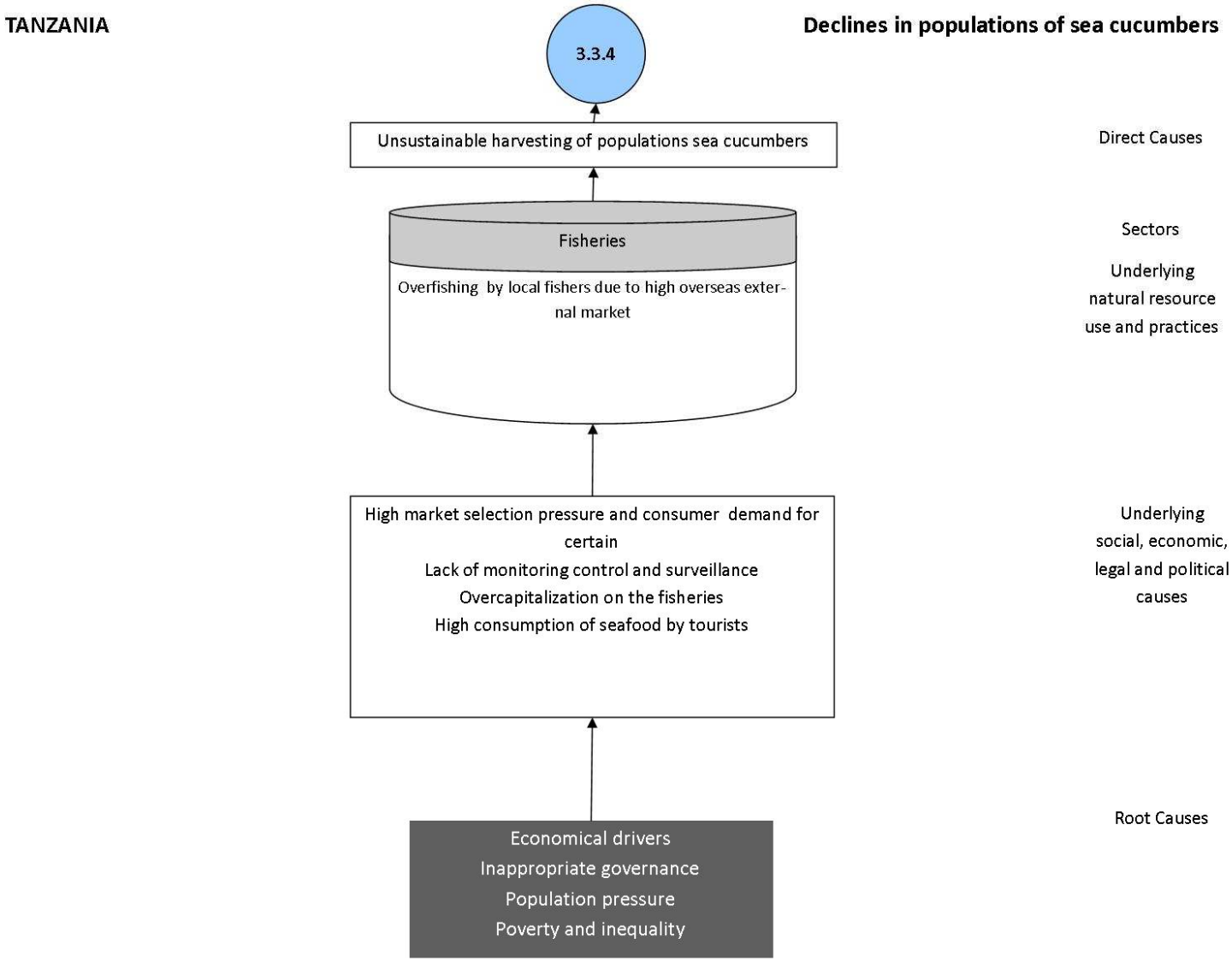


Figure 6.7.9.a: Tanzania MAC03 Impact Analysis for Issue (3.3.6.) Declines in populations of prawns and shrimps.

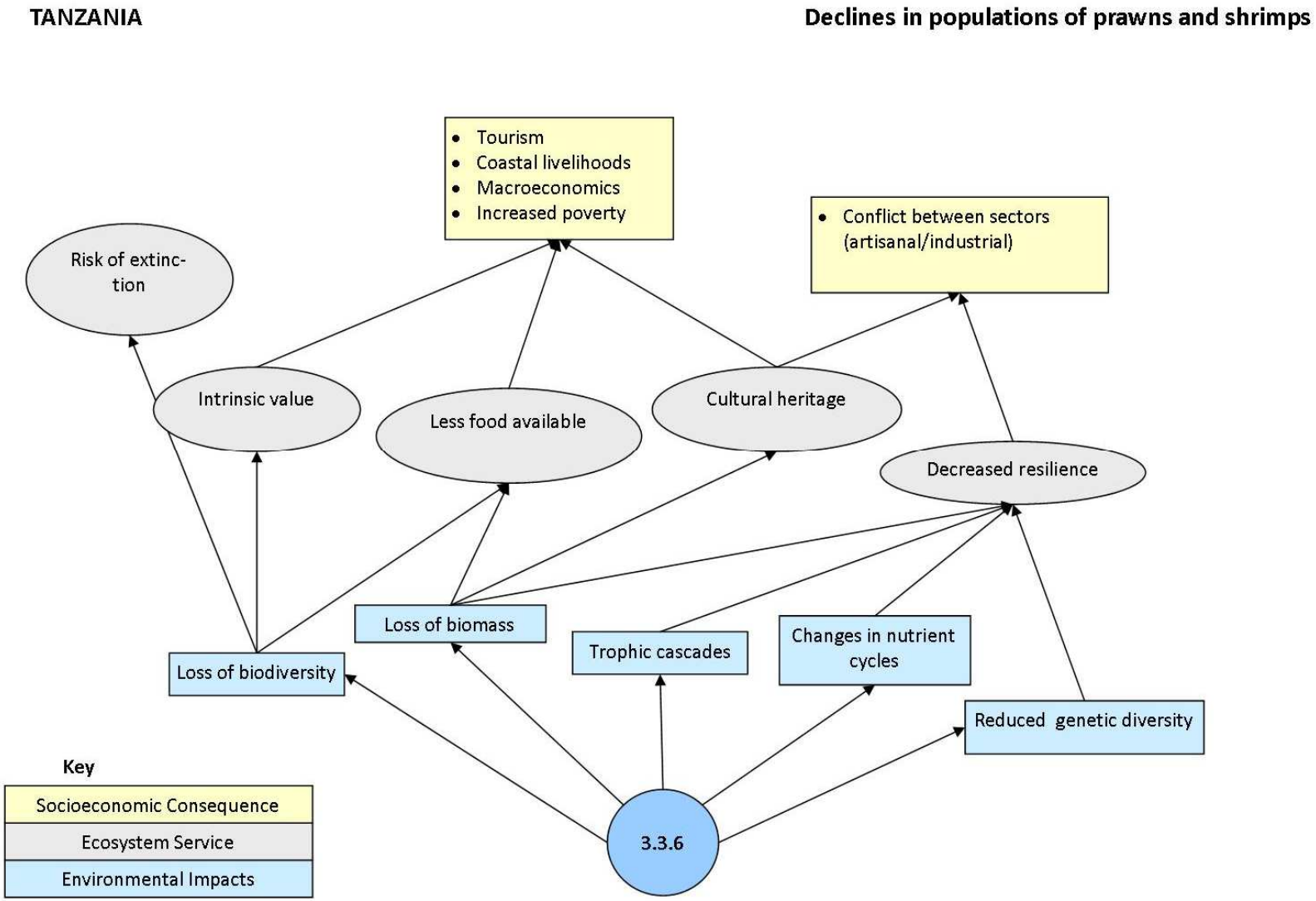


Figure 6.7.9.b: Tanzania MAC03 Causal Chain Analysis for Issue (3.3.6.) Declines in populations of prawns and shrimps.

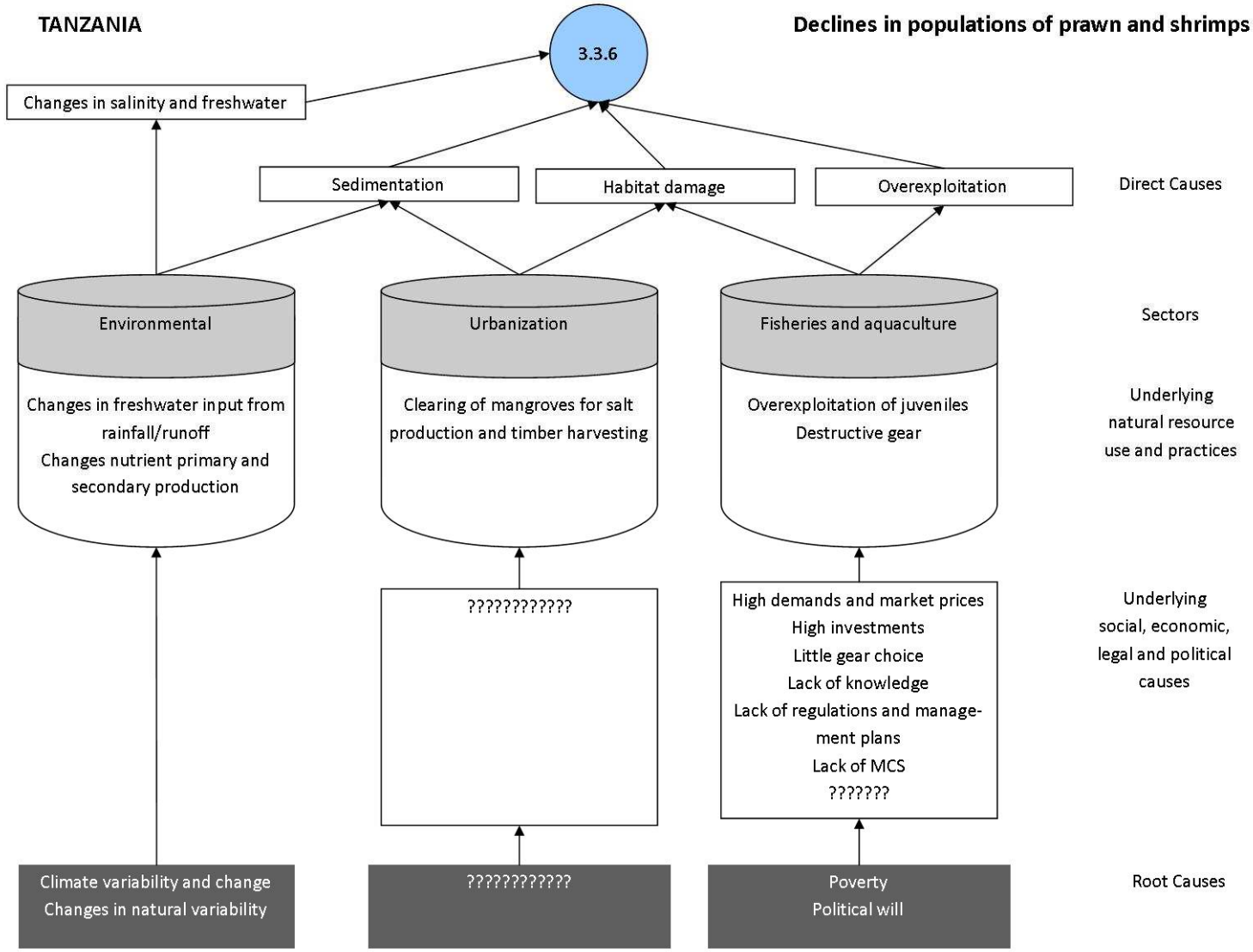


Figure 6.7.10.a: Tanzania MAC03 Impact Analysis for Issue (3.4) Excessive bycatch and discards.

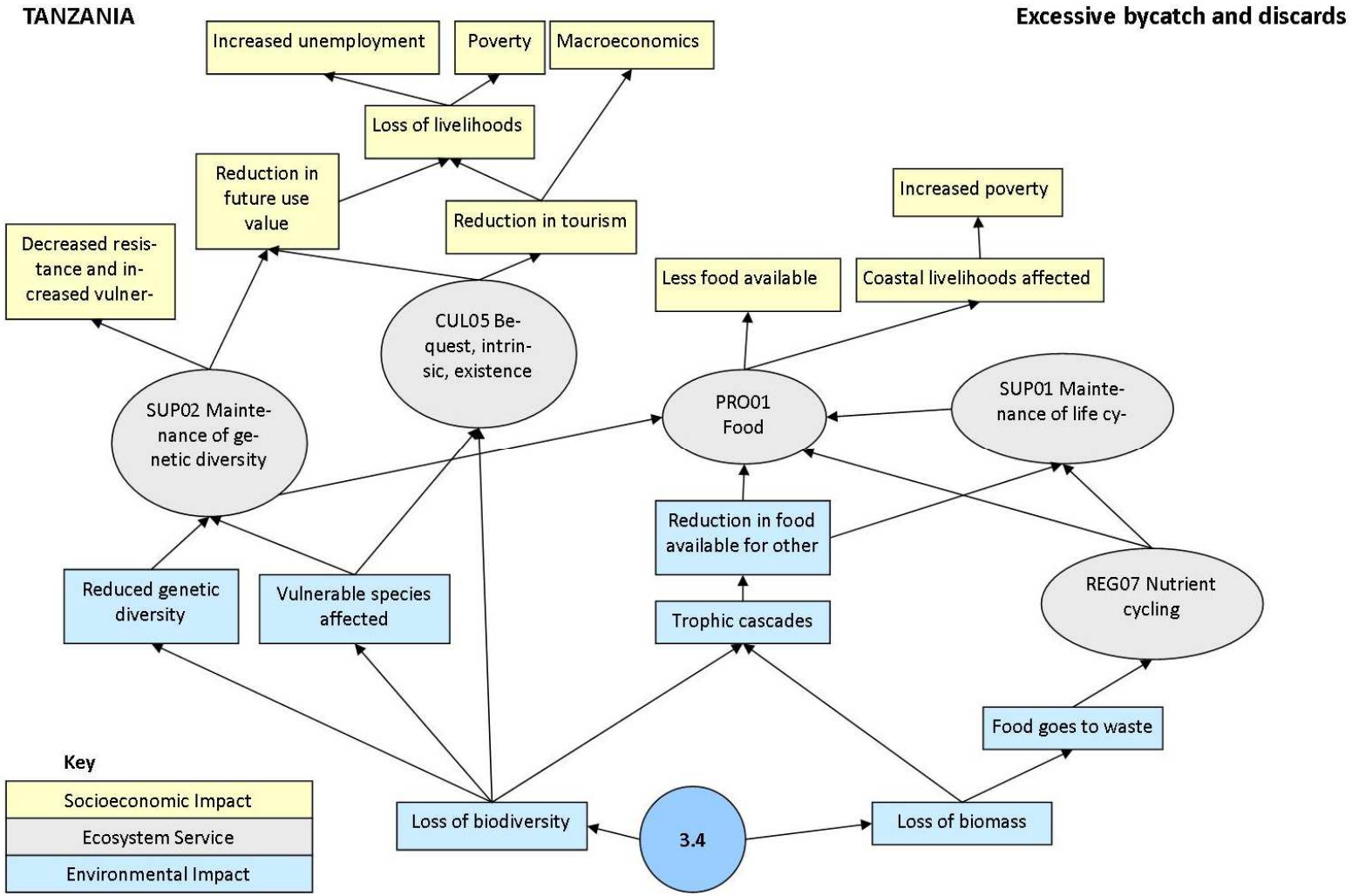
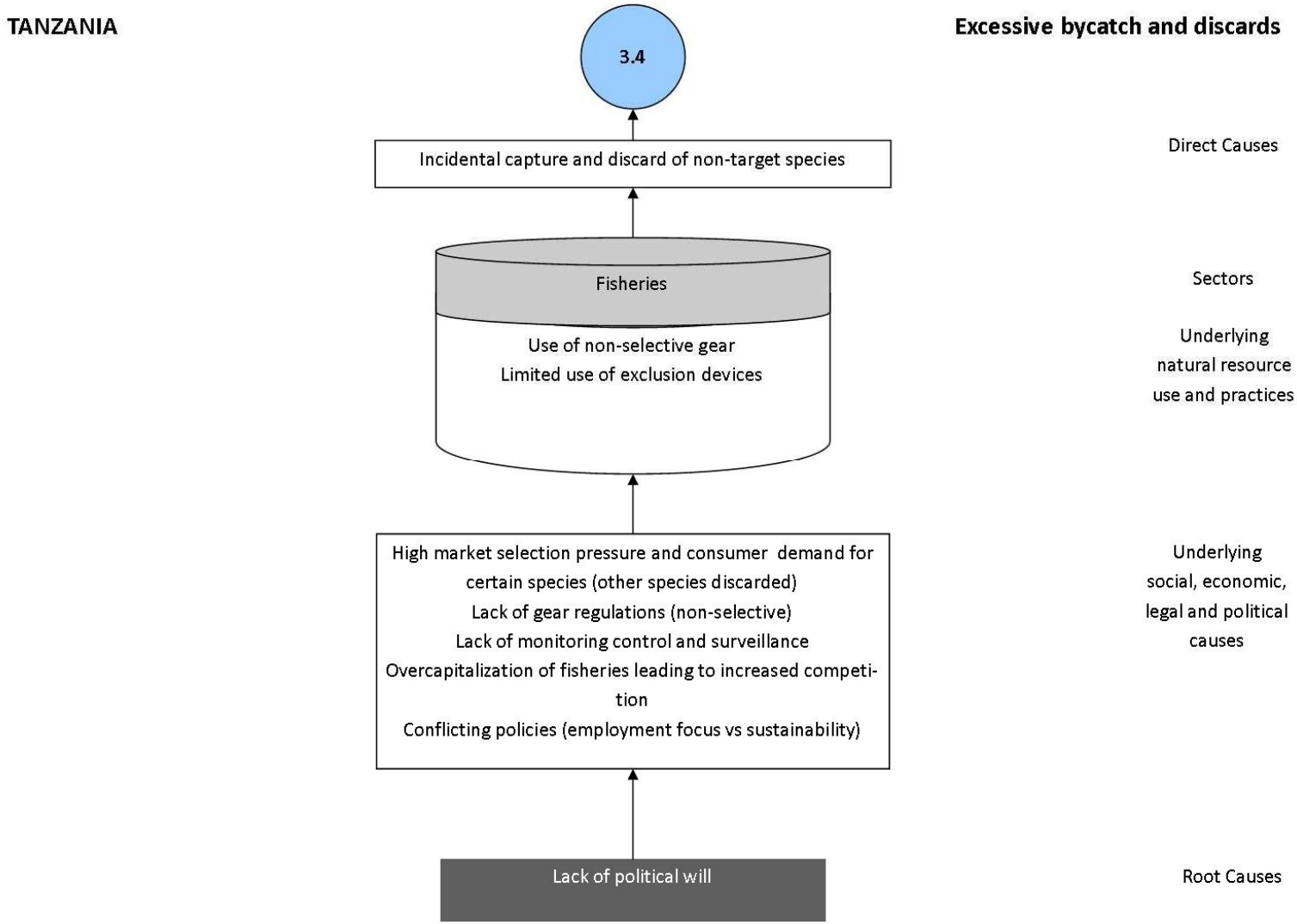


Figure 6.7.10.b: Tanzania MAC03 Causal Chain Analysis for Issue (3.4) Excessive bycatch and discards.



A6.8 Mozambique – National Causal Chain Meeting Results

Table A6.8.1: Mozambique Prioritisation 1 Results

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	R	HP	T	Yes	ARA, DNA, C. Bassa	Yes	Continuous	
1.2.	Degradation of ground and surface water quality	R	HP	T	Yes	Ministry R. Mi	Yes		
1.3.	Degradation of coastal and marine water quality								
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	R	M	T	Yes	IIP (Fishery); Ministry of Health	Yes	UEM, PNOL	
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	FR	HP	T	No				
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	R	L	T	Yes	INAMAR			
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	R	HP	T	Yes	UEM			
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	R	HP	T	Yes	Padagogic University			
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	R	HP	T	Yes	INAMAR	Yes	INAMAR	
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	R	HP	T	Yes	IMAF, CENACARIA, CDS-ZC	Limited	Limited project based (UEM, NC)	
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats								
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	R	HP	T	Yes	MINAG, MICOA, INAMAR	Yes	INAMAR, MICOA, MUNIGPIO	

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
2.2.2.	Disturbance, damage and loss of coastal forest habitats								
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	R	HP	T	Yes	MINAG, UEM-FEF, MUNICIPIS	Limited	Limited	Joint with 2.2.6
2.2.4.	Disturbance, damage and loss of wetland habitats	FR	MP	NT	Yes	MICOA, MITUR	Limited	MICOA, MITUR	
2.2.5.	Disturbance, damage and loss of estuarine habitats	R	HP	T	Yes	MICOA, PESCAS, UEM	Limited	MICOA, PESCA	
2.2.6.	Disturbance, damage and loss of mangrove habitats								Joint with 2.2.3
2.3.	Disturbance, damage and loss of subtidal benthic habitats								
2.3.1.	Disturbance, damage and loss of coral reef habitats	R	HP	T	Yes	UEM-Biologia, CDS, MICOA	Limited	MICOA, UEM	
2.3.2.	Disturbance, damage and loss of seagrass habitats	R	HP	T	Yes	UEM-Biologia	Limited	MICOA	
2.3.3.	Disturbance, damage and loss of macroalgal habitats	R	MP	NT	Yes	UEM-Biologia, CDS, MICOA	Limited	MICOA	
2.3.4.	Disturbance, damage and loss of soft sediment habitats	R	HP	T	Yes	IIP (Fishery)	Yes	IIP (Fishery)	
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)	NR							
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	FR	MP	T	No		No		
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)	R	L	T	Yes	Not at national scale	No		
2.6.	Introduction of exotic non-native species, invasives and nuisance species	R	MP	T	Yes	UEM but not at national scale	No		

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
3.1.	Decline in populations of focal species								
3.1.1.	Decline in populations of marine mammals	R	HP	T	Limited	SOME (UEM, WWF, DNAC)	Yes (Limited)	WWF, UEM, DNAC	
3.1.2.	Decline in populations of cetaceans	R	MP	T	Limited	UEM, DNAC	Yes (Limited)		
3.1.3.	Decline in populations of seabirds	R	MP	T	Yes	UEM	Yes (Limited)		
3.1.4.	Decline in populations of turtles	R	HP	T	Yes	DNAC, WWF, AICM, CTV, UEM	Yes (Limited)	WWF, DNAC,CTV,AICM (ongoing)	
3.2.	Decline in populations of commercial fish stocks								
3.2.1.	Decline in populations of sharks and rays	R	HP	T	No	Not available (limited to Tofu)	No	Not available	
3.2.2.	Decline in populations of large pelagics	FR	HP	T	Yes (Limited)	IIP	Yes (Limited)	IIP	
3.2.3.	Decline in populations of small pelagics	FR	LP	T	Some	IIP	Yes (Limited)	IIP	
3.2.4.	Decline in populations of deep water demersals	FR	LP	T	Yes (Limited)	IIP	No	Not available	
3.2.5.	Decline in populations of reef and demersal fish	R	HP	NT	Some	IIP, DNAC	Some	IIP (Fishery)	
3.3.	Decline in populations of commercial invertebrates								
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)	FR	LP	T	Some	IIP, UEM, DNAC	Some	IIP	
3.3.2.	Decline in populations of abalone								

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
3.3.3.	Decline in populations of cephalopods	FR	MP	T	Some	IIP	Yes (Limited)	IIP	
3.3.4.	Decline in populations of sea cucumbers	R	HP	T	Some	IIP, UEM	No		
3.3.5.	Decline in populations of sea urchins	FR	LP	NT	Some	UEM	No		
3.3.6.	Decline in populations of prawns and shrimp	R	MP	T	Yes	IIP	Yes	IIP	
3.3.7.	Decline in populations of lobsters	R	HP	T	Some	IIP	Some	IIP	
3.3.8.	Decline in populations of crayfish (deep sea lobster)	FR	LP	NT	Some	IIP	Yes (Limited)	IIP	
3.3.9.	Decline in populations of crabs	FR	MP	T	Some	IIP, UEM	Yes (Limited)	IIP	
3.4.	Excessive bycatch and discards	R	HP	T	Yes	IIP	Yes	IIP	
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)	FR	HP	T	Some	IIP, INAQUA	Yes	IIP, INAQUA	

Table A6.8.2: Mozambique Prioritisation 2 Results

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	H	VH	H	H	H	H	H	H	H
1.2.	Degradation of ground and surface water quality	VH	H	M	H	M	H	L	M	H
1.3.	Degradation of coastal and marine water quality									
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	L	H	M	M	M	VH	H	H	H
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	M	M	L	M	M	H	M	M	M
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	L	L	L	L	M	VH	H	H	M
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	M	H	M	M	M	H	H	H	H
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	H	H	M	H	M	VH	H	H	H
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	M	L	L	L	L	M	L	L	L
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	VH	VH	VH	VH	VH	VH	M	VH	VH
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats									
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	VH	VH	VH	VH	VH	VH	L	VH	VH
2.2.2.	Disturbance, damage and loss of coastal forest habitats									

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	VH	VH	VH	VH	VH	VH	H	VH	VH
2.2.4.	Disturbance, damage and loss of wetland habitats	VH	VH	VH	VH	H	M	M	M	H
2.2.5.	Disturbance, damage and loss of estuarine habitats	H	H	M	H	VH	H	M	H	H
2.2.6.	Disturbance, damage and loss of mangrove habitats	VH	VH	VH	VH	VH	VH	H	VH	VH
2.3.	Disturbance, damage and loss of subtidal benthic habitats									
2.3.1.	Disturbance, damage and loss of coral reef habitats	VH	M	H	H	VH	H	L	H	H
2.3.2.	Disturbance, damage and loss of seagrass habitats	VH	H	H	H	VH	H	H	H	H
2.3.3.	Disturbance, damage and loss of macroalgal habitats	VH	H	H	H	VH	H	H	H	H
2.3.4.	Disturbance, damage and loss of soft sediment habitats	VH	H	H	H	VH	H	H	H	H
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)									
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	VH	VH	H	VH	VH	H	M	H	VH
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)	M	L	L	L	VH	H	VH	VH	M
2.6.	Introduction of exotic non-native species, invasives and nuisance species	VH	H	H	H	VH	H	H	H	H
3.1.	Decline in populations of focal species									

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
3.1.1.	Decline in populations of marine mammals	VH	H	H	H	VH	VH	H	VH	VH
3.1.2.	Decline in populations of cetaceans	H	M	M	M	H	VH	H	H	H
3.1.3.	Decline in populations of seabirds	H	M	M	M	VH	H	H	H	H
3.1.4.	Decline in populations of turtles	VH	H	H	H	VH	VH	VH	VH	VH
3.2.	Decline in populations of commercial fish stocks									
3.2.1.	Decline in populations of sharks and rays	VH	VH	H	VH	VH	VH	M	H	VH
3.2.2.	Decline in populations of large pelagics	VH	L	H	H	VH	VH	H	VH	VH
3.2.3.	Decline in populations of small pelagics	VH	H	M	H	M	VH	H	H	H
3.2.4.	Decline in populations of deep water demersals	L	L	L	L	M	M	VH	H	M
3.2.5.	Decline in populations of reef and demersal fish	VH	VH	H	VH	VH	VH	M	H	VH
3.3.	Decline in populations of commercial invertebrates									
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)	H	VH	L	H	M	M	M	M	H
3.3.2.	Decline in populations of abalone									
3.3.3.	Decline in populations of cephalopods	H	VH	M	H	M	H	H	H	H

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
3.3.4.	Decline in populations of sea cucumbers	VH	VH	H	VH	VH	VH	L	L	M
3.3.5.	Decline in populations of sea urchins	L	M	L	L	L	M	VH	M	M
3.3.6.	Decline in populations of prawns and shrimp	VH	VH	VH	VH	VH	VH	VH	VH	VH
3.3.7.	Decline in populations of lobsters	H	M	M	M	M	H	VH	H	H
3.3.8.	Decline in populations of crayfish	L	L	L	L	L	L	VH	M	M
3.3.9.	Decline in populations of crabs	M	H	M	M	L	H	M	M	M
3.4.	Excessive bycatch and discards	VH	VH	L	VH	VH	VH	M	H	VH
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)	VH	VH	VH	VH	VH	VH	H	VH	VH

Figure 6.8.1.a: Mozambique MAC01 Impact Analysis for Issue (1.1) Alteration of natural river flow and changes in freshwater input and sediment load.

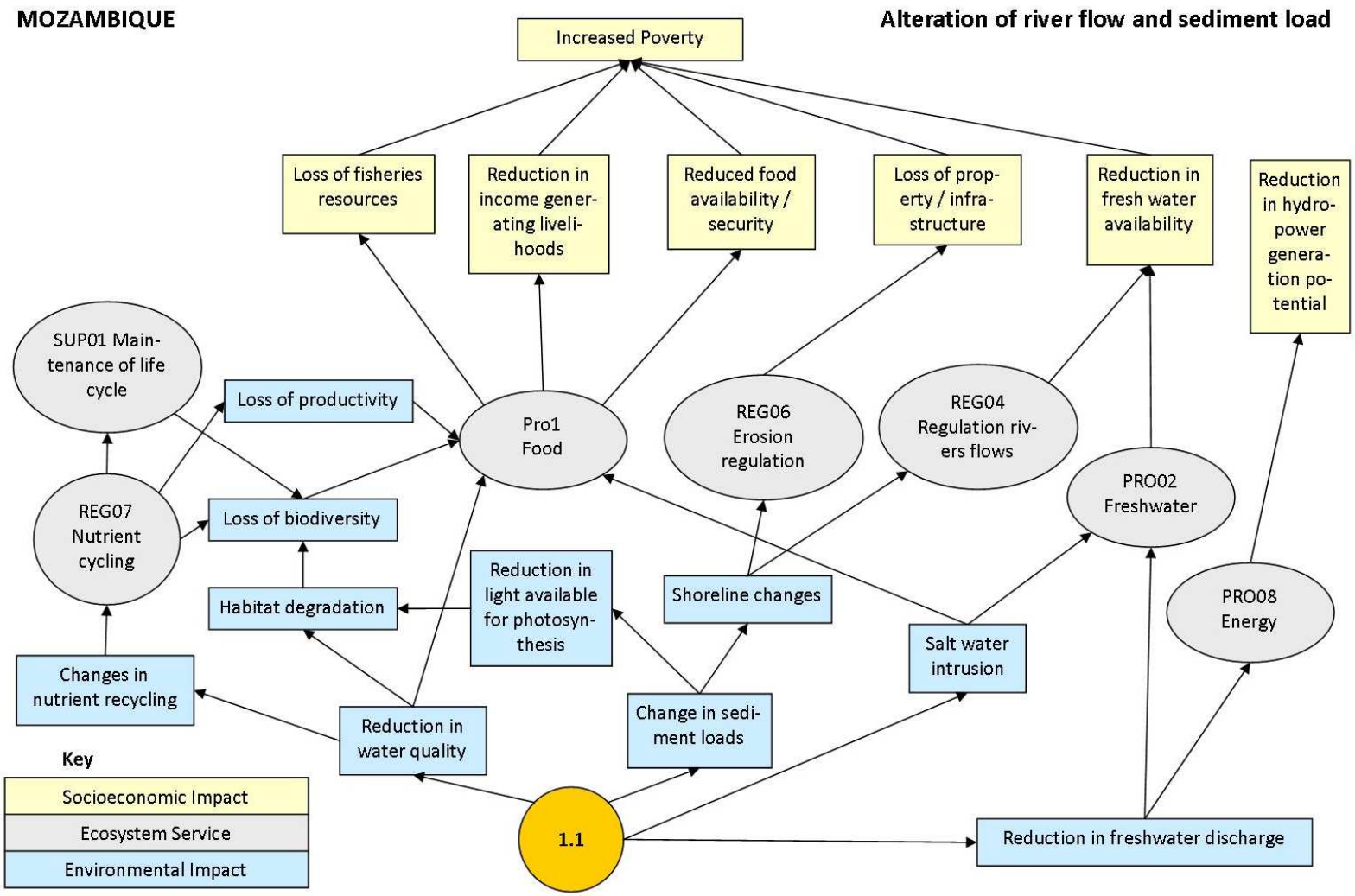


Figure 6.8.1.b: Mozambique MAC01 Causal Chain Analysis for Issue (1.1) Alteration of natural river flow and changes in freshwater input and sediment load.

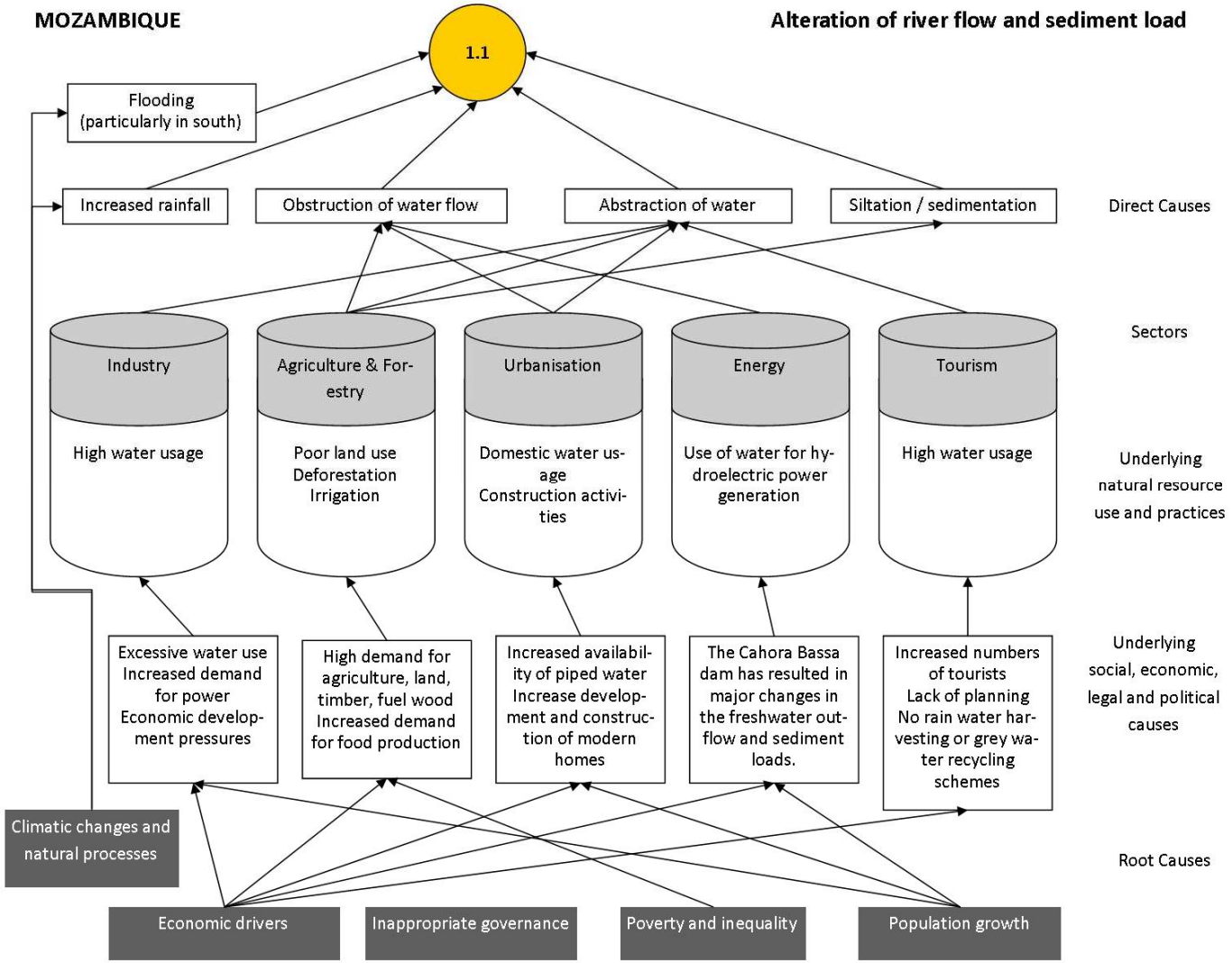


Figure 6.8.2.a: Mozambique MAC01 Impact Analysis for Issue (1.2) Degradation of ground and surface water quality.

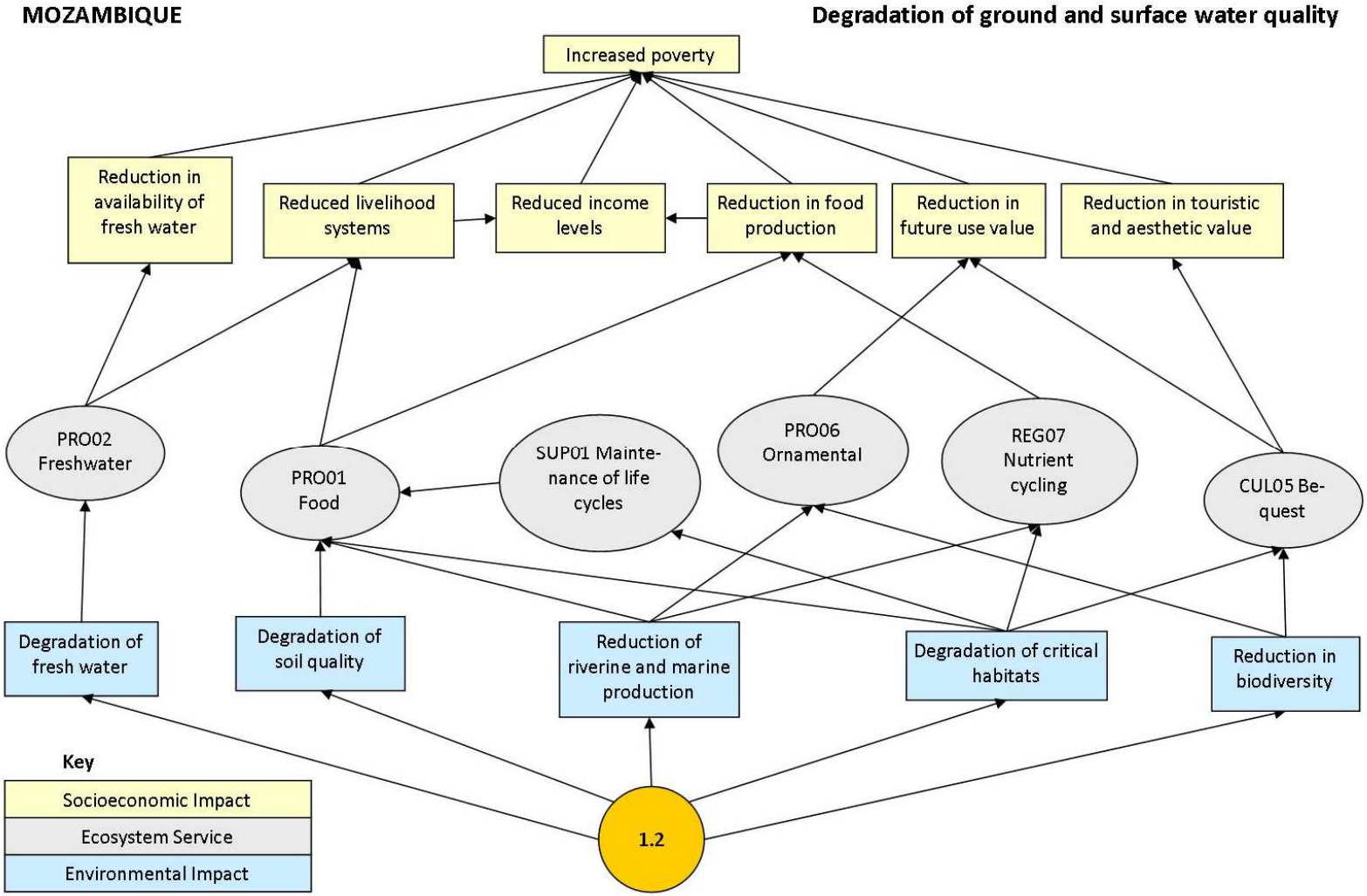


Figure 6.8.2.b: Mozambique MAC01 Causal Chain Analysis for Issue (1.2) Degradation of ground and surface water quality.

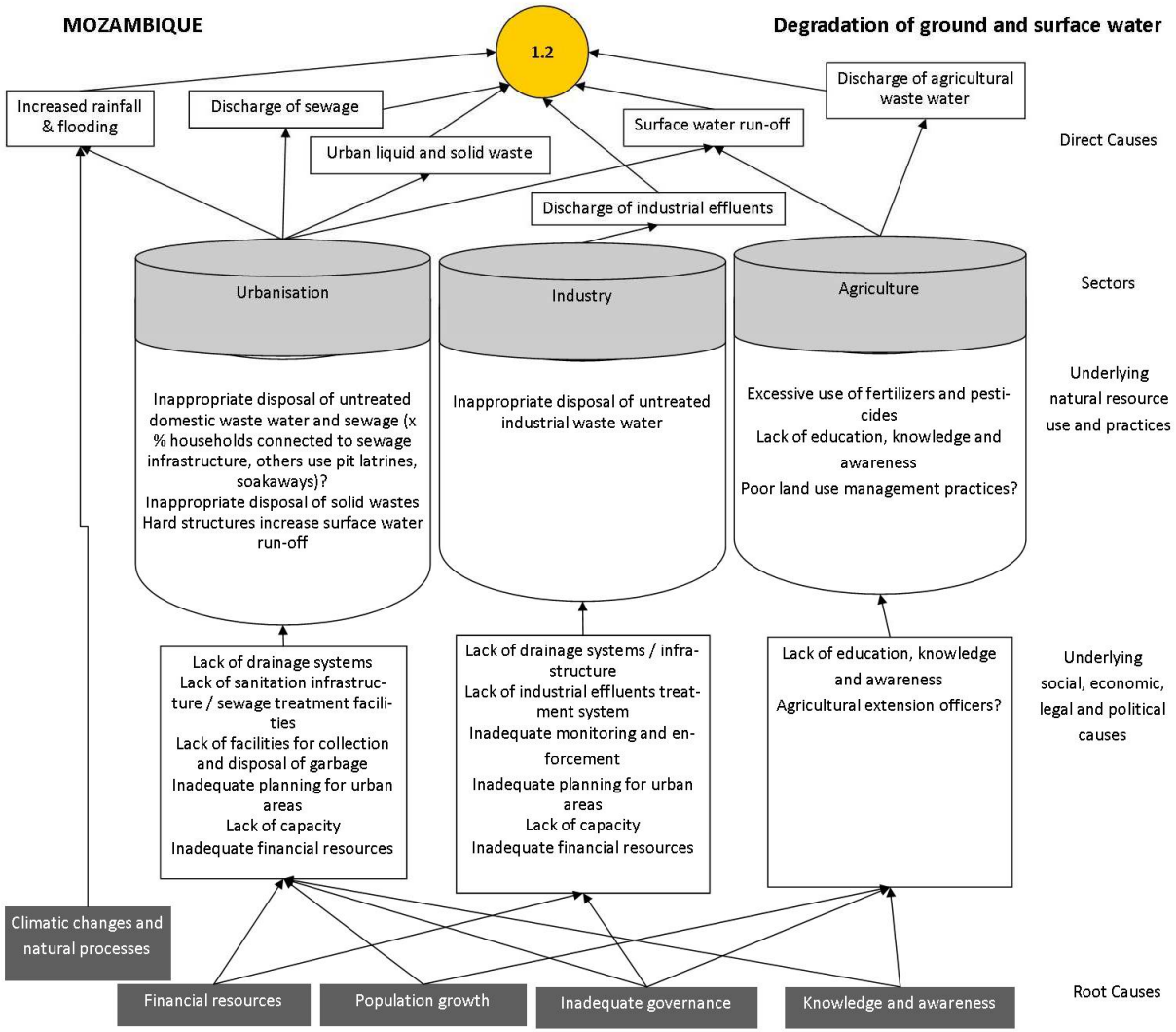


Figure 6.8.3.a: Mozambique MAC01 Impact Analysis for Issue (1.3.5) Solid wastes/marine debris from shipping.

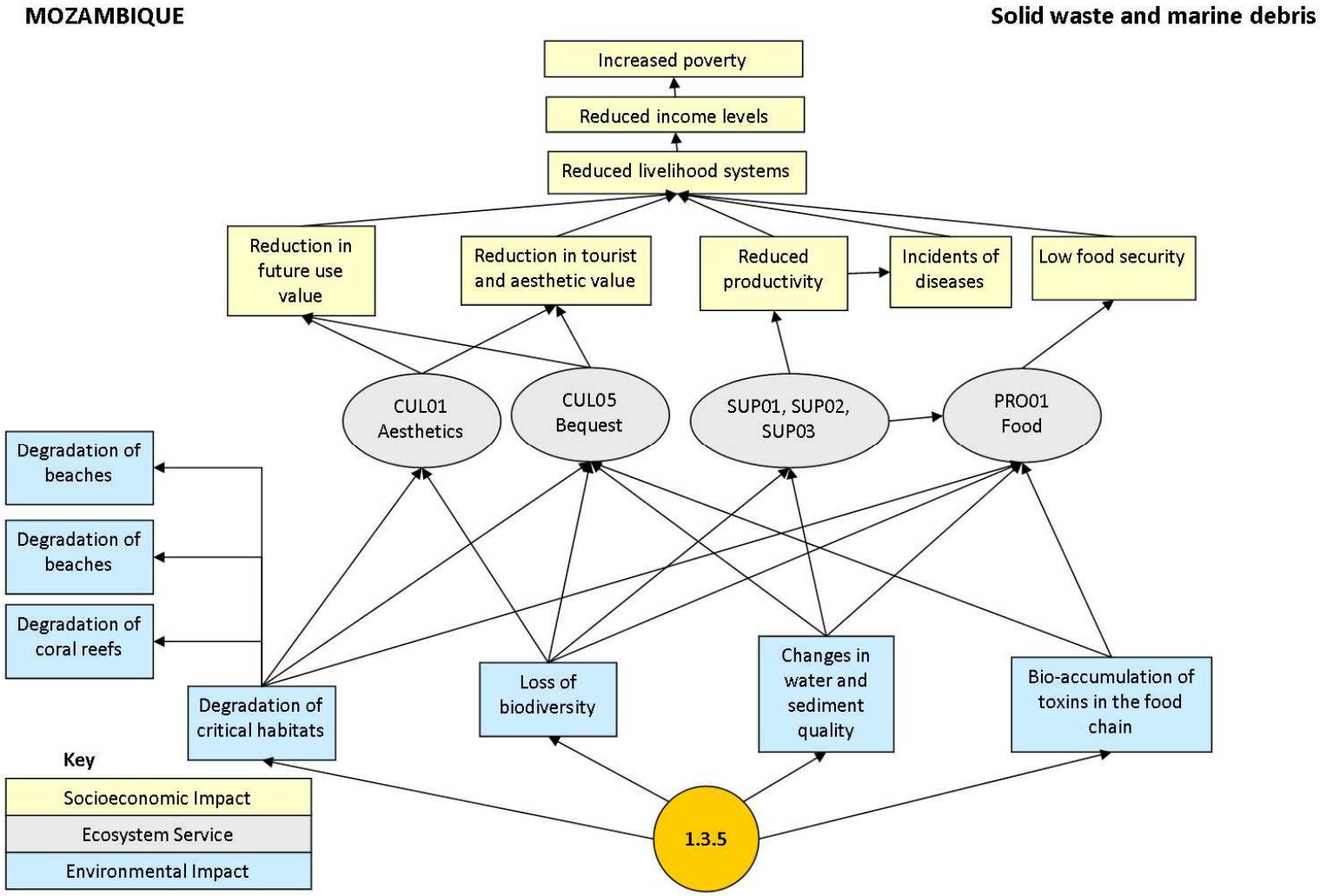


Figure 6.8.3.b: Mozambique MAC01 Causal Chain Analysis for Issue (1.3.5) Solid wastes/marine debris from shipping.

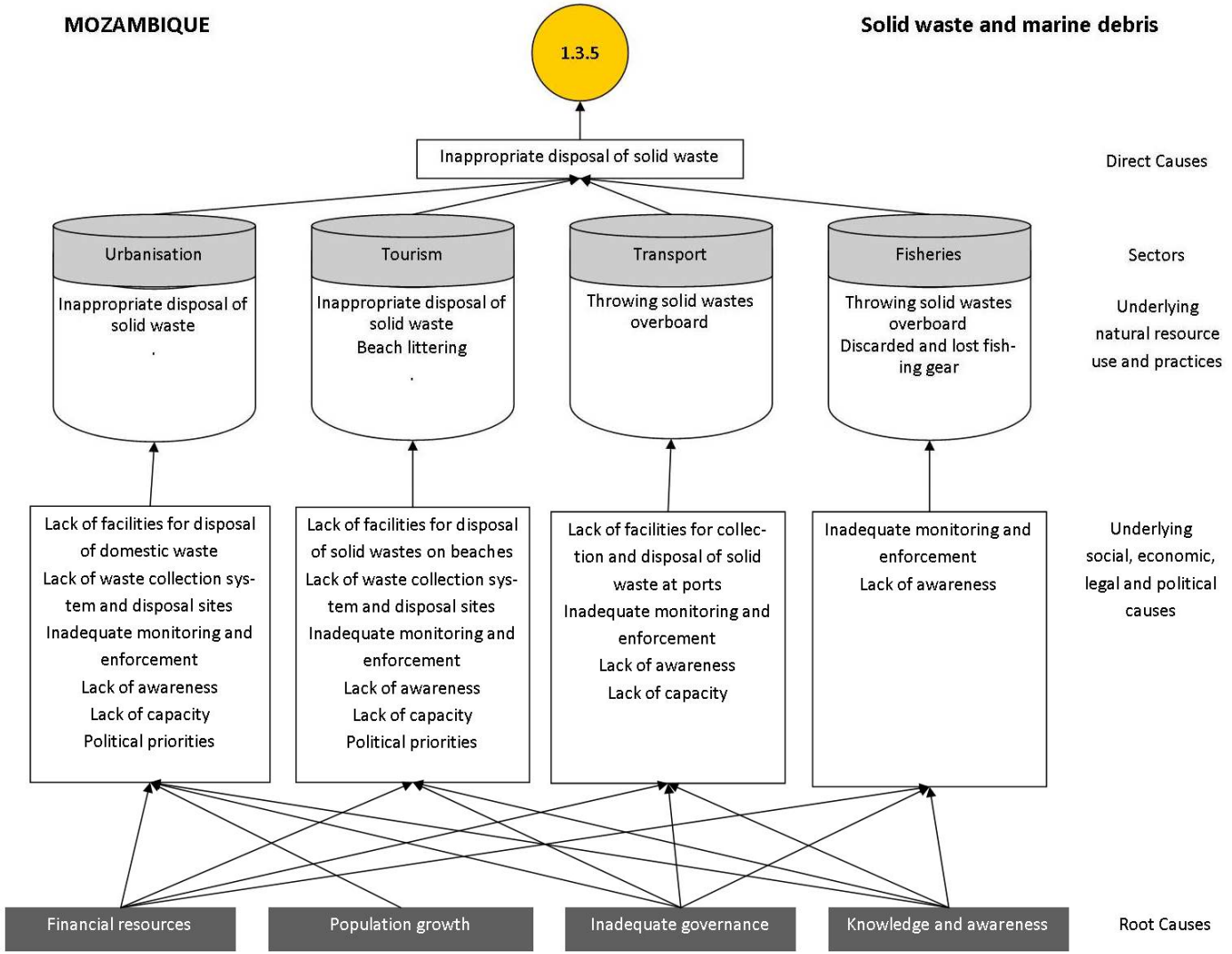


Figure 6.8.4.a: Mozambique MAC02 Impact Analysis for Issue (2.1) Shoreline change, due to modification, land reclamation and coastal erosion.

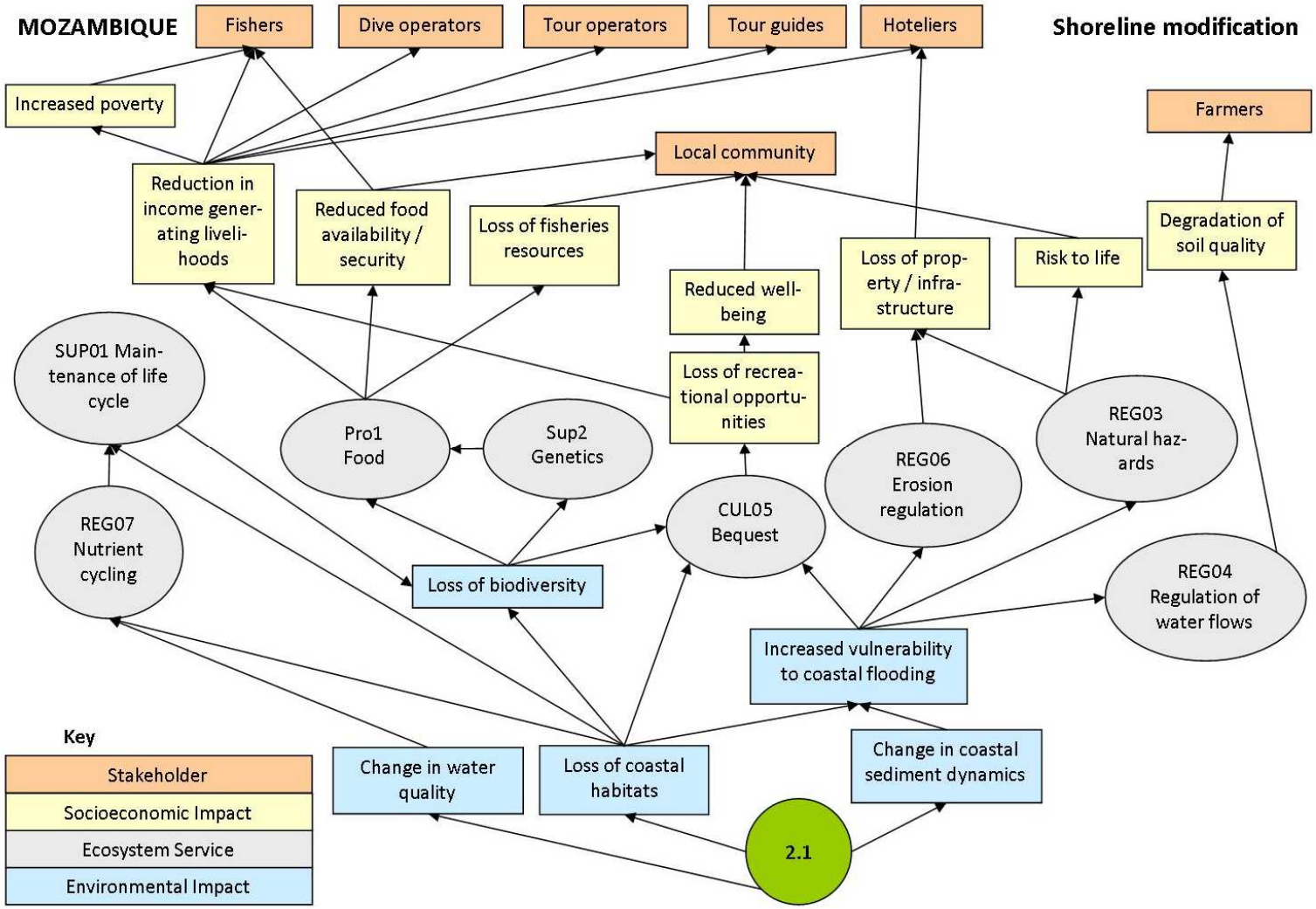


Figure 6.8.4.b: Mozambique MAC02 Causal Chain Analysis for Issue (2.1) Shoreline change, due to modification, land reclamation and coastal erosion.

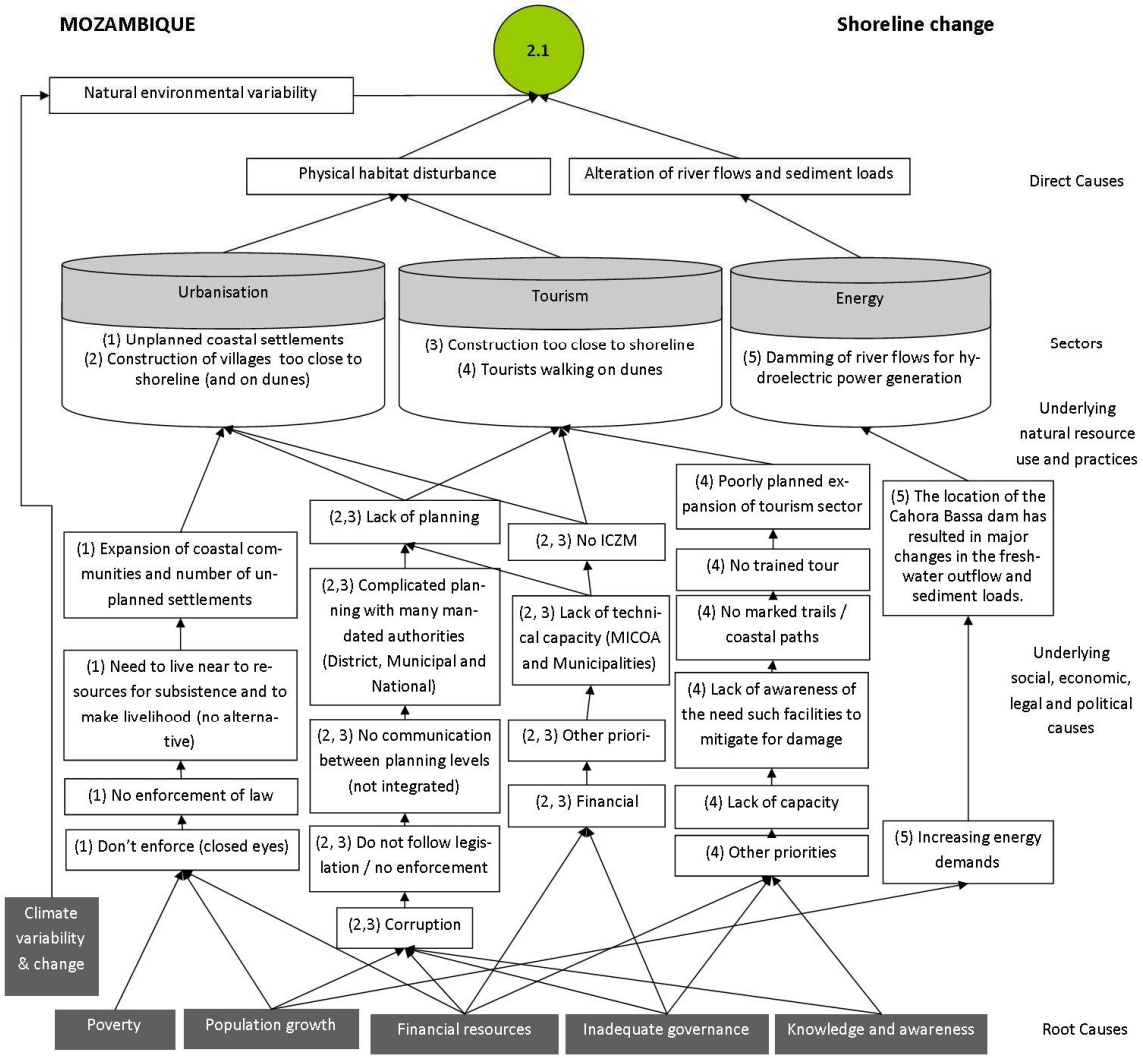


Figure 6.8.5: Mozambique MAC02 Causal Chain Analysis for Issue (2.2.1) Disturbance, damage and loss of upland habitats.

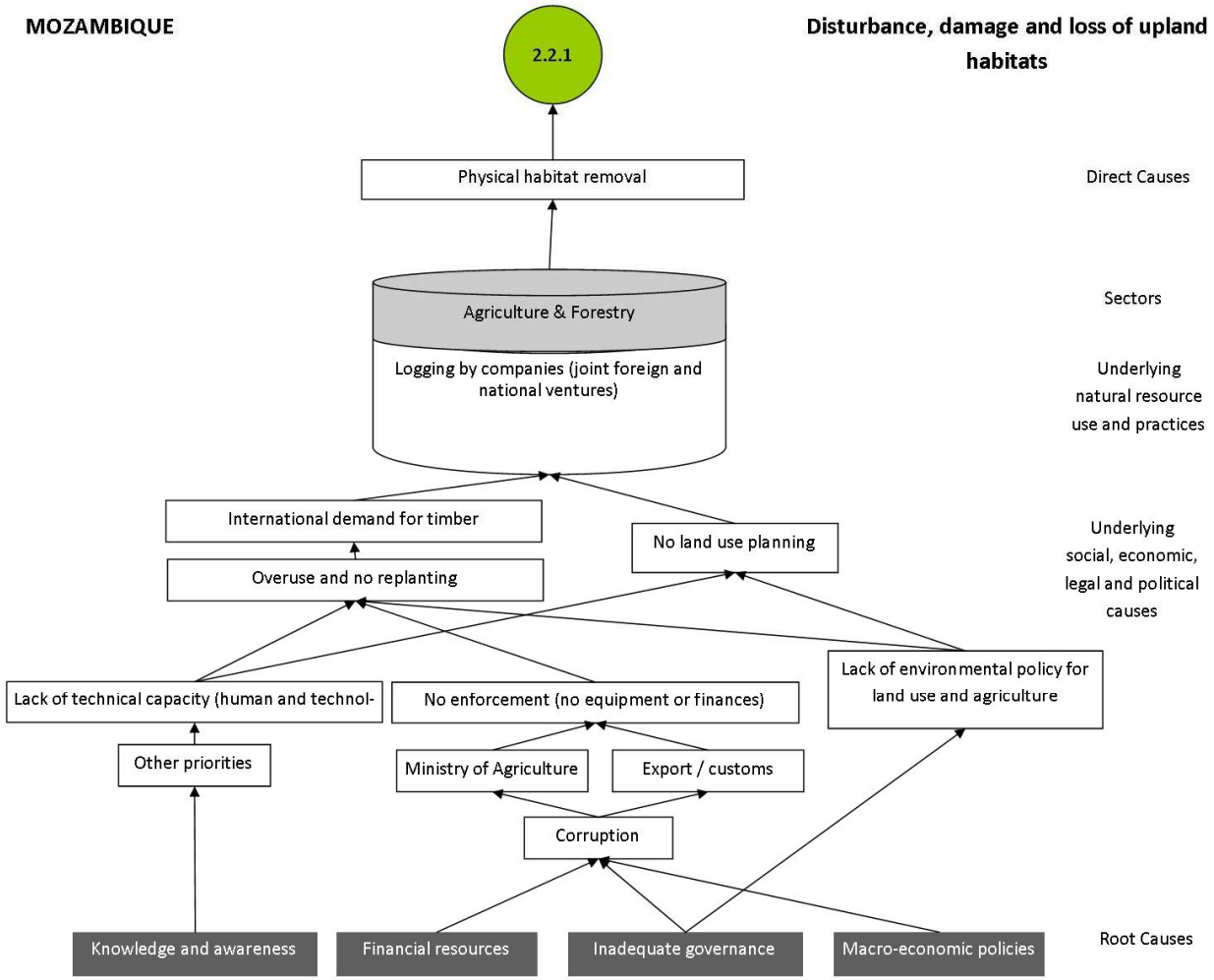


Figure 6.8.6.a: Mozambique MAC02 Impact Analysis for Issue (2.2.6) Disturbance, damage and loss of mangrove habitats.

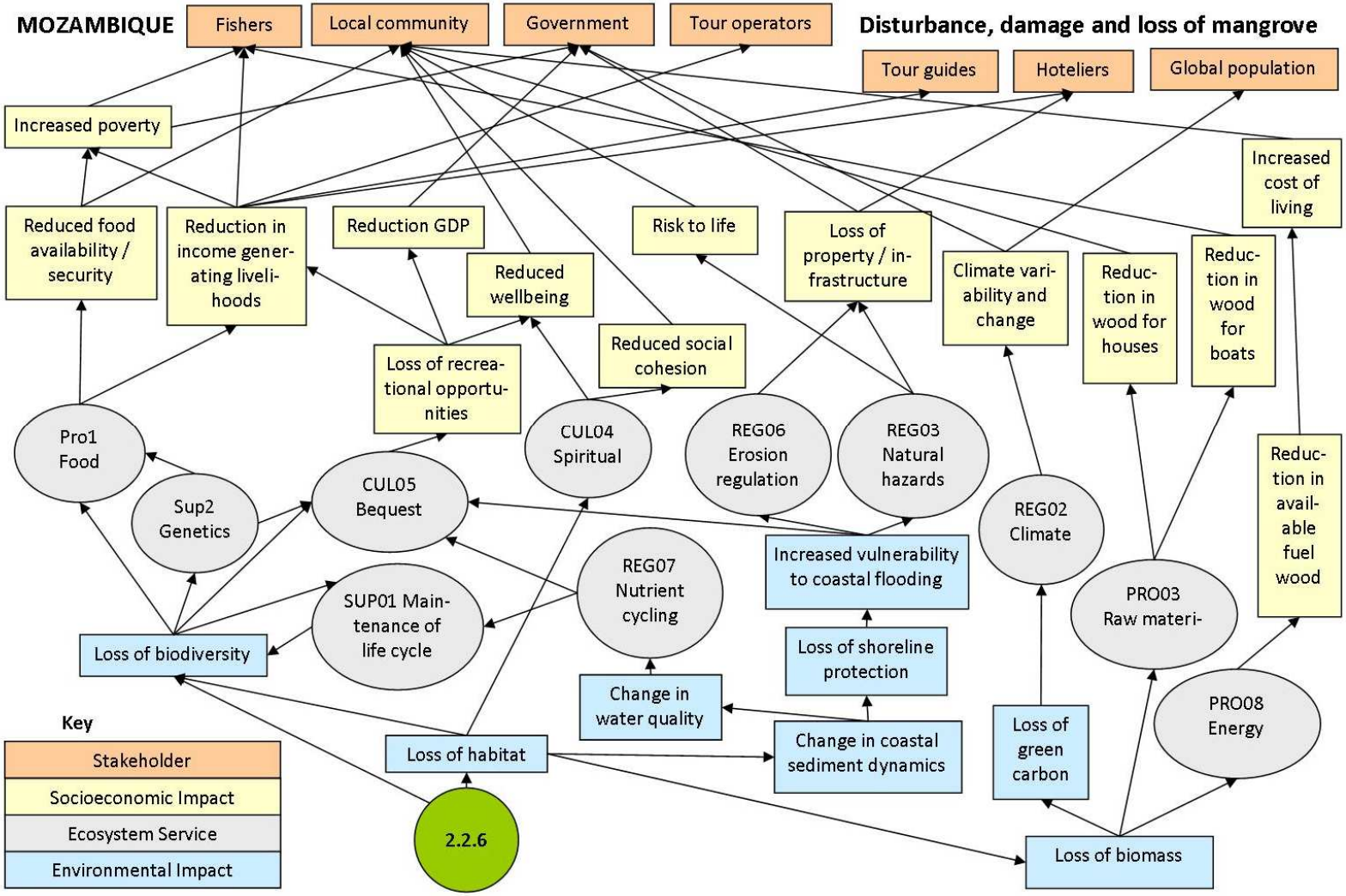


Figure 6.8.6.b: Mozambique MAC02 Causal Chain Analysis for Issue (2.2.6) Disturbance, damage and loss of mangrove habitats.

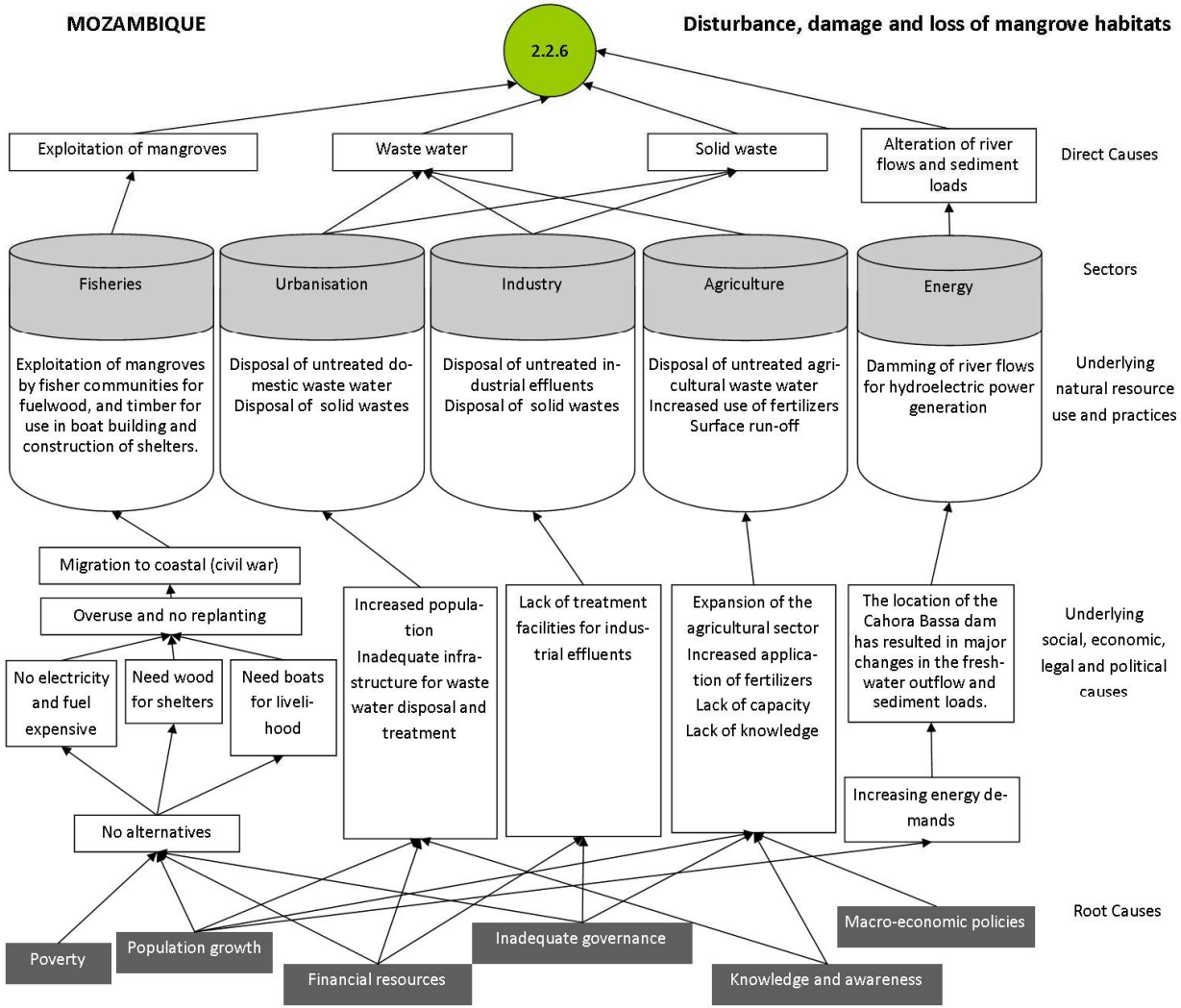


Figure 6.8.7.a: Mozambique MAC03 Impact Analysis for Issue (3.1.4) Declines in populations of turtles.

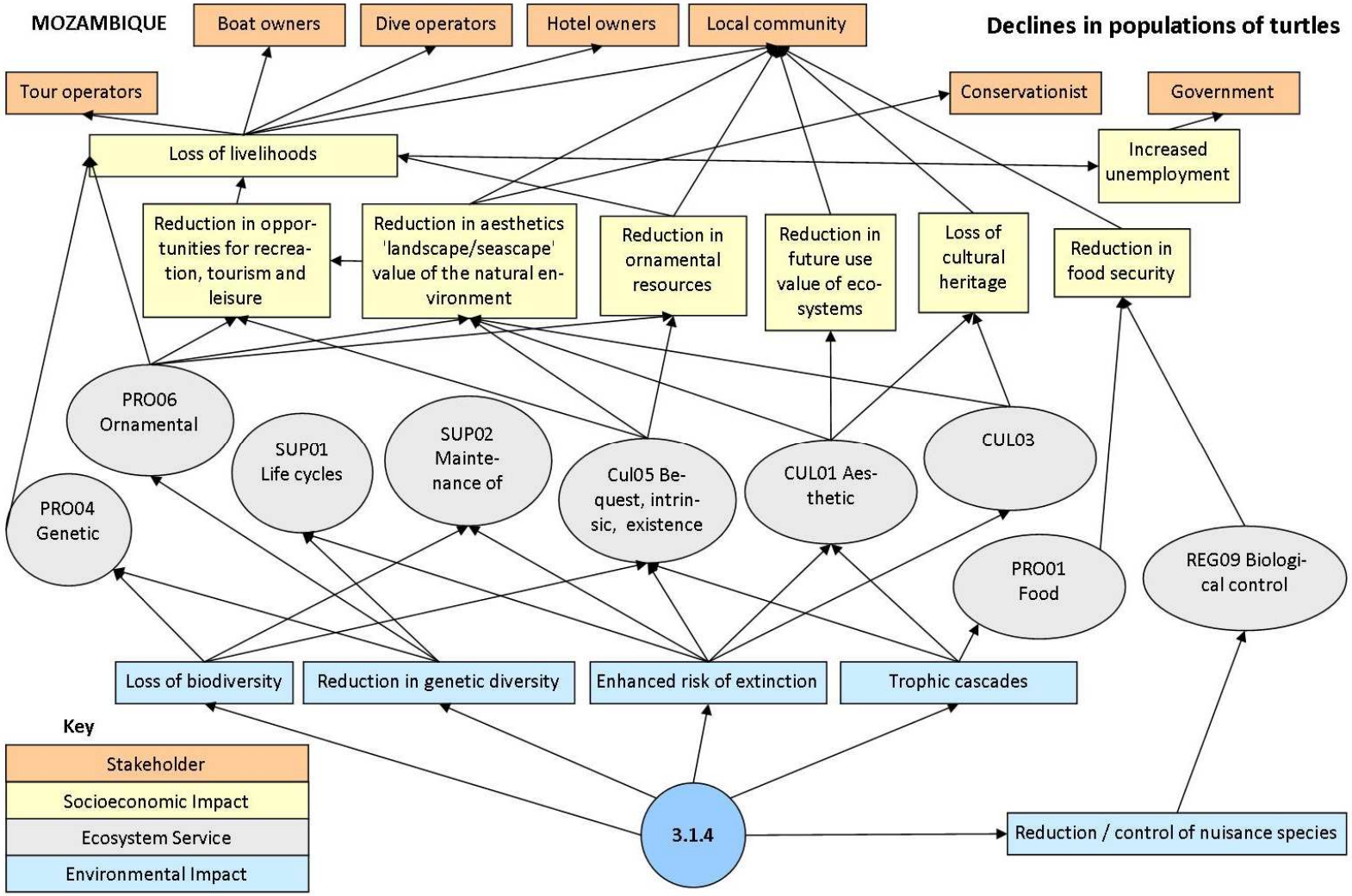


Figure 6.8.7.b: Mozambique MAC03 Causal Chain Analysis for Issue (3.1.4) Declines in populations of turtles.

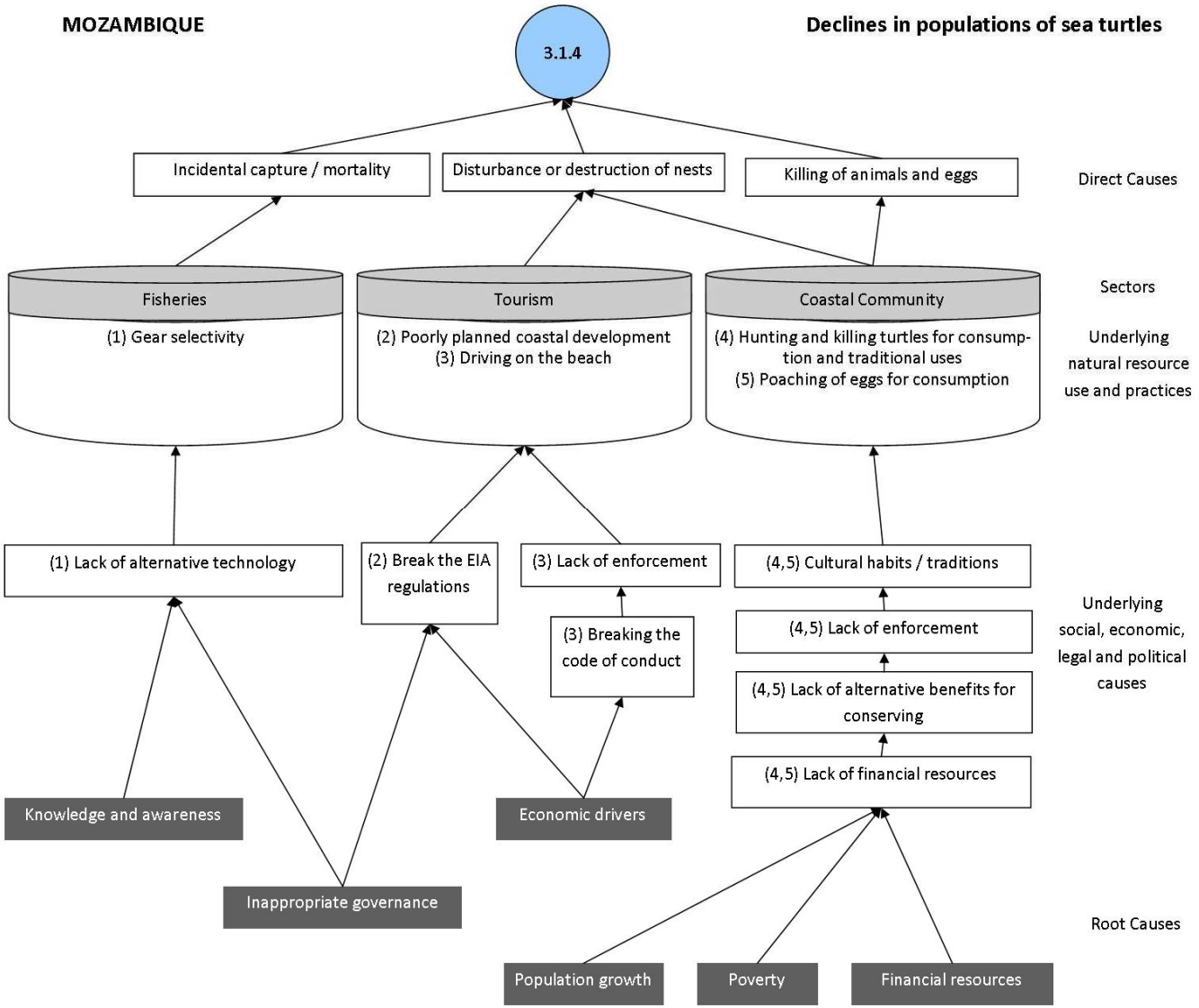


Figure 6.8.8.a: Mozambique MAC03 Impact Analysis for Issue (3.2.5) Declines in populations of reef and demersal fish.

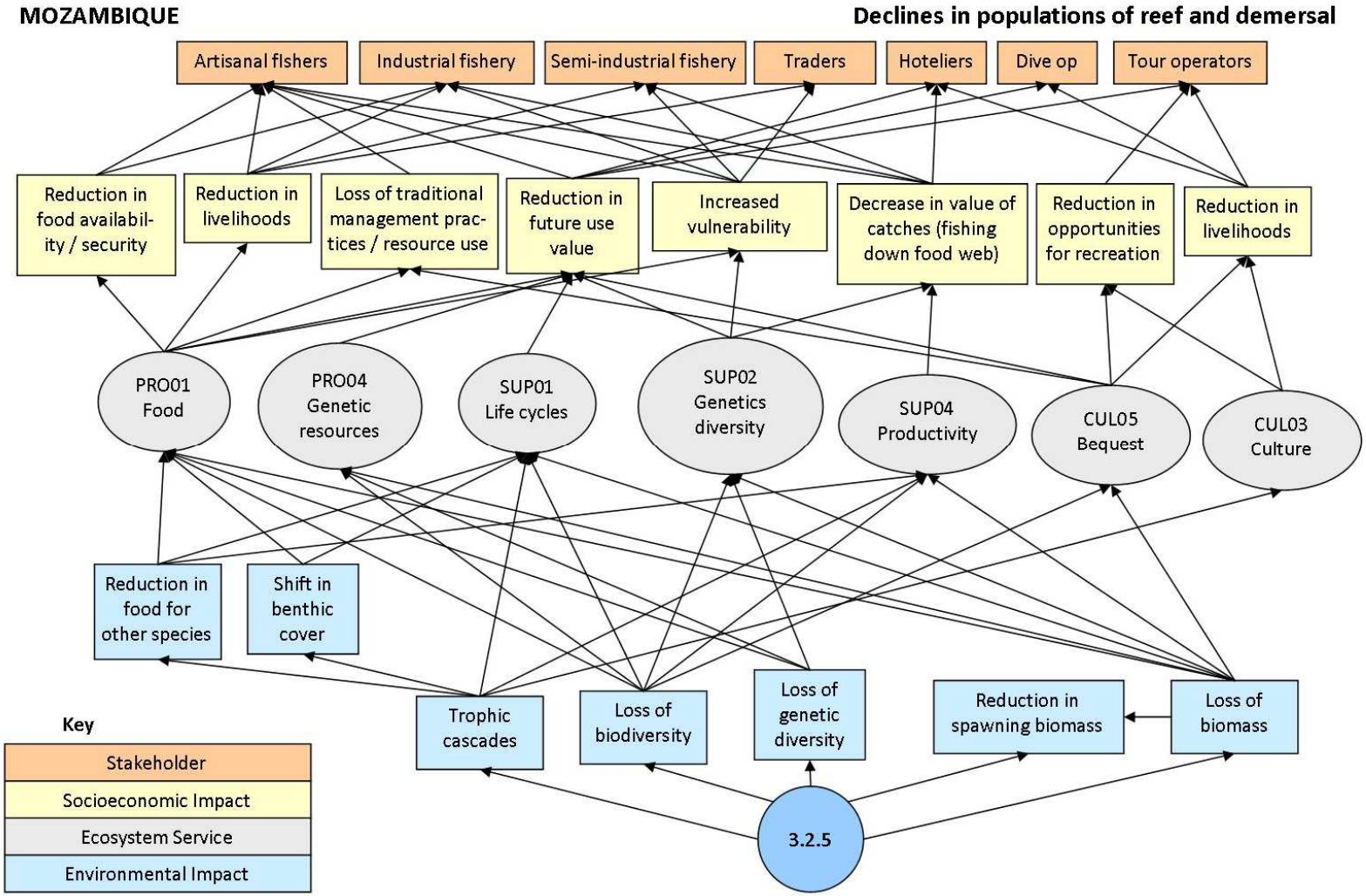


Figure 6.8.8.b: Mozambique MAC03 Causal Chain Analysis for Issue (3.2.5) Declines in populations of reef and demersal fish.

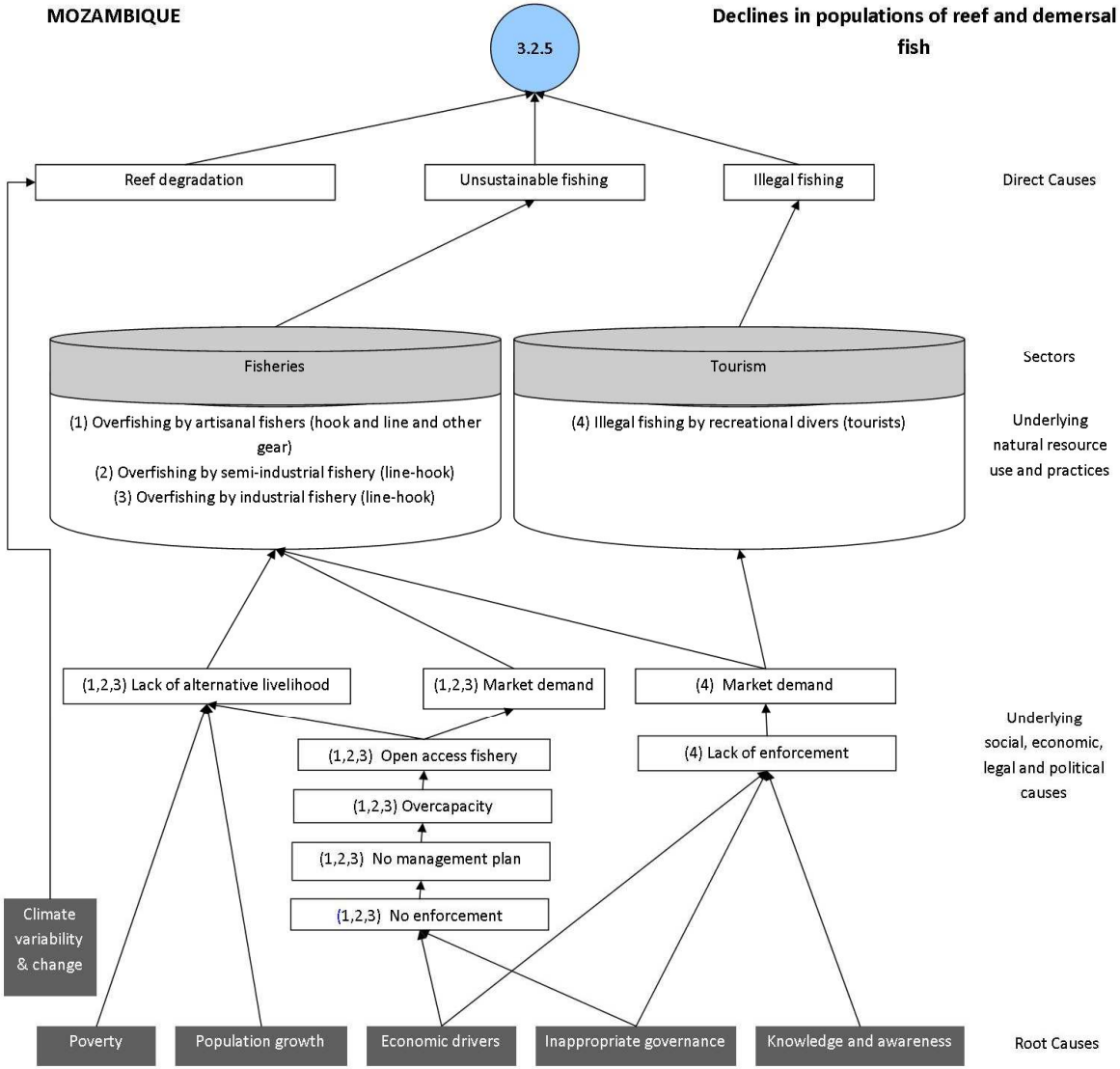


Figure 6.8.9.a: Mozambique MAC03 Impact Analysis for Issue (3.3.6) Declines in populations of prawns and shrimps.

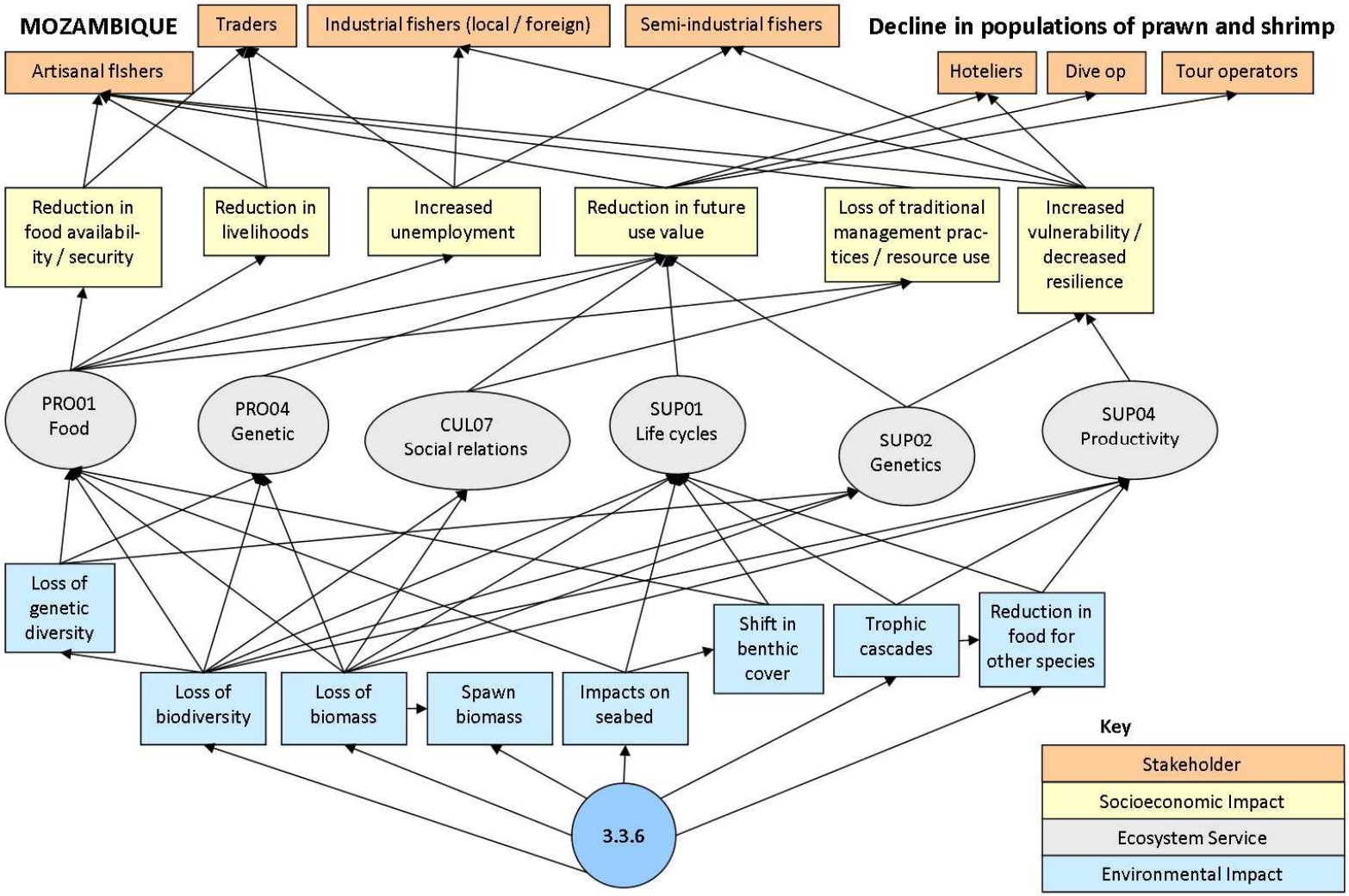
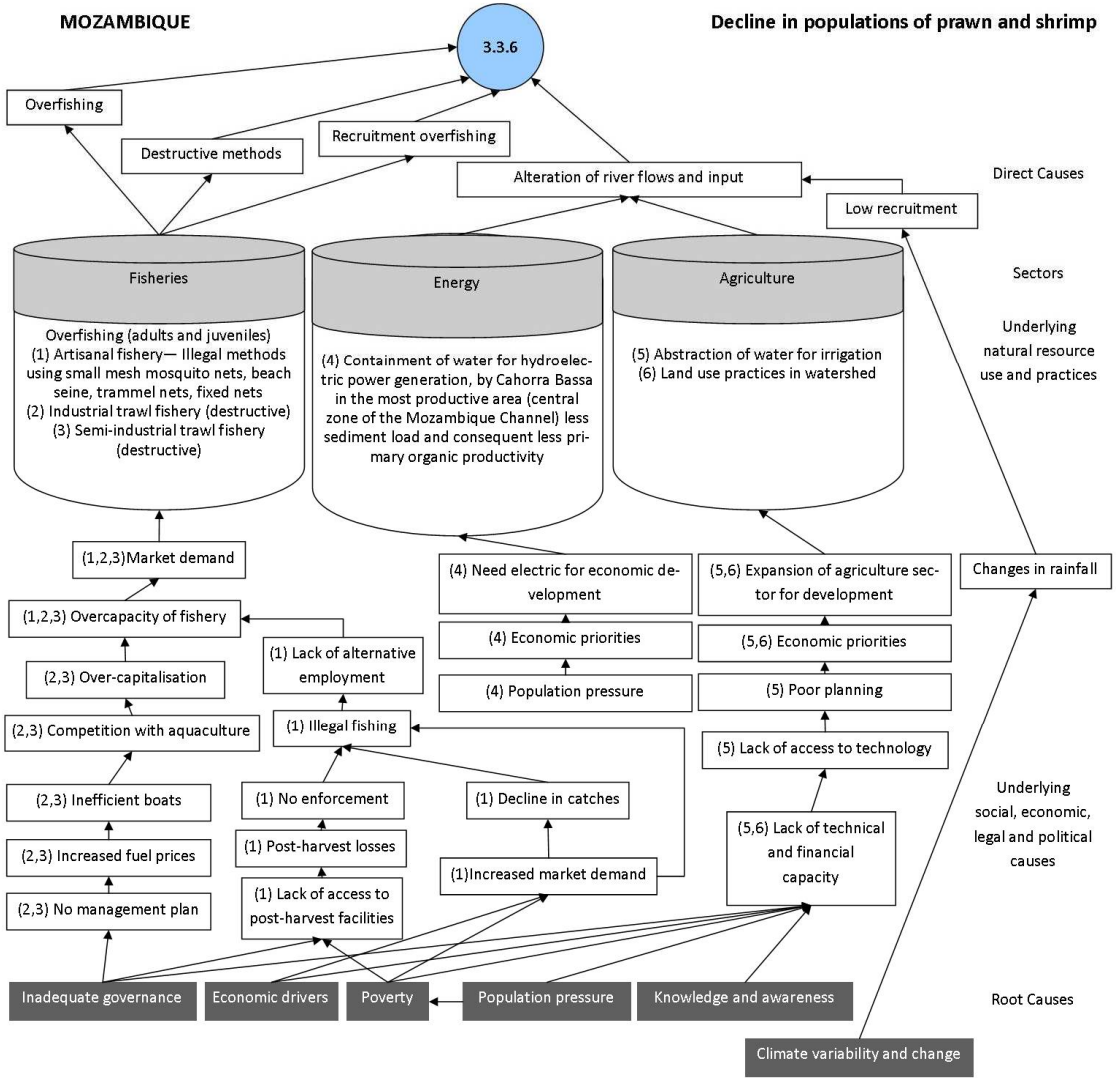


Figure 6.8.9.b: Mozambique MAC03 Causal Chain Analysis for Issue (3.3.6) Declines in populations of prawns and shrimps.



A6.9 South Africa – National Causal Chain Meeting Results

Table A6.9.1: South Africa Prioritisation 1 Results

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	R	HP	T	Yes	DWA, WRC, Universities, CSIR	Yes	DWA, Continuous but in decline	
1.2.	Degradation of ground and surface water quality	R	HP	T	Yes	DWA, WRC, Universities, CSIR	Yes	DWA, Regular	
1.3.	Degradation of coastal and marine water quality								
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	R	HP	T	Yes	CSIR, Municipalities, WESSA-Blue Flag, University of Port Elizabeth	Yes (Limited)	CSIR and Municipalities – Inadequate / limited	
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	R	MP	T	Yes	WRC, Universities, CSIR	Yes	Sporadic; SAEON, WRC	
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	R	MP	T	Yes	TNPA, CSIR, DEA	Yes	TNPA; Regular	
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	R	MP	T	Yes (Limited)	DWA	Yes (Limited)	Very limited	
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	R	MP	T	Yes	University of Cape Town,	Yes (Limited)	Very limited	
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	R	HP	T	Yes	DEA, Department of Transport, SAMSA,	No	No monitoring	
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	R	MP	S*	yes	Provincial responsibility of KZN, not one in EC	No		

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats	R							
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	R	HP	S	yes	National Land Cover Database	Yes	Department of Water Affairs	
2.2.2.	Disturbance, damage and loss of coastal forest habitats	R	HP	S	yes	National Forests Act: Dept Forestry	Partial	In some provinces. KZN yes, EC no	
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	R	HP	S	yes	National Biodiversity Assessment, legislation in place but needs to be implemented by provinces	no		
2.2.4.	Disturbance, damage and loss of wetland habitats	R	HP	S	yes	National Wetlands Programme	yes	National Wetlands Programme	
2.2.5.	Disturbance, damage and loss of estuarine habitats	R	HP	T	yes	to check	yes	To check. Likely monitoring of flow	
2.2.6.	Disturbance, damage and loss of mangrove habitats	R	LP	T	partial	in KZN yes, EC ad-hoc	no	ad-hoc	
2.3.	Disturbance, damage and loss of subtidal benthic habitats	R							
2.3.1.	Disturbance, damage and loss of coral reef habitats	R	MP	T	yes	ORI	no	ad-hoc	
2.3.2.	Disturbance, damage and loss of seagrass habitats	R	LP	T	no		no		
2.3.3.	Disturbance, damage and loss of macroalgal habitats	R	MP	S	no		no		
2.3.4.	Disturbance, damage and loss of soft sediment habitats	R	HP	S	no		no		

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)	R	HP	S	no		no		
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	R	HP	T	no	(ad-hoc)	no	(ad-hoc)	
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)	R	HP	S	no	(ad-hoc)	no	(ad-hoc)	
2.6.	Introduction of exotic non-native species, invasives and nuisance species	R	HP	T	no	(ad-hoc)	no	(ad-hoc)	
3.1.	Decline in populations of focal species								
3.1.1.	Decline in populations of marine mammals	NR							
3.1.2.	Decline in populations of cetaceans	NR							
3.1.3.	Decline in populations of seabirds	R	MP	T	Yes	Penguins -BCLME, Cormorants -BCLME	Yes	DEAF	
3.1.4.	Decline in populations of turtles	R	MP	T	Yes	KZN Wildlife, Nelson Mandela University, under contract to DEA	Yes	KZN Wildlife, Nelson Mandela University, under contract to DEA	
3.2.	Decline in populations of commercial fish stocks								
3.2.1.	Decline in populations of sharks and rays	R	HP	T	Yes	Species specific, DEF, Port Elizabeth, National Museums	Yes	DEAF for demersal species and pelagics	

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
3.2.2.	Decline in populations of large pelagics	R	LP	T	Yes	DEAF	Yes	DEAF from catch data	
3.2.3.	Decline in populations of small pelagics	R	LP	NT	Yes	DEAF	Yes	DEAF from catch data	Wording should read "Distributional shift…" not decline
3.2.4.	Decline in populations of deep water demersals	R	LP	NT in ASCLMEs (but shared with BCLME)	Yes	DEAF	Yes	DEAF from catch data	Trawl fisheries from 80 m. Wording should read "Depleted population, recovering"
3.2.5.	Decline in populations of reef and demersal fish	R	HP	T	Yes	DEAF	Yes	DEAF	Linefish (not reef and demersals) such as snook, yellowtail
3.3.	Decline in populations of commercial invertebrates								
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)	R	MP	T	Yes (scattered)	Scattered datasets, DEAF, NGOs, Universities	Yes	DEAF	
3.3.2.	Decline in populations of abalone	R	HP	T	Yes	DEAF	Yes	DEAF	
3.3.3.	Decline in populations of cephalopods	NR							
3.3.4.	Decline in populations of sea cucumbers	NR							

Issue No.	Issue	Relevance	Importance	Transboundary	Baseline	Baseline data held by	Monitoring	Monitoring by	Notes / Comments
3.3.5.	Decline in populations of sea urchins	NR							
3.3.6.	Decline in populations of prawns and shrimp	R	MP	T	Yes	DEAF	Yes	DEAF	
3.3.7.	Decline in populations of lobsters	NR							
3.3.8.	Decline in populations of crayfish (deep sea lobster)	NR							
3.3.9.	Decline in populations of crabs	NR							
3.4.	Excessive bycatch and discards	R	MP	T	Yes	DEAF	Yes	DEAF	
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)	FR	MP	T	Yes	Baseline with Universities, specific studies	Yes	Aquaculture farms, Universities, site specific studies	

* distinguished between shared issues and transboundary issues

Table A6.9.2: South Africa Prioritisation 2 Results

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
1.1.	Alteration of natural river flow and changes in freshwater input and sediment load	VH	H	VH	VH	VH	M	M	M	H
1.2.	Degradation of ground and surface water quality	VH	VH	H	VH	H	H	M	H	VH
1.3.	Degradation of coastal and marine water quality									
1.3.1	Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources	LR	M	LR	LR	H	LR	M	M	M
1.3.2	Nutrient enrichment from land-based (domestic , industrial, agriculture, livestock) and marine (mariculture) sources	M	LR	LR	LR	H	LR	M	M	M
1.3.3	Chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources	LR	LR	LR	LR	LR	LR	M	L	LR
1.3.4	Suspended solids in coastal waters due to human activities on land and in the coastal zone	LR	LR	LR	LR	LR	LR	H	M	M
1.3.5	Solid wastes / marine debris (plastics etc.) from shipping and land-based-sources	LR	LR	LR	LR	H	LR	H	M	M
1.3.6	Oil spills (drilling, exploitation, transport, processing, storage, shipping).	M	LR	LR	LR	M	M	LR	M	M
2.1.	Shoreline change, due to modification, land reclamation and coastal erosion	L	H	L	M	VH	VH	L	VH	H
2.2.	Disturbance, damage and loss of coastal, watershed and upland habitats									
2.2.1.	Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)	H	H	H	H	VH	VH	L	VH	VH
2.2.2.	Disturbance, damage and loss of coastal forest habitats	H	H	L	H	VH	VH	H	VH	VH

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
2.2.3.	Disturbance, damage and loss of coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation)	H	H	H	H	VH	VH	M	VH	VH
2.2.4.	Disturbance, damage and loss of wetland habitats	H	H	H	H	VH	VH	M	VH	VH
2.2.5.	Disturbance, damage and loss of estuarine habitats	H	H	H	H	VH	VH	M	VH	VH
2.2.6.	Disturbance, damage and loss of mangrove habitats	H	M	L	M	VH	VH	H	VH	H
2.3.	Disturbance, damage and loss of subtidal benthic habitats									
2.3.1.	Disturbance, damage and loss of coral reef habitats	H	M	L	M	VH	VH	M	VH	H
2.3.2.	Disturbance, damage and loss of seagrass habitats	L	L	L	L	VH	VH	M	VH	H
2.3.3.	Disturbance, damage and loss of macroalgal habitats	H	M	L	M	VH	H	H	H	H
2.3.4.	Disturbance, damage and loss of soft sediment habitats	H	H	H	H	VH	VH	M	VH	H
2.3.5.	Disturbance, damage and loss of deep water habitats (including sea mounts)	H	L	L	M	VH	L	M	M	M
2.4.	Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, neritic 30-200m and oceanic >200m depth)	M	M	M	M	M	M	M	M	M
2.5.	Increase in the occurrence of harmful or toxic algal blooms (HABs)	L	M	L	M	H	H	L	H	H
2.6.	Introduction of exotic non-native species, invasives and nuisance species	M	H	M	M	H	H	L	H	H
3.1.	Decline in populations of focal species									

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
3.1.1.	Decline in populations of marine mammals									
3.1.2.	Decline in populations of cetaceans									
3.1.3.	Decline in populations of seabirds	VH	M	L	M	M	L	M	M	M
3.1.4.	Decline in populations of turtles	VH	M	L	M	H	M	H	H	H
3.2.	Decline in populations of commercial fish stocks									
3.2.1.	Decline in populations of sharks and rays	VH	M	L	M	VH	M	H	H	H
3.2.2.	Decline in populations of large pelagics	M	M	L	M	VH	H	H	H	H
3.2.3.	Decline in populations of small pelagics	H	H	L	H	M	M	H	M	H
3.2.4.	Decline in populations of deep water demersals	H	H	L	H	M	M	H	M	H
3.2.5.	Decline in populations of reef and demersal fish	H	H	L	H	H	H	M	H	H
3.3.	Decline in populations of commercial invertebrates									
3.3.1.	Decline in populations of molluscs (bivalves, gastropods)	M	H	L	M	H	H	M	H	H
3.3.2.	Decline in populations of abalone	M	H	L	M	L	M	M	M	M
3.3.3.	Decline in populations of cephalopods									
3.3.4.	Decline in populations of sea cucumbers									

		Severity				Scope				
Issue No.	Issue	Environmental Impacts	Socio-economic Impacts	Macro-economic Impacts	**Severity Overall**	Transboundary	Scale of benefits	Feasibility of solution	**Scope Overall**	**Overall rating**
3.3.5.	Decline in populations of sea urchins									
3.3.6.	Decline in populations of prawns and shrimp	M	M	L	M	H	H	M	H	H
3.3.7.	Decline in populations of lobsters									
3.3.8.	Decline in populations of crayfish									
3.3.9.	Decline in populations of crabs									
3.4.	Excessive bycatch and discards	H	M	L	M	H	H	M	H	H
3.5.	Expansion of mariculture industry (biosecurity, diseases in wildstocks, exotics, habitat implications, water quality)	M	L	L	L	M	M	H	M	M

Figure 6.9.1.a: South Africa MAC01 Impact Analysis for Issue (1.1) Alteration of natural river flow and changes in freshwater input and sediment load.

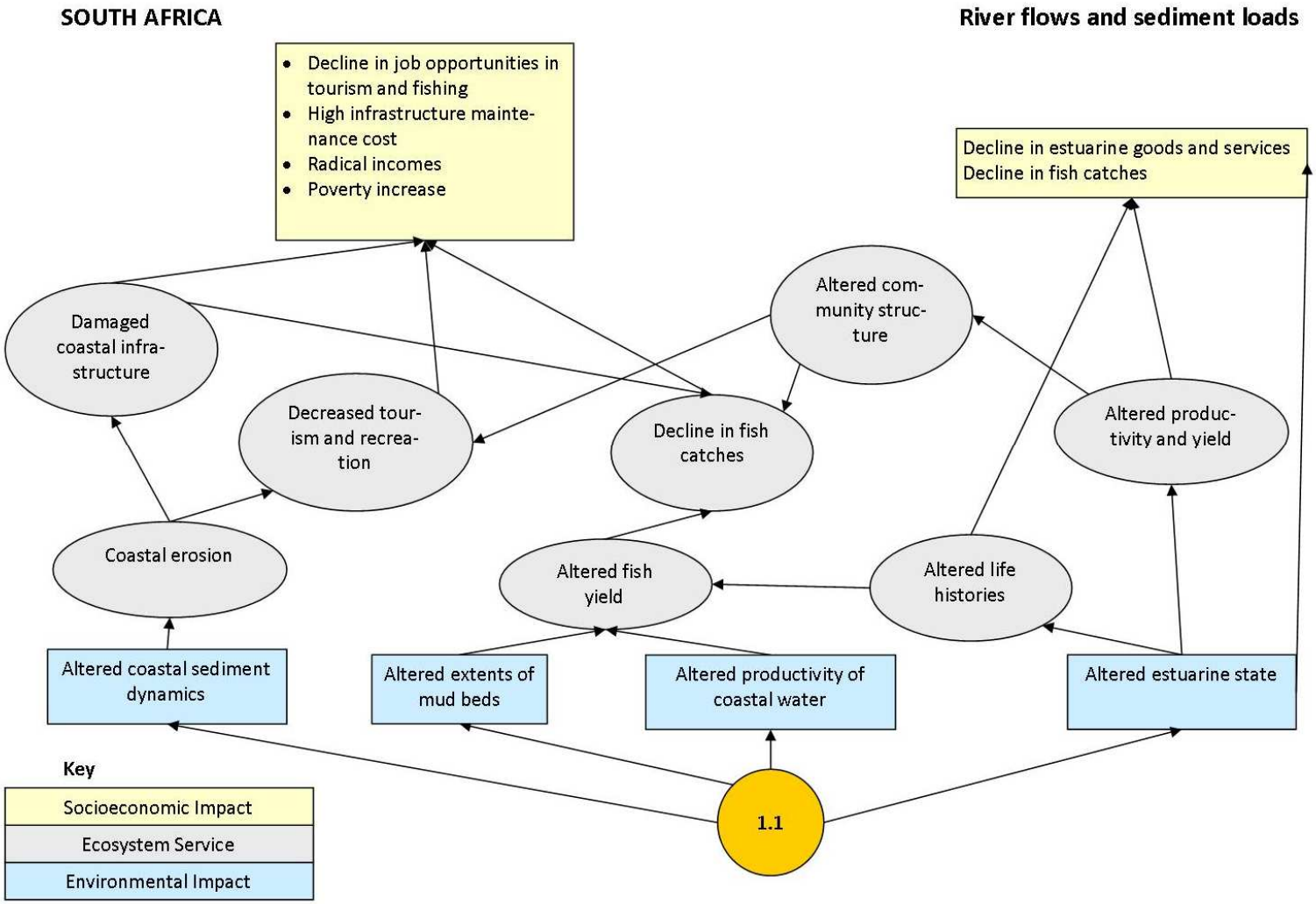


Figure 6.9.1.b: South Africa MAC01 Causal Chain Analysis for Issue (1.1) Alteration of natural river flow and changes in freshwater input and sediment load.

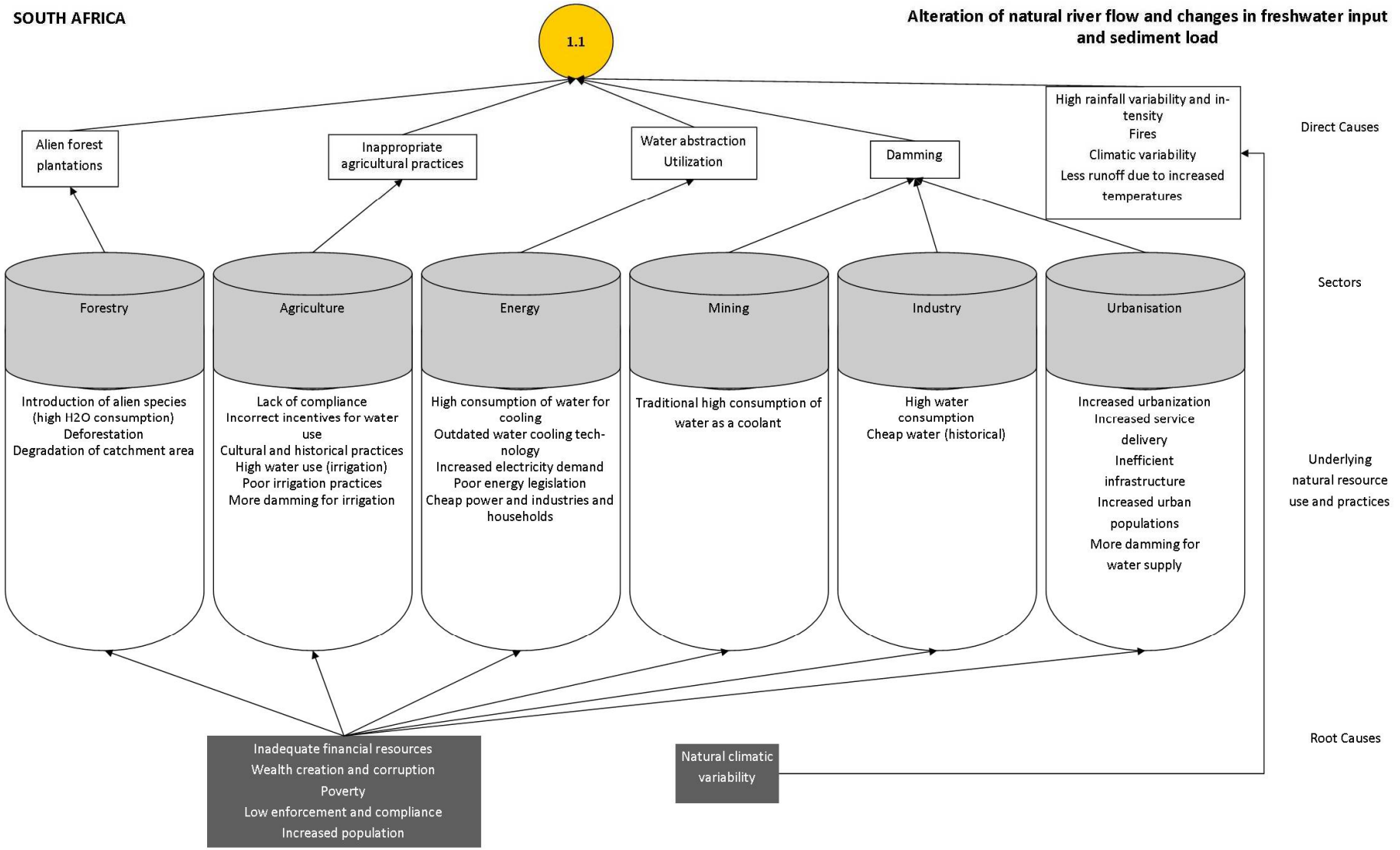


Figure 6.9.2.a: South Africa MAC01 Impact Analysis for Issue (1.2) Degradation of surface and ground water quality.

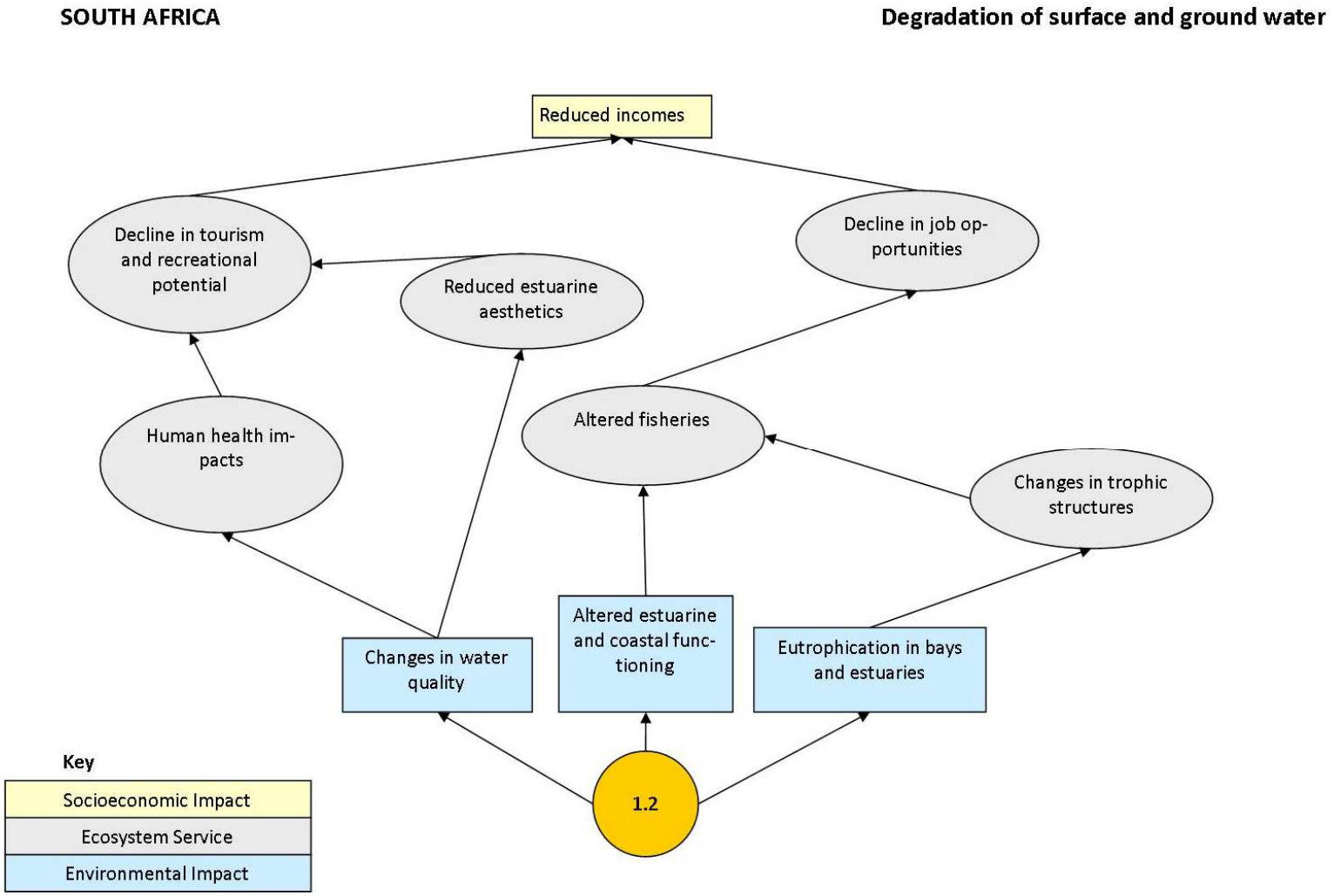


Figure 6.9.2.b: South Africa MAC01 Causal Chain Analysis for Issue (1.2) Degradation of surface and ground water quality.

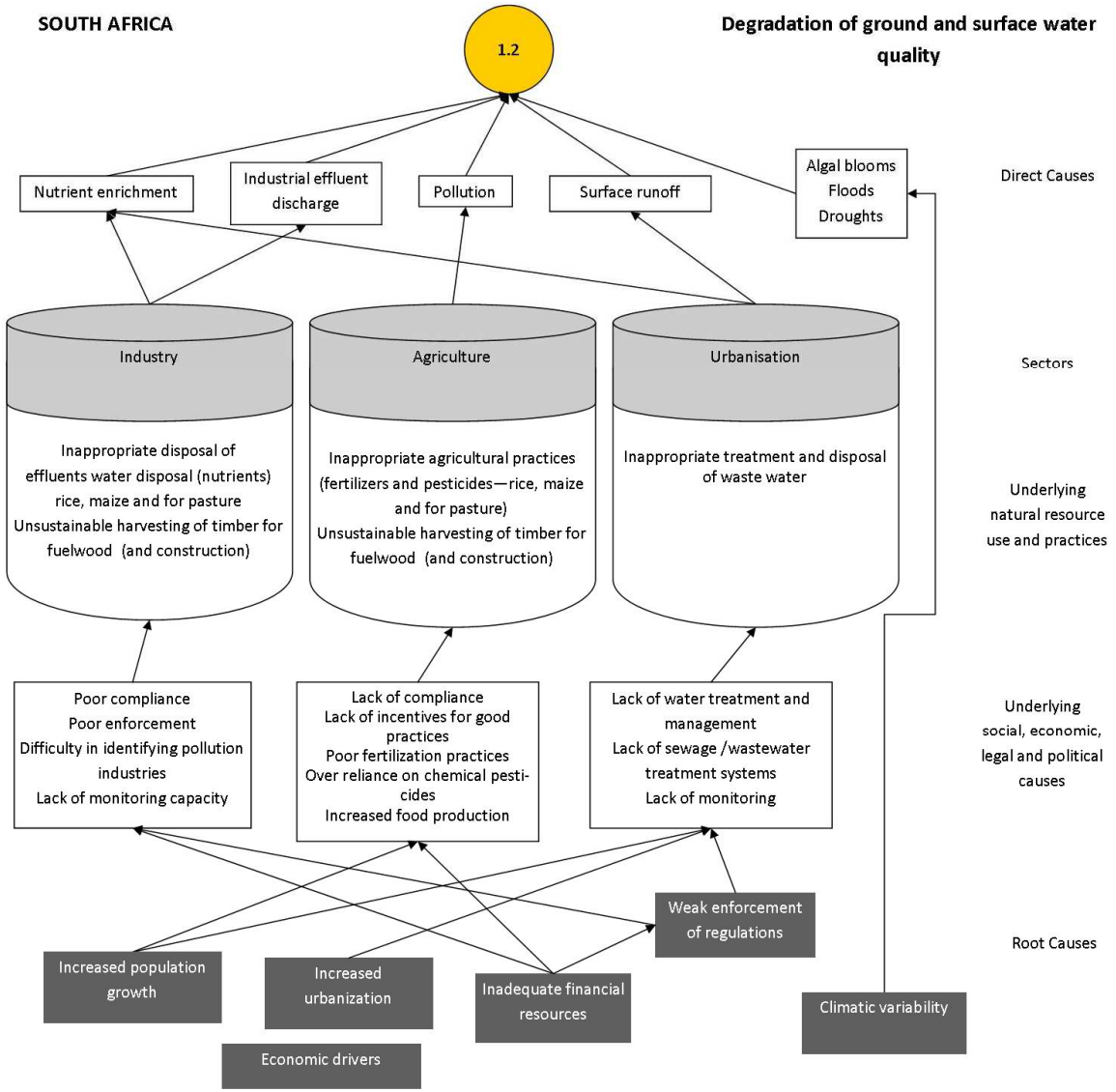

SOUTH AFRICA
1.2
Degradation of ground and surface water quality
Nutrient enrichment
Industrial effluent discharge
Pollution
Surface runoff
Algal blooms
Floods
Droughts
Direct Causes
Industry
Agriculture
Urbanisation
Sectors
Inappropriate disposal of effluents water disposal (nutrients) rice, maize and for pasture
Unsustainable harvesting of timber for fuelwood (and construction)
Inappropriate agricultural practices (fertilizers and pesticides—rice, maize and for pasture)
Unsustainable harvesting of timber for fuelwood (and construction)
Inappropriate treatment and disposal of waste water
Underlying natural resource use and practices
Poor compliance
Poor enforcement
Difficulty in identifying pollution industries
Lack of monitoring capacity
Lack of compliance
Lack of incentives for good practices
Poor fertilization practices
Over reliance on chemical pesti-cides
Increased food production
Lack of water treatment and management
Lack of sewage /wastewater treatment systems
Lack of monitoring
Underlying social, economic, legal and political causes
Weak enforcement of regulations
Root Causes
Increased population growth
Increased urbanization
Inadequate financial resources
Climatic variability
Economic drivers

Figure 6.9.3.a: South Africa MAC02 Impact Analysis for Issue (2.2.3) Disturbance, damage and loss of coastal habitats.

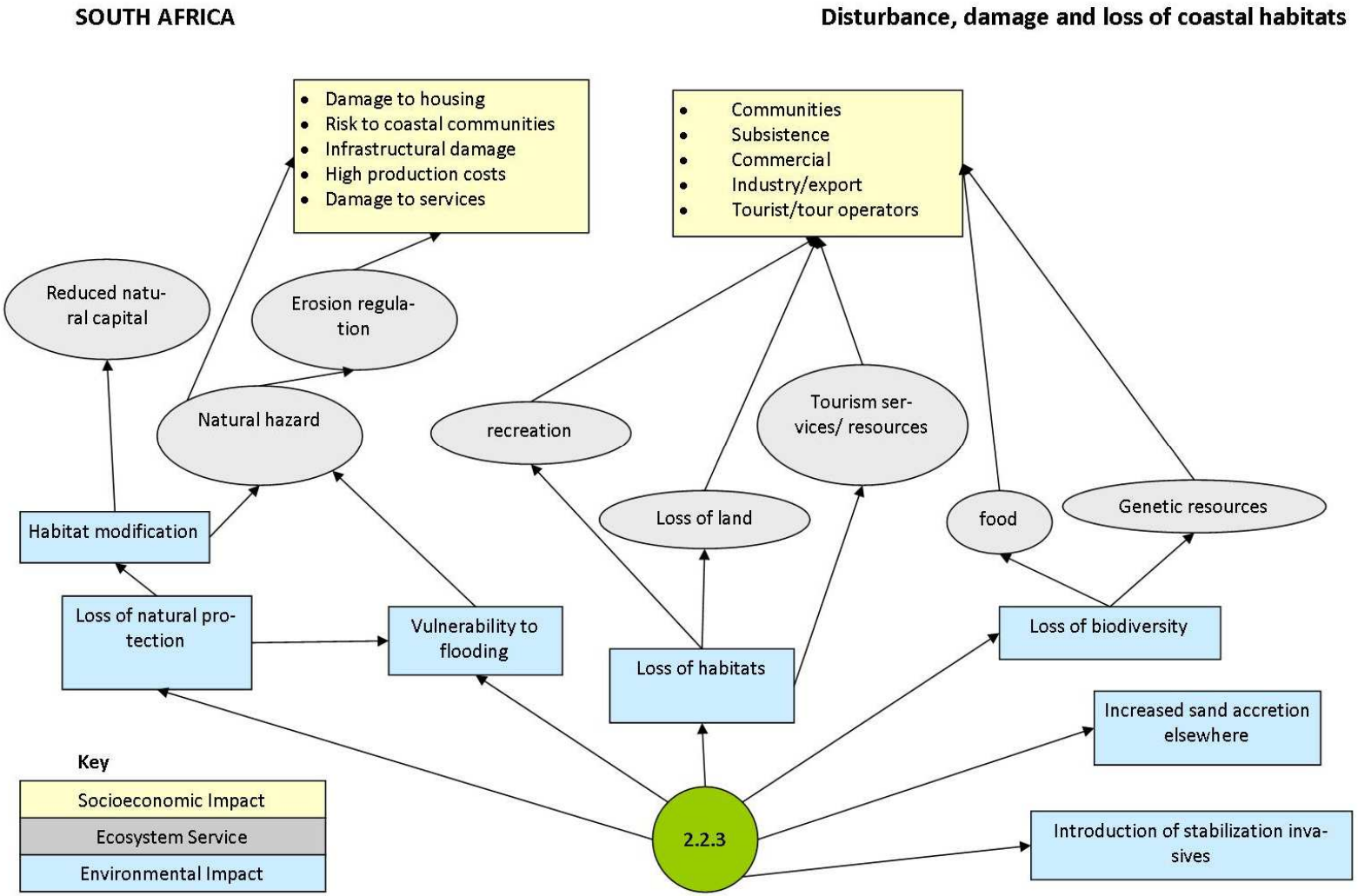


Figure 6.9.3.b: South Africa MAC02 Causal Chain Analysis for Issue (2.2.3) Disturbance, damage and loss of coastal habitats.

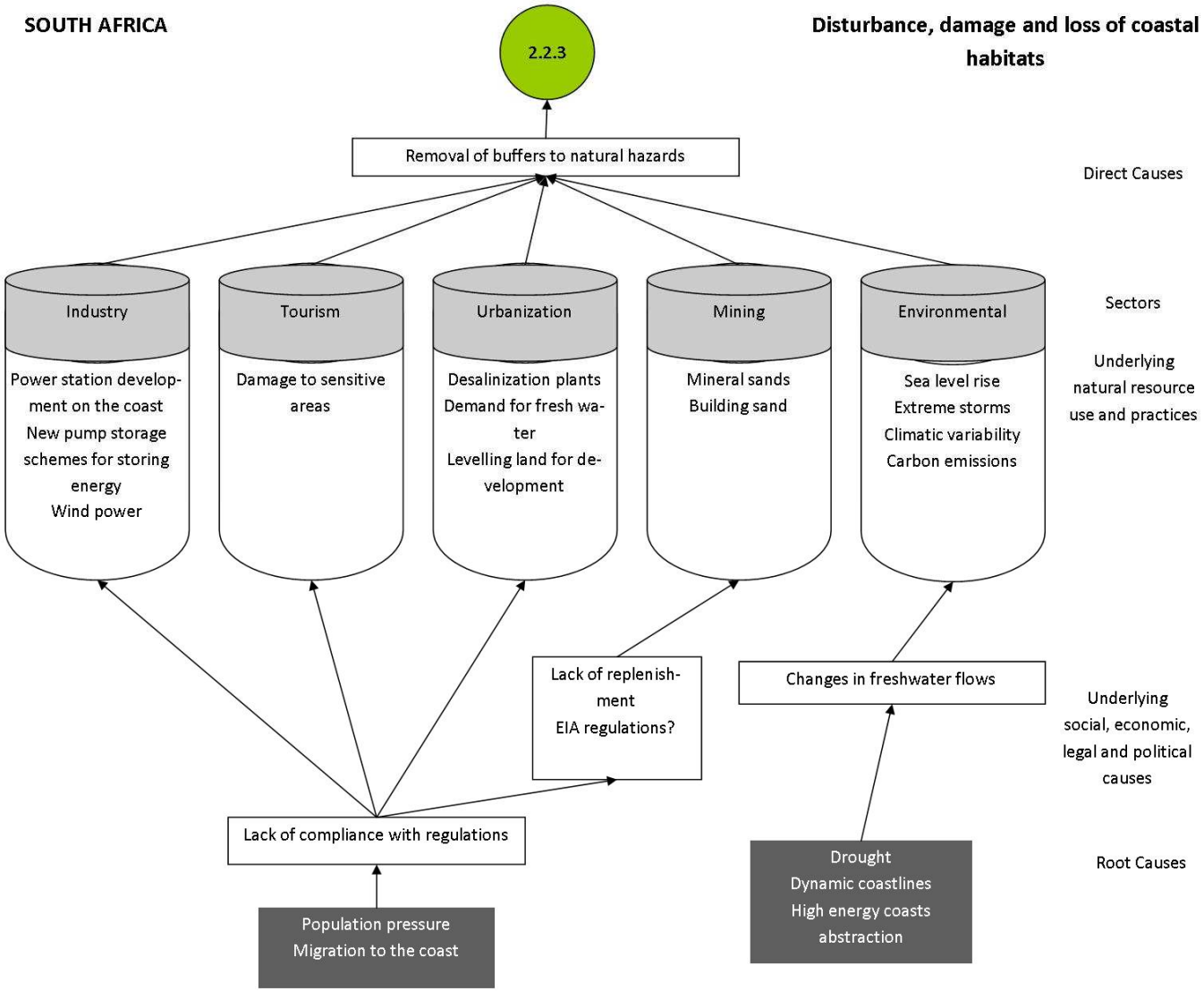


Figure 6.9.4.a: South Africa MAC02 Impact Analysis for Issue (2.2.4) Disturbance, damage and loss of wetland habitats.

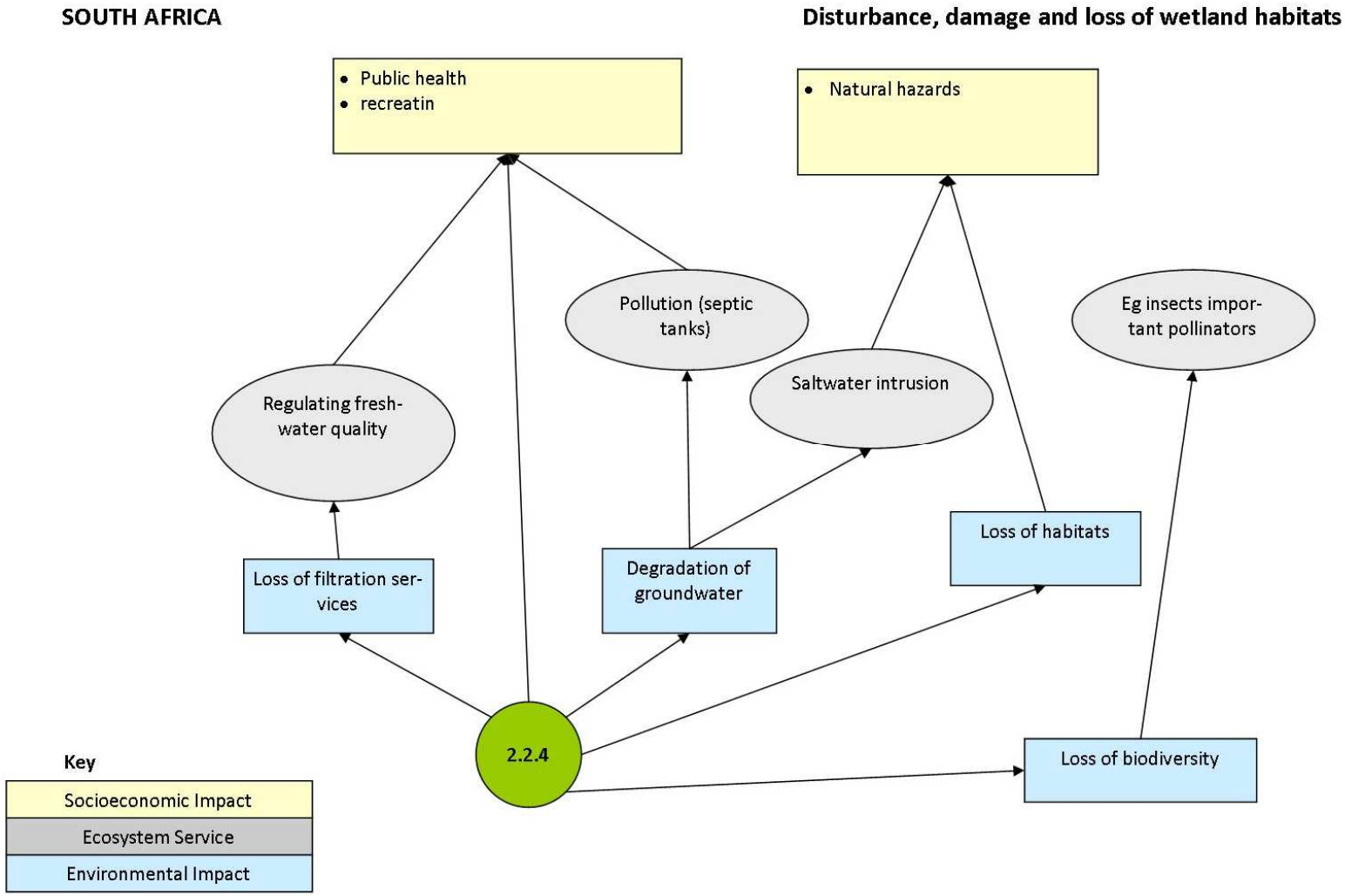


Figure 6.9.4.b: South Africa MAC02 Causal Chain Analysis for Issue (2.2.4) Disturbance, damage and loss of wetland habitats.

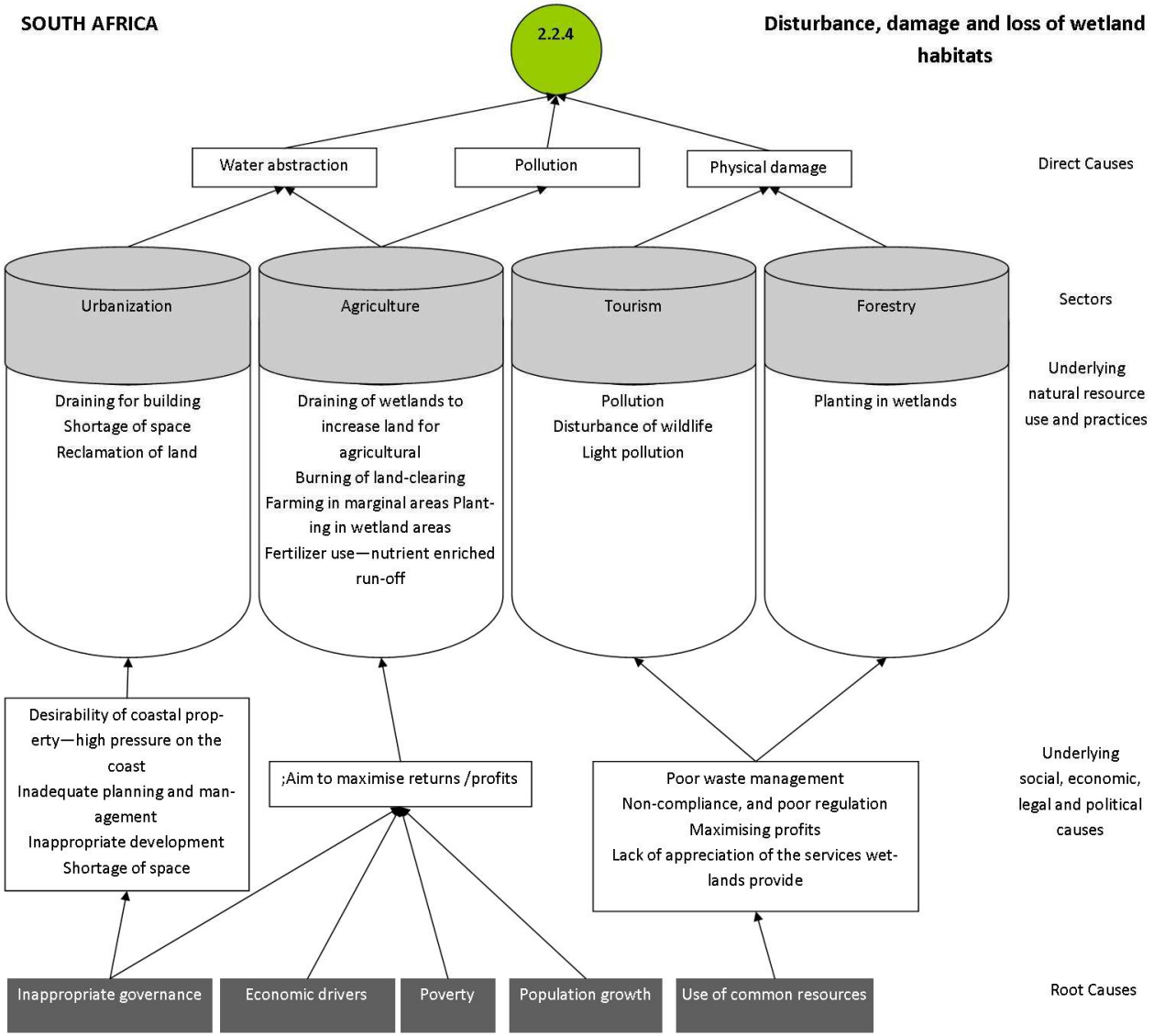


Figure 6.9.5.a: South Africa MAC02 Impact Analysis for Issue (2.3.4) Disturbance, damage and loss of soft sediment habitats.

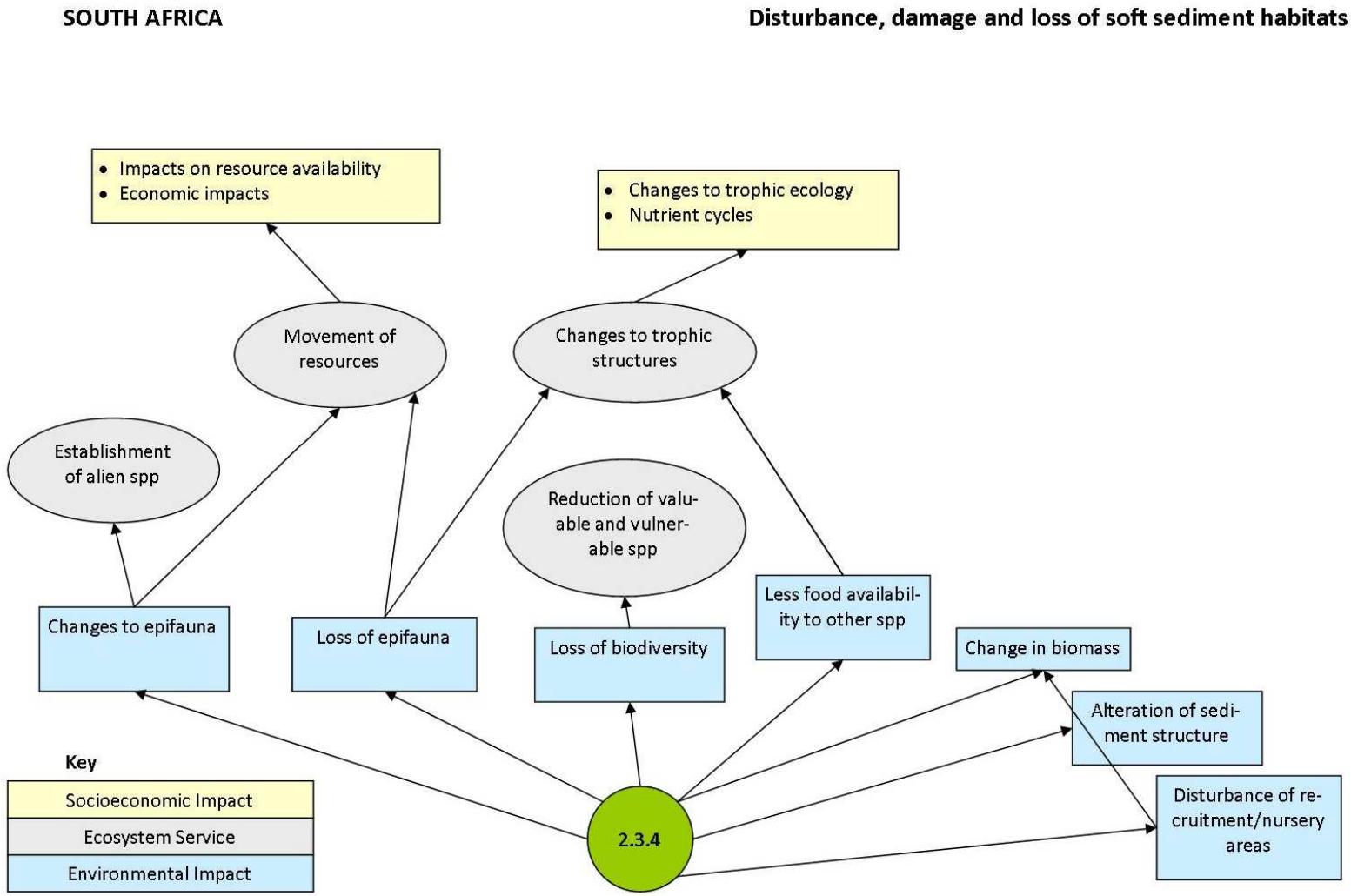


Figure 6.9.5.b: South Africa MAC02 Causal Chain Analysis for Issue (2.3.4) Disturbance, damage and loss of soft sediment habitats.

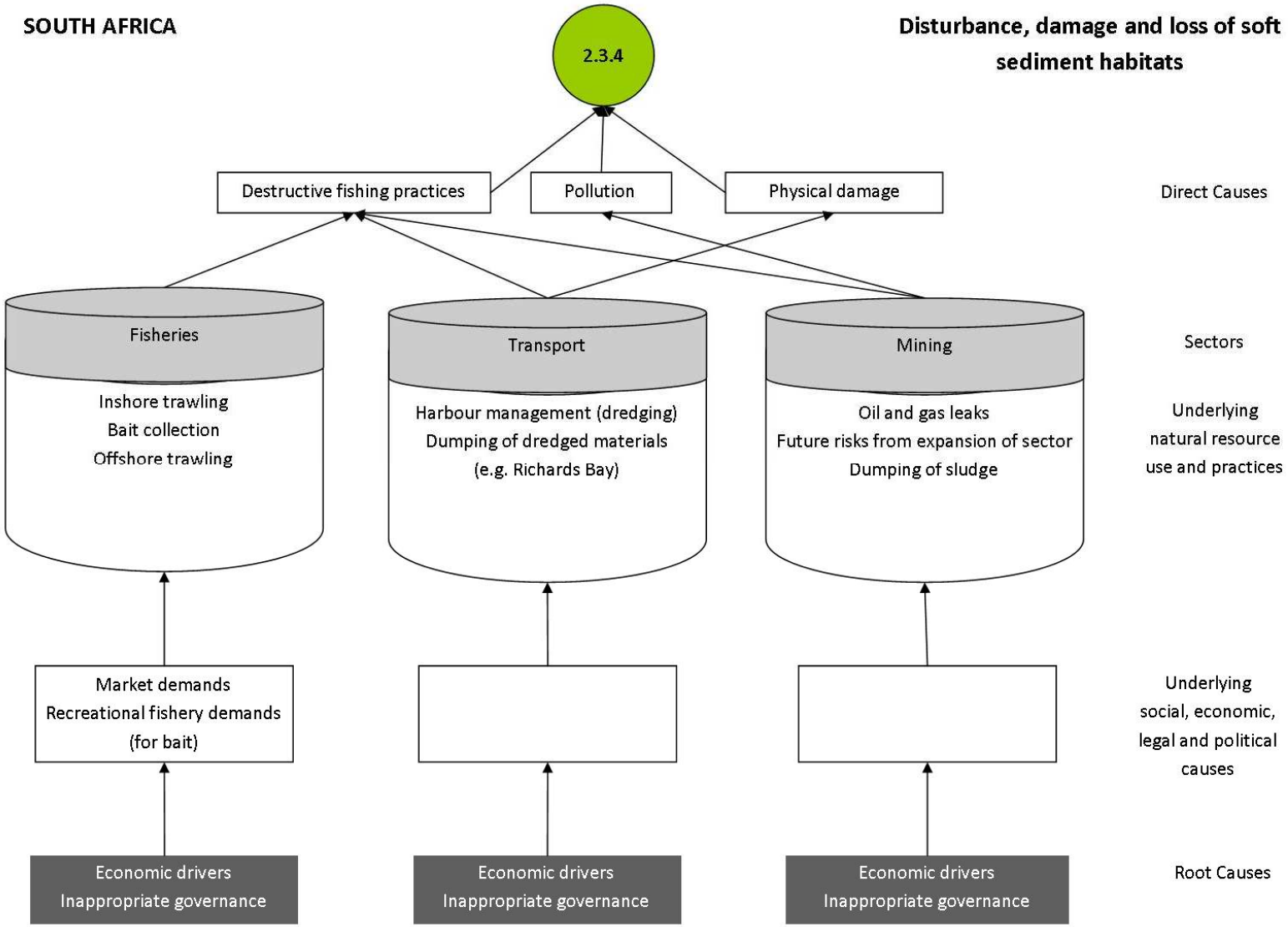

SOUTH AFRICA
2.3.4
Disturbance, damage and loss of soft sediment habitats
Destructive fishing practices
Pollution
Physical damage
Direct Causes
Fisheries
Transport
Mining
Sectors
Inshore trawling
Bait collection
Offshore trawling
Harbour management (dredging)
Dumping of dredged materials
(e.g. Richards Bay)
Oil and gas leaks
Future risks from expansion of sector
Dumping of sludge
Underlying natural resource use and practices
Market demands
Recreational fishery demands
(for bait)
Underlying social, economic, legal and political causes
Economic drivers
Inappropriate governance
Economic drivers
Inappropriate governance
Economic drivers
Inappropriate governance
Root Causes

Figure 6.9.6.a: South Africa MAC03 Impact Analysis for Issue (3.2.1) Declines in populations of sharks and rays.

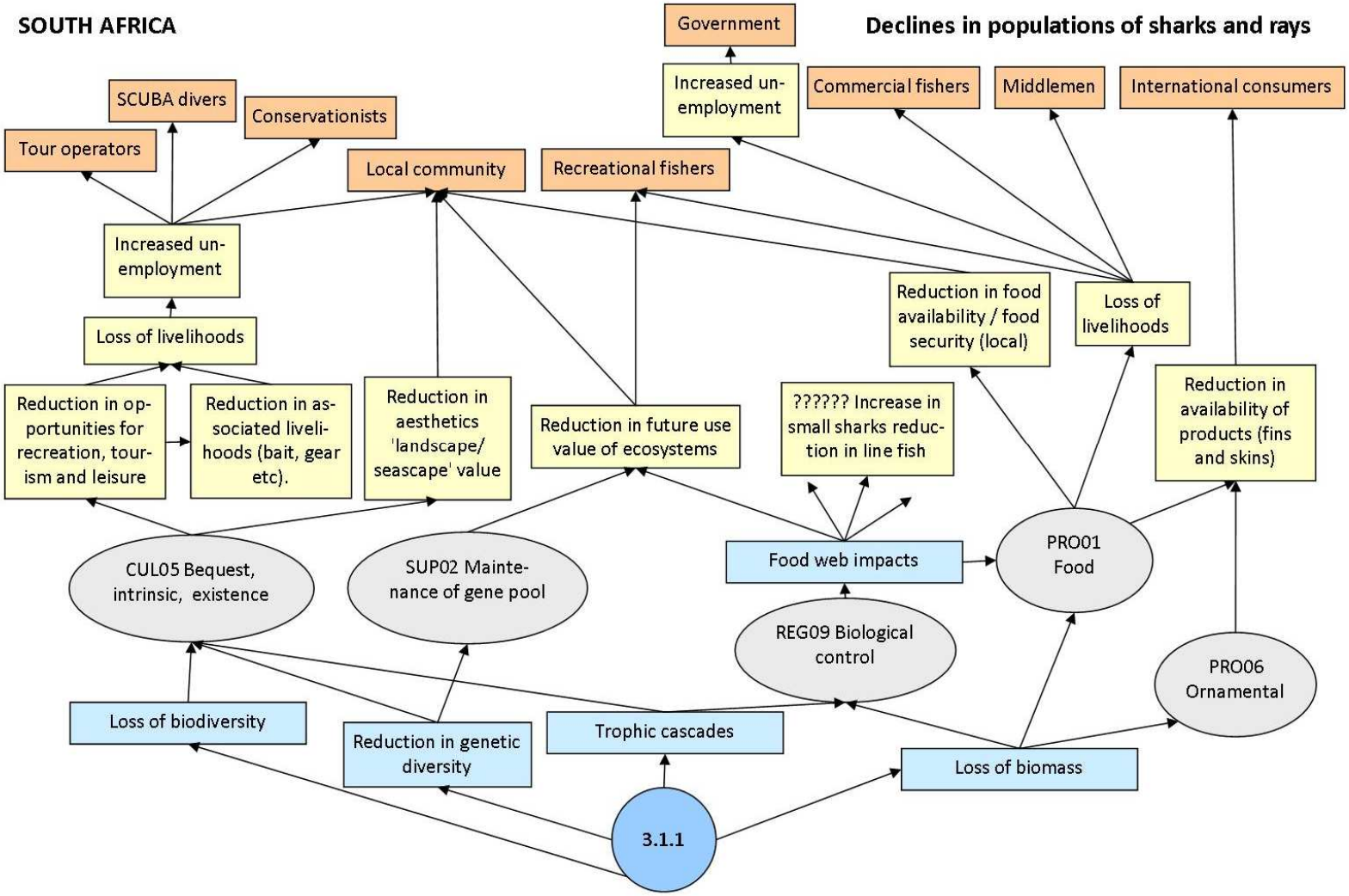


Figure 6.9.6.b: South Africa MAC03 Causal Chain Analysis for Issue (3.2.1) Declines in populations of sharks and rays.

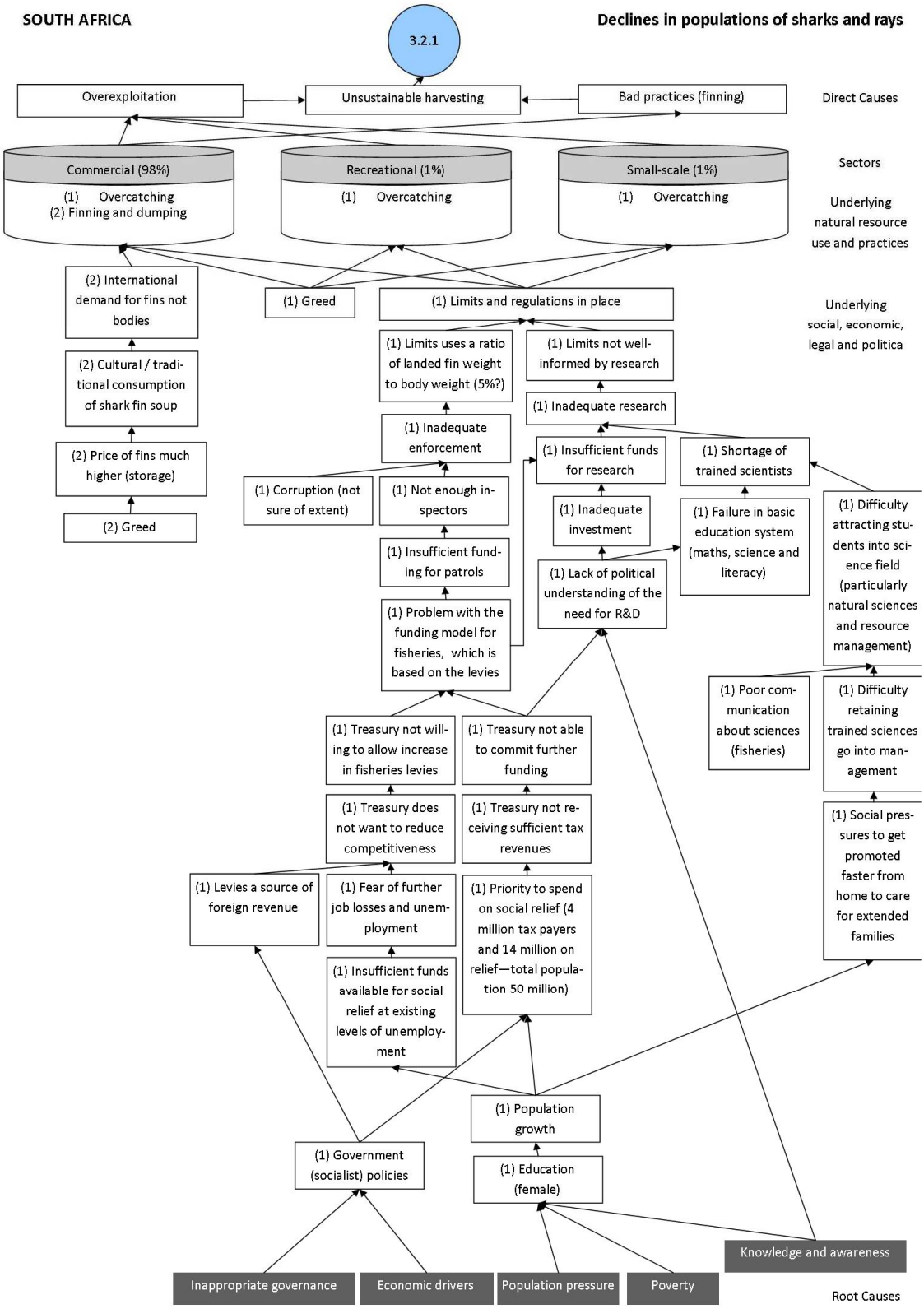


Figure 6.9.7.a: South Africa MAC03 Impact Analysis for Issue (3.2.5) Declines in populations of reef and pelagic fish (line fish).

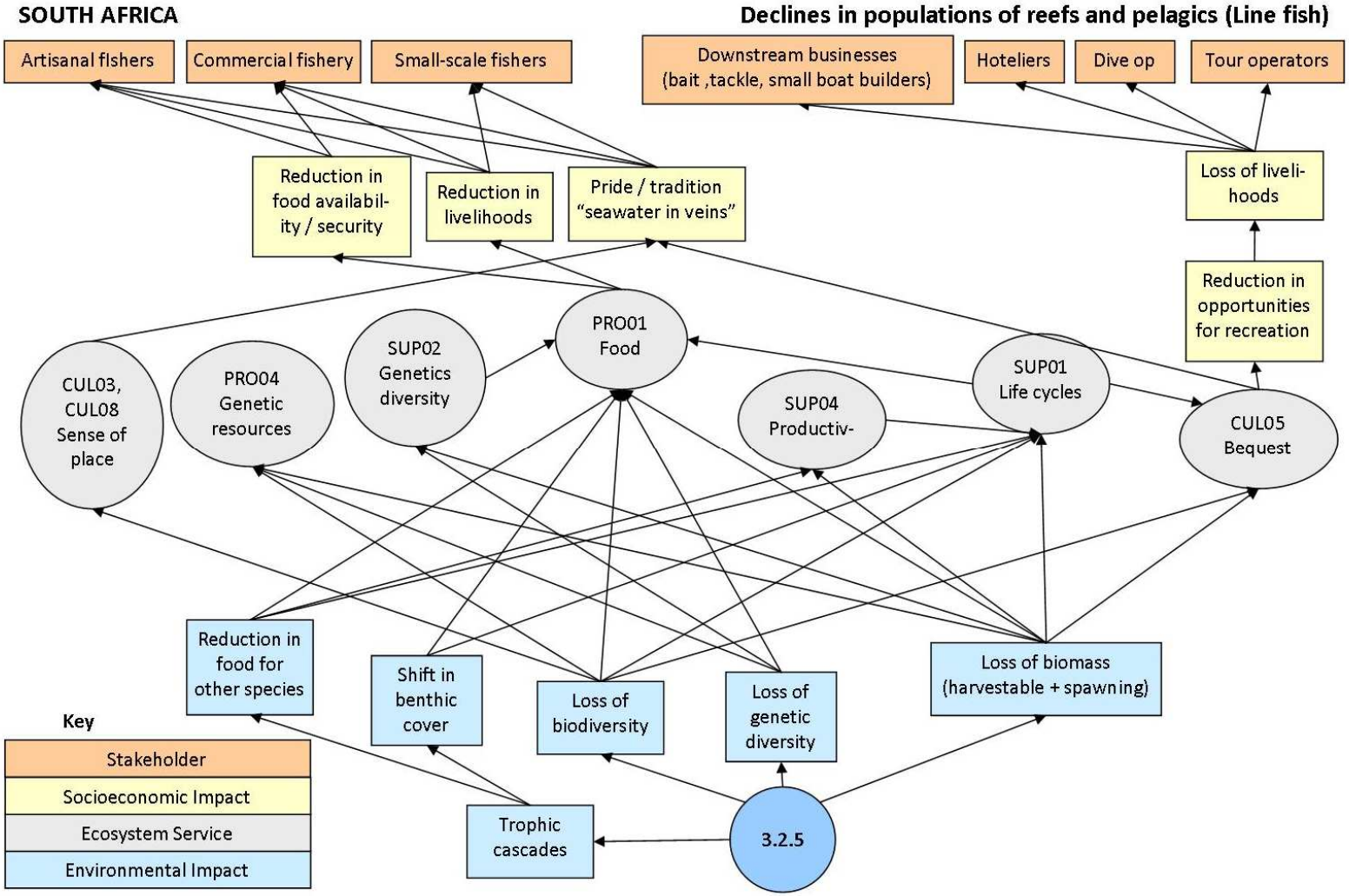
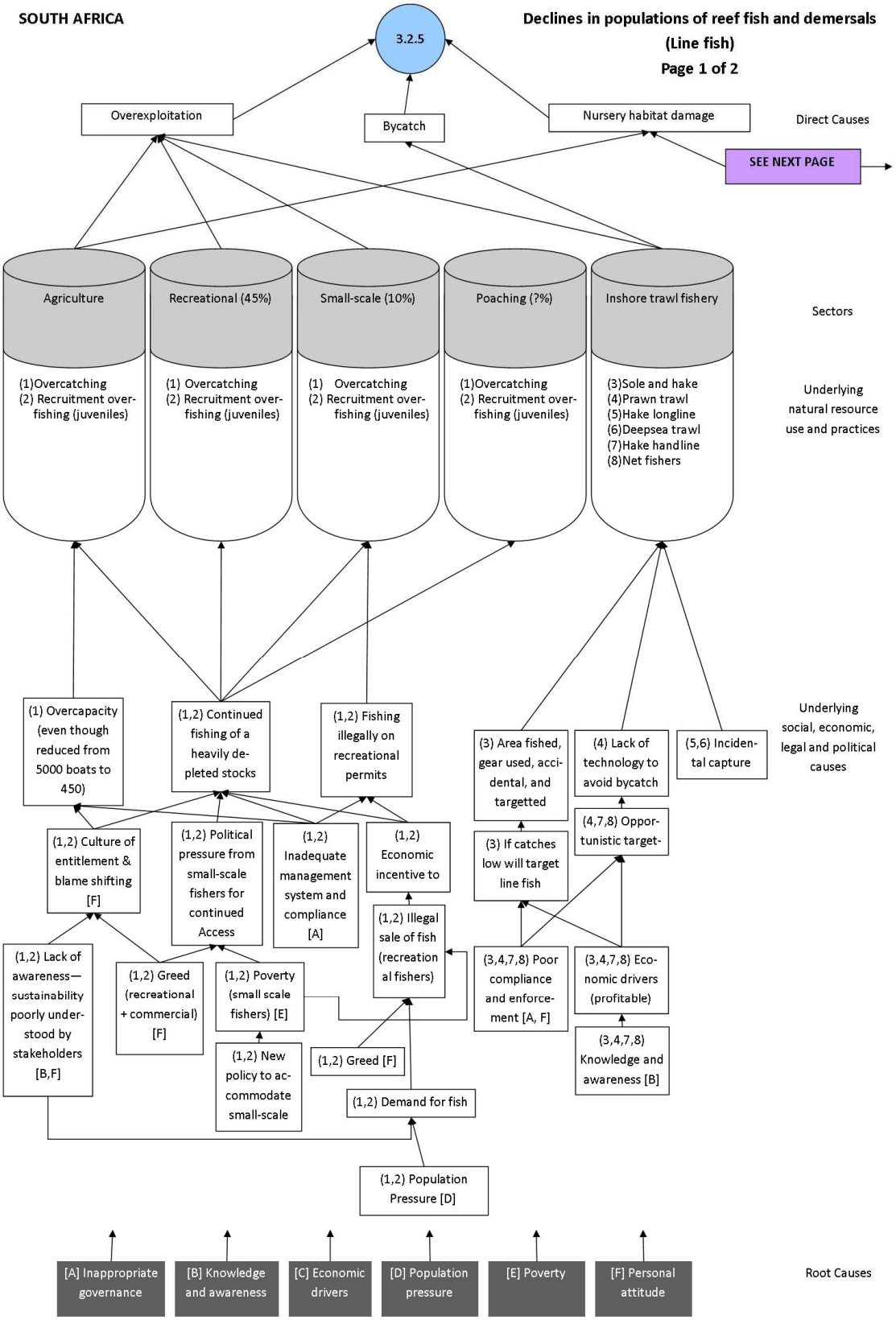
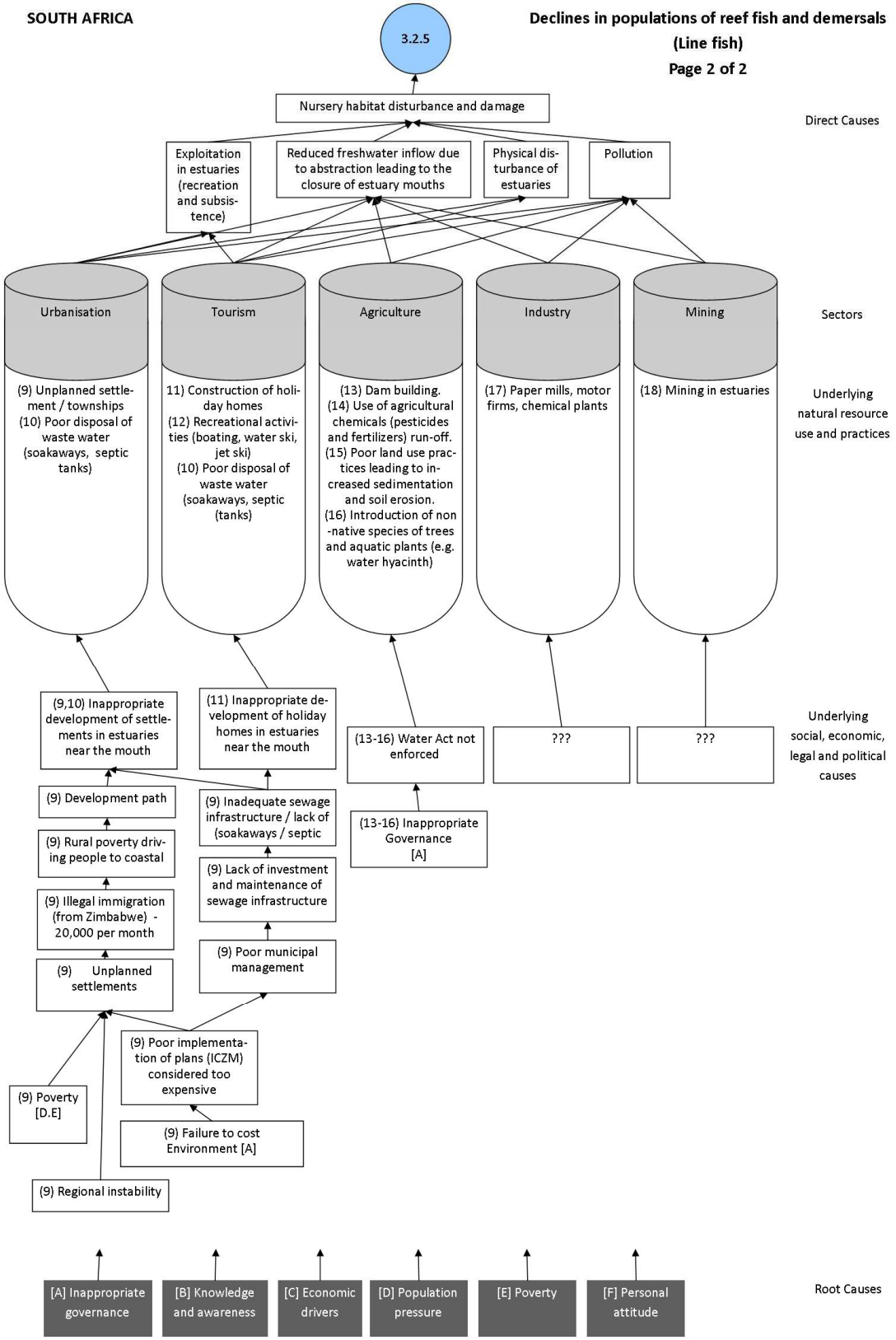


Figure 6.9.7.b: South Africa MAC03 Causal Chain Analysis for Issue (3.2.5) Declines in populations of reef and pelagic fish (line fish).




SOUTH AFRICA
3.2.5
Declines in populations of reef fish and demersals (Line fish)
Page 2 of 2
Nursery habitat disturbance and damage
Direct Causes
Exploitation in estuaries (recreation and subsis-tence)
Reduced freshwater inflow due to abstraction leading to the closure of estuary mouths
Physical dis-turbance of estuaries
Pollution
Urbanisation
Tourism
Agriculture
Industry
Mining
Sectors
(9) Unplanned settle-ment / townships (10) Poor disposal of waste water (soakaways, septic tanks)
11) Construction of holi-day homes (12) Recreational activi-ties (boating, water ski, jet ski) (10) Poor disposal of waste water (soakaways, septic (tanks)
(13) Dam building. (14) Use of agricultural chemicals (pesticides and fertilizers) run-off. (15) Poor land use prac-tices leading to in-creased sedimentation and soil erosion. (16) Introduction of non -native species of trees and aquatic plants (e.g. water hyacinth)
(17) Paper mills, motor firms, chemical plants
(18) Mining in estuaries
Underlying natural resource use and practices
(9,10) Inappropriate development of settle-ments in estuaries near the mouth
(11) Inappropriate de-velopment of holiday homes in estuaries near the mouth
(13-16) Water Act not enforced
???
???
Underlying social, economic, legal and political causes
(9) Development path
(9) Inadequate sewage infrastructure / lack of (soakaways / septic
(13-16) Inappropriate Governance [A]
(9) Rural poverty driv-ing people to coastal
(9) Lack of investment and maintenance of sewage infrastructure
(9) Illegal immigration (from Zimbabwe) - 20,000 per month
(9) Poor municipal management
(9) Unplanned settlements
(9) Poor implementa-tion of plans (ICZM) considered too expensive
(9) Poverty [D.E]
(9) Failure to cost Environment [A]
(9) Regional instability
[A] Inappropriate governance
[B] Knowledge and awareness
[C] Economic drivers
[D] Population pressure
[E] Poverty
[F] Personal attitude
Root Causes