

Application of Transdisciplinary Research to Climate Change Adaptation in Small Island Developing States

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Regional Thematic Symposium on Broadening the Application of the Sustainability Science Approach to Support the 2030 Agenda for Sustainable Development - Regional Experiences & Inputs for the Development of Sustainability Science Policy Guidelines

**Kuala Lumpur, Malaysia
December 19-21, 2016**

Presentation

- Introduction & context – selected definitions
- Synergies between climate change adaptation and transdisciplinarity
- IPCC process as an example of transdisciplinary thinking.
- Transdisciplinary assessment and adaptation planning in SIDS – conceptual national & sectoral examples
- Summary – making the case for the application of transdisciplinary integration in climate change adaptation in SIDS

Setting the Context

Interdisciplinarity

- Synthesis of knowledge from two or more disciplines
- Researchers work collaboratively to solve common problem BUT
- Apply their own '*discipline-specific*' lens.

Multidisciplinarity

- Many disciplines BUT little cross-fertilization or integration across disciplines.

Transdisciplinarity

- Process that is not only additive but *integrative* across disciplines
- Subsumes individual disciplinary paradigms to generate new knowledge, learning, understanding.
- Genuinely participatory process → *integration* of knowledge of all stakeholders and disciplines to achieve desired societal outcome.
- Characterized by common objectives, paradigms, approaches.

Transdisciplinarity and Climate Change Adaptation: Where Are The Synergies?

Climate Change Adaptation

- Complex - transcends many disciplines: physical, social, economic, cultural sciences
- Management of risks under uncertainty → scenarios
- Multiplicity of economic and social sectors
- Efficacy & acceptability of adaptation options not merely science-based
- Competing stakeholders & interests – complicated by different norms, customs, value systems & beliefs

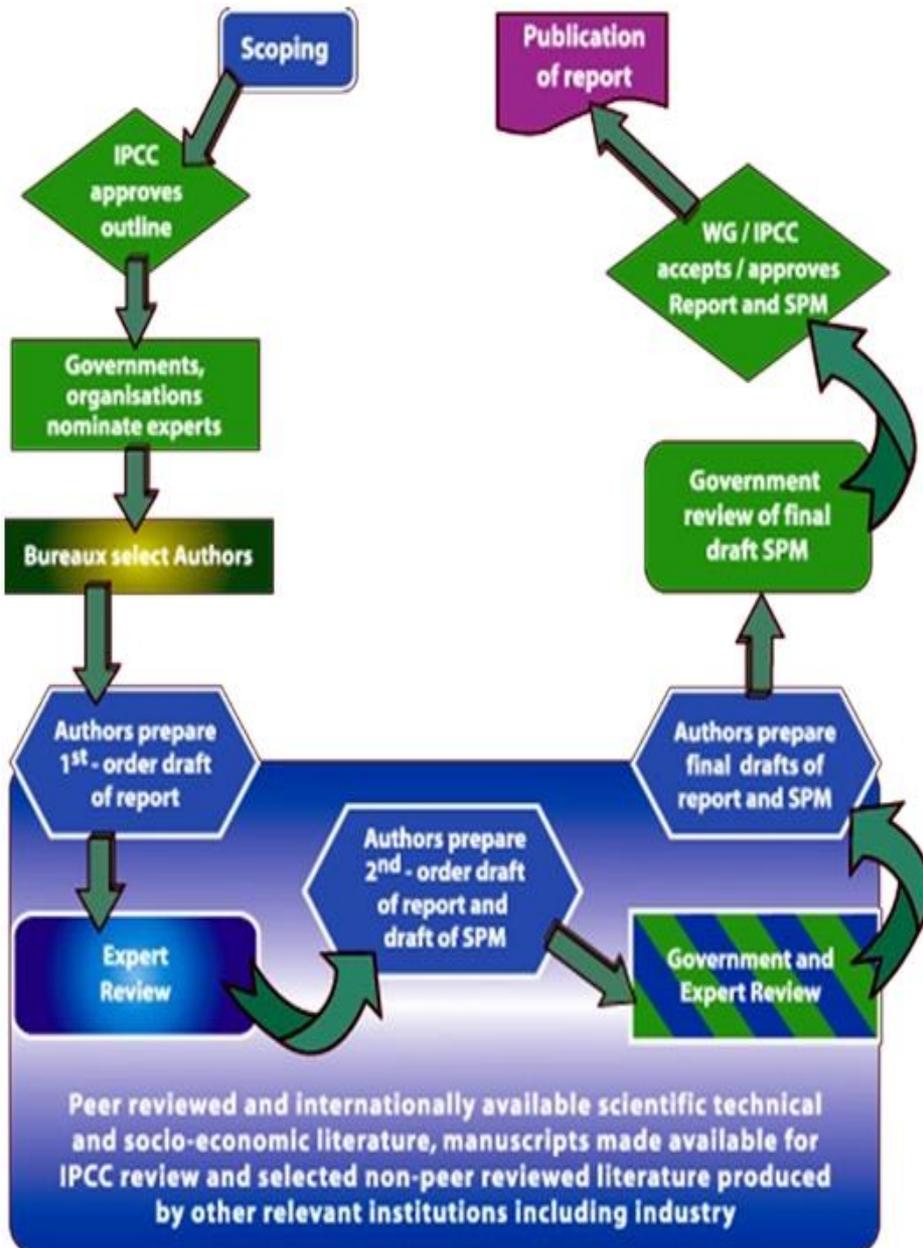
Transdisciplinary Assessment

- Integrates 'science' from many sources with *societal knowledge* – BUT without disciplinary bias
- Strong focus on creation of 'new' knowledge for solving complex challenges → *results-oriented*
- Integrates findings from theoretical research with real-world case knowledge → *human-centred*
- Genuinely participatory process → conceptualization → project design → methods & tools → validation
- Shown to be effective for building *consensus* among *divergent interest groups* in situations of uncertainty

The IPCC Process: A Transdisciplinary Experiment

- > 840 authors, numerous disciplines, many countries
- Common language, definitions, methods applied across *all* WGs, authors & disciplines, e.g.

- Climate change
- Climate variability
- Mitigation
- Adaptation
- Exposure
- Risk
- Vulnerability
- Uncertainty
- Confidence
- Likelihood



Rethinking Key Concepts in a People-Centred Manner: e.g. Vulnerability

Traditional scientific methodologies typically assume that vulnerability is:	Recent integrative approaches & thinking demonstrate that vulnerability is also:
<p><i>Only quantitative</i> – vulnerabilities can be computed and summed, i.e.</p> $VT = \sum v_1 + v_2 + v_3 + \dots v_n$	<p><i>Qualitative</i> – e.g. perceptions, cultural values, intangibles, etc, are important, even though difficult to quantify</p>
<p><i>Non-contextual</i> → Computational methods are transferable from one place to another</p>	<p><i>Contextual</i> → vulnerability is influenced by peculiar circumstances of a place; timing of an event, etc.</p>
<p><i>Applies to the present state</i></p>	<p><i>A process – best understood in context of past and future</i></p>
<p><i>'Objective'</i> → factual and indisputable</p>	<p><i>Subjective</i> – vulnerability is conditioned by one's perceptual and cultural norms or 'world view', e.g. what is regarded as 'vulnerable' in one community may be regarded differently by another group</p>
<p><i>Absolute</i>: exact numbers used to assess the extent of vulnerability</p>	<p><i>Relative</i> → proportions, percentages, subsets of a larger group (e.g. persons, infrastructure, ecosystems) also matter</p>

IPCC Confidence and Likelihood Scales

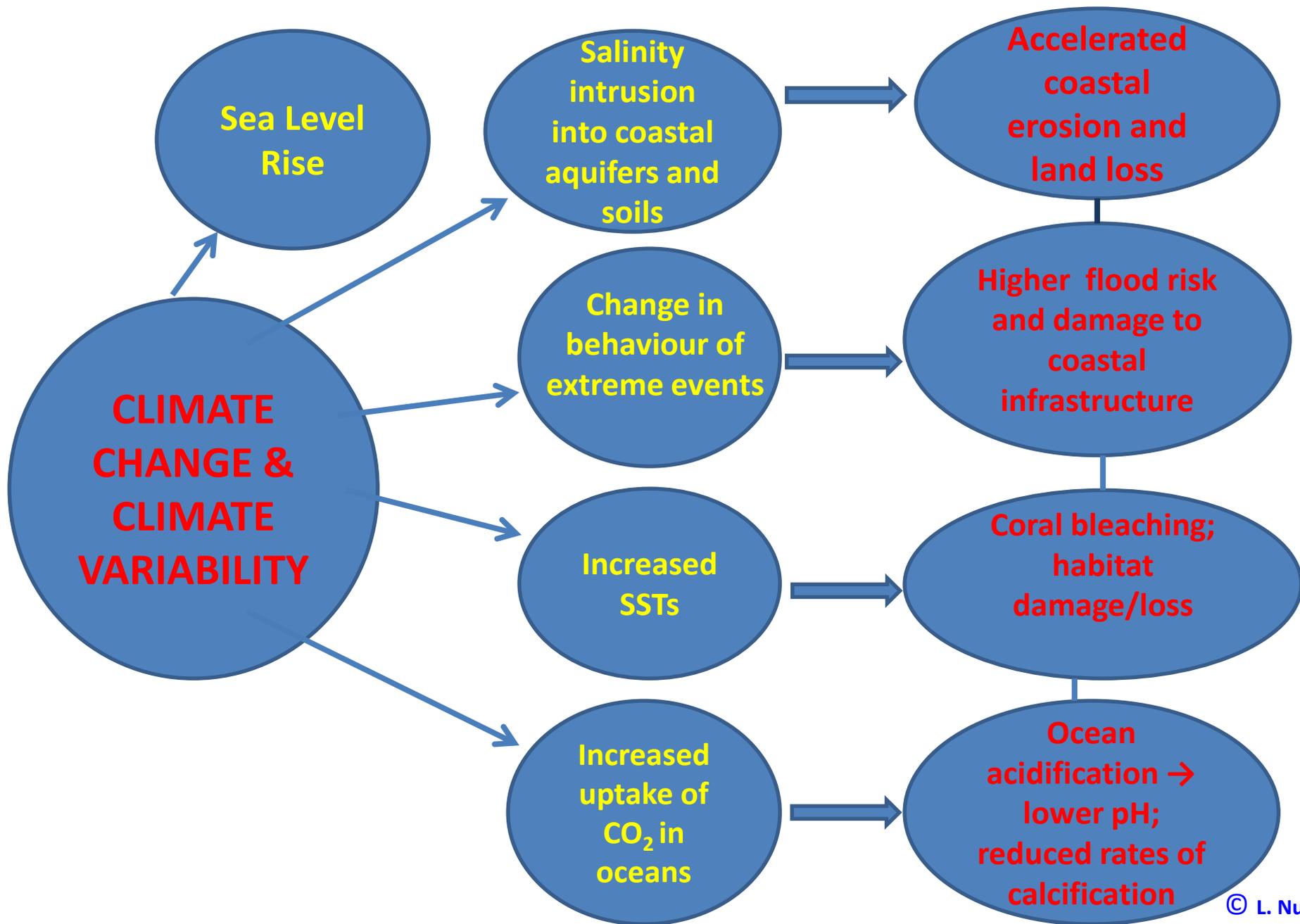
Confidence Terminology & Interpretation

Very high confidence	At least 9 out of 10 chance
High confidence	About 8 out of 10 chance
Medium confidence	About 5 out of 10 chance
Low confidence	About 2 out of 10 chance
Very low confidence	Less than 1 out of 10 chance

Likelihood Terminology & Scale

Virtually certain	> 99% probability
Extremely likely	> 95% probability
Very likely	> 90% probability
Likely	> 66% probability
More likely than not	> 50% probability
About as likely as not	33-66% probability
Unlikely	< 33% probability
Very unlikely	< 10% probability
Extremely unlikely	< 5% probability
Exceptionally unlikely	< 1% probability

Climate Change – Observed and Projected Risks to SIDS



Transdisciplinary research can generate critical knowledge for adaptation planning in SIDS, including:

Identification of Tipping Points:

Critical thresholds at which even *quantitatively* small changes can *qualitatively* alter the dynamics, equilibrium or sustainability of a system

System Failure

Collapse

Tipping points have great policy relevance. CC pushing systems towards critical thresholds rapidly

Monitoring & Early Warning Systems can help detect imminence of critical thresholds

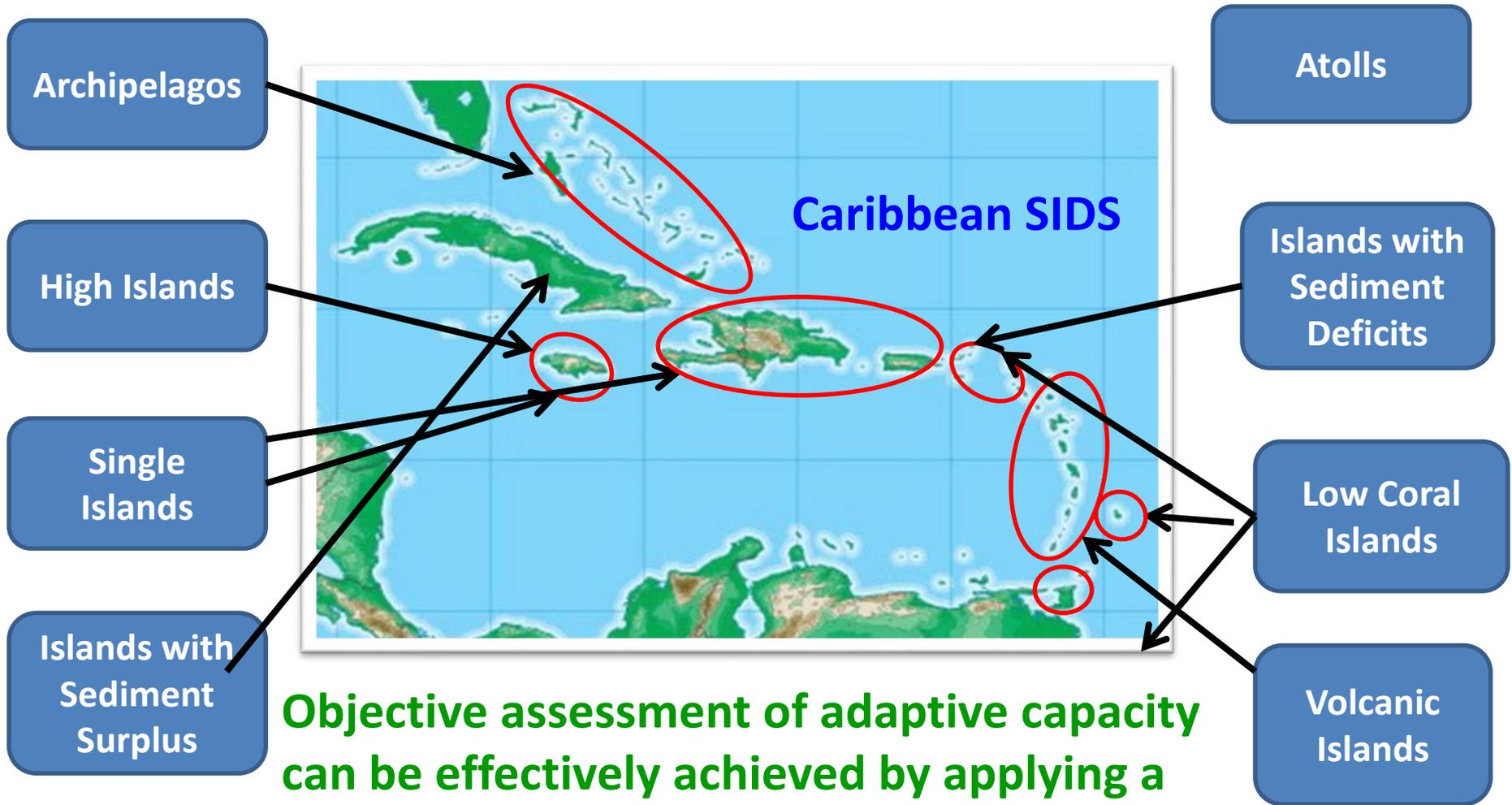
Some ecosystems already near upper limit of their critical thresholds, e.g. corals, mangroves

Quantitatively small changes can overwhelm existing critical thresholds

Transient changes in climate already adversely affecting many SIDS → occurring concurrently with rapid social & economic changes → *multiple stresses* will co-evolve in non-linear, complex and unpredictable ways → threat to the achievement of sustainable development.

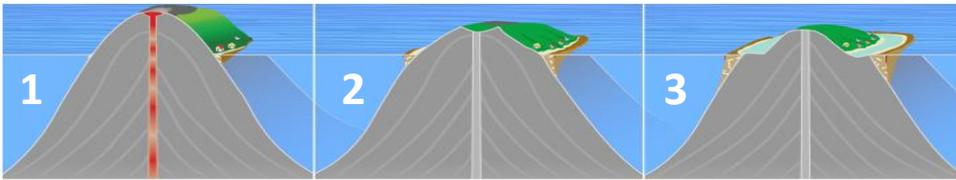
By bridging the gap between the physical and human sciences and policy, transdisciplinarity can assist in identifying, evaluating, implementing and monitoring strategies to minimize risks and enhance resilience in SIDS.

While SIDS share many common characteristics, there is much *heterogeneity*.....which influences *adaptive capacity*

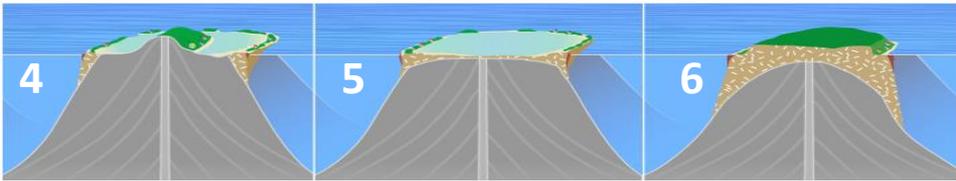


Objective assessment of adaptive capacity can be effectively achieved by applying a 'transdisciplinary lens' to the study of key factors e.g. exposure, risk, vulnerability.

Island Heterogeneity is a Factor in Adaptation



Source: Nurse et al, 2014 'Small Islands' IPCC AR5



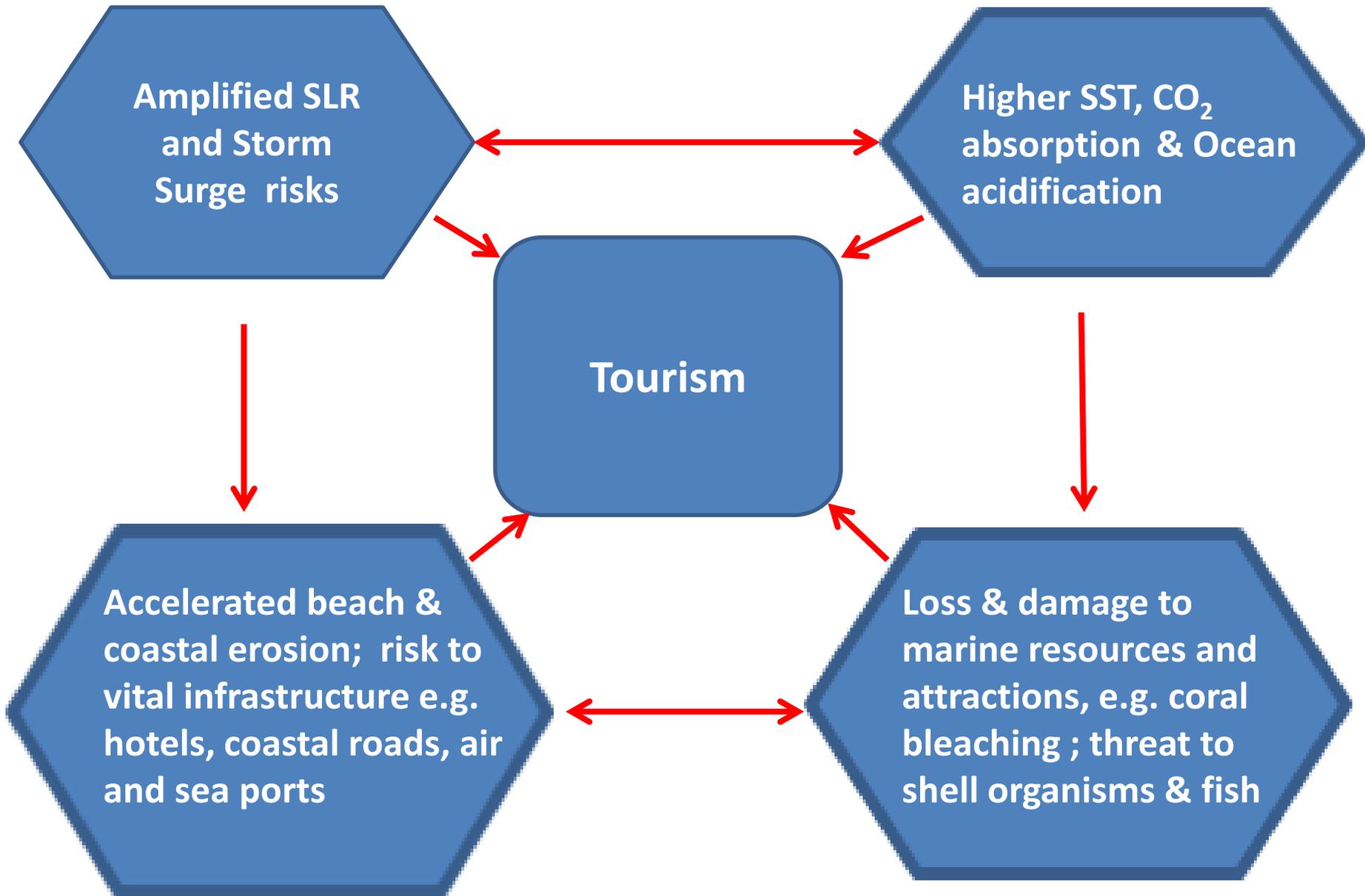
1. Tanna, Vanuatu: raised, volcanic
2. St. Lucia: volcanic
3. Rodrigues, Mauritius: low volcanic, fringed by coral reef
4. Aitutaki, Cook Is: 'near atoll'
5. Tarawa, Kiribati: atoll
6. Nauru: raised limestone



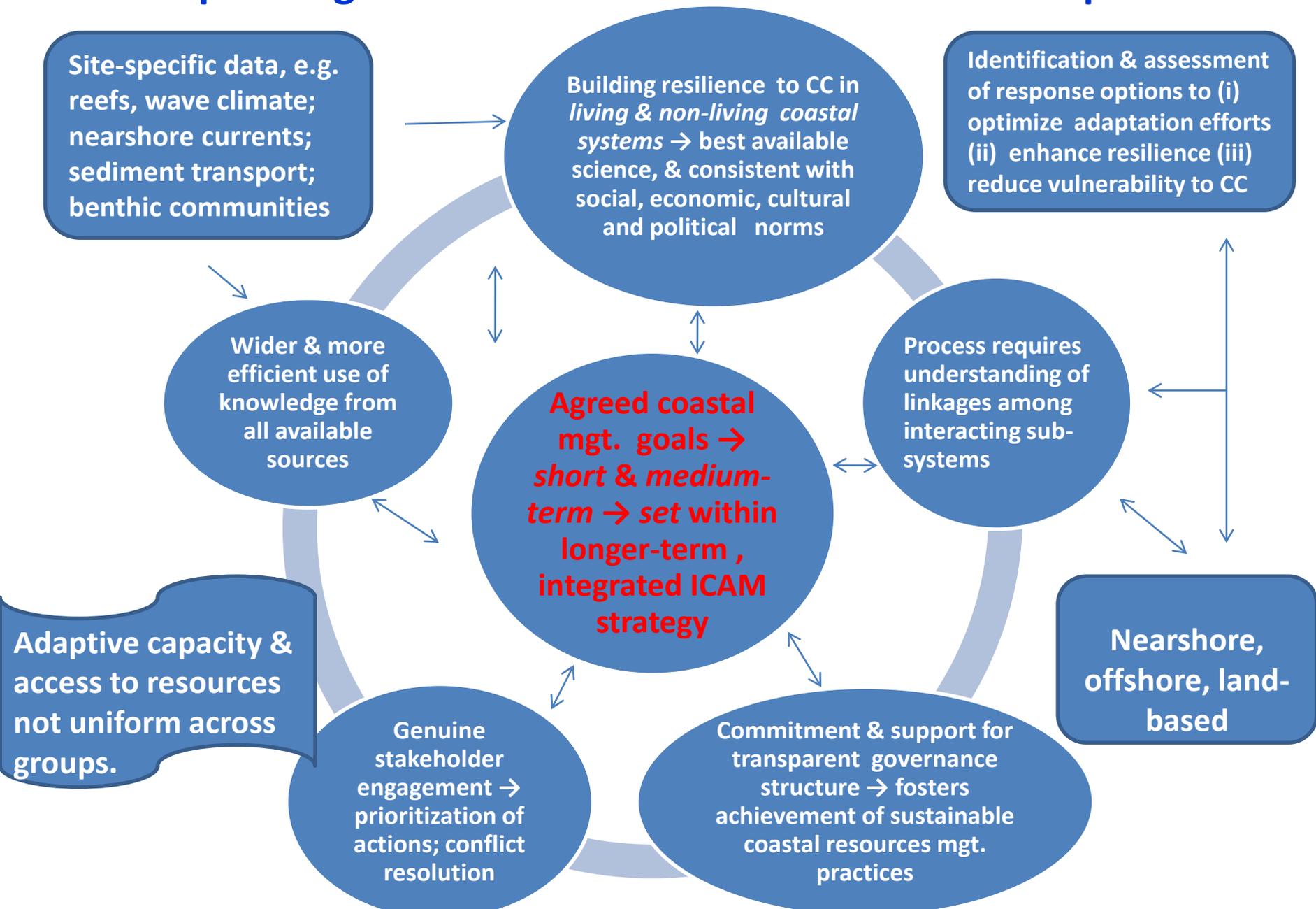
Differing social, economic, political and cultural systems ; different value systems and beliefs

- Adaptation strategies are not always transferrable among regions, countries or communities.
- Lessons learned from 'external' adaptation experience may offer useful guidance for planning → BUT lessons must be appropriate to local social, biophysical, economic, political & cultural circumstances.
- Assessment of '*risk profile*' of each individual island → using transdisciplinary lens → vital for identifying and designing efficacious, context-specific adaptation investments.

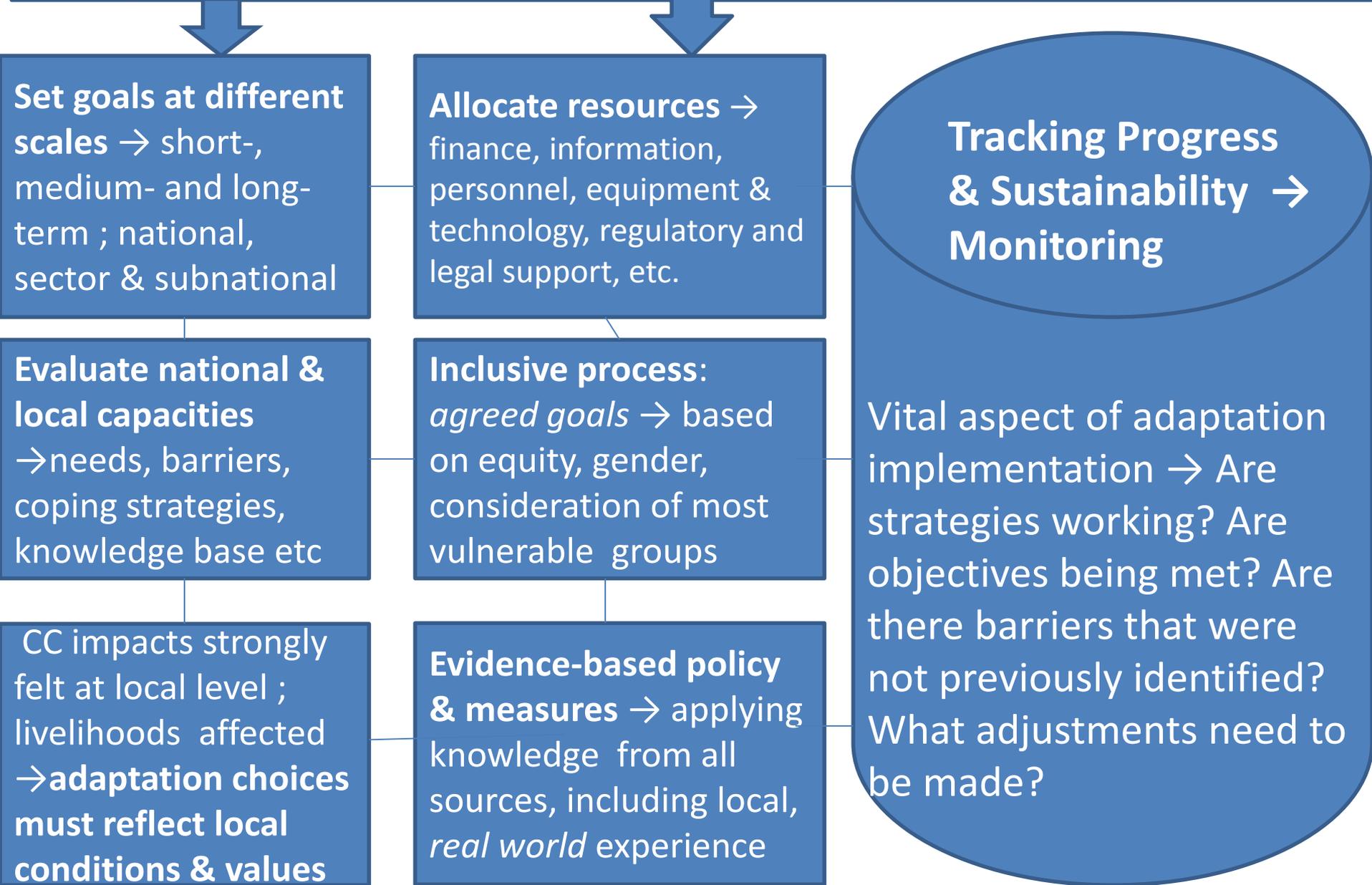
Example: Climate Change Threat to Tourism in SIDS



Transdisciplinarity can also support achievement of sustainable development goals at the sectoral level in SIDS: Example ICAM.



Transdisciplinary assessment can facilitate the integration of adaptation into national sustainable development planning in SIDS



Avoiding Maladaptation

- In most SIDS there is a complex interdependence between environment, natural resources, quality of life and livelihoods
- SIDS are also confronted by many 'old' challenges, that on their own pose a significant threat to sustainability → limited resources, openness of economies, high ratio of debt to GDP, poverty etc.
- Climate change & associated risks will likely amplify these existing, long standing challenges → absolute requirement to adapt
- However, inappropriate adaptation choices → *maladaptation* – could make achievement of SDGs even more elusive for SIDS
- A reliable assessment of the *implications of adaptation choices* should therefore be mandatory, prior to implementation.
- The application of transdisciplinary methods may be a potentially effective approach to detecting and preventing the implementation of maladaptive choices.

Summary - Making the Case for Applying Transdisciplinary Assessment in Climate Change Adaptation Planning in SIDS

- Even in the absence of anthropogenic climate change, SIDS are highly exposed to climate sensitive-hazards → floods, droughts, hurricanes & storm surges.
- GCC will amplify *existing* hazards & trigger *new* challenges
 - drowning and injury → floods, hurricanes
 - freshwater shortages → drought and changed spatial distribution of rainfall
 - infrastructural damage and losses → sea level rise, hurricanes and storm surge;
 - crop failure & effect on nutrition → *rain-fed & irrigated* cultivation
 - reduced *abundance* and *diversity* of living and non-living marine resources
 - adverse consequences on tourism → direct & in direct

Summary - Making the Case for Applying Transdisciplinary Assessment in Climate Change Adaptation Planning in SIDS

- GCC has potential to undermine achievement of the SIDS agenda for sustainability →SDGs, SIDS-POA & Samoa Pathway.
- Adaptation planning will require a wide *suite of interventions* → financial/fiscal, technological, administrative.
 - Broad knowledge base→ integration of local experiences, physical &, social sciences + stakeholder engagement
 - Consensus on adaptation choices/solutions → socio-cultural, economic, financial, political & environmental acceptability
 - Agreement on process → goals, methods & tools; shared language (risk, uncertainty, vulnerability); rules of engagement



Transdisciplinary Assessment → knowledge integration: solution-oriented to inform decision-making and policy intervention → not focused on knowledge advancement for its own intrinsic value.

Thank You

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<http://cavehill.uwi.edu/cermes>