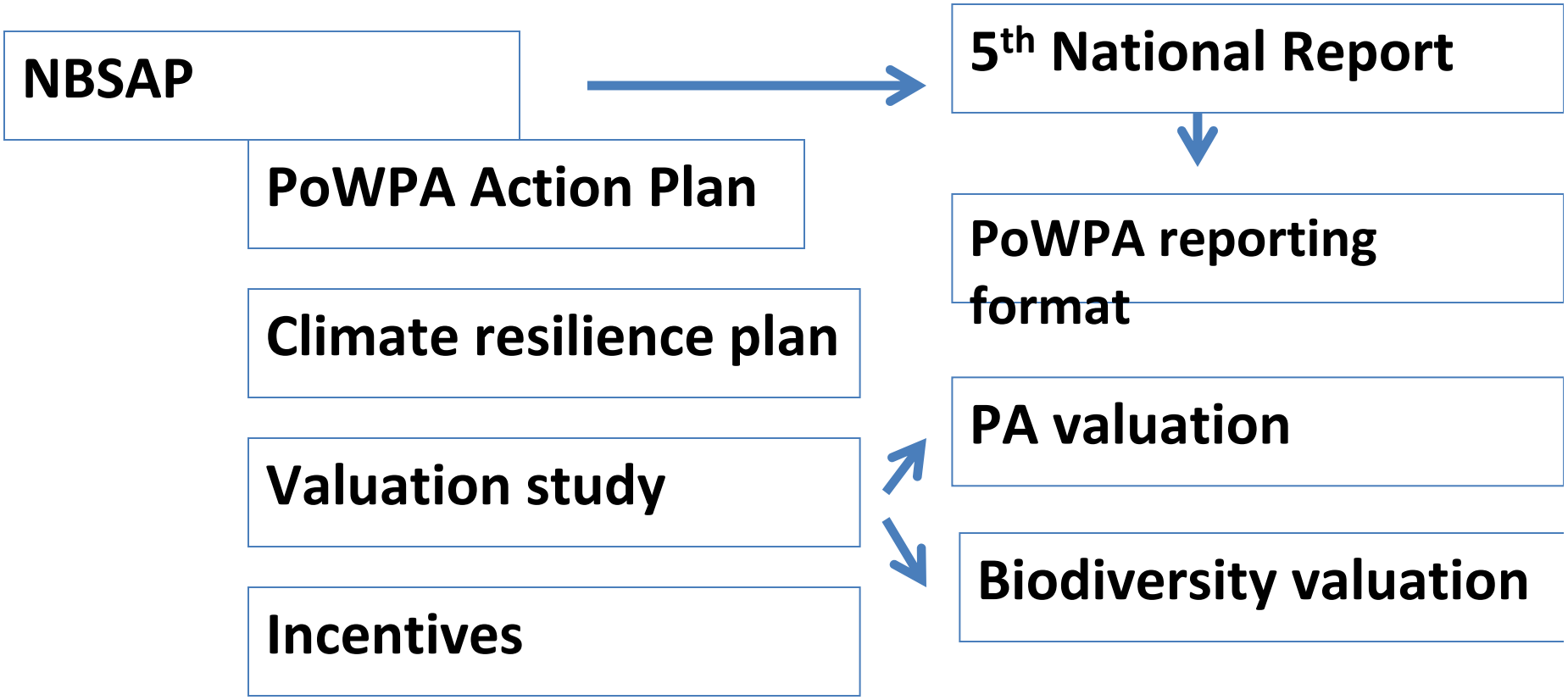
Protected areas and climate change:

Strategies for building resilience

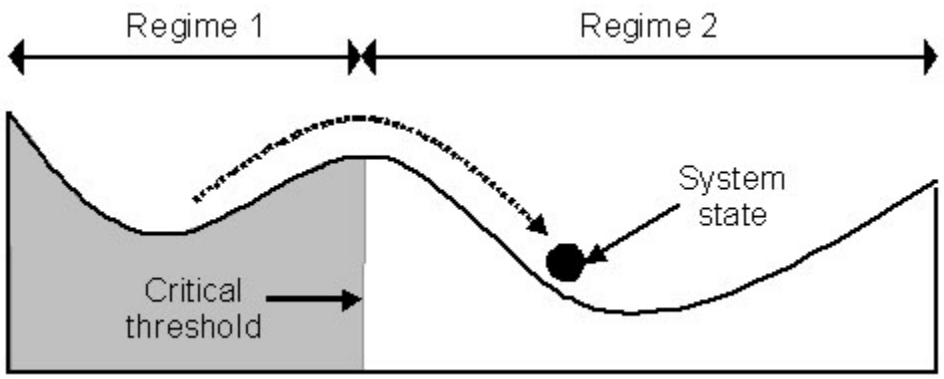
Jamison Ervin, UNDP Senior Advisor

Relationships



Key Concepts

- **Regime shift**
- Tipping point
- Resilience
- Adaptation
- Mitigation



"…large, persistent changes in the structure and function of ecological systems"

www.regimeshifts.org

Key Concepts

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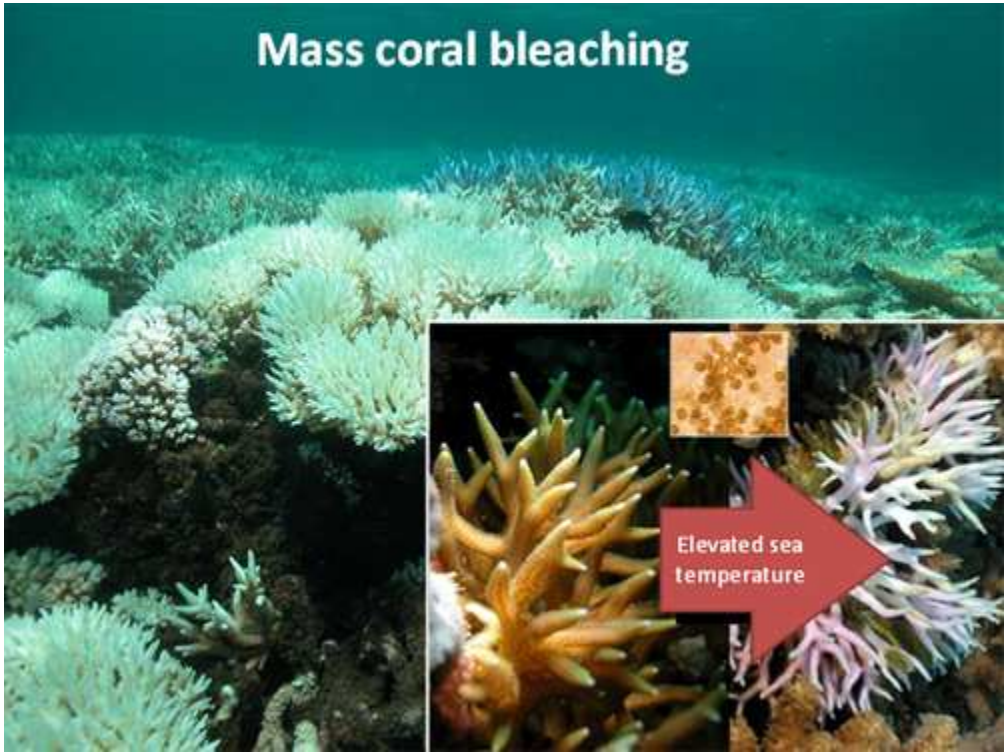
- Mitigation



www.regimeshifts.org

Key Concepts

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- **Tipping point**
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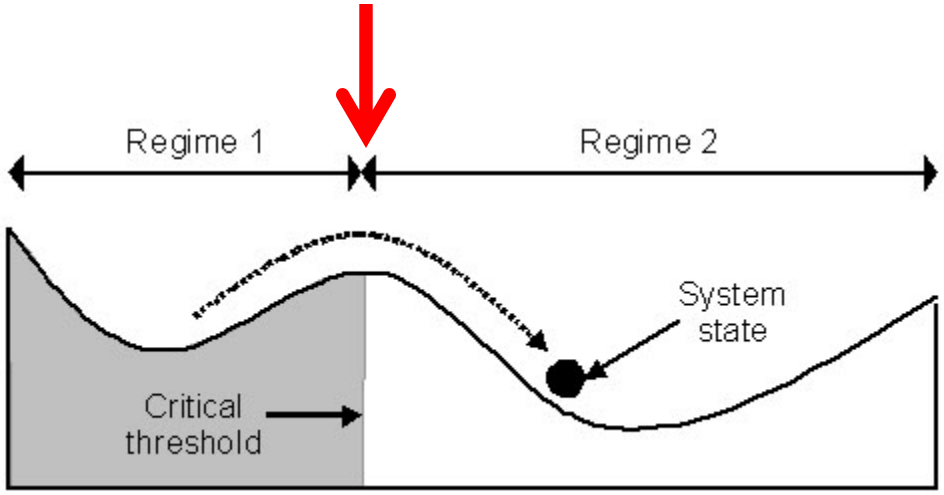


Definition: The point at which a driver causes a significant a regime shift that is considered unalterable, or recoverable on only very long timescales

Drivers: Overfishing, disease, invasive species, climate-related event

Key Concepts

- Regime shift
- Tipping point
- **Resilience**
- Adaptation
- Mitigation

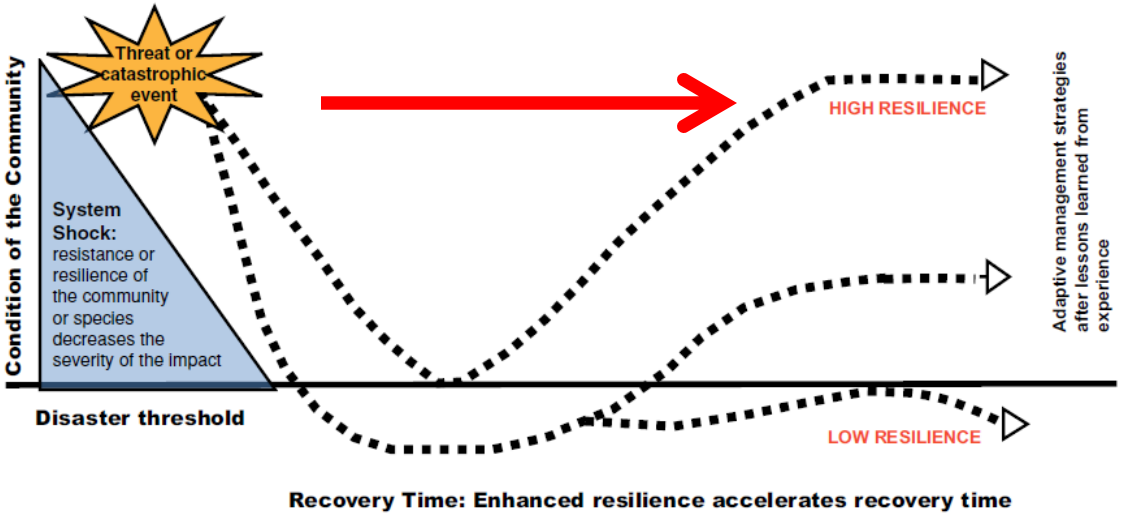
Definition

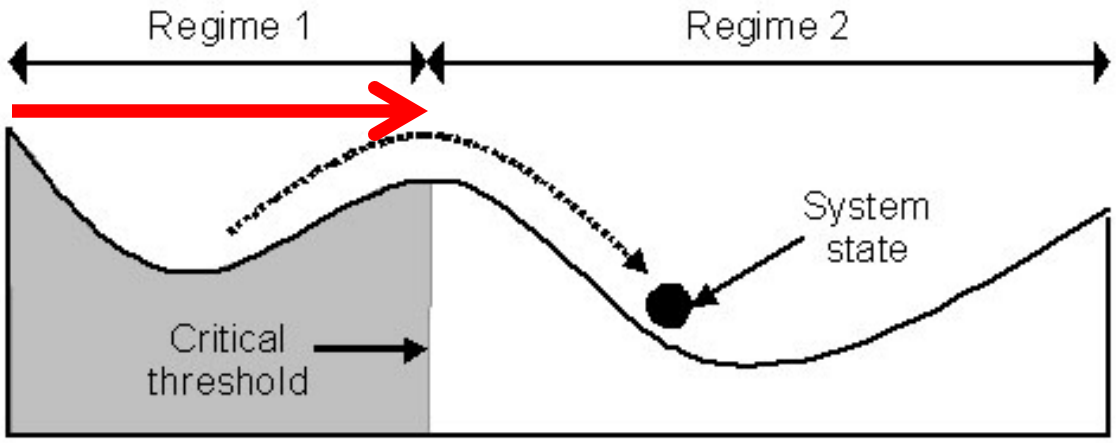
"….the ability of an ecosystem to maintain key functions and processes in the face of stresses, or pressures, by either resisting or adapting to change"

www.reefresilience.org

Key Concepts

- Regime shift
- Tipping point
- **Resilience**
- Adaptation
- Mitigation





www.reefresilience.org

Key Concepts

- Regime shift
- Tipping point
- **Resilience**
- Adaptation
- Mitigation

Principles of reef resilience:

- **Representation**, replication, redundancy and risk spreading
- **Critical habitats** for replenishment and recovery
- **Connectivity** among reefs
- **Effective management** by reducing threats

www.reefresilience.org

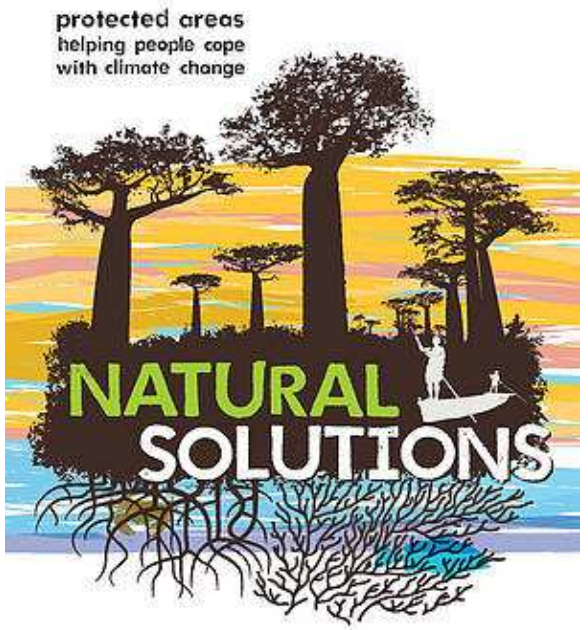
Key Concepts

- Regime shift
- Tipping point
- Resilience
- **Adaptation**
- Mitigation

- **Nature's** ability to adapt to climate impacts (often through human intervention); and….

Key Concepts

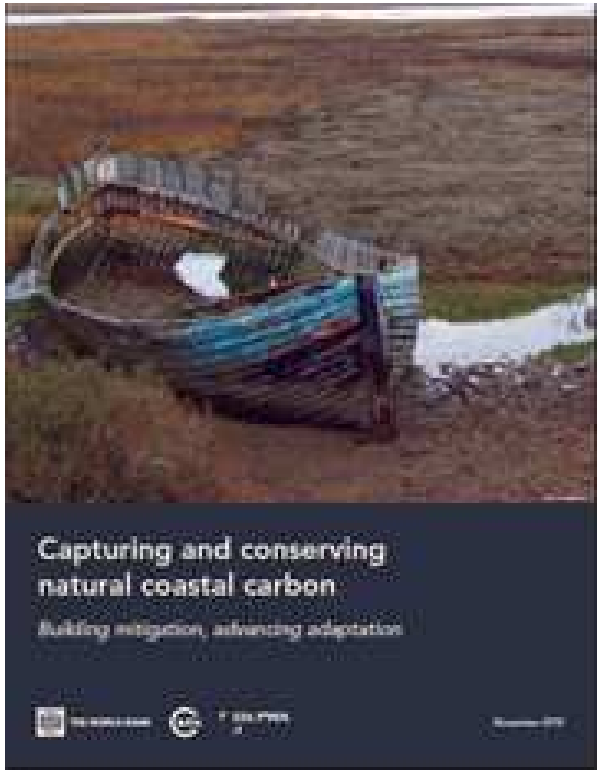
- Regime shift
- Tipping point
- Resilience
- **Adaptation**
- Mitigation



- **Human's** ability to adapt to climate impacts (often through nature's buffering and provisioning services)

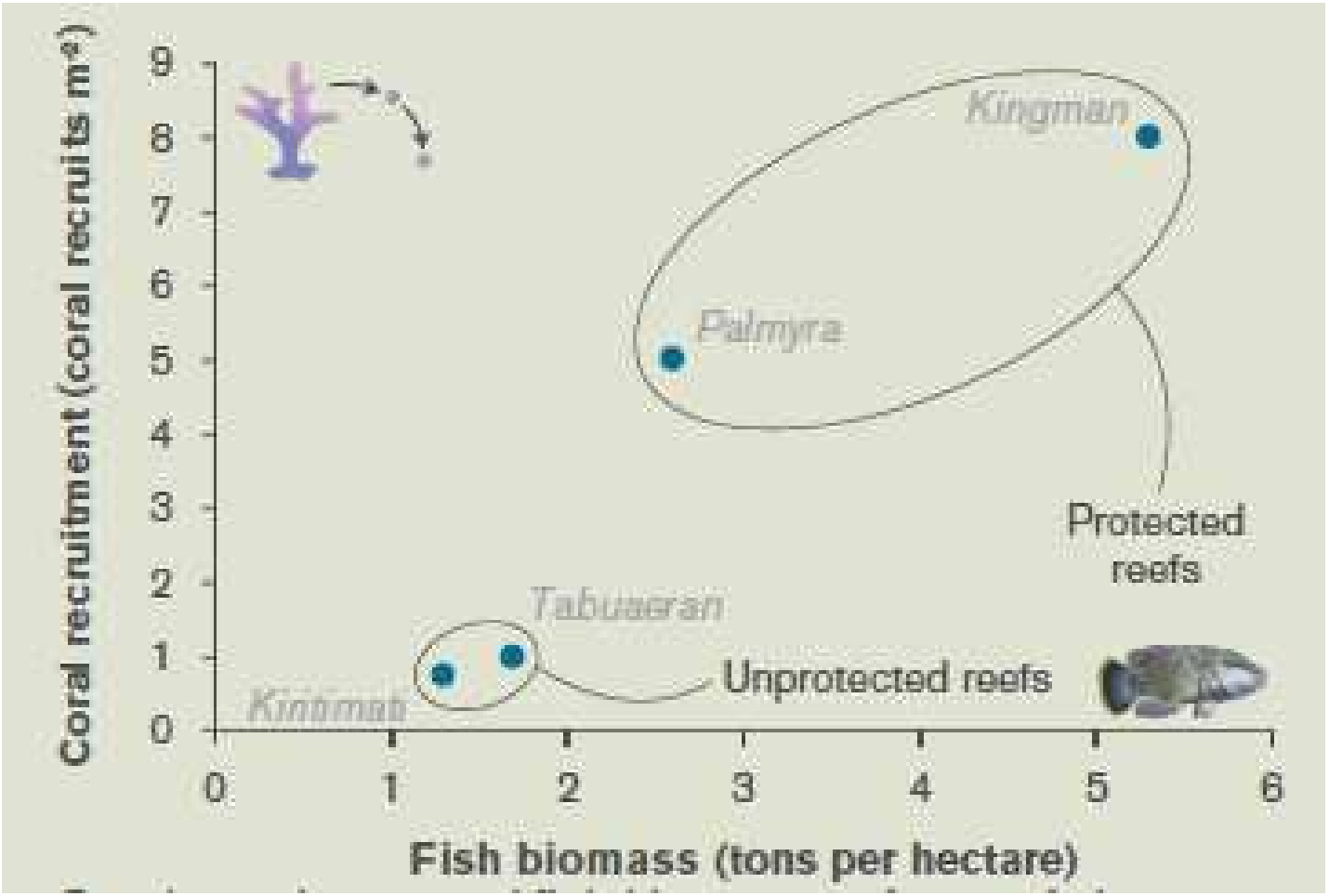
Key Concepts

- Regime shift
- Tipping point
- Resilience
- Adaptation
- **Mitigation**



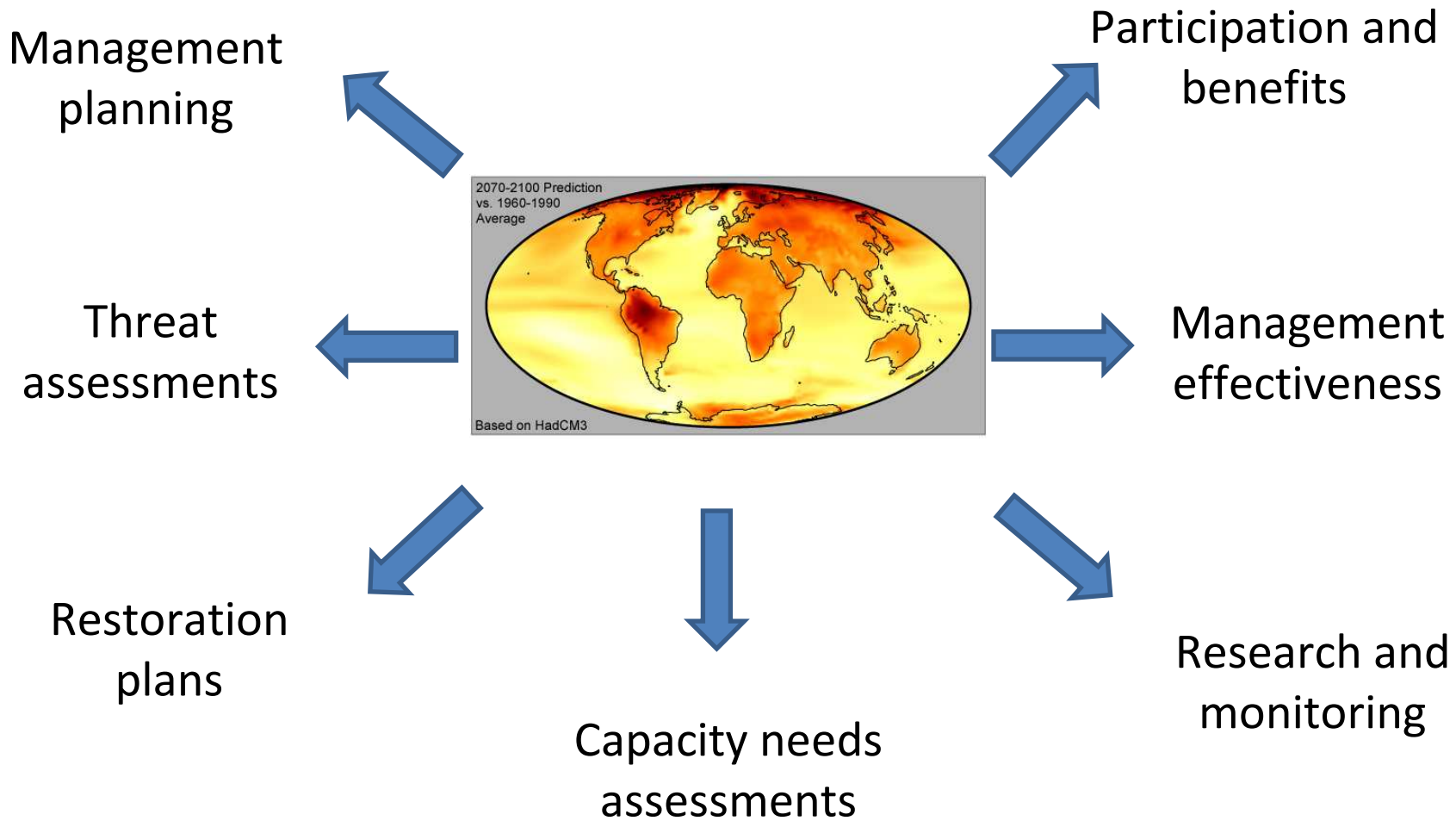
...reducing the scope and magnitude of climate change and its impacts…

The more healthy reefs showed more resilience (faster recovery) from 1997-98 bleaching event



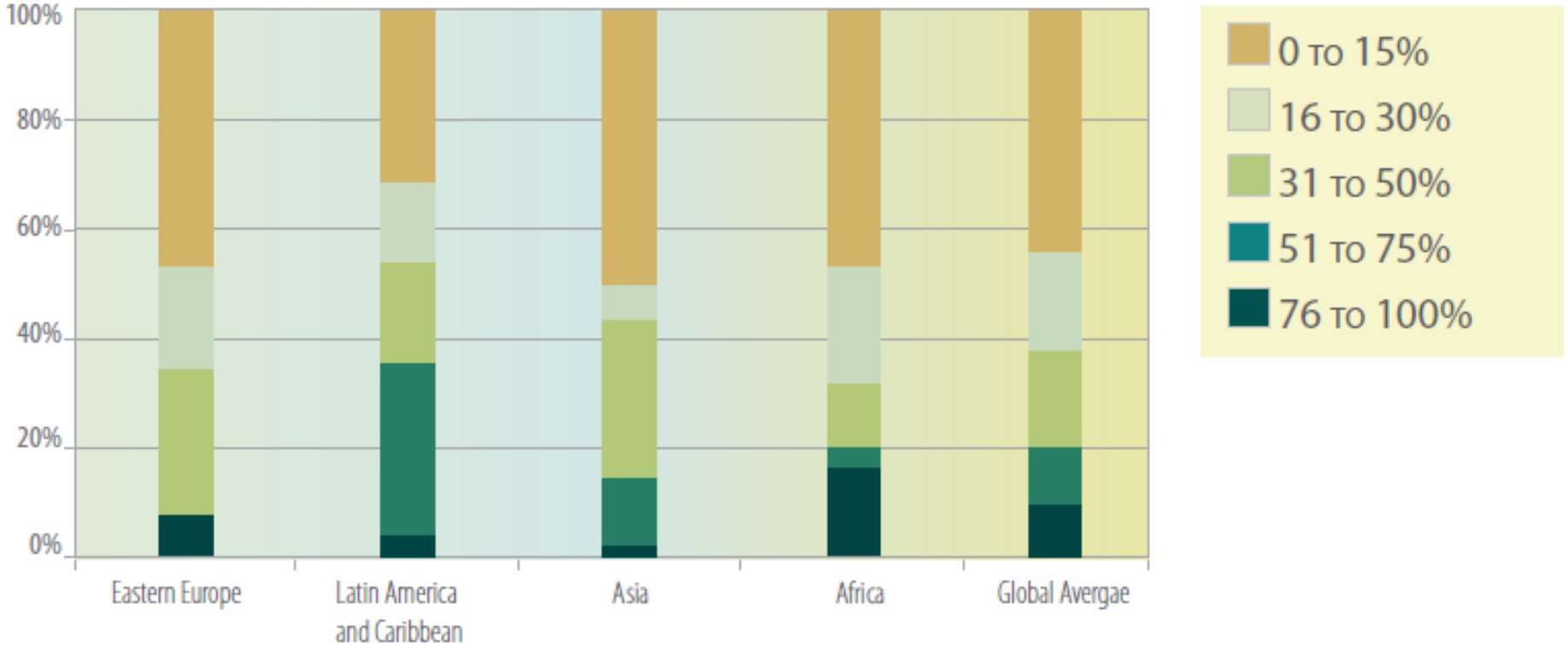
SCIENCETOACTION

Strengthening resilience by incorporating climate into site-level PA management:



Management Planning

Management Planning



- About 90,000 (>2/3) of the world's protected areas do not have management plans
- Of those plans that do exist, only a miniscule fraction incorporate climate change issues

Management Planning – typical elements

- Specific **goals and objectives**
- Important **areas and species**
- Identification and prioritization of **key threats**
- Identification and prioritization of **critical actions**
- Identification of protected area **zones and regulations**
- Develop **indicators** for measuring biodiversity

Management Planning for resilience

- Develop **specific goals and objectives** for improving climate resilience
- Identify **areas and species** of particular importance to climate adaptation, mitigation and resilience
- Identify and prioritize **threats** that exacerbate climate impacts
- Identify and prioritize **critical actions** for strengthening resilience
- Identify areas important for climate change adaptation and mitigation into **protected area zones and regulations**
- Develop **indicators** of climate resilience

Management Planning

Discussion questions:

- To what extent do the management plans in your country incorporate climate resilience and adaptation?

- What are the most feasible strategies for incorporating climate resilience and adaptation into management plans?

- What is the single most important thing you could do to incorporate climate resilience and adaptation into management plans in your country?

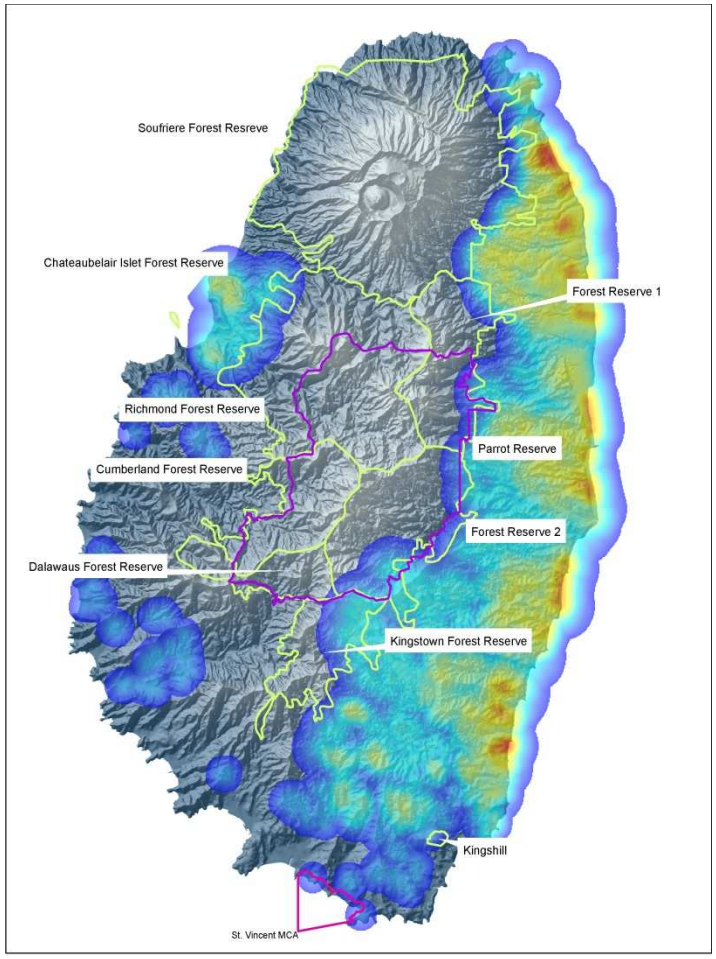
Threats Assessment



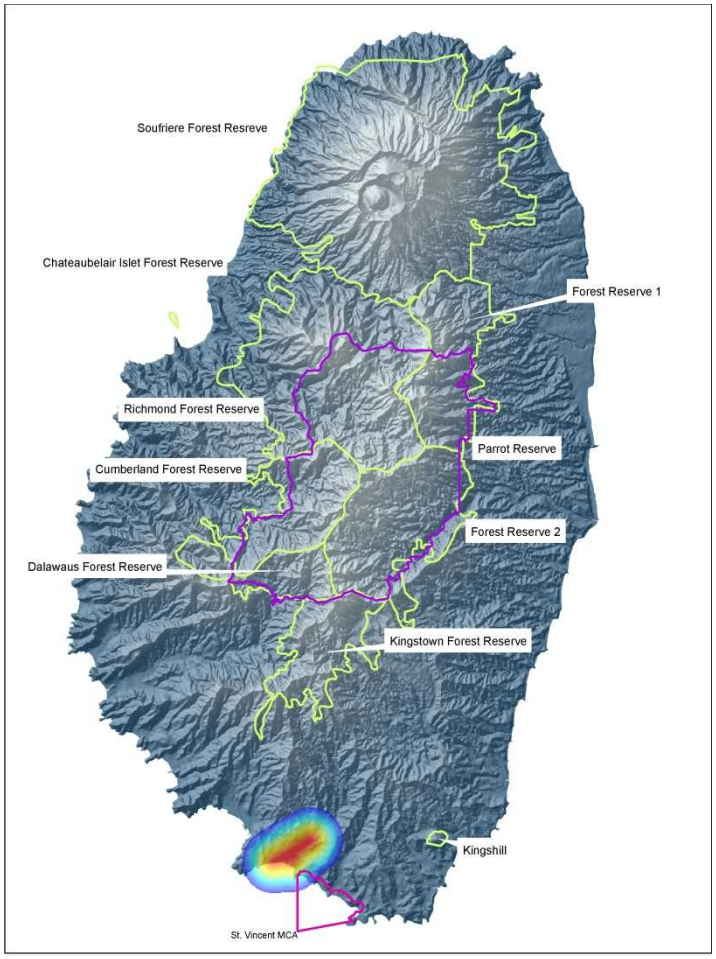



- **Threat assessment**: An assessment of the degree to which human activities impact the integrity of biodiversity

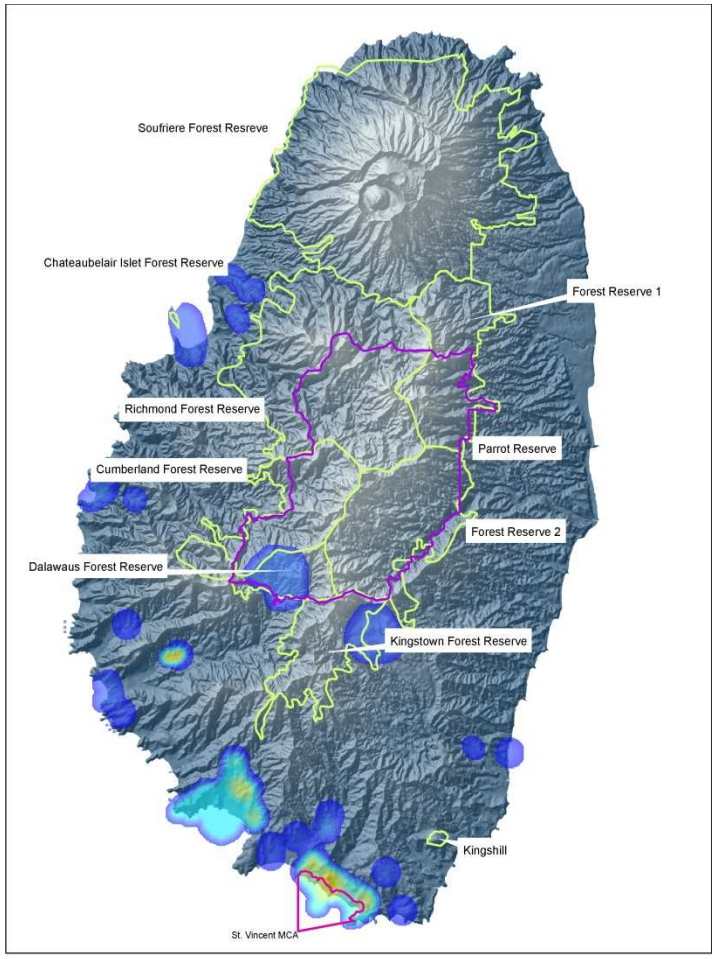
Agriculture



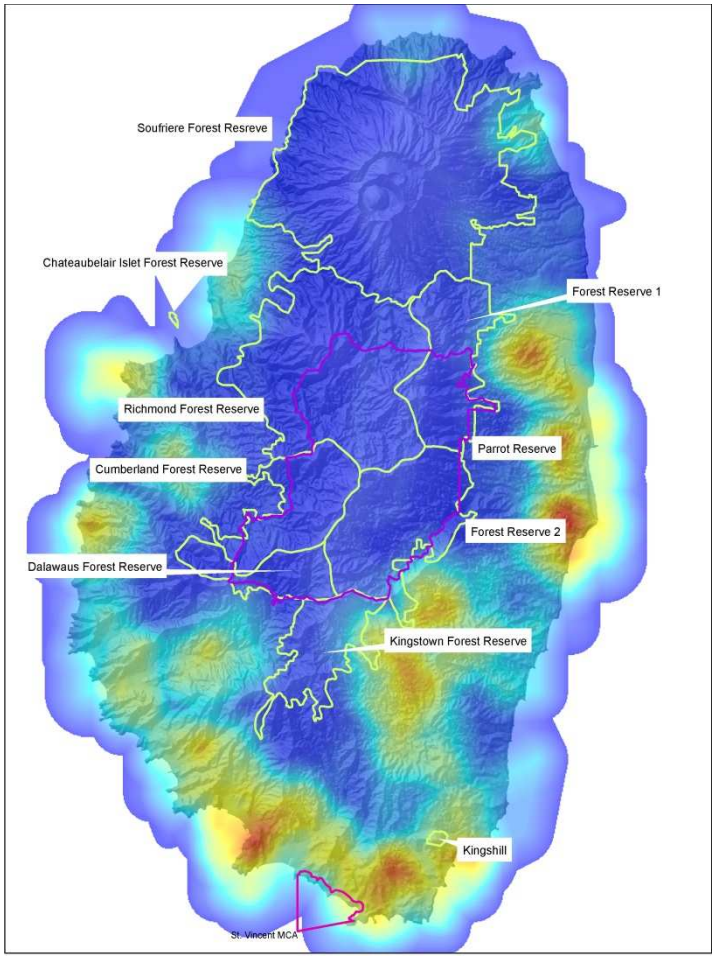
Airports



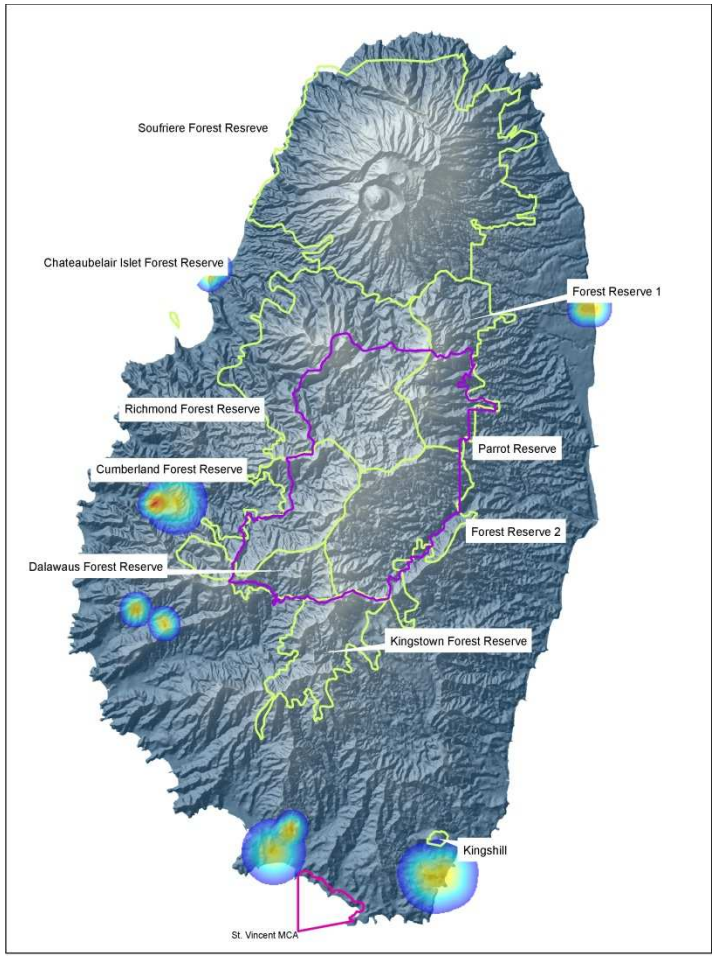
Tourism



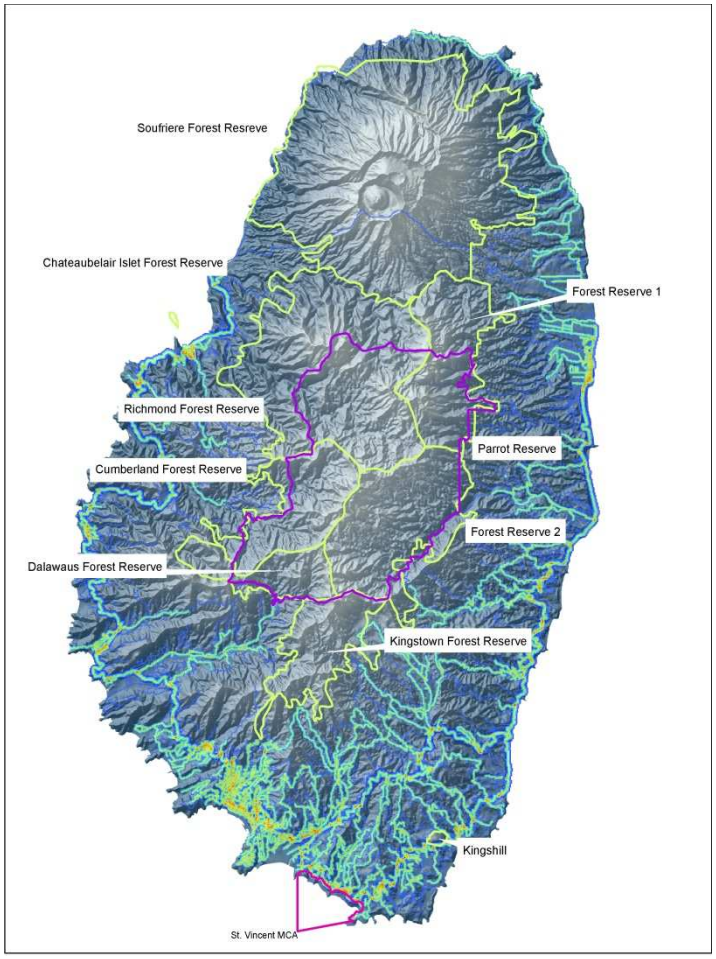
Population



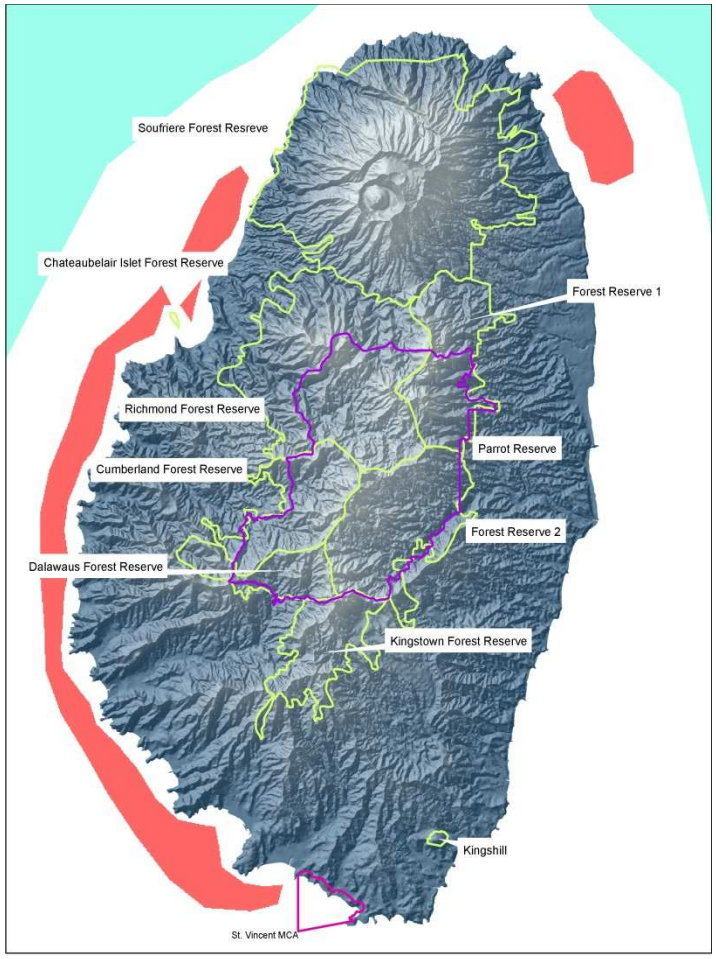
Quarries & Dumps



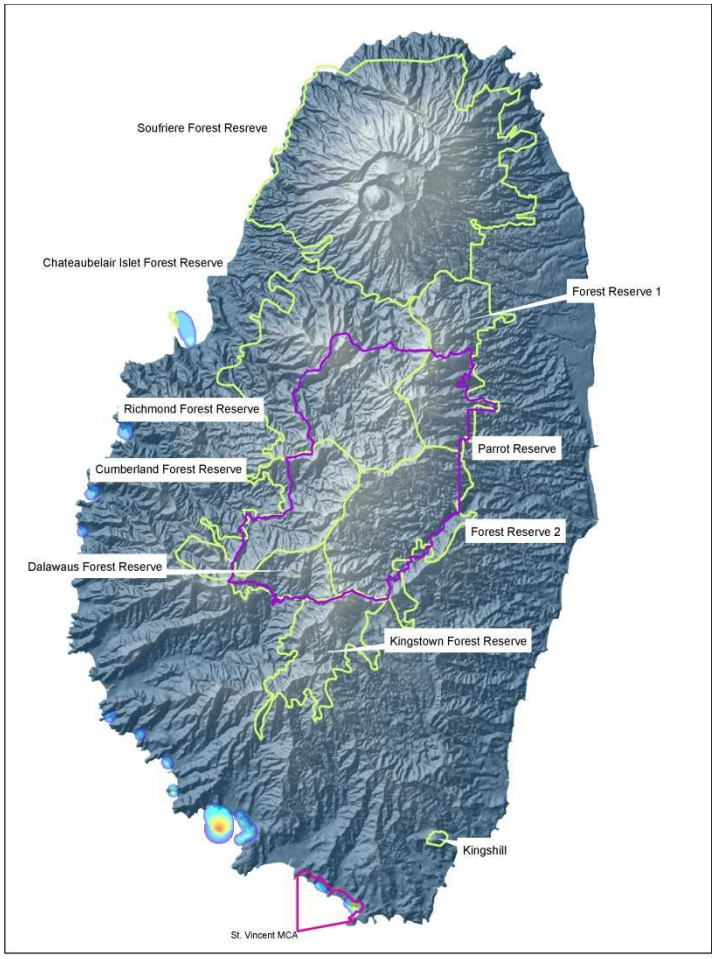
Roads



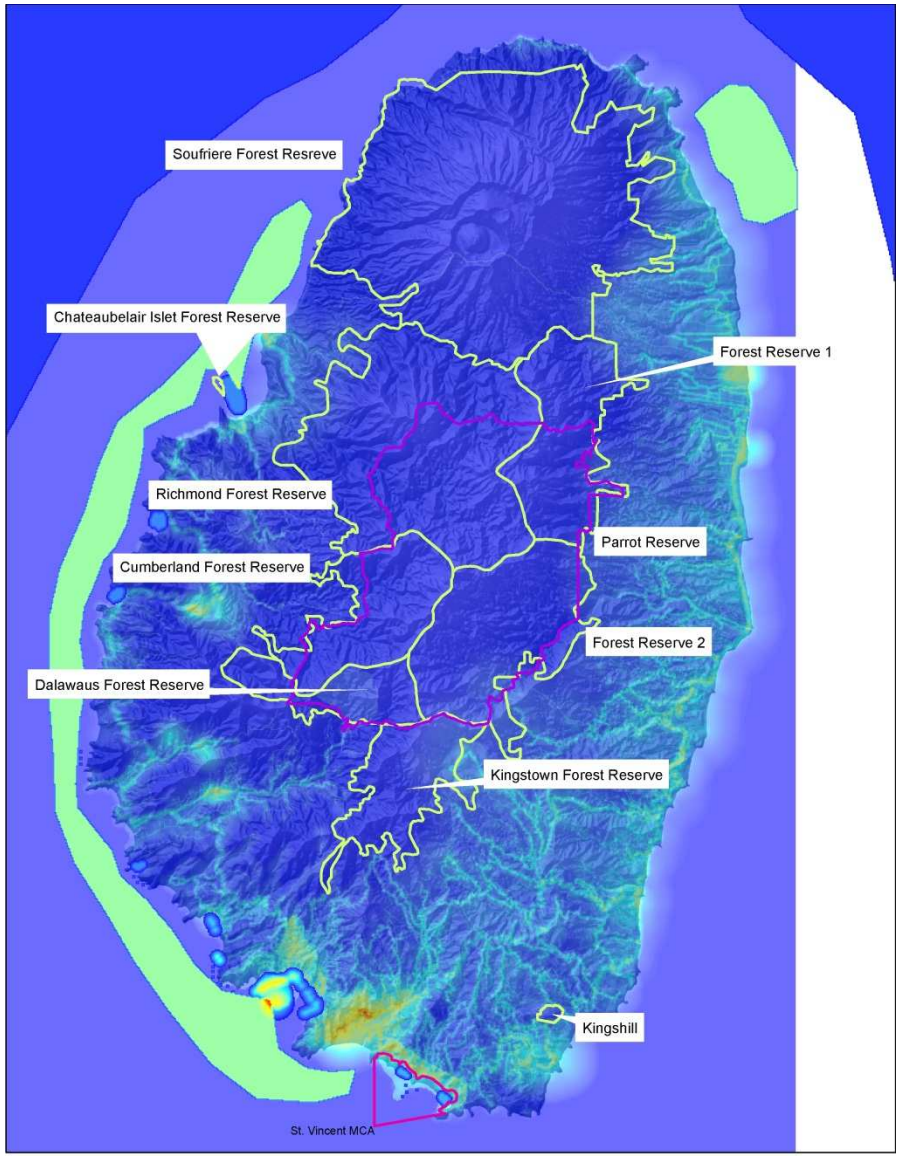
Fishing



Marine Facilities



Cumulative threat surface



Threats Assessment

Protected Areas Threats: Data Sheet 2

Please tick all relevant existing threats as either of high, medium or low significance. Threats ranked as of **high** significance are those which are seriously degrading values; **medium** are those threats having some negative impact and those characterised as **low** are threats which are present but not seriously impacting values or **N/A** where the threat is not present or not applicable in the protected area.

1. Residential and commercial development within a protected area

Threats from human settlements or other non-agricultural land uses with a substantial footprint

High	Medium	Low	N/A	
√				1.1 Housing and settlement
				1.2 Commercial and industrial areas
		√		1.3 Tourism and recreation infrastructure

2. Agriculture and aquaculture within a protected area

Threats from farming and grazing as a result of agricultural expansion and intensification, including silviculture, mariculture and aquaculture

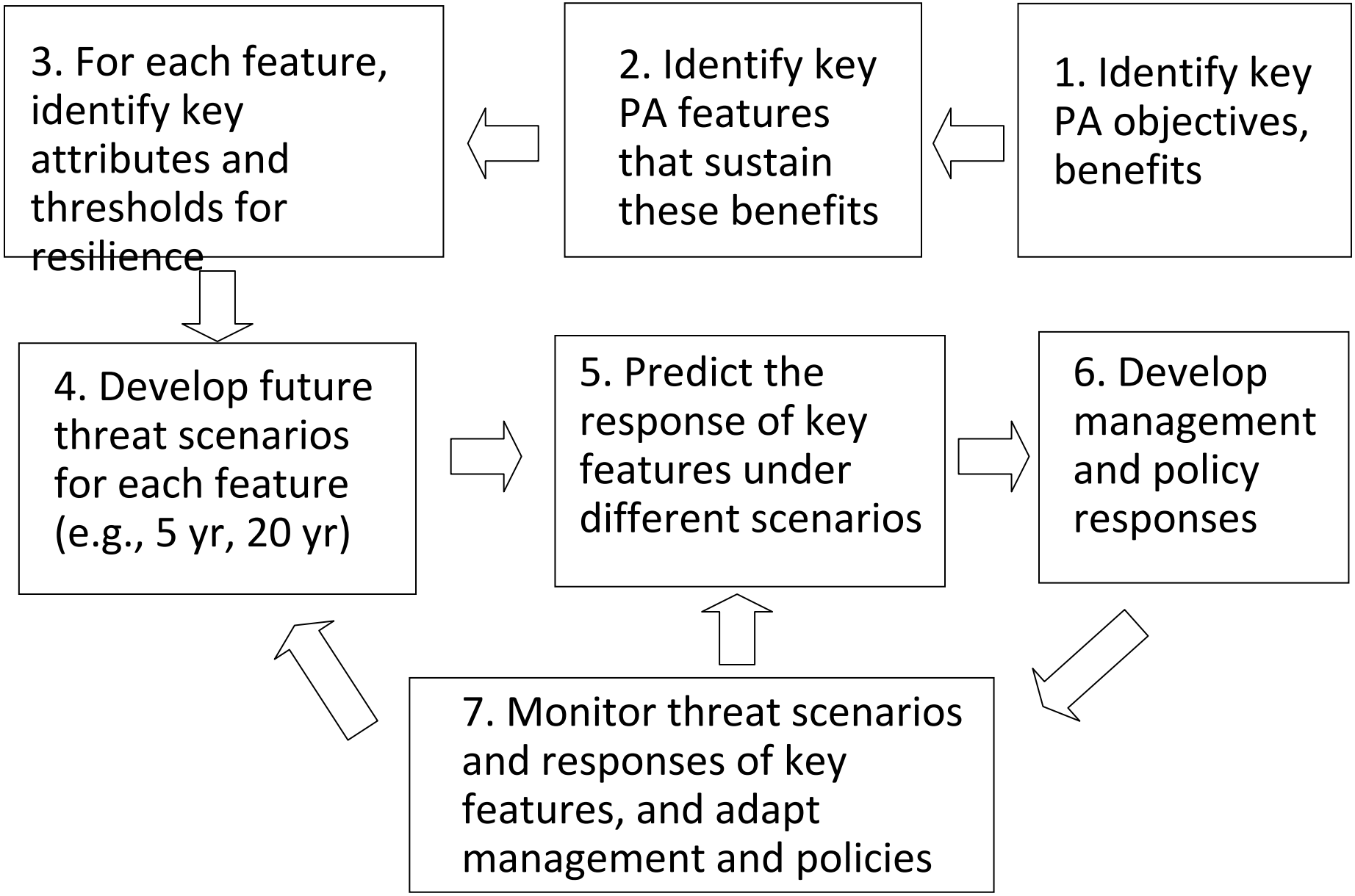
High	Medium	Low	N/A	
				2.1 Annual and perennial non-timber crop cultivation
		√		2.1a Drug cultivation
				2.2 Wood and pulp plantations
√				2.3 Livestock farming and grazing
	√			2.4 Marine and freshwater aquaculture

- Typical protected area threat assessments are a one-page (or a one-paragraph) summary of existing threats within the protected area

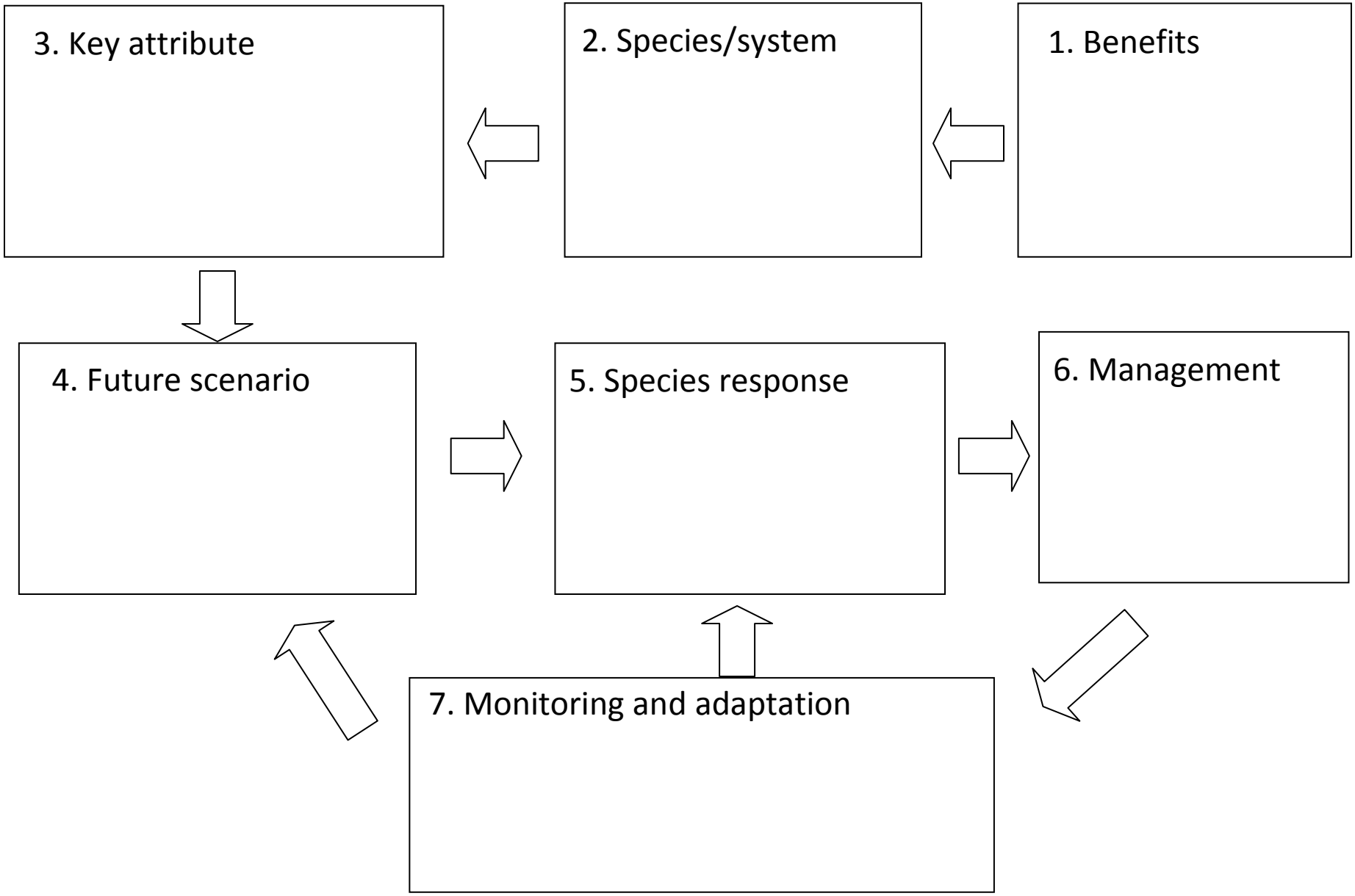
Threat assessments – incorporating climate

- Identify climate change adaptation and resilience as **PA objectives**
- Identify species and systems that **enable resilience and adaptation**
- Incorporate **resilience thresholds** and principles into threat assessments
- Assess the **synergies** between a variety of threats
- Conduct species and ecosystem climate **vulnerability assessments**
- Develop **threat scenarios**

Climate-inclusive Threats Assessment Steps



Threats Assessment Exercise



Assessing threats with climate in mind

Discussion questions:

- What are the threats to the protected area system that will likely be exacerbated by climate change?

- Which threats are most likely to lead to a regime shift?

Protected Area Restoration

- Most restoration efforts focus on the past, not the future
- Few restoration plans or actions consider climate resilience or adaptation

Setting traditional restoration targets and priorities

- Focus on **historical ranges of variation**
- Focus on areas of **high threat**
- Areas important for **species habitat**
- Restore **large and potentially intact habitat** patches
- Focus on **vulnerable species**

Incorporating climate into restoration priorities

Focus on:

- **Resilience thresholds** as well as historical ranges of variability
- Those areas most likely to have **negative synergistic threats** and impacts
- Areas important for **species adaptation**, including ecotones, altitudinal, latitudinal and longitudinal gradients, and riparian and connectivity corridors
- **Refugia and areas important for climate resilience**, including large and intact habitat patches, particularly areas with a history of resilience and resistance to stressors
- Those species most **vulnerable to the impacts of climate change**

Restoration

Discussion questions:

- How well do your restoration plans and priorities include climate resilience and adaptation issues?

- What are the most important priorities for restoration in your country? How important are these areas for climate resilience and adaptation?

- What's the single most important restoration priority in your country for strengthening climate resilience and promoting climate adaptation?

Protected Area Capacity

- Inadequate capacity is one of the most limiting factors of effective management
- Lack of capacity to effectively address climate change impacts will further limit the effectiveness of protected areas in the future

Traditional Capacity Areas:
Protected area policy
Management planning
Threat assessment
Communication
Participation
Site design
Resource management
Monitoring and research

Protected Area Capacity

Capacity Areas:	New skills needed:
Protected area policy	Designing new policies and working with new sectors to address climate change
Management planning	Incorporating climate issues into management plans; assessing species vulnerability to climate change
Threat assessment	Incorporating climate into threat assessments; understanding climate impacts and predictions
Communication	Communicating the value of protected areas in climate change resilience and adaptation
Participation	Identifying new constituencies
Site design	Adapting site design for improved resilience
Resource management	Understanding tipping points and thresholds, and managing natural resources for climate resilience
Monitoring and research	Identifying climate-related indicators for vulnerable species and ecosystems, and for affected human communities

Capacity

Discussion questions:

- What are your most important capacity weaknesses relative to climate change resilience and adaptation?

- What are the best mechanisms for addressing these weaknesses?

PA Participation and Benefits

Traditional focus on participation and benefits

- Focus on consultation
- Focus on finding representative and diverse community members
- Emphasis on rights and benefits for resource use

PA Participation and Benefits

Emerging focus on participation:

- Providing an **early detection** and warning system for climate-related threats
- Identifying **localized impacts** of climate change
- Sharing **traditional resource management knowledge** to promote resilience
- Participating in **resource management** trials for climate resilience, adaptation
- Participating in **payment for ecosystem services** schemes

Participation and benefits

Discussion questions:

- Who will likely be most negatively affected by climate change?
- Who has the ecological and agricultural knowledge needed to contribute to climate change resilience?
- Who is best placed to detect climate change impacts on the ground, monitor impacts and provide early detection services?

PA Management Effectiveness Assessments

- Traditional focus on degree to which management achieves PA objectives (biodiversity conservation)

PA Management Effectiveness Assessments

Management Effectiveness Elements
Threats
Planning and design
Inputs (staff, funding)
Processes (management planning, participation, resource management)
Outputs (resource management, restoration)
Outcomes (ecological integrity)

PA Management Effectiveness Assessments

PAME Elements	New Questions to Consider
Context & Threats	How are climate-related threats impacting, or likely to impact, biodiversity and ecosystem services within the protected area? How important is the site for climate resilience and adaptation?
Planning	How suitable is the PA design for climate resilience? Do landscape/seascape linkages account for climate change?
Inputs	Are there adequate data systems for monitoring climate impacts?
Processes	How well do PA staff understand climate-related issues, and how well are these issues incorporated into management plans? Are research and monitoring priorities aimed at climate resilience?
Outputs	Are restoration efforts aimed at climate resilience?
Outcomes	Is the protected area resilient to climate change? Does it enable adaptation of human and natural communities

Management effectiveness

Discussion questions:

- How important is it within your protected areas to assess management effectiveness for climate resilience and adaptation?
- Which of these potential indicators would be most important in assessing management effectiveness for climate resilience?
- What are some practical steps that you could take soon to assess and improve management effectiveness for climate resilience and adaptation?

PA Research and Monitoring

- Traditional monitoring focuses on current status and trends in biodiversity health
- Research priorities are largely driven by researcher interests and funding

PA Research and Monitoring

EMERGING PRIORITIES

- Determine the **potential magnitude and rate** of climate change impacts on protected areas
- Predict ecosystem structures and functioning and services under **different climate scenarios**
- Assess the **effects of temperature** and enhanced CO2 levels in various ecosystems
- Conduct cross-sectoral research on the impacts of climate change on human wellbeing, and on **relationships between climate and poverty**

PA Research and Monitoring

EMERGING PRIORITIES

- Develop general **climate adaptation principles** that could be applied locally
- Determine **resilience thresholds** for a variety of ecosystems
- Estimate the cascading effects and negative **synergies of multiple threats**
- Assess the impact of climate change on **large-scale migration patterns**

Research and Monitoring

Discussion questions:

- What are the most urgent climate-related research and monitoring needs in your protected areas?

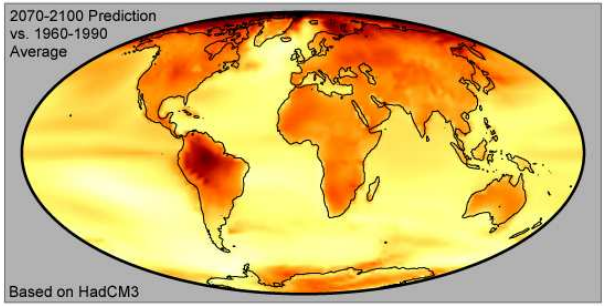
- Who are some potential partners and collaborators for research and monitoring on climate issues in your region?

Developing a PA climate resilience plan

Capacity needs assessments

Participation and benefits

Management planning



Threat assessments

Management effectiveness

Restoration plans

Research and monitoring

PA climate resilience and adaptation plan