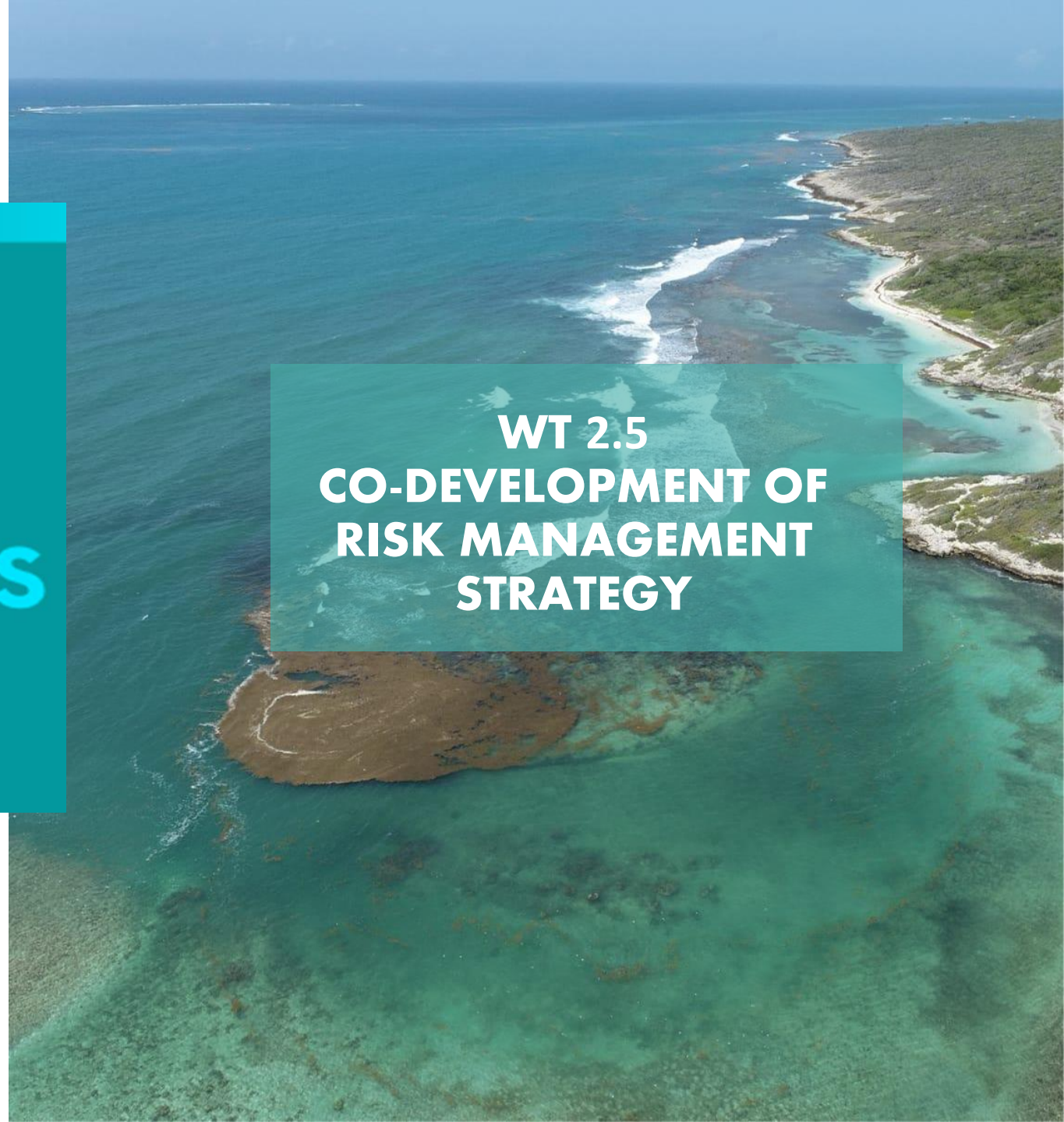
MONA GEOINFORMATICS

MONA GEOINFORMATICS INSTITUTE

2021

SARTRAC SCIENTIFIC SARGASSUM SERIES

RISK MANAGEMENT STRATEGY FOR SARGASSUM STRANDING IN JAMAICA AND THE CARIBBEAN



WT 2.5 CO-DEVELOPMENT OF RISK MANAGEMENT STRATEGY

Prepared by:

Dr. Kerrine Senior

Dr. Ava Maxam

Mr. Romario Anderson

SARTRAC (Teleconnected SARgassum risks across the Atlantic: building capacity for TRansformational Adaptation in the Caribbean and West Africa)

SARTRAC: OUR FOCUS

To identify new transformational developmental opportunities that build resilience equitably, for people affected by changing biomes / ecosystems in least developed countries.

Partners:

Funders:

Work Packages:

WP1-Drivers

WP2-Monitoring

WP3-Transformational Adaptation

WP4-Governance

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KEY OUTPUTS

SARGASSUM DETECTION MODEL

PHYSICAL CHARACTERISTICS OF SHORELINE

VOLUMETRIC QUANTIFICATION OF SARGASSUM

SARGASSUM DETECTION MODEL

PHYSICAL CHARACTERISTICS OF SHORELINE

VOLUMETRIC QUANTIFICATION OF SARGASSUM

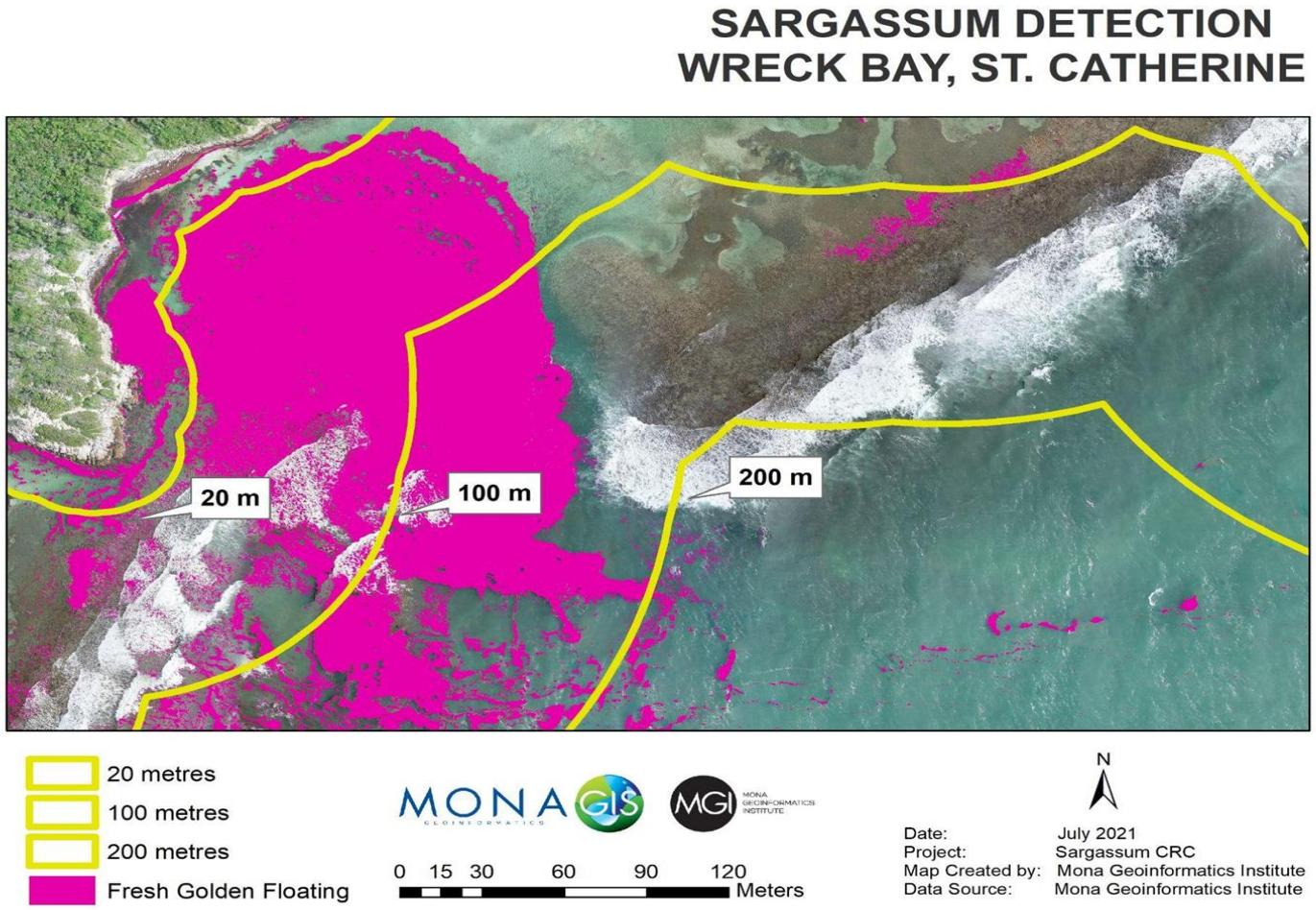
SARGASSUM DETECTION
SANDHILLS BAY, ST. CATHERINE

Comparative images illustrating inshore fresh golden sargassum detection at Sandhills Bay, St. Catherine.

SARGASSUM DETECTION MODEL

PHYSICAL CHARACTERISTICS OF SHORELINE

VOLUMETRIC QUANTIFICATION OF SARGASSUM



Inshore sargassum detection at Wreck Bay within 20m, 100m and 200m intervals of the coastline.

SARGASSUM DETECTION MODEL

PHYSICAL CHARACTERISTICS OF SHORELINE

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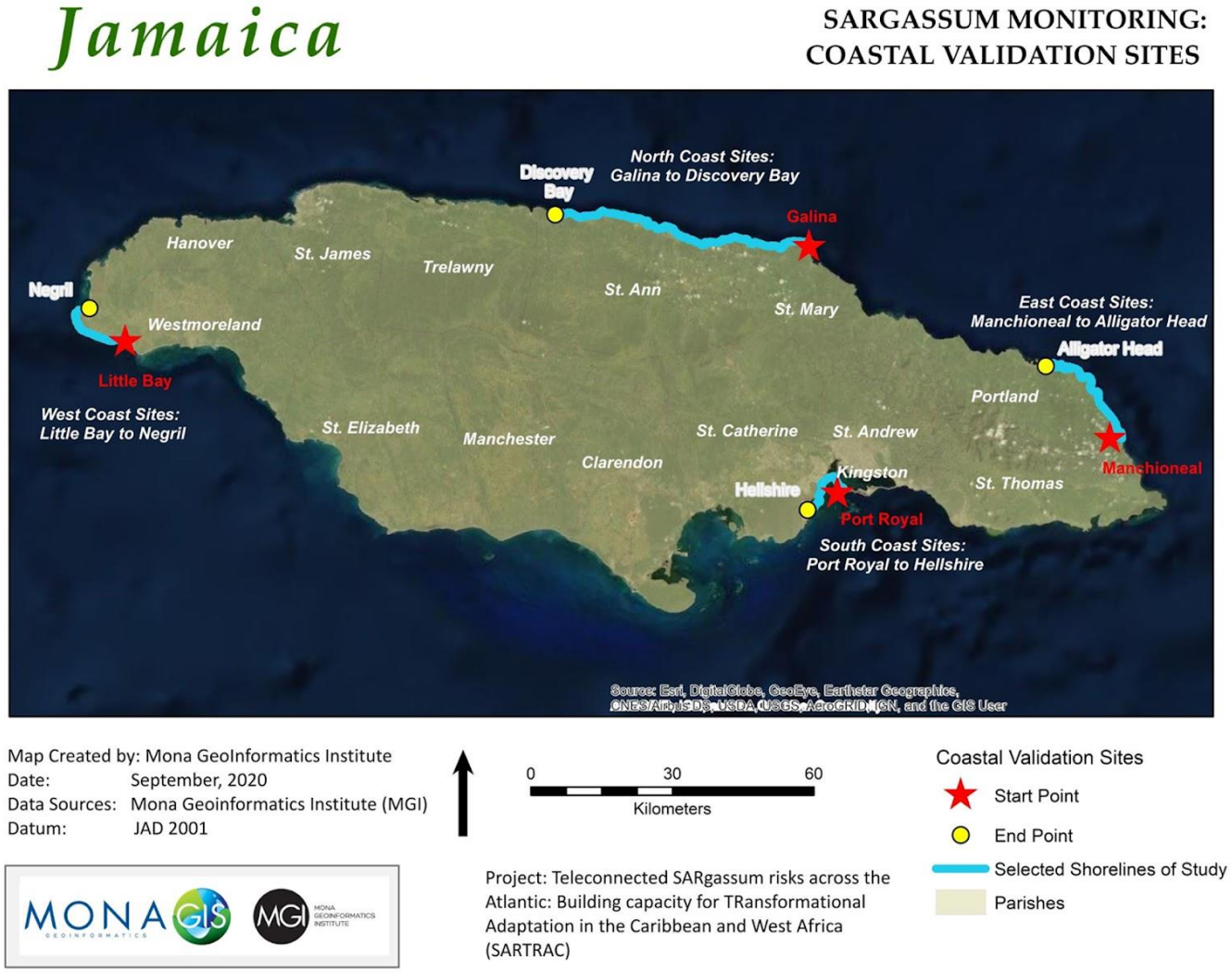

Map showing coastal validation sites

SARGASSUM DETECTION MODEL

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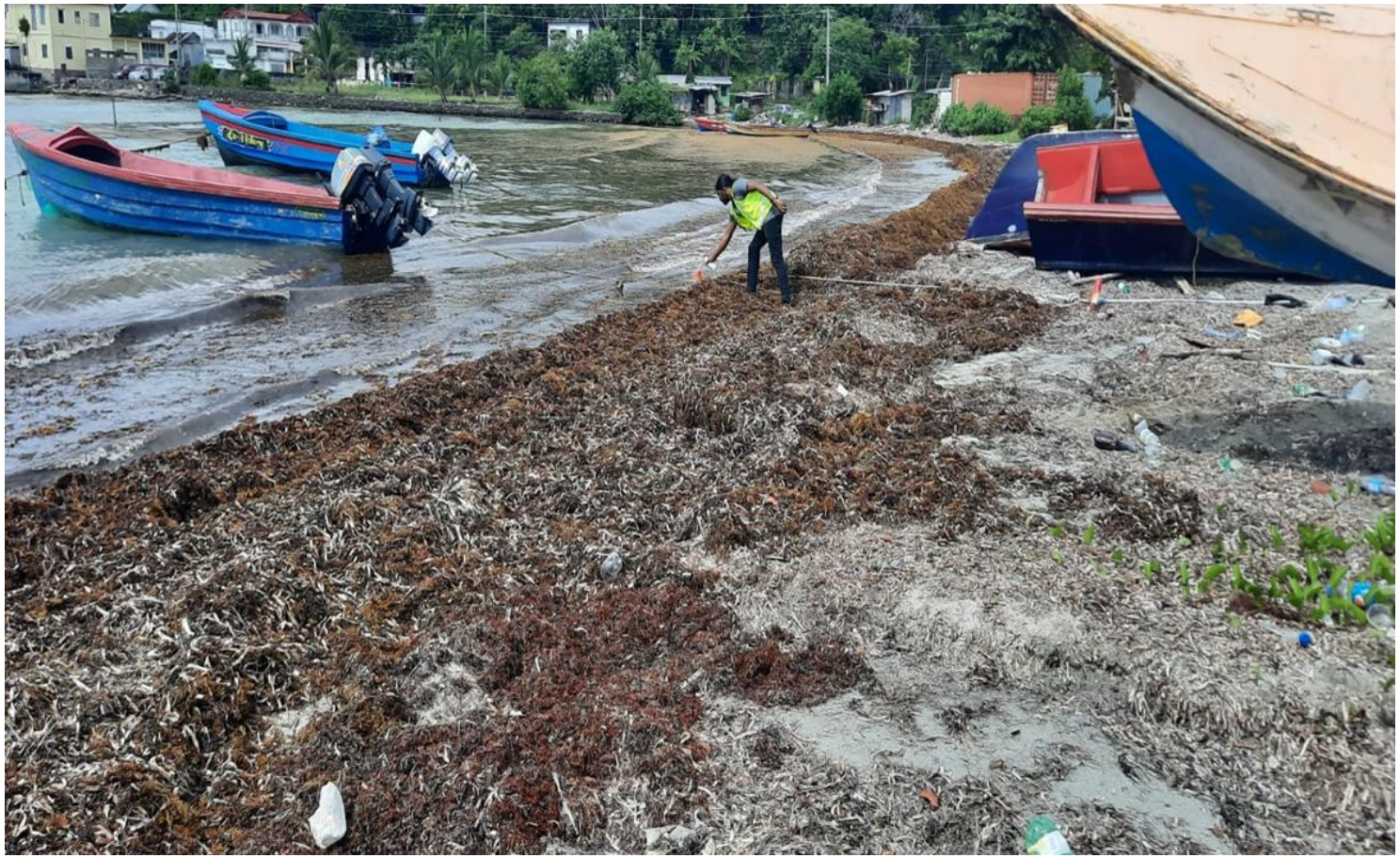

Sargassum volume estimation through establishment of line transects in Manchioneal, Portland, Jamaica

KEY OUTPUTS cont'd

INDEX TO QUANTIFY RISK TO COMMUNITIES

RESILIENCE FACTORS

RISK MANAGEMENT STRATEGY

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WT 2.5 CO-DEVELOPMENT OF RISK MANAGEMENT STRATEGY

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PURPOSE

Define a risk management framework for impact of *Sargassum* strandings in Jamaica and the Caribbean

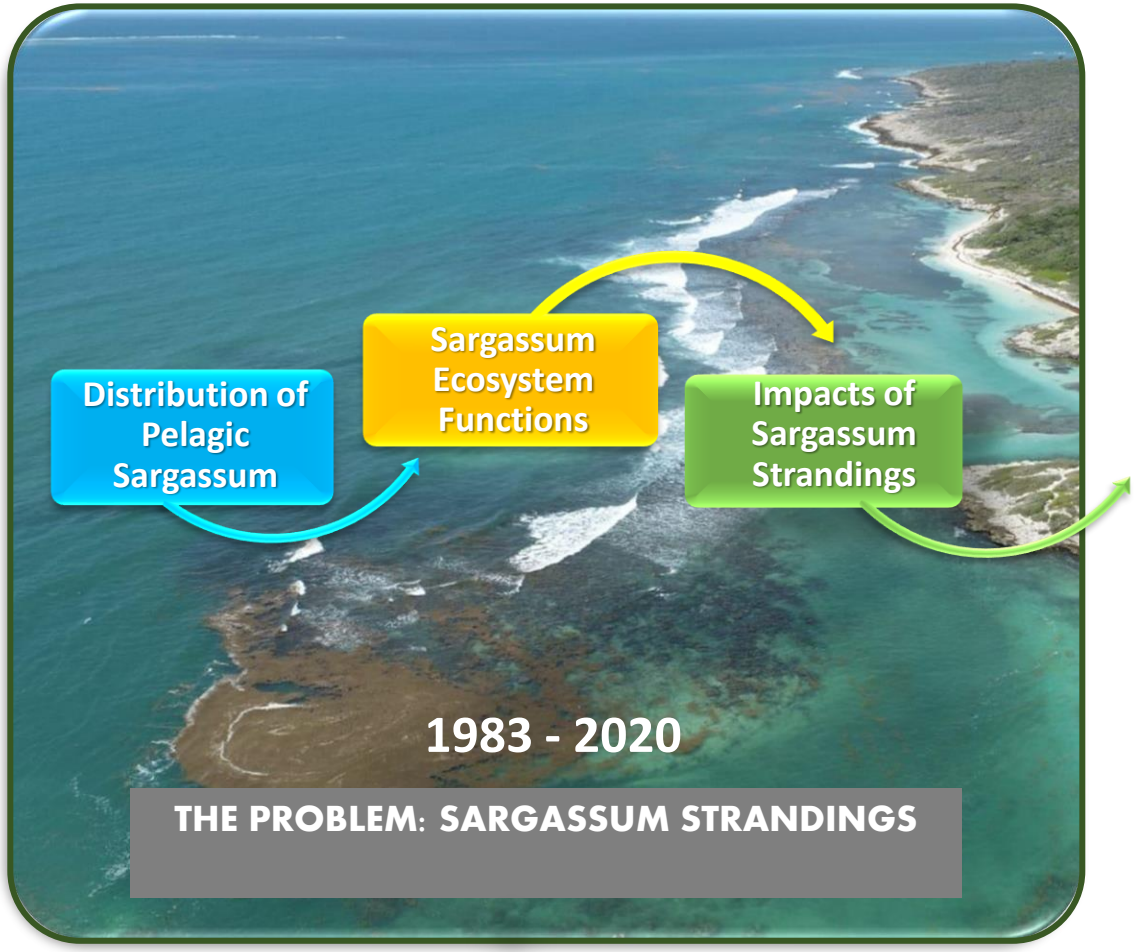
OBJECTIVES

- Maintain Risk Management Principles
- Prepare a Risk Register
- Assist the most vulnerable stakeholders
- Rank all risks
- Allocate clear roles

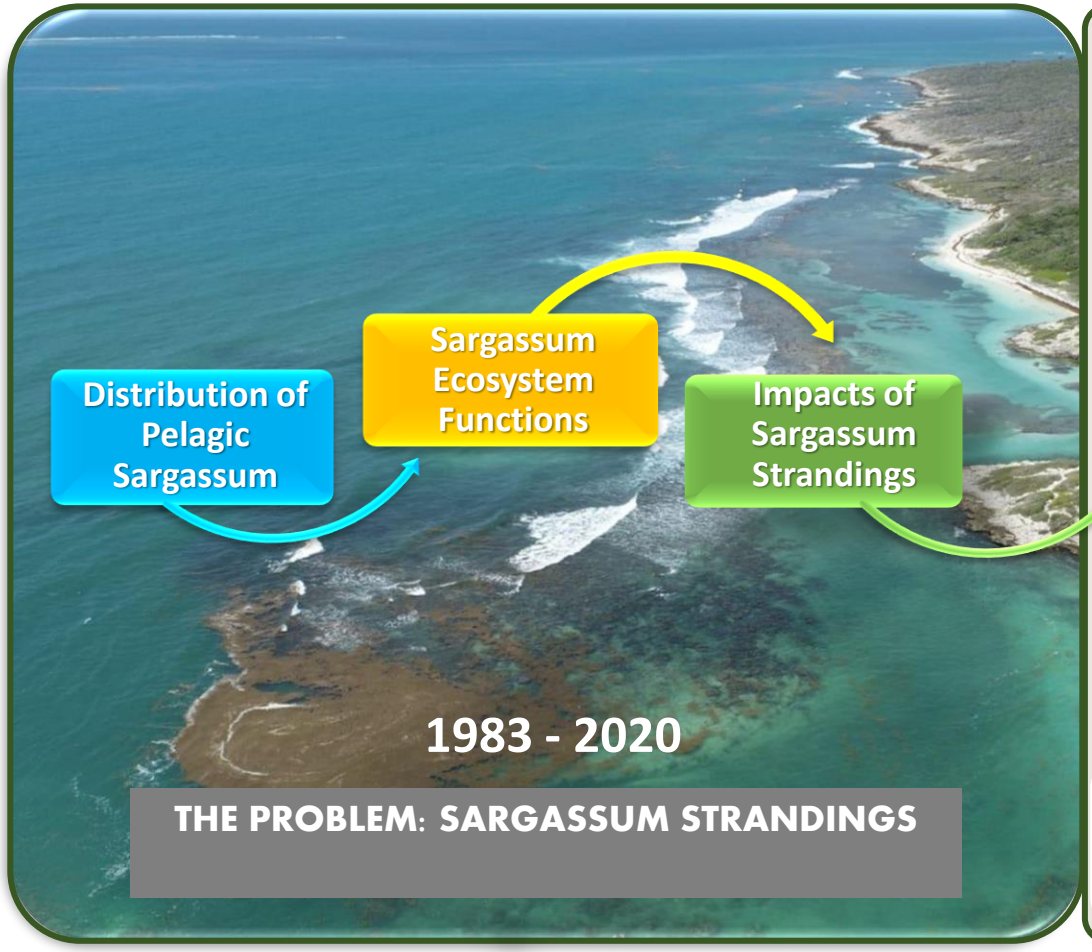
OBJECTIVES

- Regulatory compliance and CSR
- Raise awareness
- Obtain commitment

Land-based Sources of Pollution to the Marine Environment



Land-based Sources of Pollution to the Marine Environment



Land-based Sources of Pollution to the Marine Environment

Non-Sargassum Disaster Risk Mitigation

2000 - 2020

Global Focus: Environmental Disaster Risk Management

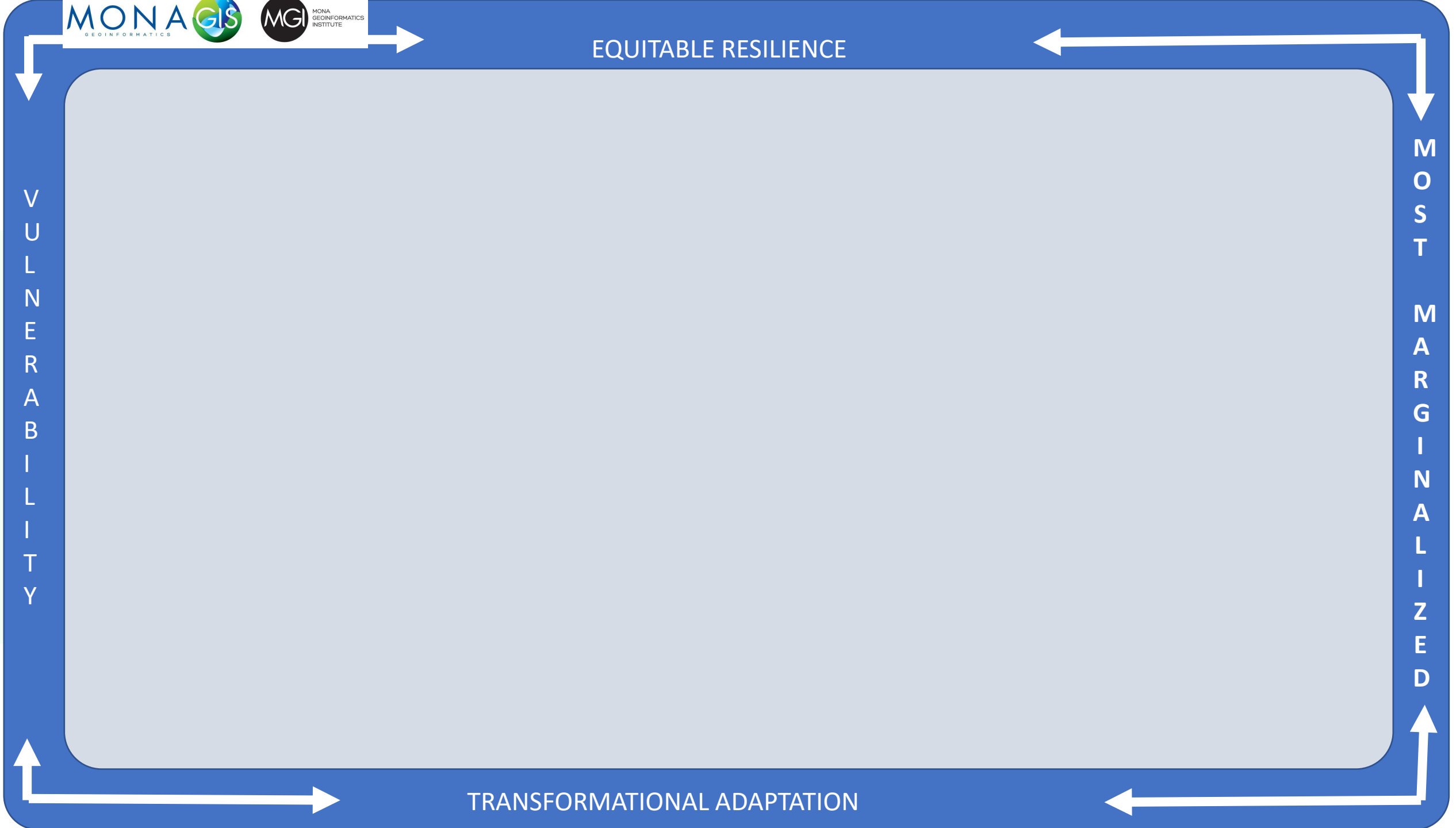
Technological Solutions to Sargassum Strandings

Transformational Adaptation of Sargassum

Sargassum Risk Management Strategies

2010 - 2020

THE SOLUTION: SARGASSUM POLICIES & RISK MANAGEMENT STRATEGIES


EQUITABLE RESILIENCE
VULNERABILITY
MOST MARGINALIZED
TRANSFORMATIONAL ADAPTATION

EQUITABLE RESILIENCE

VULNERABILITY

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The Sargassum Problem: Causes and Impacts on the Vulnerable

Solutions: Sargassum Policies and Hazard Risk Management Strategies

THEORETICAL INPUTS FROM LITERATURE

THEORETICAL FRAMEWORK

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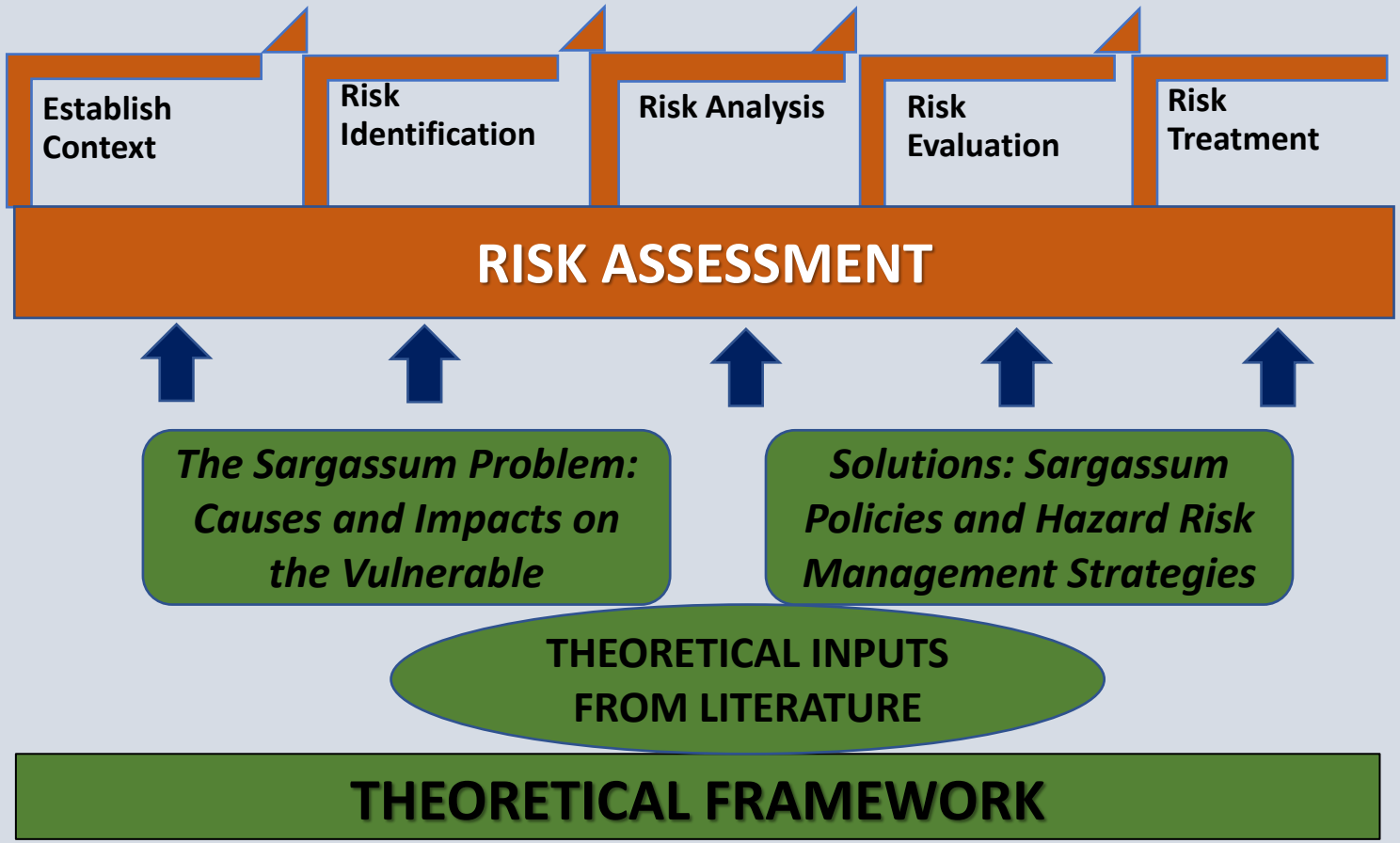
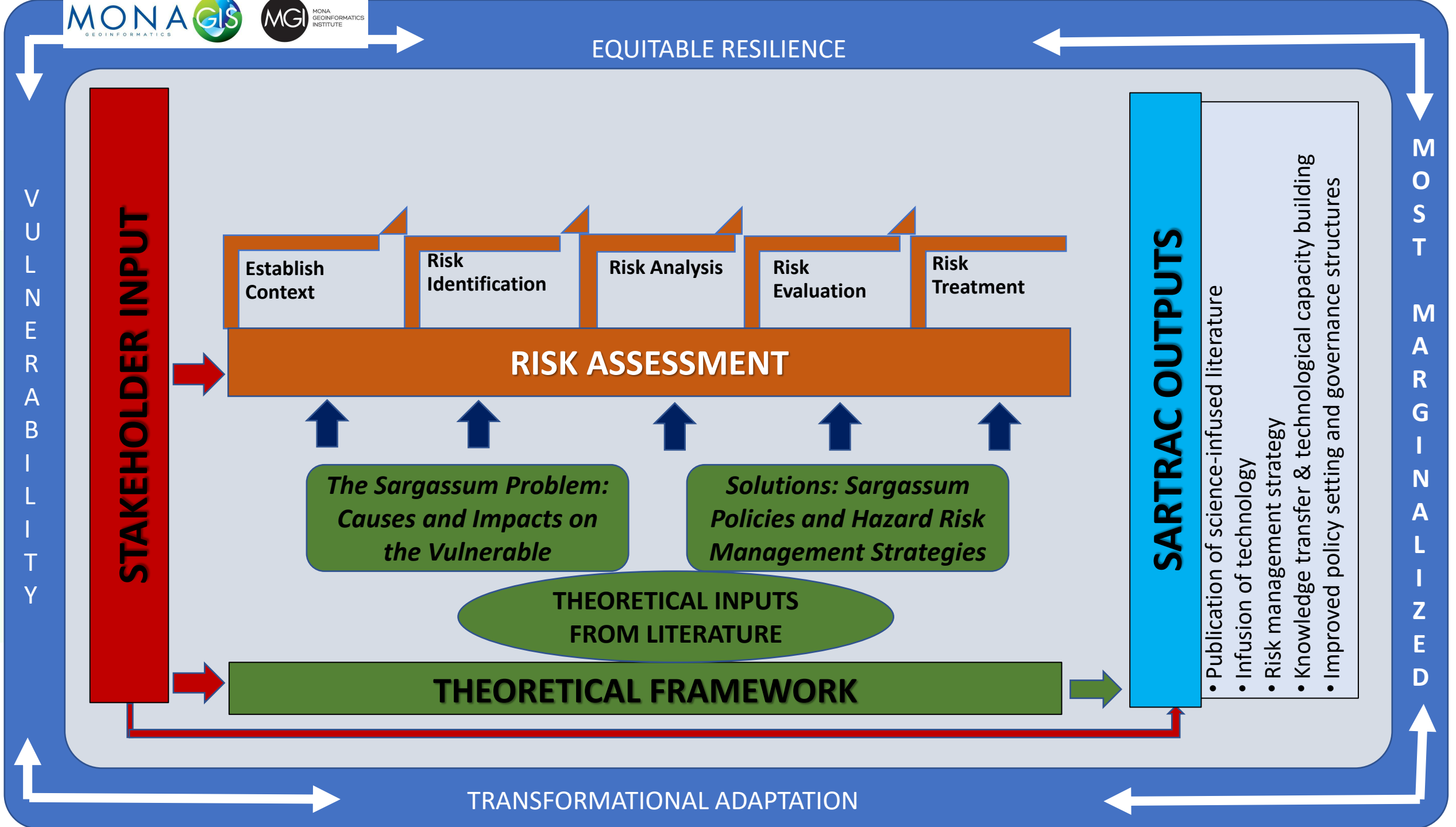


TRANSFORMATIONAL ADAPTATION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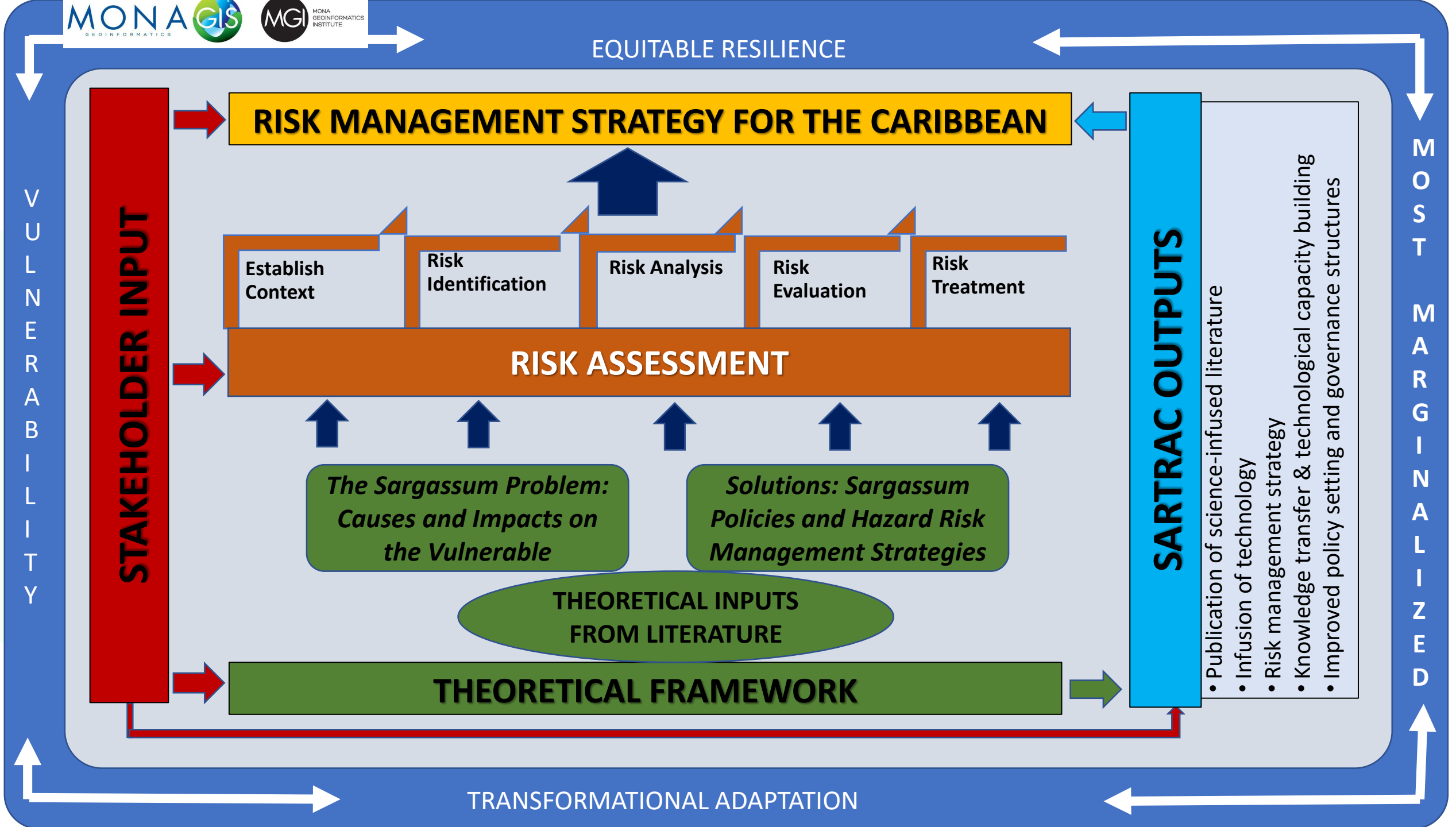
• Publication of science-infused literature
• Infusion of technology
• Risk management strategy
• Knowledge transfer & technological capacity building
• Improved policy setting and governance structures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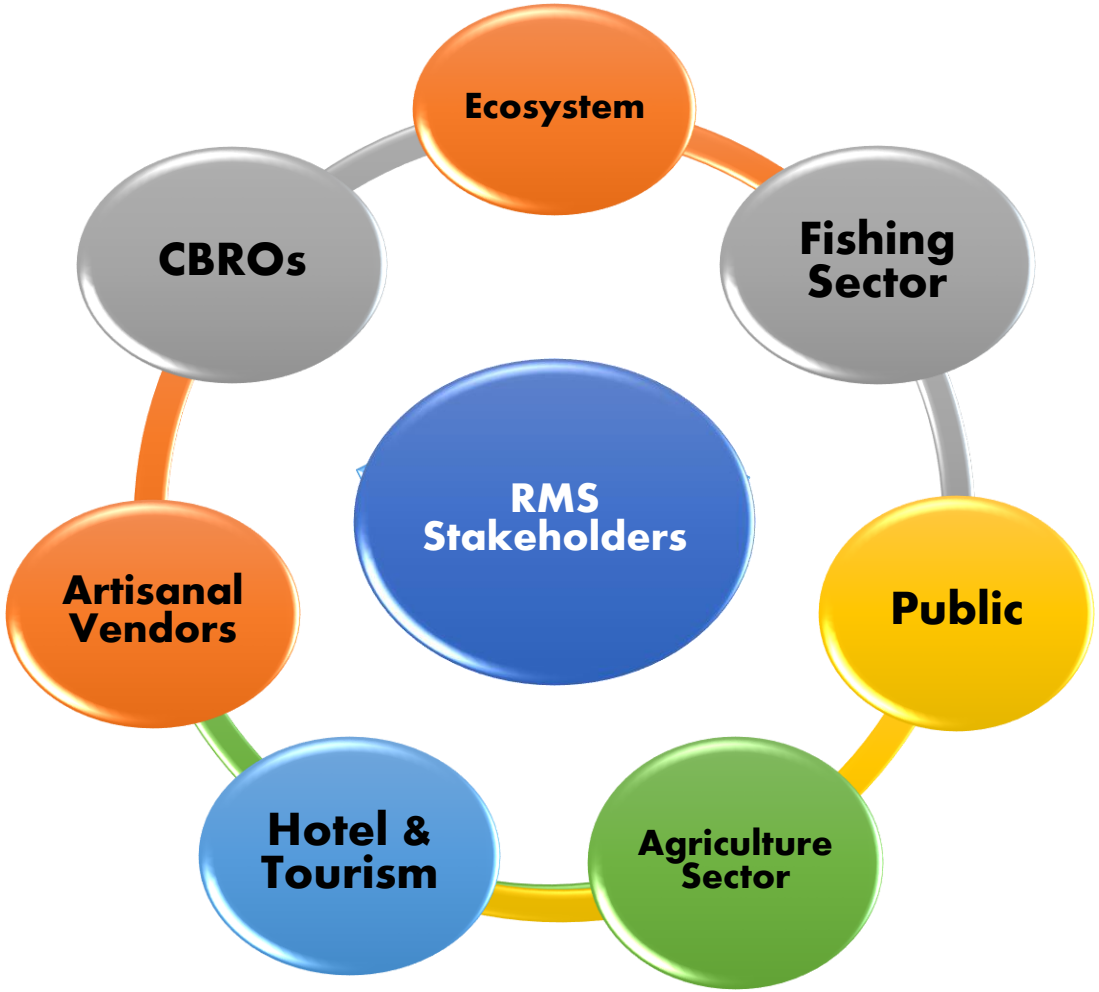
THE PROCESS


4
Reviewing and Reporting Tasks
1
Identifying Risks
Managing and Controlling
3
Assessing Risks
2


WT2.5
Co-development of Risk Management Strategy

STAKEHOLDERS



WT2.5
Co-development of Risk Management Strategy

RISK IDENTIFICATION

BIODIVERSITY

- Formation of anoxic zones [fish die off]
- Inc. organic loading and oxygen dec. = eutrophication
- Release of toxic H2S (g) and heavy metals
- Reduction in light penetration at depth
- Introduction of invasive species

HUMAN HEALTH AND SAFETY

- H_2S hazardous to human health
- Overwhelmingly H_2S (g) = stressful working environments

Fig 6. Effects of eutrophication on marine life
(***Source:*** *University of Maryland Center for Environmental Science*)

RISK IDENTIFICATION

POLICY

- No sustainable management policies for Sargassum
- Lack of access financial assistance/ insurance for stakeholders
- No policies for price control (fishers risk losing income)
- Lack of Sargassum removal procedures (habitat damage)
- Health implications of Sargassum fertilizer (for agriculture)

Fig 7. Fisherman, Portland Jamaica
(***Source: Transformation Implementation Unit, GOJ***)

RISK IDENTIFICATION

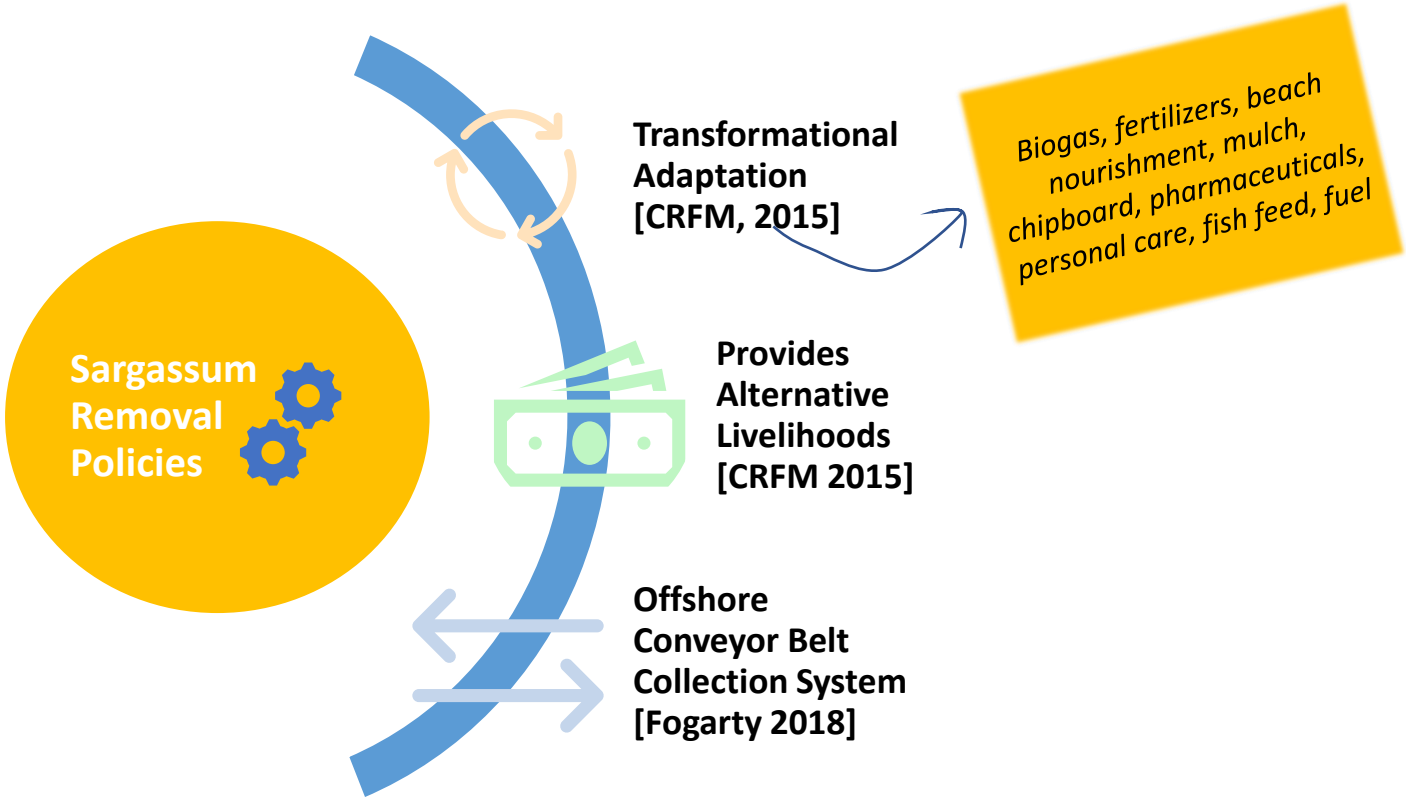
SOCIOECONOMIC

- Impedes operation of fishers and vessels
- Damages fishing equipment and vessels
- Negative changes in fish communities
- Loss of income earning opps
- Interruptions in services provided by CBOs
- Reduced disposable income for households
- More time at sea
- Inc Fish prices = Dec income for fishers
- Increased maintenance costs for fishing equipment
- Increased debt to substitute for loss of income
- Fishers selling less fish
- Decreased sales due to fish species in short supply
- Reduced profits lead to reductions in necessary expenditures
- Costs incurred for transformational use of sargassum

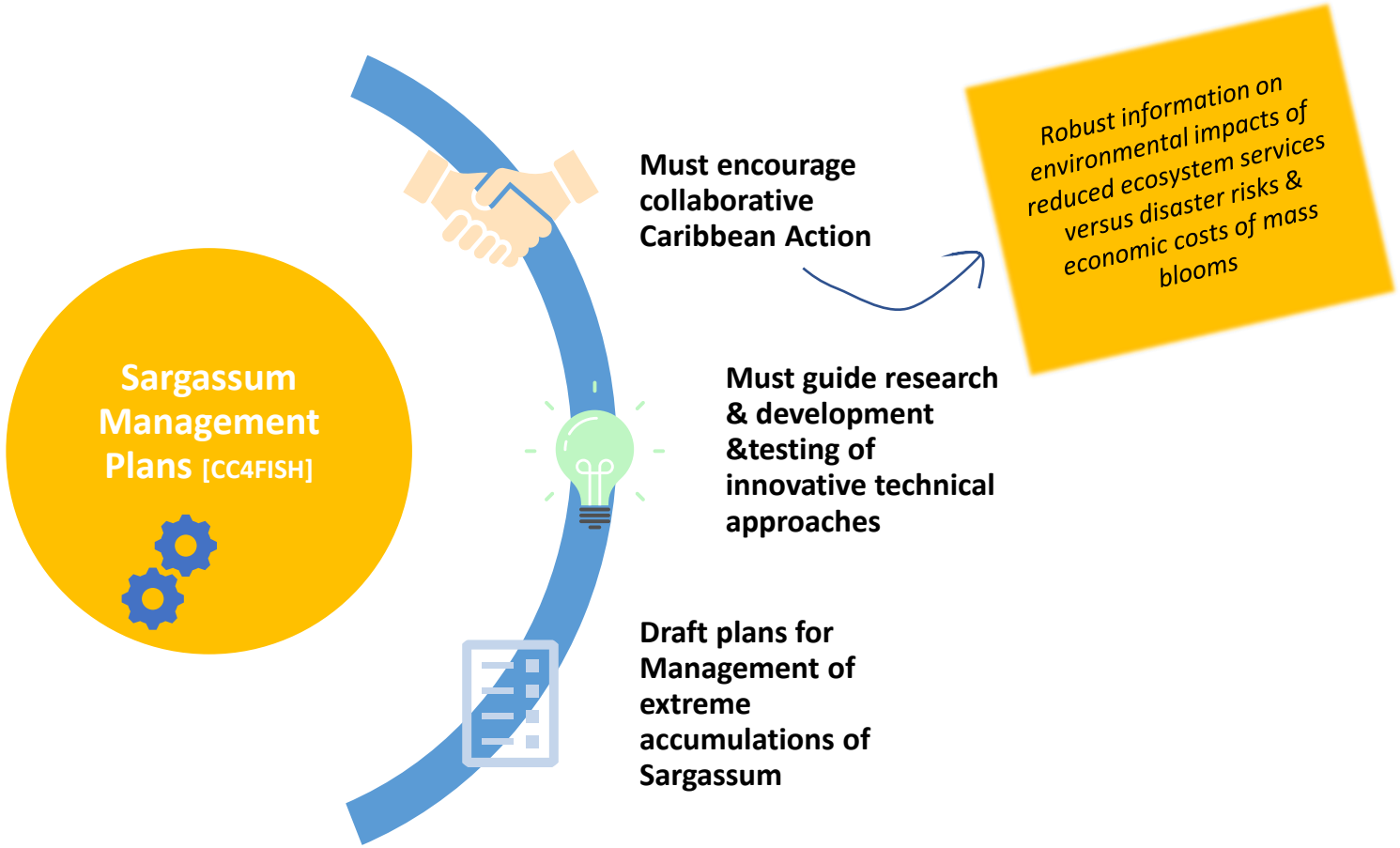
Fig 8. Cleaning sargassum seaweed from the beaches of Placencia, Belize.
(*Source: The Guardian 'How do you deal with 9m tonnes of suffocating seaweed?)*

RISK TREATMENT OPTIONS

- Promotes beach clearance as the main response to management of Sargassum strandings
- Offshore conveyor belt system to collect Sargassum before in lands ashore (CRFM, 2016; Fogarty, 2018)

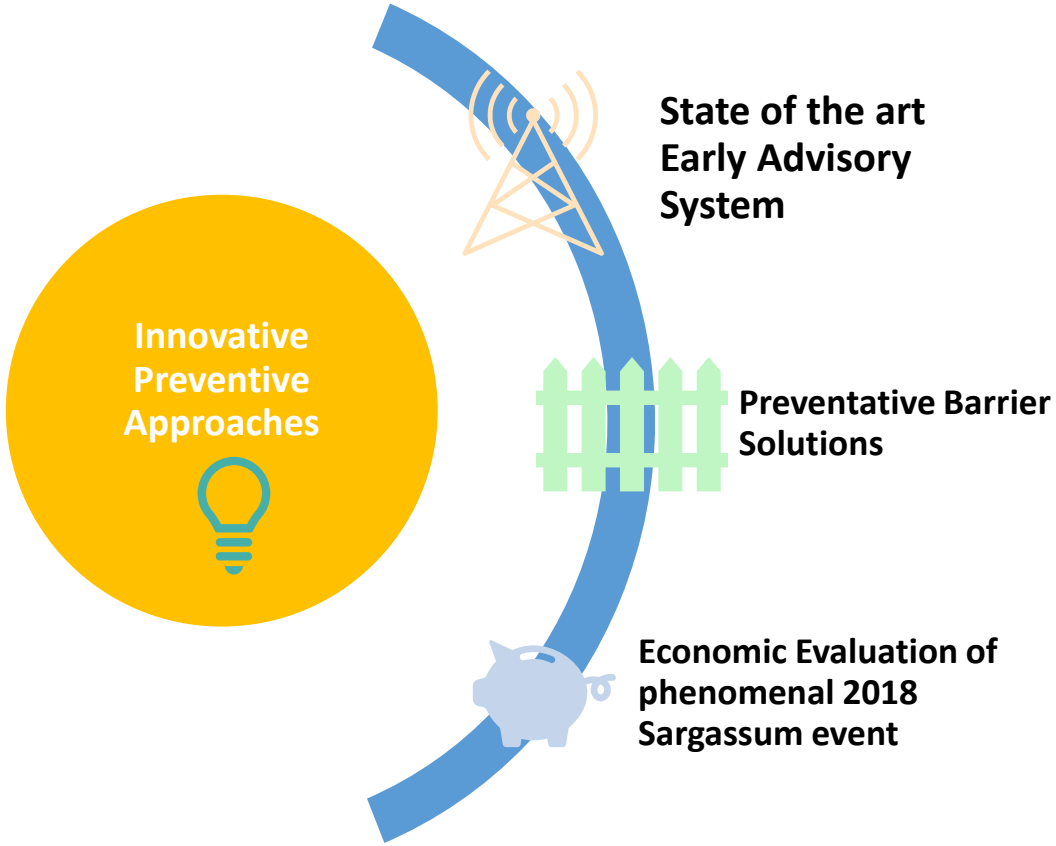


RISK TREATMENT OPTIONS



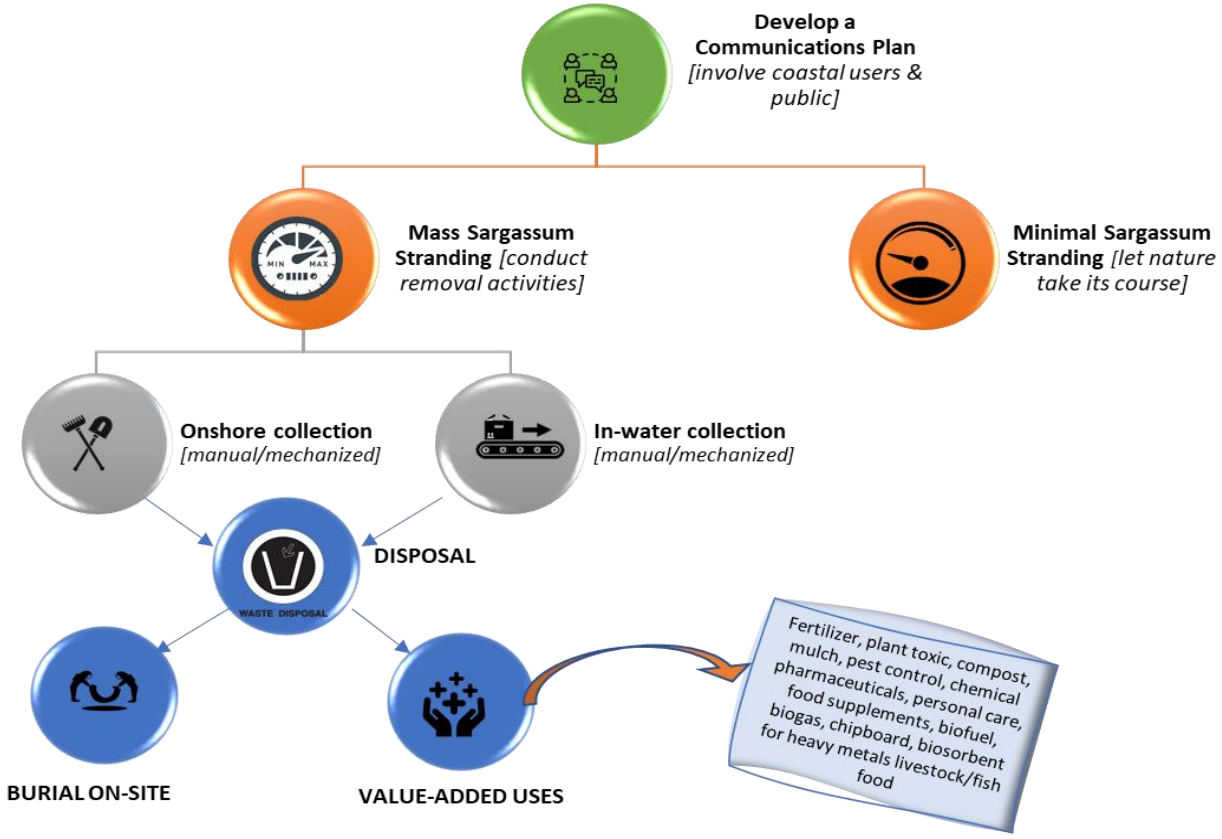
RISK TREATMENT OPTIONS

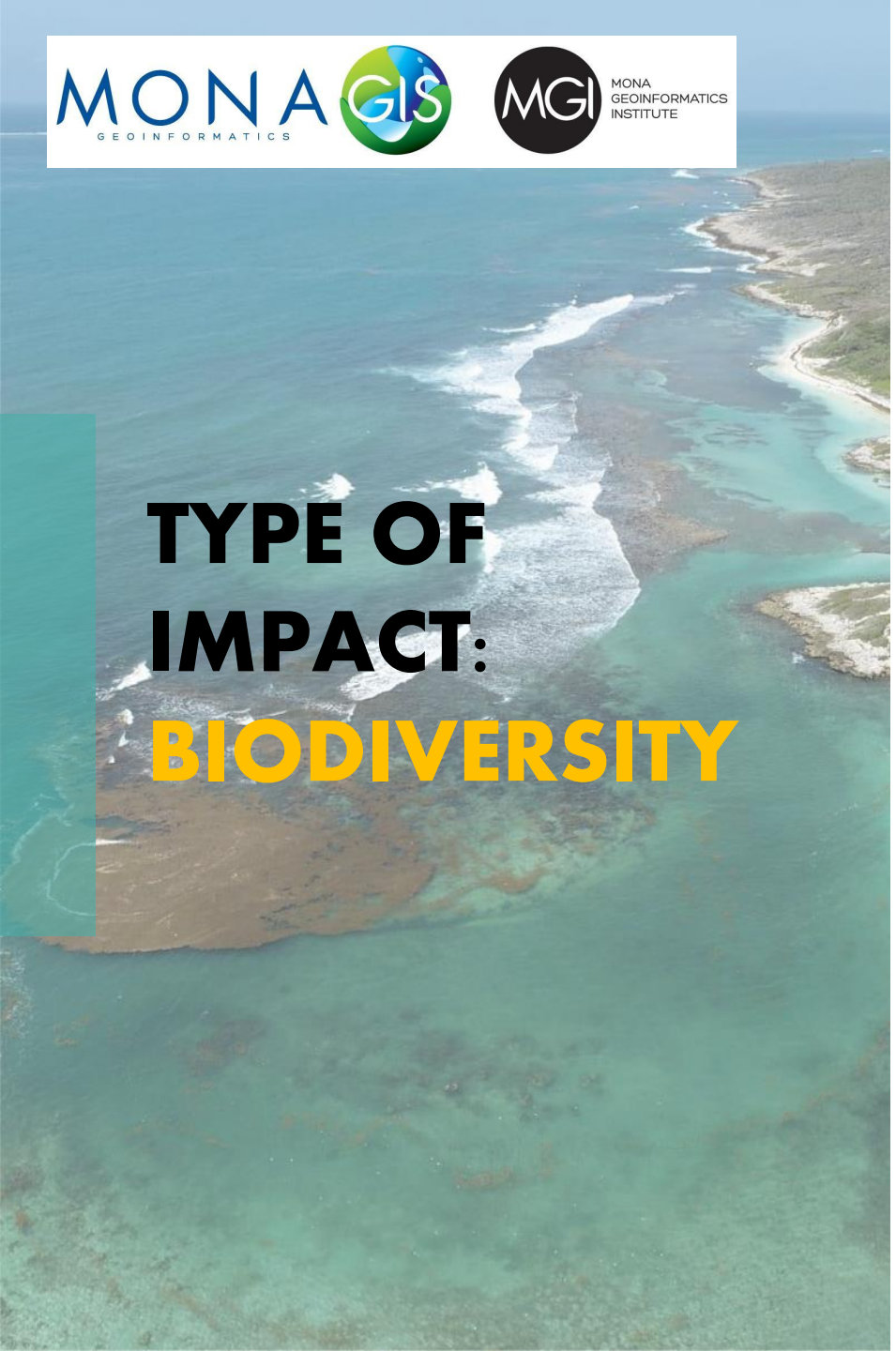
Stimulating innovative preventative approaches for Sargassum (Mexico News Daily 2018; Government of Antigua and Barbuda 2018; Mufson 2018; Moscoco 2018)



RISK TREATMENT OPTIONS

Sustainable Management/Management Best Practices requires local action, regional coordination &collaboration (Hinds et al 2016 and Desrochers et al 2020)





TYPE OF IMPACT: BIODIVERSITY

NEGATIVE IMPACTS	ADAPTATIONS BY FISHERS
Restricted type of fisheries	• Switched gear, fishing method/target spp
Turtles impacted	• Community groups clean nesting beaches
Seaweed drove away some fish	• Changed fishing grounds to avoid mats.
Some fish lived in seaweed difficult catch	• Fish around mats for larger spp

TYPE OF IMPACT: PHYSICAL

NEGATIVE IMPACTS	ADAPTATIONS BY FISHERS
Seaweed entangled nets	• Net fishers avoid fishing around mats or used other gear types
Restricted movement of boats.	• Fishers and boat captains drove around the Sargassum mats • Some fishers returned to shore when the seaweed was too thick. • Some fishers use satellite imagery (internet) to ID fishing grounds. • Radios used to find out and inform others about locations to avoid.
Damage to boat engines	• Used radio to warn other fishers of Sargassum mats. • When it is stuck in propellor: stop, reverse and get 'moss' out. • If the bearing is damaged & unavailable, local agent can import • Some fishers use strainers over the engine's intake

TYPE OF IMPACT: SOCIOECONOMIC

NEGATIVE IMPACTS	ADAPTATIONS BY FISHERS
Decrease in revenue for most fishers	• Some found jobs in other areas outside of the fishery sector
Affects livelihoods	• Fishers budgeted more and spent more carefully; only buy essentials • Some in the harvest sector borrowed money to maintain boats.
Increased maintenance cost.	• Some fishers increased effort by spending more days /hours out fishing. • Some boats spent less days, and time fishing to avoid wastage of resources.

TYPE OF IMPACT: POLICY

NEGATIVE IMPACTS	ADAPTATIONS BY FISHERS
No policy exists	Fisheries Authorities Activities: • Consultations with various stakeholder groups to devise solutions • Discussions with ministries and agencies on best practices for landed Sargassum. • Regional information exchange e.g., UNEP SPAW-RAC (Sargassum focus) • No specific legislation or policy to address Sargassum events particularly • Strategic Action Plan for Fisheries has sections relevant to vulnerabilities
Lack of policy for financial assistance	
Lack of policy for price control	
Lack of policy to regulate import and export of fish	

RISK LIKELIHOOD

SCALE/LEVEL	DESCRIPTOR	DESCRIPTION
1	**Remote**	May only occur in exceptional circumstance
2	**Unlikely**	Is unlikely to occur but could occur at some time
3	**Possible**	Fairly likely to occur at some time or in some circumstances
4	**Probable**	Will probably occur at some time, or in most circumstances
5	**Highly Probable**	Is expected to occur in most circumstances

DEFINITION OF IMPACT

RISKS	SCALE	EFFECT : Biodiversity
Severe	**5**	Severe disruption to ecosystem functions and ecosystem services. Loss of species & biodiversity
Major	**4**	Major disruption to ecosystem functions and ecosystem services Serious damage to ecosystem services and species diversity
Moderate	**3**	Noticeable disruption to ecosystem functions and ecosystem services Loss of some species
Minor	**2**	Some disruption to ecosystem functions and ecosystem services Minor loss of species
Insignificant	**1**	Insignificant disruption to ecosystem functions and ecosystem services No loss of species

RISK PRIORITIZATION

LIKELIHOOD

IMPACT

	Remote 1	Unlikely 2	Possible 3	Probable 4	Highly Probable 5
Severe 5	5	10	15	20	25
Major 4	4 =	8	12	16	20
Moderate 3	3 =	6	9	12	15
Minor 2	2 =	4 =	6	8	10
Insignificant 1	1 =	2 =	3 =	4 =	5

RISK TREATMENT OPTIONS

Level of risk/ Inherent Risk Score	Indicated by	How the risk should be managed
Very High Risk (16-25)	Red	Requires active management
Medium Risk (5-15)	Amber	Contingency Plans
	Amber	Best Practices
Low Risk (1-4)	Green =	Review periodically

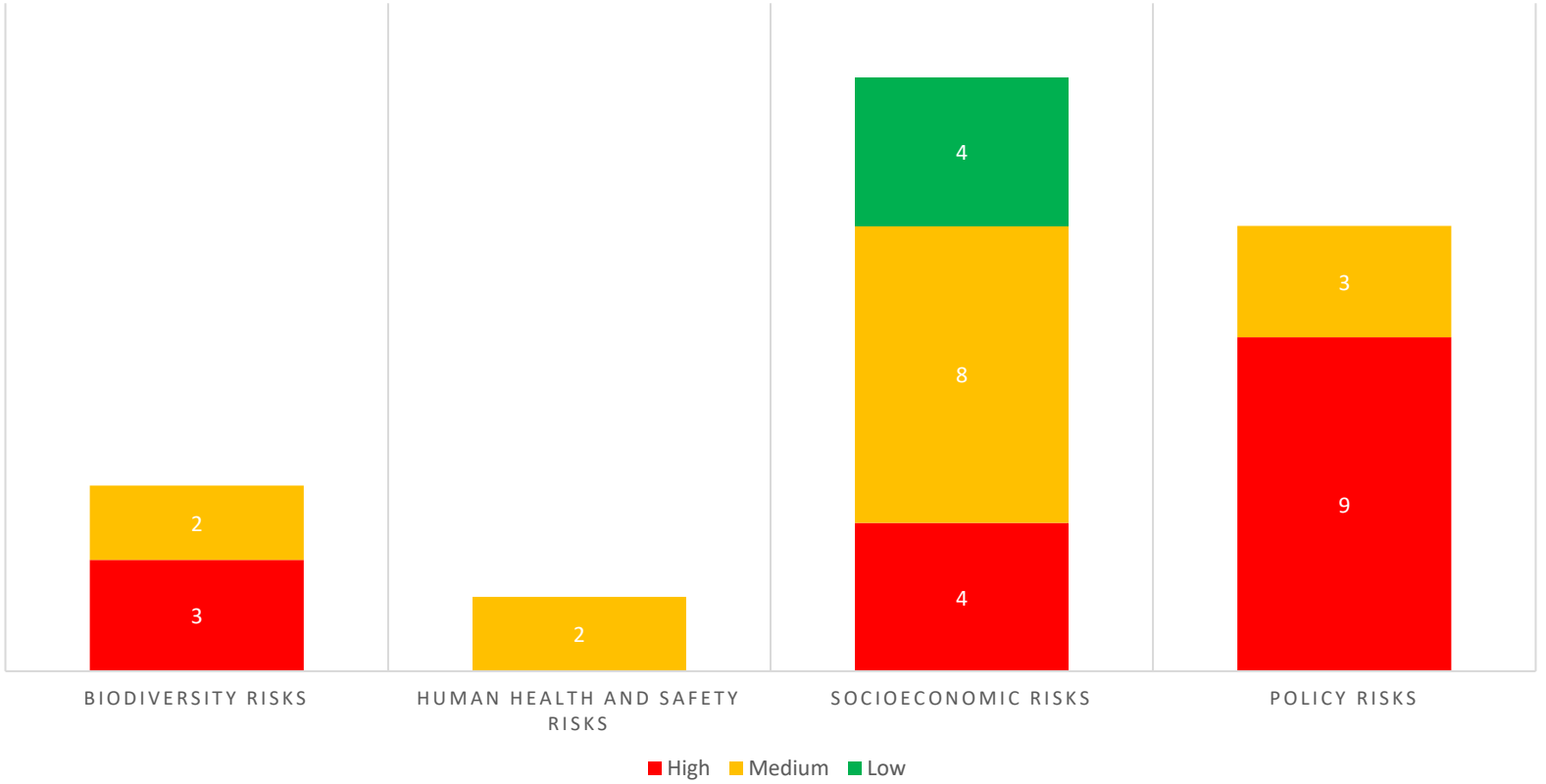
.

RISK RESPONSE

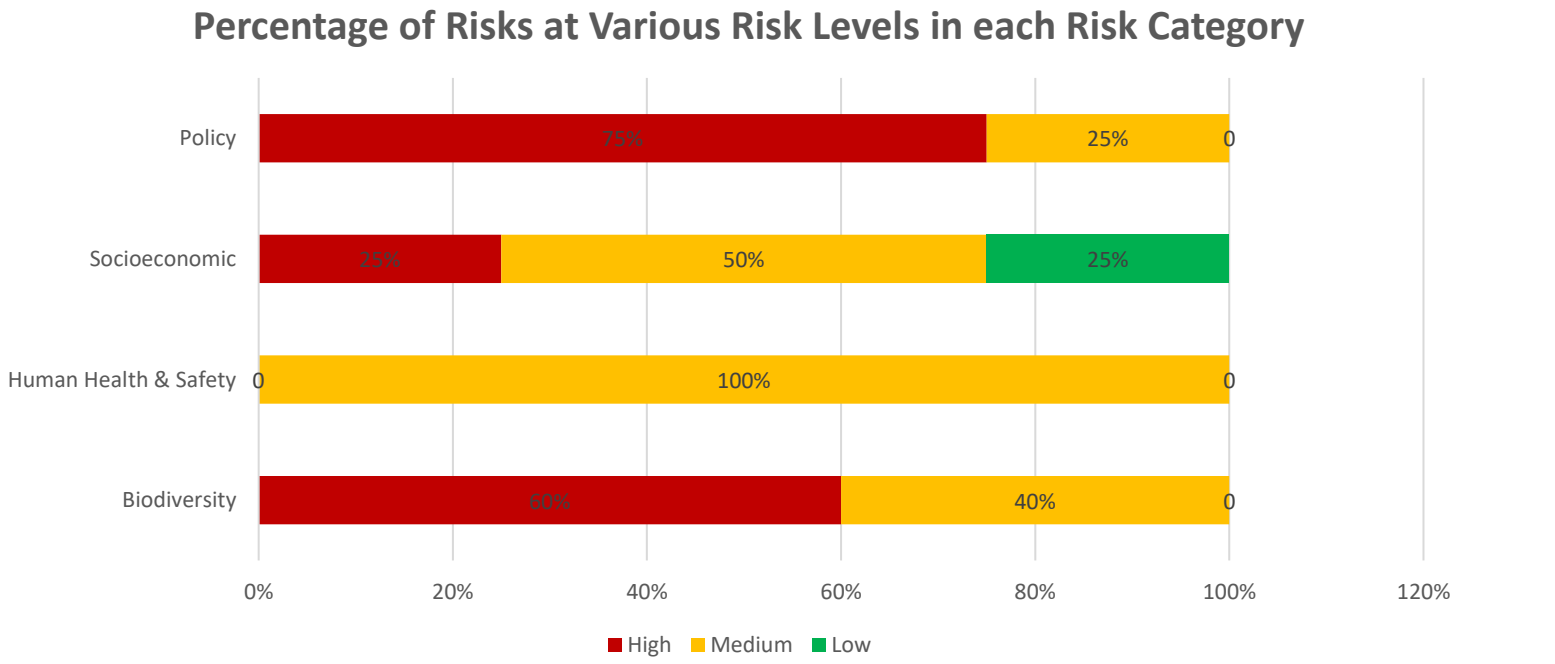
RATING	INTERPRETATION
Escalate	When managing the threat is outside the scope of the vulnerable stakeholders in most marginalized communities
Avoid	Eliminating the threat of *Sargassum* strandings or protecting the vulnerable stakeholders from its impacts
Transfer	Shifting ownership and management to a third party to bear the impact of the risk
Mitigate	Reducing the probability or impact of the risk by making it a lesser risk
Accept	Doing nothing (usually for low level threats or when it is not cost-effective to alleviate.

THE RISK ACTION PLAN

The Risk Action Plan identified thirty-eight (38) risks.



THE RISK ACTION PLAN



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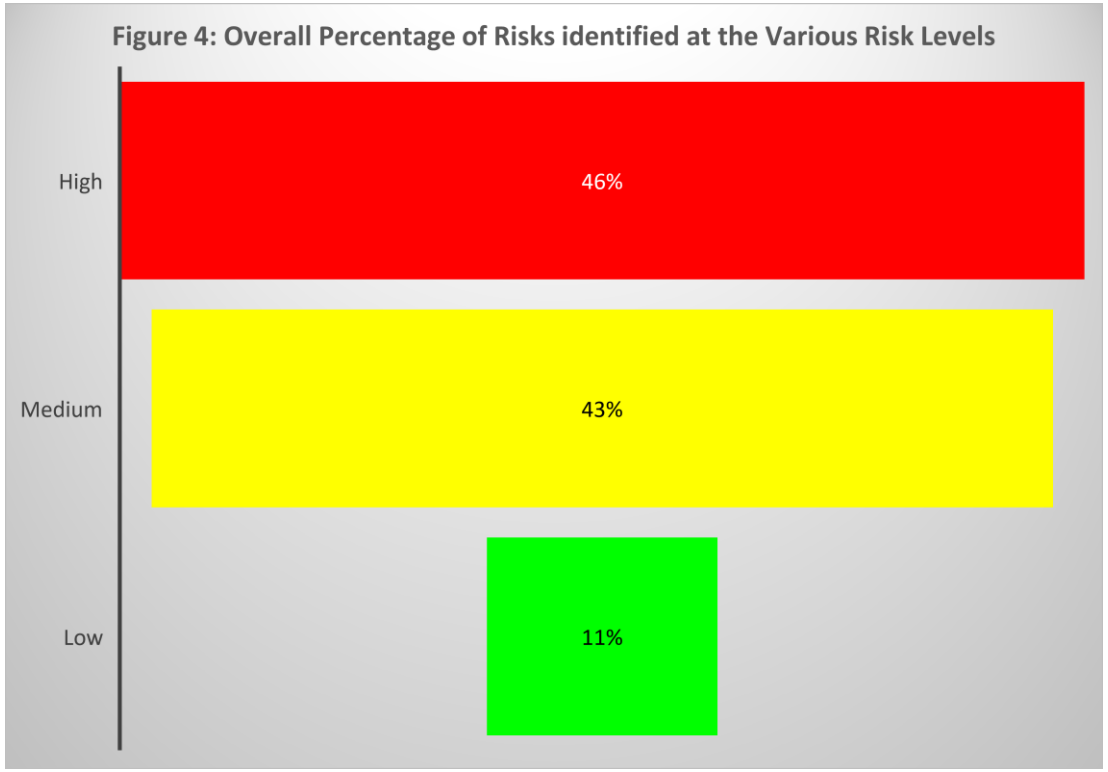
Low Risk (1-4)	Green =	Review periodically Risks are unlikely to require mitigating actions, but status should be reviewed periodically

THE RISK ACTION PLAN



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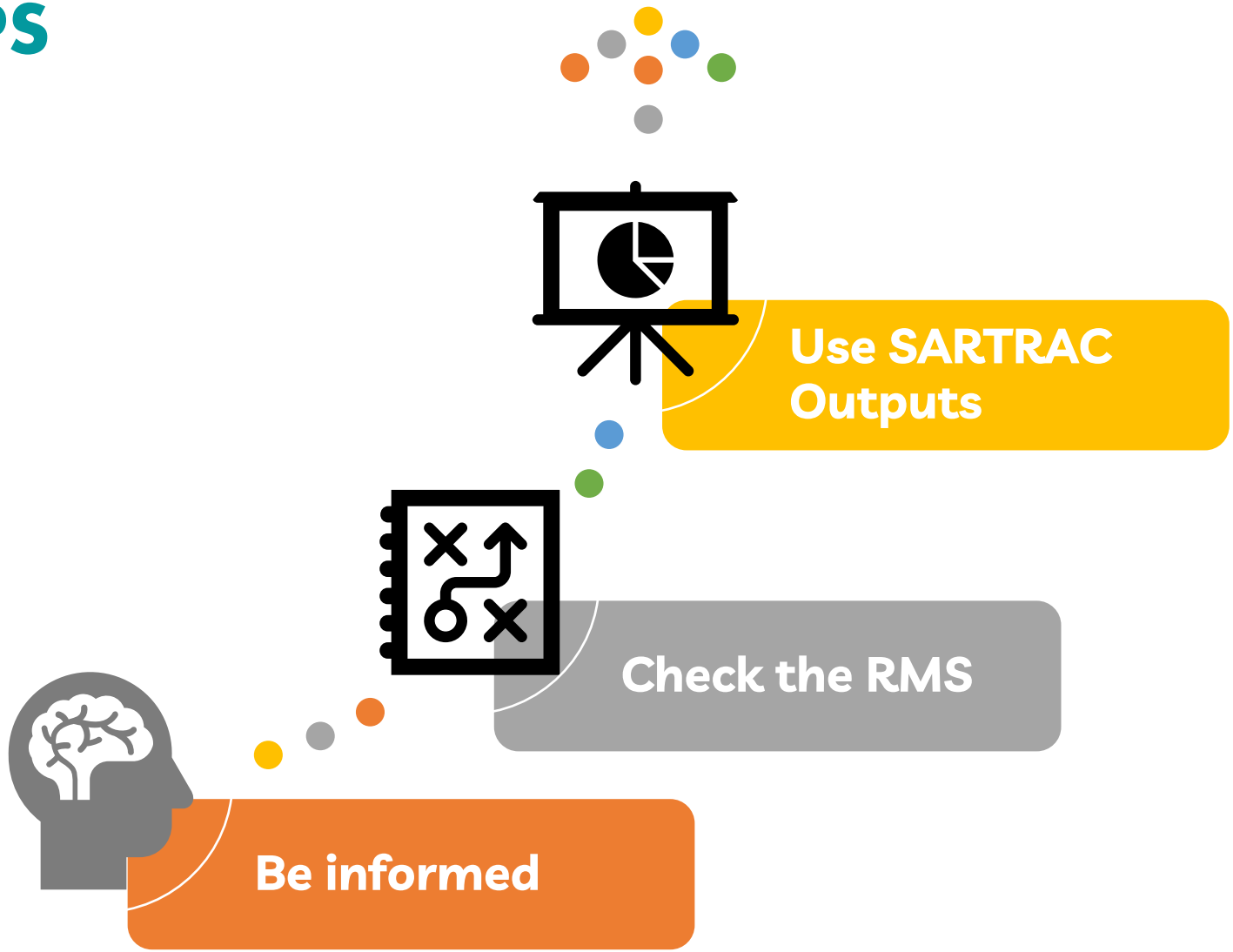
THE RISK ACTION PLAN

NEXT STEPS



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