GLOBAL ADAPTATION PROGRESS TRACKER

GAP-TRACK

PILOT STUDY REPORT 2021

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A.K. Magnan (IDDRI, France), A. Anisimov (IDDRI, France), V.K.E. Duvat (La Rochelle University, France), P.N.K. Deenapanray (Ecological Living In Action Ltd, Mauritius), B. Fall (Dakar University of Cheikh Anta Diop, Senegal), V. Kauppaymuthoo (Delphinium Ltd, Mauritius), M. Noblet (Consultant, France), S. Persand (Coastal Land and Marine Solutions Ltd, Mauritius), M. Sadio (Climate Analytics), C. Schaer (Consultant, Georgia), L. Vallejo (IDDRI, France).

STEERING COMMITTEE

The development of the pilot phase of the GAP-Track benefited from the support of an international Steering Committee composed of 24 members from different organizations representing the scientific community, potential users of the GAP-Track and funding partners. The Steering Committee helped challenge and refine the methodological approach; provided advice on the development of the pilot study; and shared views on post-2021 developments and opportunities for application of the GAP-Track at a global perspective, including key questions raised (and initial solutions) on upscaling and potential partners to be involved. The report does not represent the views of the institutions that members come from, nor their personal views.

LIST OF STEERING COMMITTEE MEMBERS:

Karim Anegay *(International Platform on Adaptation Metrics, IPAM)*
Magnus Benzie *(Stockholm Environment Institute, SEI)*
Pilar Bueno *(National University of Rosario, UNFCCC Adaptation Committee)*
Adèle Colvez *(Ministry of Environment, France)*
Christophe Buffet *(Agence Française de Développement, AFD)*
François-Xavier Duporge *(Agence Française de Développement, AFD)*
John Firth *(Willis Towers Watson)*
Catherine Gamper *(Organisation for Economic Cooperation and Development, OECD)*
Matthias Garschagen *(Ludwig Maximilians Universitat Munchen & IPCC WG II)*
Katy Harris *(Stockholm Environment Institute, SEI)*
Miriam Kennedy *(UK Climate Change Committee, UKCCC)*
Andrea Liverani *(World Bank)*
Henry Neufeldt *(UNEP-DTU Partnership)*
Bertrand Reysset *(Agence Française de Développement)*
Michiel Schaefferer *(Global Commission for Adaptation, GCA)*
Karl Schultz *(International Platform on Adaptation Metrics, IPAM)*
Ramchurn Seenauth *(Ministry of Environment, Solid Waste Management and Climate Change, Mauritius)*
Youba Sokona *(Sustainable Development - The South Centre & IPCC)*
Liam Upson *(UK presidency for COP26 & Cabinet Office)*
Marie-Noelle Woillez *(Agence Française de Développement, AFD)*
From IDDRI: ***Ariadna Anisimov, Michel Colombier, Alexandre Magnan, Lola Vallejo***

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EXECUTIVE SUMMARY

Point of departure

Understanding whether we are on track to adapt to climate change globally is fundamental for constructing a common vision and development pathway in a warming world. Over the last decade, scientific and policy research has been tackling important questions on methods for evaluating adaptation effectiveness and progress, especially given varying country vulnerabilities, and the complexity to move from local scale context specificities to a global perspective. These issues are at the core of COP26 (Glasgow) where Parties will discuss the Global Goal on Adaptation and preparations for the Global Stocktake (GST) in 2023. This latter is expected to deliver a first estimation of adaptation progress and potential gaps and needs at a global level, with the intention of providing the international adaptation community with a common reference to design adaptation pathways.

Estimating global progress on climate adaptation raises methodological challenges, together with diverging diplomatic viewpoints (e.g. implications on the allocation of international climate finance for adaptation to most vulnerable countries) (Beauchamp *et al.,* 2021). Schematically, tracking adaptation is difficult because of a lack of structured information on climate risk levels, adaptation-related interventions in place, and evidence on effective risk reduction; and because of difficulties to aggregate local- and national-level information into a global perspective. In addition, a lack of clearly defined adaptation goals at the global level means there is no reference point for assessing progress or gaps. Several initiatives have been developed over the recent years to inform adaptation progress tracking and contribute to the Global Stocktake, including, among others, the UNEP Adaptation Gap Report, the OECD Adaptation Task Force, the Global Commission on Adaptation, and more national-level initiatives such as by the UK Climate Change Committee. The UNFCCC Adaptation Committee recently developed a technical paper that provides an overview of existing adaptation tracking approaches in view of assessing progress towards reaching the global goal on adaptation (UNFCCC, 2020). In addition, guidance is available on reporting on adaptation in Adaptation Communications (UNFCCC, 2018). Overall, it is increasingly recognized that multiple approaches are needed to come up with the big picture in terms of adaptation progress.

Basics of the GAP-Track approach

The GAP-Track approach builds on the above challenges to offer a new avenue for tracking adaptation progress globally that could support the Global Stocktake by providing the international community with complementary information on adaptation progress and gaps. The GAP-Track approach consists in using a question matrix for assessment and a scoring system to set a framing that facilitates wide application across scales and for different kinds of *Representative Adaptation Challenges*. These questions encompass six important dimensions of adaptation: *(1) Knowledge about current and future climate risk; (2) Adaptation planning and policy tools; (3) Adequacy of adaptation actions in place; (4) Institutional, technical, and financial capacities; (5) Evidence of progress towards actual climate risk reduction; and (6) Consideration of pathways for long-term adaptation planning.*

Each question is described by a set of 3-4 sub-questions and then informed by an expert judgment exercise using multiple rounds of assessment and a collective discussion. The experts carrying out the assessment are required to have scientific and policy expertise, and accumulated experience on the ground on the *Representative Adaptation Challenge*. The scoring system ranges from 0 (no evidence) to 4 (high contribution to adaptation progress). The scorecard approach allows to create a common language between experts as well as between the various dimensions of adaptation reflected in the questions and sub-questions, and so lays the foundation for a cross-dimensional analysis. The overall framing allows flexibility in the evaluation where information and data might not be available, or of such different types that they are usually not combined (e.g. quantitative metrics, traditional knowledge inputs, policy information). In that way, GAP-Track is complementary to existing approaches, and does not aim to replace or challenge national reporting mechanisms or monitoring and evaluation frameworks for adaptation progress. The approach can offer a method

to gather scientifically robust and multi-source information on adaptation progress for various global adaptation challenges.

Pilot phase and challenges ahead

A pilot phase in 2021 consisted in applying the GAP-Track approach to one *Representative Adaptation Challenge* (coastal adaptation) and two national-level case studies (Mauritius Island in the South West Indian Ocean, and Senegal in West Africa). The results confirm that the approach is feasible and pragmatic, offering a method to gather information on adaptation progress where official data might be lacking. The pilot study allowed us to survey potential for future applications ahead of the GST, which raises questions on how to further expand on and upscale the approach to a global perspective. This report discusses three main aspects (and includes concrete proposals): How to identify the *Representative Adaptation Challenges* to describe adaptation at the global level? What should be the entry point to a global GAP-Track? And how to operationalize a global-scale GAP-Track?

The GAP-Track: Key Takeaways

— Highlights a new method to assess adaptation progress (question-matrix, expert judgment and scoring system).
— Supports the scientific community, informs policy-making, provides complimentary information on adaptation progress to convene stakeholders and discuss adaptation processes.
— Structures a framing of adaptation at multiple scales using a common language informed by the question matrix.
— Supports regional to national and local stakeholders (adaptation planning and monitoring and evaluation systems), as well as possibly UNFCCC mechanisms, for example, towards enhanced structuring of the next generation of Adaptation Communications (e.g., organized by the six overarching questions of the GAP-Track framing).
— Helps identify common challenges across *Representative Adaptation Challenges* and study systems (e.g. socio-geographical), in order to identify priority areas of action. Some examples could be: increasing knowledge on current and future climate risks from score 2 to score 3 (for instance); understanding the context-specific synergies and trade-offs between several adaptation-related options, and potential for sequencing over time; ensuring that funding mechanisms and project implementation go beyond several years; assessing the effect of adaptation-related policies and actions on current risk reduction; etc.
— Given its cross-country entry point, the GAP-Track could support international cooperation on climate adaptation, in relation with the emerging challenges raised by transboundary climate risks.

INTRODUCTION

Climate change impacts are occurring and expected to increase under all global emission reduction scenarios, even under a 1.5°C warming. Accordingly, countries recognize the need for preparing, anticipating and reducing vulnerability to those impacts in their adaptation plans. However, the question emerges on how to navigate adaptation trajectories, and on the potential knowledge gaps? The Global Stocktake in 2023 will aim to bring substance to the Global Goal on Adaptation (Article 7 of the Paris Agreement 2015) by preparing a first estimation of adaptation progress and potential gaps and needs at a global level. The discussions underway, and at the heart of COP26 negotiations, is what modalities will be agreed upon to assess global adaptation progress given several technical and policy challenges. The **Global Adaptation Progress–Tracker** (hereinafter **GAP-Track)**[1] developed by IDDRI aims to inform and support those discussions by presenting a new approach to tracking adaptation that could provide complimentary information on adaptation progress at a global scale, and therefore support existing approaches.

The GAP-Track aims to present a methodological protocol that is based on an expert judgement exercise, using a question matrix, scoring system, open evidence base and scorecard narrative. The project builds upon existing scientific literature and policy discussions, which highlights issues of: assessing progress across scales (trade-offs and risks of losing context specificities), data aggregation, lack of common metrics and conceptual complexities (e.g., outcomes *versus* outputs). In fact, a recent technical paper by the Adaptation Committee of the United Nations Framework Convention on Climate Change UNFCCC (2020) highlights the conceptual, methodological and political frictions for adaptation progress tracking, especially at a global scale. It is increasingly recognized that indicators or standardized approaches may not be fully satisfying, given both the particularity of adaptation reflecting varying vulnerability and risk contexts, and the challenges around the availability of relevant data. T**he GAP-Track therefore aims to harness as much as possible these deadlocks by exploring the added value of a risk-oriented entry point (identified through global *Representative Adaptation Challenges*), an expert judgement exercise and supporting methodological protocol (adaptation success is framed by a six-question matrix, scorecards, open resource and narratives) as an additional way to assess progress and gaps in adaptation at various scales and in different contexts** (see Positioning note[2] of the GAP-Track approach).

This report presents the outcomes of a pilot study launched in 2021 by IDDRI in partnership with the Agence Francaise de Developpement (AFD) to test a first implementation of the approach. The pilot phase applied the GAP-Track approach to a selected *Representative Adaptation Challenge* (coastal adaptation) in two national-level country case studies, Mauritius (South West Indian Ocean) and Senegal (West Africa), gathering a group of local and international experts for each case. The basic methodological insights on applying the approach to these case studies are presented in this report, including lessons learnt. The full details of the methodological protocol[3] and results are available on the project webpage.[4]

While the pilot study focused on a national-level assessment, several lessons have led to survey opportunities for upscaling the approach to a global perspective. In addition, the pilot study was supported by an international Steering Committee to guide policy engagement (see Steering Committee page 2). By drawing from these insights, IDDRI explores an architecture for operationalizing the GAP-Track at a global level based on a wider set of *Representative Adaptation Challenges* and systems

1 https://www.iddri.org/en/project/assessing-global-progress-climate-adaptation-gap-track-2021

2 https://www.iddri.org/sites/default/files/PDF/Projets/Internal%20Note%20A%20-%20Positioning%20of%20GAP-Track_June%202021.pdf

3 https://www.iddri.org/sites/default/files/PDF/Projets/GAP-Track_Methodological%20report%20(D1)_September%202021.pdf

4 https://www.iddri.org/en/project/assessing-global-progress-climate-adaptation-gap-track-2021.

(e.g. socio-geographic), and involving a multi-stakeholder partnership and worldwide experts. This could ensure wide participation and mobilize a breadth of information, data, knowledge and expertise on adaptation challenges and priorities globally. In the run-up to the Global Stocktake in 2023, such an architecture could offer **complementary information based on an independent assessment process** outside of UNFCCC Party-centered reporting structures. It is important to note that the GAP-Track does not aim to challenge nor replace the official nationally led approach for assessing progress towards meeting the Global Goal on Adaptation under the provisions of the Global Stocktake.

IDDRI's positioning and proposition is therefore to contribute to the scientific landscape and policy dialogue (bridging the two streams) by exploring a complementary way of thinking adaptation progress from a global perspective. The GAP-Track could provide three major benefits:

(i) Propose a methodological protocol;

(ii) Support an independent assessment process to develop complementary information on adaptation progress and gaps, and that could be of interest to support the Global Stocktake;

(iii) In that way, the GAP-Track does not aim to replace or challenge national reporting mechanisms or monitoring and evaluation frameworks for adaptation progress, but rather to offer an additional perspective on the adaptation tracking issue.

The report is structured as follows. Chapter 1 presents the approach in terms of the key concepts (e.g., *Representative Adaptation Challenges*), the methodological tool (e.g., expert judgment exercise and scoring) and the main research steps deployed for the 2021 pilot phase. Chapter 2 illustrates the results of the two case studies undertaken in 2021 on evaluating coastal adaptation progress in Mauritius and Senegal. Chapter 3 builds on the above to draw key lessons learnt. Chapter 4 highlights important challenges ahead for a global scale application, and proposes first thoughts on ways forward.

1. GLOBAL ADAPTATION PROGRESS TRACKING (GAP-TRACK)

1.1. Objectives

The GAP-Track project explores a new method to track climate adaptation progress that is based on a question matrix, expert judgement exercise and scoring system. Since it allows addressing some of the technical, methodological and conceptual challenges that have been raised in the scientific literature and policy debate, its core objective is to put forward the basis of an innovative approach that can be refined through test and trial, surveying how results could be important signals for complimentary evidence to inform adaptation policy and planning, and for designing long-term trajectories of sustainable development.

The GAP-Track methodological protocol is synthesized in this chapter and Figure 1, while a full description can be found in a previous Methodological Report[5] issued in 2021. Given that the core objective of adaptation is to reduce climate risk, the GAP-Track advocates that in order to avoid ending with a non-focused analytical framework, any approach to assess adaptation progress needs to be designed against clearly defined climate risks. The GAP-Track approach is therefore risk-oriented, relying on the identification of major adaptation challenges in relation to important climate change risks, i.e. of global significance. Identifying these adaptation challenges are further explored. As this chapter illustrates, the question matrix frames a conceptual understanding of adaptation progress/gaps, including a set of sub-questions that allow to dive deeper into context specificities for a given climate change risk and related adaptation area. At the same time, the mobilization of study context expert groups allows to bring together various types of expertise and information to ensure evidence based scoring, while retaining an independent assessment process. To this purpose, flexibility and practical considerations on further implementation are core elements of the approach that are discussed in this chapter.

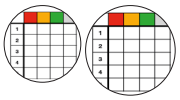
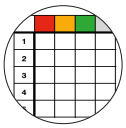
The chapter addresses some of the advantages and potential limitations of the GAP-Track approach and explores opportunities as a modality that can bring forward complimentary information on adaptation progress for Parties in preparing for the Global Stocktake 2023 and also beyond for other potential users (bilateral and multilateral funding organizations, national decision-makers, practitioners and adaptation planners).

1.2. The methodology

1.2.1. Representative Adaptation Challenges

The assessment focuses on key climate change risks and associated adaptation priorities that are identified at a global scale. These are called *Representative Adaptation Challenges* – examples are provided in **Figure 7** at the end of this report and one of them, coastal adaptation, is further developed in section 2.1. This framing was inspired by the work of both the Intergovernmental Panel on Climate Change (IPCC) under the Working Group II on "impact, vulnerability and adaptation",[6] and the UK Climate Change Committee (UK CCC) (2015) that bases national progress assessments on Key Risk Areas and related Adaptation

FIGURE 1. Overview of the GAP-Track approach.

Step 1 ⇨	Step 2 ⇨	Step 3 ⇨	Step 4 ⇨	Step 5
Representative Adaptation Challenges (RAC), reflecting key climate risk areas	**Guiding questions**	**Expert judgment protocol**	**Assessment**	**Conclusions**
Examples (depending on context and scale of analysis) • Coastal adaptation to face sea-level changes • Agriculture strategies to face changes in temperature and precipitations • Urban infrastructure to face temperature changes • Etc.	**6 overarching questions** 1. Knowledge on current and future risks? 2. Plans in place? 3. Adequate actions in place? 4. Capacities to implement adaptation? 5. Effectiveness in reducing climate risks and manage long-term vulnerability? 6. Pathway-like approach in place? For each overarching question, a small set of sub-questions help refine guidance to assess adaptation progress	• Potential adjustments to the sub-questions according to the specific *Representative Adaptation Challenge* (RAC) and scope of analysis • Scoring system (including confidence levels) • Rounds of expert assessment • (individual and collective), and aggregation Aggregated scores to inform each sub-question and then overarching question	• Scorecards • For each *Representative Adaptation Challenge* and study system  • Synthesis (cross-*Representative Adaptation Challenge*, cross-system) 	• Conclusions on adaptation progress (are we on track?) • Reflection on Shared Adaptation Goals to describe the Global Goal on Adaptation

5 https://www.iddri.org/sites/default/files/PDF/Projets/GAP-Track_Methodological%20report%20(D1)_September%202021.pdf

6 For example chapter 19 of the WGII contribution to the Fifth Assessment report (Oppenheimer *et al.*, 2014). It is also based on IDDRI's contribution (Lead Author responsibility) to one of the synthesis chapters of the WGII contribution to the Sixth Assessment report.

Priorities. Similar to the UK Climate Change Committee, the GAP-Track proposes a point of departure focused on *Representative Adaptation Challenges* that facilitates a cross-scale assessment from a local level, to national and global perspective. As the project develops, a consideration of defining those key areas of risk and adaptation will be necessary to ensure a fair and representative selection (see section 4.2).

1.2.2. Framing of adaptation success: six overarching questions

The GAP-Track approach is based on a question matrix, which consists of six overarching questions and a set of sub-questions that aim to gather targeted information on context-specificities corresponding to the *Representative Adaptation Challenge* and at the given scale of assessment. The development of these overarching and sub- questions represent an important first framing to the GAP-Track approach by setting the foundation for what components are considered to shape adaptation success, including climate risk, governance and capacities, and the understanding of both outputs and outcomes. In order to tackle any conceptual challenges, the six questions below (see also **Box 1**) aim to cover the full breadth of adaptation-related progress concerns discussed in the scientific literature (e.g., Magnan *et al.,* 2020; UNEP 2020; Berrang-Ford *et al.,* 2021) and policy documents (e.g. UK CCC 2015) including on:

(1) Knowledge about climate change risks in the present and in the future, and especially if there is available scientific information (with a focus on climate hazards as well as the drivers of exposure and vulnerability to human and natural systems);

(2) Adaptation planning and policy tools, including the extent to which these instruments are effectively implemented and whether a variety of stakeholders, at multiple scales, are included in those processes;

(3) The adequacy of adaptation actions taking place to reduce climate risks, and if these activities target the main climate hazards and drivers of exposure and vulnerability;

BOX 1. THE SIX OVERARCHING QUESTIONS STRUCTURING THE GAP-TRACK APPROACH

1. Does scientifically-based knowledge on current and future climate risks exist at the appropriate scale?

Understanding climate risks (their nature, extent and potential future trends) is a key starting point to adaptation progress. Therefore, question 1 aims to determine whether context-relevant climate risks are known, and more specifically if there is scientific knowledge on current and future climate risks at the needed scale (from local to national level and eventually global, depending on the targeted scale of the assessment). Each *Representative Adaptation Challenge* can refer to multiple climate risks. For example coastal adaptation in the 2021 pilot study refers to marine flooding, coastal erosion and groundwater and soil salinization as well as hazards from both extreme events and slow onset changes. Depending on the context and extent of the assessment, the focus can be applied to a set of climate hazards but not necessarily all.

2. Are there national to local plans in place and are they implemented?

In order to enhance adaptation action, it is important to have policies and plans in place to guide decision-making, actions and stakeholders. This question aims to determine whether national and/or local adaptation policies and plans are in place, and more specifically if they are implemented on the ground. It seeks to understand "whether there is an explicit policy or plan in place that aims to address the relevant climate risks. For example in the UK, the National Planning Policy Framework explicitly considers climate change and provides a basis for appropriate planning decisions that take account of current and future flood risk" (UK CCC 2015, p. 41).

3. Are adequate actions taking place at a relevant scale to reduce climate risks?

This question aims to understand the extent of actions taking place to reduce climate risks, and thereby adaptation progress on the ground. "Action" refers to a wide diversity of options aiming at implementing adaptation on the ground, including specific measures as well as regulatory processes. It is important to note that given the specific focus of the assessment—to understand adaptation to climate change-related risks—only actions that are specifically designed for climate risk reduction are considered. A wide range of measures could contribute more or less directly to climate risk reduction over the long run, for example incentives to enable poor people to access jobs, to reduce socioeconomic inequalities, to access land and more broadly to support the enhancement of the adaptive capacity of individuals, households and society as a whole. However, these actions play as indirect drivers of vulnerability and risk reduction, while the assessment here needs to remain focused on actions specifically directed at identified climate risk reduction. Relevant scale means that these actions are accepted to have an effect on risk reduction at the scale considered in the assessment (in the 2021 pilot phase, local actions, with a national-level perspective).

4. Are there sufficient institutional, expertise and technical, and financial capacities to implement adaptation at the required scale?

The goal of this question is to understand some critical governance arrangements that support adaptation progress, especially institutional, financial and human capacities. The

aim is to determine a level of understanding on the extent to which those responsible for carrying out certain tasks are indeed doing so (or in capacity to do so). It is important to note that the focus of this question is on how such capacities can help determine progress on adaptation; it is not an evaluation of "good governance of adaptation" (e.g. enough funding for adaptation?). Technical capacities are considered in this assessment under "human capacities" (thereafter "expertise and technical capacities"), but could be better highlighted in further assessments.

5. Is progress being made in actually reducing current and future climate risk (including reducing hazards locally and managing long-term exposure and vulnerability)?

This question aims to understand to what extent adaptation actions are contributing to risk reduction and more specifically, gather information on available evidence of risk reduction in the present day. It encompasses understanding of those risk reduction actions undertaken, as well as those actions that could contribute to increasing exposure and vulnerability (maladaptation) as well as the role of communities and society at large in terms of awareness of climate change risks. Inspired by the UK CCC, this question aims at providing understanding on "the assessment takes account of the scale of the current and future risks, and the impact of relevant policies and actions. Where possible, the evaluation is based on the suite of indicators that the [relevant assessment partners have] developed, that measure over time changes in exposure and vulnerability, and observed impacts, within each priority area. Where appropriate, account is taken of whether the actions will take time to deliver measurable changes in vulnerability" (UK CCC 2015, p. 41). Three time horizons could ideally be addressed here in relation to climate risks, i.e. present-day and mid- and end-century.

6. Is a pathway-like approach considered?

Scientific works demonstrate that no single measure will offer a comprehensive solution to climate risks, but rather that sequences of measures and decisions have to take place in order to ensure some flexibility in the face of uncertain developments in climate hazards, vulnerability and risks. In that view, adaptation pathways "enable the adjustment of adaptation strategies in response to new information and changing circumstances, in ways that are as efficient and transparent as possible. The approach builds flexibility into an adaptation strategy through the development of a range of options to deal with different climate scenarios" (UK CCC 2015, p. 40). The adaptation pathway approach covers several dimensions; the goal of the GAP-Track approach is not to enter into such complexity, but just inform whether the sequencing of actions over time is part of the strategy and planning tools in place. This question therefore aims to understand whether the anticipatory use of sequencing adaptation actions over time is considered; and whether synergies and trade-offs among multiple adaptation responses are considered and associated to a multi-decadal roadmap.

(4) The governance of adaptation, such as the institutional, technical (including expertise) and financial capacities to coordinate and carry out adaptation policy design and activities across relevant scales. The goal here is not an evaluation of "good governance of adaptation" (e.g. is funding enough?) but rather an understanding of the extent to which those responsible for carrying out certain tasks are indeed doing so or in capacity to do so (e.g. the existence of adaptation-specific and sustainable funding support);

(5) Evidence of progress towards reducing current and future climate risk, which includes the awareness of society and attention to minimizing the risk of maladaptation;

(6) The consideration of pathways for long-term adaptation planning, which refers to goal setting, sequencing actions and considering alternative strategies, while evaluating the trade-offs and/or synergies of different adaptation options.

The themes of those six overarching questions represent a way to touch on a comprehensive vision of success and potential gaps or needs in adaptation policy, planning, implementation and outcomes. Indeed, one weakness of existing tracking approaches is that they tend to focus on some dimensions, but rarely encompass adaptation in its whole complexity (UNEP 2020). For example, some indicator-based quantitative methods are constrained by data availability and often end up in selecting adaptation criteria that corresponds to available quantitative data, resulting in a restrictive understanding of adaptation (e.g., GDP-oriented). The GAP-Track approach emphasizes the importance of combining multiple dimensions of adaptation to garner a comprehensive understanding of progress. A question matrix and an expert judgment assessment serves as a promising way to move forward. Such a positioning raises its own methodological challenges that the 2021 pilot phase started to explore.

Sub-questions are developed for each overarching question. They reflect the descriptive qualities of the overarching questions with a focus on gathering targeted information and data of multiple nature. Indeed, the different components of the Global Goal on Adaptation (adaptive capacity, resilience, and reducing vulnerability to climate change) are considered in these sub-questions (e.g. governance takes a deep dive into capacities while evidence of progress and adequacy of actions focuses on risk reduction). The sub-questions that have been developed for

the Pilot Study in 2021 on Coastal Adaptation are described in Annex A2, including details on their respective scope and scale(s).

The advantage of this framing is that the breadth of the question grid enables an application in different contexts (developing and developed countries and for different kinds of *Representative Adaptation Challenges*; see section 4.2) thereby ensuring an approach that is not designed to fit one typology of risk and vulnerability conditions, nor constrained to a cultural, socio-economic or institutional setting. In other words, the overarching and sub- questions presented in **Box 1** and Annex A2 are generic enough that they can be applied to various *Representative Adaptation Challenges* and adaptation contexts, and therefore support an overall **cross-context and cross-risk understanding**. Furthermore, the question matrix is not spatially or geographically limited, which enables a **cross-scale approach at a regional or even global level**. The scoring system developed for the expert judgment approach (see section 1.2.3) allows to create a **common language across a diversity of sources of information** (quantitative and qualitative; scientific, policy, and local knowledge; etc.) resulting in the use of similar descriptors to discuss different situations at different scales, e.g. local and national levels.

There are some limitations to the current framing that deserve more attention as the methodology develops, including for example aspects of justice and equity as important components for adaptation success. These areas among others will be necessary to integrate in an advanced version of the question matrix, for example in existing sub-questions dealing with the anthropogenic drivers of vulnerability (e.g. sub-questions 1.3 and 5.2 in Annex A2). It is important to note that at this stage the GAP-Track approach does not aim at capturing adaptation components in an exhaustive way, but rather to help provide an overall understanding of key dimensions. In addition, critical attention needs to be paid to the technical feasibility of the approach especially in terms of its implementation to multiple *Representative Adaptation Challenges* (see section 4.2), which in turn advocates for keeping the number of overarching questions and sub-question limited. In that way, the coastal adaptation assessment matrix developed for the pilot study in 2021 only provides a concrete example to reflect on.

1.2.3. An expert judgment-based assessment: experts, evidence-base scoring system

The experts

Expert judgement is based on mobilizing people who have in-depth knowledge and expertise on a given subject/context to provide an assessment using their knowledge base and experience. It is often used in areas where available data and information may be limited and the development of standardized indicators may be too complex - if not impossible. Recent expert judgement exercises have highlighted the added value of the approach, especially in areas where climate risk and uncertainties may hamper modeling and metrics (Zommers *et al.,* 2021). Some recent examples include assessment exercises led by IDDRI and the IPCC, such as the assessment of sea-level rise risk for different low-lying coastal archetypes (Oppenheimer *et al.,* 2019, Zommers *et al.,* 2020), risk to the future habitability of atoll islands (Duvat *et al.,* 2021), and global climate risk across latitudes and systems (Magnan *et al.,* 2021).

In an expert judgement exercise, the recruitment of experts is a critical component to ensure the robustness and validity of the results, including both assessment scores (see below) and the associated narratives. It would be important to ensure that those who partake in the exercise are independent (not serving institutional or organizational interests) and have extensive experience on the *Representative Adaptation Challenge* and study context in terms of scientific research, project involvement and ground-rooted observations. A participatory approach mobilizes a group of experts to ensure a robust and comprehensive assessment, therefore collaborative skills and ability to work in a group is also an important quality of a selected expert (see also section 3.2 for lessons learnt).

The scoring system

The expert judgement treats sub-questions using a scoring system of five potential scores in the case of the 2021 pilot study, with a score set from 0 (no progress identified) to 4 (high contribution to adaptation progress). Examples for some sub-questions are presented in Annex A3 and all are available on the GAP-Track webpage[7] and the 2021 Methodological Report[8] (p. 34-50). Each score is attributed a clear and precise definition with specific criteria to be considered by the expert. Thereby, the scores are qualified with a description (i.e. qualitative narrative). From 0 to 4 there is a gradation in score description, for example: no information available (score 0); only partial knowledge on a very limited number of cases (score 1); in-depth knowledge for very specific cases (2); good to in-depth knowledge for a number of cases that are sufficiently representative of the diversity of the study context to allow for some scaling up lessons learnt (3); and in-depth understanding for most of the cases. Evidence should be provided to justify the score, which should match with the relevant criteria (example above: depth of knowledge and number/representativeness of case studies), and sources of information should be listed. The justification presented in a supporting narrative and the sources of information provided for each score and by each expert of the expert group are critical components to ensure the assessment is scientifically robust and not just a series of subjective and unsubstantiated individual opinions.

The scoring system exercise should then be completed by the set of experts forming the expert group, in order to allow for

7 https://www.iddri.org/en/project/assessing-global-progress-climate-adaptation-gap-track-2021

8 https://www.iddri.org/sites/default/files/PDF/Projets/GAP-Track_Methodological%20report%20(D1)_September%202021.pdf

comparison of individual scores and eventually ensure a robust and informed response set at the group-level (see Figure 1). Therefore, we implemented two rounds of individual assessments during the 2021 pilot phase, where the second round allowed for experts to review their first set of scores based on a first synthesis of the group (indicating mean scores). Mean scores across experts' individual scores reflect final results at the group level and are scaled over the 0-4 gradient used for individual scores, so that final mean scores of 4 and 1, for example, respectively indicate a high and very low contribution to adaptation progress across the dimensions considered (see Box 1). Additional rounds could be incorporated in future applications (see section 3.3), including a round of collective discussion with the full expert group to help refine the scores and define shared outcomes. Similarly, median scores could be preferred to mean scores.

Lastly, to enhance the robustness of the results, together with consistency across experts, a confidence level is attributed to the cross-expert mean score for each sub-question. The confidence level is expressed qualitatively (Low, Medium, High; Table 1), and is supported by the level of evidence provided by the experts. The confidence level reflects the difference between the expert's minimum and maximum scores at the sub-question level, where the more expert's scores are similar (e.g. 0 or 1 point of difference), the higher the agreement across experts leading to a higher confidence level (e.g. "high confidence"). In contrast, a minimum-maximum difference of 3 points indicates a low level of agreement ("low confidence").

TABLE 1. Confidence levels developed during the GAP-Track 2021 pilot phase.

Color code	Level of agreement among experts	Confidence level
●●●	0 or 1 point of difference between min-max individual scores — High agreement	High
●●○	2 points of difference between min-max individual scores — Medium agreement	Medium
●○○	3 point of difference between min-max individual scores — Low agreement	Low

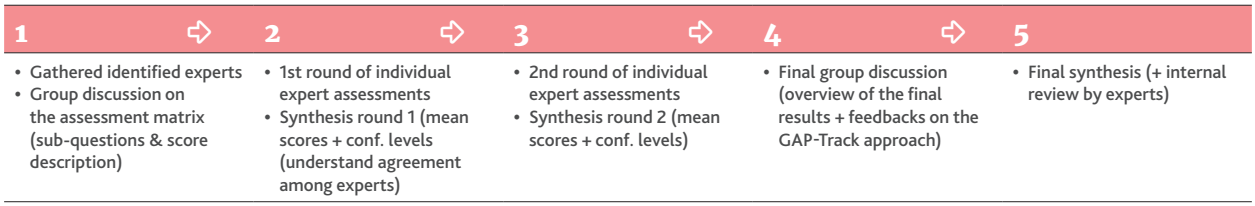
The scoring system therefore presents **a method to organize the expert judgment by using a language (scores) that is common to all the sub-questions, is scientifically-robust (using justification, sources of information and confidence levels) and, ultimately, can be aggregated if needed and applied across case studies and *Representative Adaptation Challenges***. For a given *Representative Adaptation Challenge*, the final scorecard helps display the results on adaptation progress, with many possible ways of presenting results (see example in Figure 3, Figure 4 and Figure 5 in chapter 2).

Another advantage of the approach and the scoring system is that it **allows bringing various types of information together, including but not limited to: literature (scientific, grey), policy documents, project reports and accumulated experience/knowledge and observations on the ground**. In addition, experts can use information drawn from interviews and experiences carried out during fieldwork with multiple stakeholders, including with local communities, giving a space for indigenous and cultural knowledge in the assessment process. Therefore, the method allows to combine a diversity of resources and information, which **helps to avoid difficulties related to a lack of available datasets to inform a quantitative indicator-based or a policy document-based methodology, for example**. At the same time it does not rely on one information source (e.g. Adaptation Communications, NAPs, or a given global database), as it is often the case in other tracking approaches. As a result, the GAP-Track offers a method to systematically collect data and information to inform progress and **provides an opportunity to account for varying contexts and different understandings of progress**. For example, adaptation governance and planning adaptation activities are designed and implemented depending on idiosyncratic country settings, including institutional structures and local communities, which shape varying risk perceptions, cultures and acceptability levels of adaptation options. In some countries, national adaptation plans set the strategic planning for adaptation while in others pilot projects are funded by international organizations and multilateral funding instruments. To this purpose, to capture the range of settings on how adaptation is planned and carried out, varying information sets are needed across different scales from local case study information (e.g. community surveys, adaptation pilot projects) to sub-national-to-national policy and planning issues (governance) to regional and global level (transboundary issues and climate finance).

The approach also offers flexibility for designing sub-questions and therefore openness to varying types of information to support and justify scores, depending on the *Representative Adaptation Challenge* and study context. This supports a multi-scale approach (global, national, local), which has been highlighted as a key challenge in the scientific literature and policy discussions, especially because adaptation is often considered a local context-specific issue. However, upscaling is needed to inform the policy discussions on global adaptation progress and gaps as significant indicators for informing future climate negotiations under the UNFCCC.

Finally, the expert judgement process can be **relatively quick to set up and carry out**, taking into account the scale of assessment (e.g. about four months for one *Representative Adaptation Challenge* and two contexts during the 2021 pilot phase), thereby offering a practical approach to implement. So far, adaptation progress assessment methods available are resource intensive and could trigger a duplication of efforts for reporting requirements (e.g. various forms of monitoring and evaluation frameworks). The expert judgement and methodological protocol of the GAP-Track could be independent and rapidly implemented by multi-stakeholder partnership to ensure worldwide representation of experts, while refraining from nation-based country reporting modalities.

FIGURE 2. Overview of the GAP-Track expert judgment process.



1.2.4. The six basic steps of the GAP-Track assessment process

The GAP-Track approach and underlying expert judgement process entails several critical steps to ensure scientifically robust results (**Figure 2**), including feedback loops and verification processes between individual evaluations and collective rounds to contrast and compare experts' assessments (confidence levels and mean scores) and sources of information (evidence). These steps are outlined here and further detailed in the Methodological Report[9] of the project.

Step 1. Preliminary preparations: the coordination team designs the assessment especially in terms of the *Representative Adaptation Challenge* and scale of analysis, and identifies relevant experts. This step calls for in-depth literature review and multi-partner consultations to be able to identify *Representative Adaptation Challenges* that are relevant from both a scientific and a policy perspective, and for the scale of analysis.

Step 2. Reviewing the question framing and developing tailored sub-questions. At this stage, the experts and coordination team review the question matrix, including the criteria for each score, in order to check their relevance to the specific context of analysis. Depending on the *Representative Adaptation Challenge* and scale considered, some refinement could be needed. However, it is important to note that in order to ensure consistency and enable a cross-*Representative Adaptation Challenge* analysis, it is important that each analytical context (*Representative Adaptation Challenge* and scale) is assessed based on a common framing, meaning that refinements to the assessment method can only be limited and cannot lead to substantial changes in the meaning of the overarching questions and sub-questions. Another important dimension of this step is to ensure a common understanding of the overarching questions and sub-questions among the experts, as well as of the score descriptions. Such a process helps experts to agree on the language and nuances of the components that shape adaptation success within different settings.

Step 3. Individual assessments – first round. Experts provide their first assessment, giving a score for each sub-question and the evidence to support the score (justification and sources of information). It is critical that each expert answers a maximum, if not all of the sub-questions in order to help build a cross-expert agreement (i.e. confidence level). In the most difficult cases, a "Not Assessed" option exists. After all experts have completed this assessment round, a first group-level synthesis is carried out through an independent review (by the coordinator(s)), to calculate the mean scores and confidence levels, as well as oversee the evidence provided by each expert to identify potential gaps or areas where more information is needed. This synthesis matrix is distributed among experts so that each one has access to the material provided by the others.

Step 4. Individual assessments – second round. Experts are asked to review the synthesis of results for the first assessment and their scores, narrative and sources of information based on other experts' scoring and evidence base. This step enables feedback loops between the individual assessments and the collective group synthesis, to help identify areas of contrast, which is further explored in collective group discussions (next step). The coordinator on the same bases as for the first round synthesis then carry out a second round of synthesis. The new synthesis represents the near-final group-level assessment. The final matrix can still include low confidence levels in case initial areas of disagreement have been confirmed by the experts.

Step 5. Collective discussion. At this stage, experts are invited to discuss in a group the scoring exercise and potential areas of contrast (for example where confidence levels are still low). This stage helps to potentially refine the scores and take stock on the whole approach (lessons learnt for further applications of the approach).

Step 6. Final synthesis of results. An external review (i.e. by the coordinator(s)) is carried out of the scores that have been agreed upon by the experts and a narrative is drafted for the final synthesis and for each overarching question and sub-questions (see chapter 2 for examples from the 2021 pilot study).

1.3. Pilot phase in 2021: national-level assessment

Given the methodological protocol underlying the GAP-Track, an application of the approach could help to identify advantages and potential challenges of the framing and method for assessing adaptation progress. A pilot study was developed in 2021 in partnership with the Agence Francaise de Developpement (AFD) that

9 https://www.iddri.org/sites/default/files/PDF/Projets/GAP-Track_Methodological%20report%20(D1)_September%202021.pdf

consisted of demonstrative case studies to test the methodological basis of the GAP-Track and refine the approach. This pilot phase focused on a national scale, one *Representative Adaptation Challenge* (coastal adaptation) in two cases (Mauritius Island in the Indian Ocean and Senegal in West Africa).

IDDRI led the coordination of the pilot study by identifying experts for both case studies, which consisted of local experts in Senegal and Mauritius as well as external experts who had extensive experience on coastal adaptation issues in the country context. Experts had scientific backgrounds and research/consulting experience on the ground on issues of physical processes along the coast, policy and governance, as well as the operationalization of coastal adaptation projects in the countries. The IDDRI team facilitated the expert judgement rounds including the synthesis work and overseeing the quality of the evidence base provided by the experts. At the launch of the study in June 2021, IDDRI held a kick-off framing call with each expert group to ensure a common understanding of the objectives, time-frame and the approach more generally. This allowed to diver deeper into the question matrix and the process of the expert judgement (two rounds, evidence, synthesis, collective discussions). After the two rounds of expert judgement, a collective scorecard was compiled, which was undertaken within a three month span. A final group call was held to gain feedback from the experts and share experiences on the process and views on further applications especially for other types of *Representative Adaptation Challenges*. The results of this pilot study are presented in chapter 2 and the lessons learnt are explored in chapter 3.

2. CASE-STUDY RESULTS: COASTAL ADAPTATION PROGRESS IN MAURITIUS AND SENEGAL

This chapter presents the findings of the pilot study carried out in 2021 on applying the GAP-Track approach to coastal adaptation progress in Mauritius and Senegal.

Two levels of findings are described (**Tables 2** and **3**) for each case study: per overarching question and sub-questions; and across the overarching questions. We deliberately do not propose any cross-case comparison, as the intent of the GAP-Track is not to compare situations but rather to analyse various adaptation dimensions (see the six overarching questions described in chapter 1) and develop a cross-context understanding of adaptation progress. The full results are available on the project webpage (https://www.iddri.org/en/project/assessing-global-progress-climate-adaptation-gap-track-2021).

2.1 Coastal adaptation (Representative Adaptation Challenge)

The GAP-Track focuses on assessing adaptation progress for identified *Representative Adaptation Challenges* that reflect key risk areas and related adaptation priorities. These latter can be identified from policy and scientific communities, and coastal adaptation has been selected for the 2021 pilot phase.

Coastal areas have been identified as key areas of risk at the global level. Climate change is severely affecting coastal erosion, flooding, storm surge, tropical hurricanes and extreme weather events, loss of biodiversity and ecosystems (coral reefs, estuaries, wetlands). At the same time, coasts are prime areas for development, tourism, and community livelihoods (fishing). Therefore, adapting coastal areas is a priority for countries that have long coastal strips, such as small islands.

Low-lying coastal areas are particularly at risk to climate change impacts because of their modest elevation above sea level, climate-sensitive physical and ecological characteristics (e.g. coral beaches, sea ice environments, sand-dune systems), and high societal exposure and vulnerability (e.g. flood-prone high population and asset density, marine-dependent small-scale economies). It is estimated that the Low-Elevation Coastal Zone (continental and island areas hydrologically connected to the sea and no more than 10 m above mean sea level), currently hosts ~11% of the global population (from small islands to megacities) and generates ~14% of the global Gross Domestic Product (GDP) (Magnan *et al.,* 2019).

Sea level changes are one of the most important climate-related coastal risks. Recent findings of the IPCC[10] highlight three points. First, global mean sea level (GMSL) is expected to rise by 0.43 m (0.29–0.59 m, likely range; RCP2.6) and 0.84 m (0.61–1.10 m, likely range; RCP8.5) in 2100, relative to 1986–2005. Second, the rise in GMSL is accelerating: the end-of-century rates are expected to be between 4–9 mm/yr and 10–20 mm/yr (RCP2.6 and RCP8.5 likely ranges, respectively) compared to 3–4 mm/yr since the early 1990s. Third, the irreversibility of sea-level rise will continue to go up after the end of the 21st century under any greenhouse gas emission scenario. As a result, the population living below projected annual flood levels is expected to more than double in the case of a 1 m global mean sea-level rise.[11]

This context poses direct threats to coasts and highlights that societal adaptation will remain decisive for the viability of settlements along the coast, indefinitely (Oppenheimer *et al.,* 2019). Sea-level rise and the associated increases in frequencies of extreme sea levels at the coast are widely considered among the highest climate priorities by policymakers and the public worldwide.[12]

Both Mauritius and Senegal provide illustrations of the role of coastal areas for national development, and therefore of the coastal adaptation challenge.

2.2. Mauritius

2.2.1. Coastal context

Mauritius Island (South-West Indian Ocean; 1,868 km^2) covers 93% of the total land area of the Republic of Mauritius and has a coastline of 322 km, 83% of which are made of sandy beaches bordered by fringing and barrier reefs. The island experienced a relative sea-level rise of 4–6 mm/year over the past 30 years, indicating an absolute sea level rising 2–3 times faster than the 20th century Global Mean Sea Level.[13] In addition, the island hosts most of the national population (96% of the 1,265,000 inhabitants) and is the economic hub of the country, with coasts having a high economic value especially due to the emergence of coastal tourism in the 1950s and take-off in the 1970s (then 76% of the GDP and to 67% of employment in 2018). Tourism development and associated social dynamics (e.g. growth of recreational activities) led to important coastal developments, including residential buildings and consequently to an increase in the exposure of people, assets and infrastructure to coastal hazards such as marine flooding and erosion.

2.2.2. Summary of the results

This section provides a summary of the results, showing the scores given by the Mauritius expert group and the confidence level for each sub-question and guiding question. The expert group for this case study was made of five experts[14] in coastal adaptation from various disciplines (physical aspects, oceanography, geography, adaptation processes, governance) and with expertise on the Mauritius context. **Table 2** and **Figure 3** (see also **Figure 5** in section 2.4) provide syntheses of the main assessment results for the Mauritius case study.

10 IPCC (2019); IPCC (2021).

11 Kulp and Strauss (2019).

12 Oppenheimer and Alley (2016).

13 Becker *et al.* (2019).

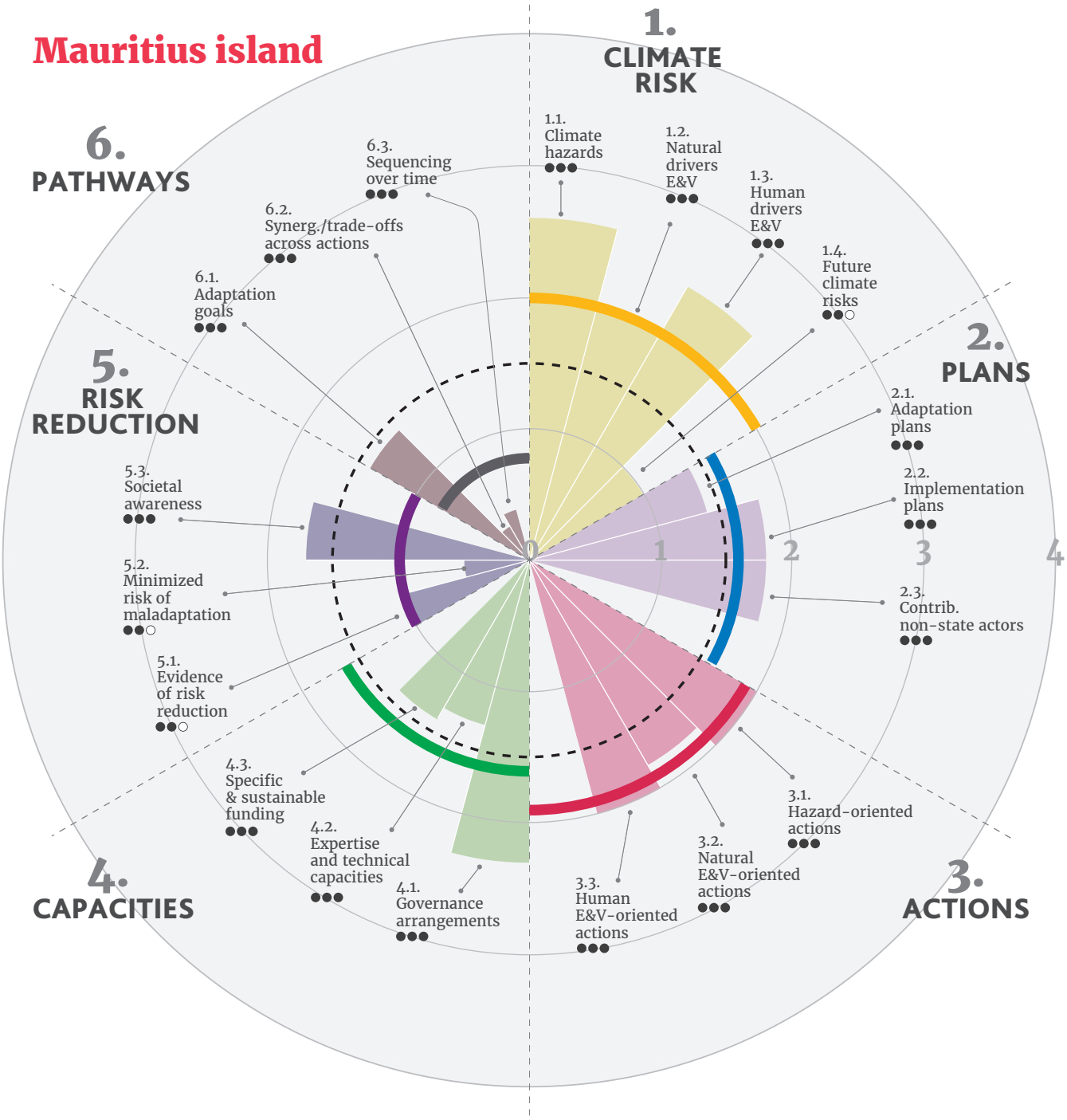
14 See full list in the GAP-Track Methodological Report (p. 26-27).

TABLE 2. Main results for Mauritius.

Case study: Mauritius Island (South West Indian Ocean)				
Guiding question	Sub-questions	Cross-expert scores (mean)		Confidence level*
1. Does scientifically-based knowledge on current and future climate risks exist at the appropriate scale?	**1.1.** Are current climate-related coastal hazards known?	2.6	2.0	●●●
	1.2. Are current drivers of exposure and vulnerability of natural systems known?	2.0		●●●
	1.3. Are current drivers of exposure and vulnerability of human systems known?	2.4		●●●
	1.4. Are future climate risks projected (at a relevant/useful scale)?	1.0		●●○
2. Are there national to local plans in place and implemented?	**2.1.** Is there an adaptation plan(s) (national to local)?	1.4	1.6	●●●
	2.2. Are there adaptation plan(s) (national to local) implemented?	1.8		●●●
	2.3. Are the main non-state actors contributing to the design and implementation of national and local plans/policies?	1.8		●●●
3. Are adequate actions taking place at a relevant scale to reduce climate risks?	**3.1.** Are there actions targeting the most prominent climate hazards on the coast?	2.0	1.9	●●●
	3.2. Are there actions addressing the main drivers of exposure & vulnerability of natural systems?	1.8		●●●
	3.3. Are there actions addressing the main drivers of exposure & vulnerability of human systems?	2.0		●●●
4. Are there sufficient institutional, technical (expertise) and financial capacities to implement adaptation at the required scale?	**4.1.** Are there governance arrangements in place to support institutional capacities to coordinate adaptation activities (multi-level governance and mainstreaming across policy areas/sectoral plans)?	2.3	1.6	●●●
	4.2. Is there expertise and technical capacities in place at the relevant scale and at both national and local levels?	1.3		●●●
	4.3. Does specific and sustainable funding exist that is specifically dedicated to managing climate-related coastal risk and adaptation?	1.4		●●●
5. Is progress being made in actually reducing current and future climate risk (including reducing hazards locally and managing long-term vulnerability)?	**5.1.** Is there evidence of risk reduction today?	1.0	1	●●○
	5.2. Are there indications that the implemented policies and actions contribute to minimize the risk of maladaptation on the long run?	0.5		●●○
	5.3. Are there indications that the society is aware of the need to tackle both current and future coastal climate risks?	1.7		●●●
6. Is a pathway-like approach considered?	**6.1.** Are adaptation goals established in the short to medium and long-term (multi-decadal scale), and articulated with each other (i.e. how does reaching present-day goals support reaching longer-term ones)?	1.4	0.8	●●●
	6.2. Are synergies and trade-offs between various adaptation-related options considered?	0.4		●●●
	6.3. Are options planned in a sequenced manner and alternative strategies considered?	0.5		●●●
Aggregated final score (case study-level)			1.5	

* Low ●○○ | medium ●●○ | high ●●●

FIGURE 3. Detailed results for Mauritius.



1. KNOWLEDGE ON CURRENT AND FUTURE CLIMATE RISK
2. PLANS IN PLACE AND IMPLEMENTED
3. ADEQUATE ACTIONS IN PLACE
4. INSTITUTIONAL, TECHNICAL & FINANCIAL CAPACITIES
5. EVIDENCE ON ACTUAL CLIMATE RISK REDUCTION
6. PATHWAY-LIKE APPROACH

Mean score for the overarching questions

Mean score for the sub-questions

Country-level mean score (all questions)

Confidence level: High ●●● ●●○ Medium ●○○ Low

Contribution to adaptation progress (assessment scores; mean across experts): None 0 | Very low 1 | Low to Moderate 2 | Moderate to High 3 | High 4

2.2.3. Findings at the overarching question level

Q1. Does scientifically based knowledge on current and future climate risks exist at the appropriate scale?

Q1, mean score 2.0; rather high confidence - Overall, climate hazards are far better understood and considered than the natural and anthropogenic drivers of exposure and vulnerability. Projections on future risks are at an early stage.

Current hazards (**Q1.1**, mean score 2.6; high confidence), especially coastal erosion, marine flooding and soil salinization are well known due to in-depth local-scale analyses in areas that are representative enough (in terms of physical features) of most of the other coastal areas of the island. However, marine flooding remains understudied, especially compared to coastal erosion.

There is a lack of understanding and studies on the drivers of **Exposure and Vulnerability in both natural and human systems** (**Q1.2** and **Q1.3**, mean scores 2.0 and 2.4, respectively; high confidence). Some studies exist but remain system-specific, e.g. on coral reefs or specific human contexts and anthropogenic processes.

Future risks and trends of Exposure and Vulnerability (**Q1.4**, mean score 1.0; medium confidence) are overlooked as no comprehensive projections are considered. Warming scenarios are limited in number and scope; although some downscaling has been undertaken by the Mauritius Meteorological Service and by the Agence Francaise de Developpement Building Resilience in the Indian Ocean (AFD-BRIO) and Hydromet projects. However, these latter focus on future trends in climate parameters, rather than on projected impacts and risks, as well as in the context of the Disaster Risk Reduction (DRR) framework (for one hazard). There is also very limited consideration of Mauritius-specific trends in Exposure and Vulnerability of coastal areas to climate change, leading to a lack of opportunities to develop alternative adaptation scenarios.

Q2. Are there national to local plans in place and are they implemented?

Q2, mean score 1.6; high confidence -- There is no indication of locally led **adaptation plans (design and implementation)**, despite that a national-level plan is in place that highlights the importance of local actors. Non-state actors are involved in consultation phases for adaptation related activities, but these latter usually remain focused on immediate needs and lack a longer-term perspective. However, there are emerging examples of private companies engaging in coastal adaptation-related activities.

There is a gap in comprehensive **adaptation plans** that are designed and implemented across multiple scales (**Q2.1**, mean score 1.4; high confidence). While a National Climate Change Adaptation Policy Framework for the Republic of Mauritius (2012) has been set up—together with other framing documents such as the Third National Communication for Climate Change and the Technological Need Assessment—it only provides high level adaptation strategies and actions at the sectoral level and without any granularity to local level contexts and interventions. As a result, it does not allow for a prioritization of action nor the design of sub-national adaptation plans. In parallel, there are legislations in place concerning environmental protection (Environment Protection Act 2002/revised version 2020, National Environmental Policy 2007), Integrated Coastal Zone Management (component of the EPA 2002/2020) and other tools regulating coastal areas (e.g. Environemental Impact Assessment (EIA) on development and setback rules in the Guidelines for Climate Change Adaptation Strategy, Coastal Setback 2016 drafted by the Japanese International Cooperation Agency (JICA)). Another example is the National Physical Development Plan (2003) that restricts building in highly exposed areas and supports asset relocation inland, controls sand mining and protects ecosystems (Policies NO. R.6 Coastal Footpath; MQ/5 Control Sand Extraction from Lagoons; NE.4 Special Protection Areas; NE.12 Marine Parks). However, these legislations target individual sectors such as tourism or fisheries for coastal management, for example, and remain weak in addressing the cross-sectoral challenges associated with climate change adaptation.

Implementation (**Q2.2**, mean score 1.8; high confidence) is hard to track since the Monitoring and Evaluation framework provided in the National Climate Change Adaptation Policy Framework has not yet been fully put into practice. The expert group estimates that progress towards implementing adaptation plans is relatively low: most actions on the ground are supported by international interventions and funding agencies, and the lack of sectoral plans in the National Climate Change Adaptation Policy Framework hampers implementation on the ground. As a result, actions are carried out on an ad hoc basis and often based on acute impacts related to extreme weather events; that is, they are often carried out in response to disasters rather than in preparation and anticipation to climate change impacts. It is expected that a more systematic and systemic approach will be adopted through implementation of the newly proclaimed Climate Change Act 2020, so that there is potential to increase effective implementation of existing adaptation plans.

Effective **participation of non-state actors** (**Q2.3**, mean score 1.8; high confidence) in the design and implementation of adaptation plans and policies also remains limited. Multi-stakeholder consultation exercises are mainly carried out by international funding programs/projects, for example the AFD-driven Climate Change Vulnerability Assessment. This is partly due to contextual limitations such as the changing legal framework that tends to limit environmental governance; for example, the Environmental and Land Appeal Tribunal Act and the Environmental Protection Act have been amended to make it harder for third parties to contest coastal development in a court of law. Most private companies usually do implement adaptation plans and measures but minimally, that is, only to get an Environmental Impact Assessment license to operate. To note, some private companies started to engage in proactive planning for adaptation—e.g. Business Mauritius is trying to engage with the public sector on managing risks along the coast—, for example in response to activist groups contesting their projects.

Q3. Are adequate actions taking place at a relevant scale to reduce climate risks?

Q3, mean score 1.9; high confidence—Understanding the panorama of **actions implemented** on the ground that contribute to risk reduction (hazard, exposure and vulnerability) is seriously constrained by a lack of information on the location/extent of actions carried out, and to what extent they are addressing drivers of risk. In such a context (same for Q5 and Q6 below), the expert judgement mobilized the group's experience and observations of the case study on the ground, to converge around a rather low contribution to adaptation progress. The expert group recognizes that coastal risk-oriented actions are taking place in Mauritius over several decades, especially under the impetus of private actors (e.g. coastal retreat and sediment recharge by tourism companies) and international funding support (e.g. UNDP & JICA; some of these taking a comprehensive approach aiming at addressing the drivers of exposure and vulnerability). Many actions are still under deployment on the ground (see a first review of 60 actions in Duvat *et al.*, 2020), especially at the local scale. Until now, however, the national-level decision-making process does not seem to have capitalized enough on such an experience. For example, there is no regular stocktake carried out (e.g. by national authorities) to track actions. The expert group also estimates that there are actually many sites where actions are not adequate, e.g. hard protection structures are in poor condition or not effective in reducing risk (current and projected levels).

Actions can be identified targeting multiple **hazards** (**Q3.1**, mean score 2.0; high confidence) such as coastal erosion, marine flooding and inland flooding (e.g. Land Drainage Master Plan and CCVA study by AFD). However, only coastal erosion is addressed in a set of comprehensive actions on the ground. These actions are often led by the tourism industry, especially over the last decades as well as by the government, for example the development of public coastal protection for infrastructure (mainly roads). Actions however generally do not consider future changes in hazards.

In parallel, actions are undertaken to reduce the **exposure and vulnerability of natural systems** (**Q3.2**, mean score 1.8; high confidence), for example the building of artificial reef barriers and vegetation restoration in the North (at Mon Choisy) and mangrove planting in the East (UNDP project). There are also actions underway by the National Disaster Risk Reduction Management Centre (NDRRMC) and the Drainage Authority (project led in partnership with AFD) to address run-off and damage to natural ecosystems. Overall, these actions remain focused on ecosystems that are already at risk, and only poorly address the root causes of the degradation of climate-sensitive marine and terrestrial ecosystems (e.g. sand mining, vegetation clearing, coastal waters pollution).

Similar conclusions apply to the actions targeting the **human drivers of Exposure and Vulnerability** (**Q3.3**, mean score 2.0; high confidence). To address flood risk for example, the approach today consists of building drains in view of redirecting the water flow, and implementing preparedness measures for extreme events such as shelters and early warning systems (UNDP project); but the underlying causes of flooding (e.g. buildings in flood-prone areas, wetland reclamation, leveling of sugar cane fields for mechanized harvesting, etc.) are not considered thoroughly.

Q4. institutional, technical (including expertise) and financial capacities to implement adaptation at the required scale?

Q4, mean score 1.6; high confidence—Overall, the **capacities** (institutional, technical and financial) for addressing the coastal adaptation challenge in Mauritius are not at the appropriate scale. There are several gaps in the governance arrangements and limited technical capacities including few personnel assigned to tackle this issue, while coastal adaptation funding mechanisms are still dominated by project-oriented funding that are limited in scope and duration.

In terms of **governance arrangements** (**Q4.1**, mean score 2.3; high confidence), the coordination and mainstreaming processes of adaptation across sectoral policies is driven by the Coordination and Implementation Division as well as the Climate Change Division in the Ministry of Environment, Solid Waste and Climate Change. However, horizontal coordination across policy areas and across levels of government (multi-level governance) remains limited. There is a National Disaster Risk Reduction and Management (DDRM) Center that is coordinated by the Head of the Police Force, and serves as a cross-sectoral institutional mechanism for dealing with extreme weather events (cyclones and flooding mainly), and operates at all levels. However, this DDRM center does not coordinate activities with the adaptation-related units in the Ministry of Environment. There is also little indication of bottom up information sharing and policy planning processes, where Local governments who are responsible for issuing building permits and licenses, have almost no institutional capacity to deal with climate change issues—N.B.: the Climate Change Act 2020 now includes the issue of building permits, but local governments officers have not yet been trained to deal with this new framing.

Expertise and technical capacities are estimated to be very low (**Q4.2**, mean score 1.4; high confidence) by the expert group. While some training has been available for government officials (e.g. in 2016 on cost benefit analysis of risk and adaptation measures along the coast), only a small fraction of participants have had the opportunity to put this knowledge into practice (e.g. because their jobs relate to dealing with coastal issues). The lack of practice and of a learning-by-doing process is recognized by the expert group as one important reason for very low expertise and technical capacities today. Another reason is a usual failure to carry out evidence-based planning, implementation and monitoring and evaluation (in relation with Q4.1), meaning that capacity building is not institutionalized. This results in very limited technical capacities at all levels (national and local government), with even less at the local government level.

The expert group also acknowledges gaps in terms of the **financing context** (**Q4.3**, mean score 1.4; high confidence). As a reminder, this criteria does not aim to discuss whether the budget is sufficient or not but rather focuses on whether the

financing architecture is suitable or not for long-term adaptation planning. In Mauritius, a budget is decided yearly to run institutional units and coordinate project-based funding from international and bilateral cooperation bodies; however, there is neither a dedicated budget for coastal adaptation nor a longer-term funding strategy in place (limited to filing for grants and aid programs). An important contextual element is that there is no multi-year framework for budgetary allocations in Mauritius, and while Ministries have to submit a list of priorities for capital expenditures, allocation is carried out on political priorities. This results in funding for coastal adaptation that remains of limited scope and duration (i.e. when financing is over, not much happens to sustain the project).

Q5. Is progress being made in actually reducing current and future climate risk (including reducing hazards locally and managing long-term vulnerability)?

Q5, mean score 1.0; rather medium confidence - The expert group unanimously acknowledges that there is a critical lack of evidence on whether the adaptation-related actions carried out on the ground actually reduce risk levels, now and possibly in the future. This is partly due to a lack of reporting mechanisms on the characteristics of these actions (scope, objectives, results, etc.), and due to knowledge gaps on how to measure climate-related risks.

Current risk reduction is hard to assess, and the expert group estimates that evidence on this is very low (**Q5.1**, mean score 1.0; medium confidence). On the one hand, some projects consisting of reinforcing beach processes, moving road infrastructure inland, restoring mangroves, building artificial reefs, or installing some sea walls have the potential to already showcase some levels of risk reduction to climate hazards. On the other hand, the lack of robust monitoring and evaluation systems in place as well as of a comprehensive planning at the coastal sediment cell level (and considering context-specificities) makes the conclusion difficult to draw for experts.

For the same reasons, understanding whether interventions reduce the **risk of maladaptation** or not is difficult (**Q5.2**, mean score 0.5; medium confidence). The expert group highlights that the concept of maladaptation is almost never mentioned in interviews with stakeholders, and warns against a tendency in Mauritius to replicate measures and technologies without proper evaluation of the option's adequacy according to the specificities of new contexts of implementation, which has the potential to lead to maladaptive practices. The very low score of Q5.1 may therefore reflect the lack of background information rather than a wide agreement among the expert group that actions and policies in place do not properly limit the risk of maladaptation.

The **societal awareness** parameter (**Q5.3**, mean score 1.7; high confidence) also lacks dedicated studies and a comprehensive assessment. Some consultations with vulnerable communities have been carried out in localized areas as components of adaptation-projects, and larger raising awareness initiatives with school children have been developed (e.g. by the UNDP office in Mauritius). The expert group, which consists of members living in Mauritius and/or have conducted fieldwork there, estimates that the level of awareness is rather low: people in general know that climate change can affect local economies and settlements, but this understanding remains general and not connected to specific preemptive actions at the coast and local levels. This low level of awareness may also be linked to a lack of involvement of community members in adaptation policy and planning more generally, reflecting again a gap in climate governance in Mauritius where decision making is centralised.

Q6. Is a pathway-like approach considered?

Q6, mean score 0.8; high confidence - Overall, as for Q5, these dimensions of adaptation (setting goals, sequencing action and accounting for trade-offs and synergies) critically lacks information, either because such information has never been formally collected, or simply because this forward-looking dimension is poorly addressed. This latter hypothesis is based on the experts' own knowledge of the Mauritius context and led the expert group to assign this dimension a very low score (the lowest among all overarching questions).

No precise, context-specific climate **adaptation goals** have been set by the Mauritius government (**Q6.1**, mean score 1.4; high confidence). While the National Climate Change Adaptation Policy defines Policy goals for 20 years (i.e. to 2032), Strategic goals for 10 years (i.e. 2022) and an Investment Plan for 3 years (i.e. 2015), no climate risk targets have been clearly identified. As mentioned earlier, the policy framework and strategic plan were not developed using a forward looking approach or climate change scenario modeling. Such an approach of defining climate-related goals is emerging in Mauritius for greenhouse gas mitigation (based on quantified carbon metrics) but is not there yet for adaptation in general (not only coastal). The longer term (>20 years) is more or less missing from the national strategy, for example, or at least is not addressed through precise objectives and priorities.

In addition, and in line with Q3 and Q5, **synergies and trade-offs between various adaptation-related actions** (**Q6.2**, mean score 0.0; high confidence) are barely considered, so that information is not available to support any multi-action planning and, ideally, **sequencing** (**Q6.3**, mean score 0.5; high confidence). The UNDP project at Rivières des Galets provides an example of a case where trade-offs between options have been considered: the option of relocating the small coastal community has been explored, but rebuilding the sea wall was preferred by the local community (consultations showed the local community was not willing to move). However, as this case shows, trade-offs are at times considered to decide which option to implement, but they are not used to inform a potential sequencing of adaptation options over time (e.g. start with hard protection to buy time and, when hard protection will become too costly or not efficient enough, be able to shift to retreat). At the end, the lack of synergies/trade-offs analysis weakens the anticipatory and dynamic planning process (i.e. the pathway-like approach in Q6.3).

2.3. Senegal

2.3.1. Coastal context

Senegal (West Africa; total area of 1 868 km^2) has a coastline of about 700 km and an Exclusive Economic Zone of more than 198,000 km^2. Coastal areas host the main cities, including the capital Dakar, and the vast majority of the national population. The country experienced a relative sea-level rise of about 2–3 mm/year between 1950 and 2009, indicating an absolute sea-level rising at a similar rate than the 20th century Global Mean Sea Level.[15] And it is estimated that Africa's Atlantic Ocean coastline will experience a rise of about 40 cm in sea-level in three to four decades from now, which will substantially increase the number of Senegalese people at risk of flooding. Another important issue in Senegal is soil salinization (with consequences on reduced crop yield and food security), as about 1.7 million ha out of 3.8 million ha of cultivated lands are already affected by salt resulting from seawater intrusion.[16] Such a climate context raises concerns, first, because the Senegalese population remains marked with high poverty trends, despite recent progress on life expectancy or improved access to sanitation for example. Second, because the country experiences a general rural exodus since the recurring droughts in the 1970s and 1980s,[17] with now more than 80% of the national population living no more than 200 km from the coastline. As a result, coasts have a high economic value especially due to the tourism industry, as well as to fishing activities. According to the country's second national communication to the UNFCCC (MEPN 2010), by 2100, a 1m rise in sea level is expected to reduce Senegal GDP by 12-17%.

2.3.2. Summary of the results

This section presents a summary of the results, showing the scores given by the Senegal expert group and the confidence level for each sub-question and guiding question. The expert group for this case study was made of four experts[18] in coastal adaptation from various disciplines (physical aspects, oceanography, geography, adaptation processes, governance) and with expertise on the Senegal context.

Table 3 and **Figure 4** (see also **Figure 5** in section 2.4) provide syntheses of the main assessment results for the Senegal case study.

15 Becker *et al.* (2019).

16 Thiam *et al.* (2021).

17 Weissenberger *et al.* (2016).

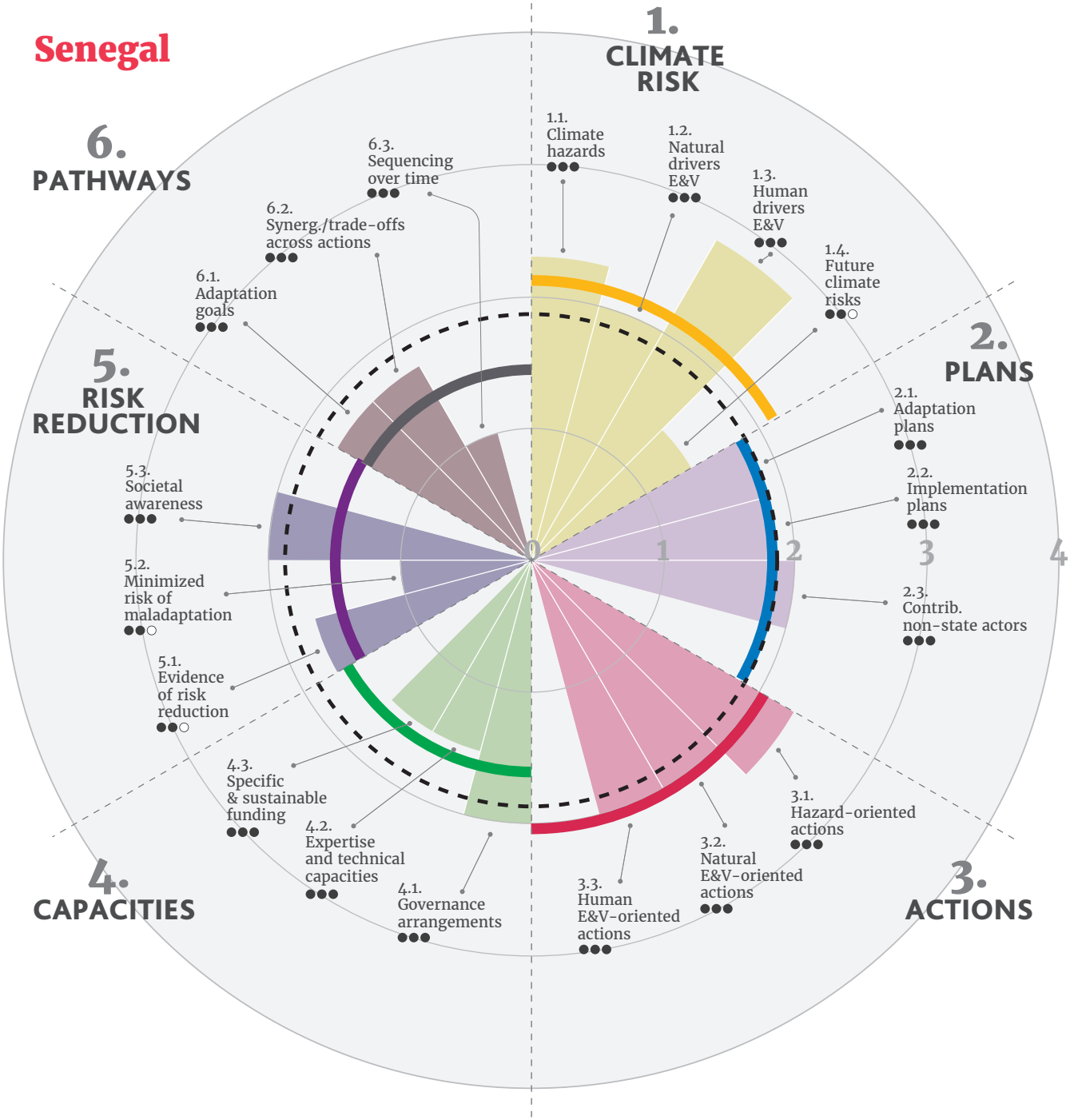
18 See full list in the GAP-Track Methodological Report (p. 27).

TABLE 3. Main results for Senegal.

Case study: Mauritius Island (South West Indian Ocean)				
Guiding question	Sub-questions	Cross-expert scores (mean)		Confidence level*
1. Does scientifically-based knowledge on current and future climate risks exist at the appropriate scale?	**1.1.** Are current climate-related coastal hazards known?	2.3	2.2	●●●
	1.2. Are current drivers of exposure and vulnerability of natural systems known?	2.0		●●●
	1.3. Are current drivers of exposure and vulnerability of human systems known?	2.8		●●●
	1.4. Are future climate risks projected (at a relevant/useful scale)?	1.5		●●○
2. Are there national to local plans in place and implemented?	**2.1.** Is there an adaptation plan(s) (national to local)?	1.8	1.8	●●●
	2.2. Are there adaptation plan(s) (national to local) implemented?	1.8		●●●
	2.3. Are the main non-state actors contributing to the design and implementation of national and local plans/policies?	2.0		●●●
3. Are adequate actions taking place at a relevant scale to reduce climate risks?	**3.1.** Are there actions targeting the most prominent climate hazards on the coast?	2.3	2.1	●●●
	3.2. Are there actions addressing the main drivers of exposure & vulnerability of natural systems?	2.0		●●●
	3.3. Are there actions addressing the main drivers of exposure & vulnerability of human systems?	2.0		●●●
4. Are there sufficient institutional, technical (expertise) and financial capacities to implement adaptation at the required scale?	**4.1.** Are there governance arrangements in place to support institutional capacities to coordinate adaptation activities (multi-level governance and mainstreaming across policy areas/sectoral plans)?	2.0	1.6	●●●
	4.2. Are Expertise and technical capacities in place at the relevant scale and at both national and local levels?	1.5		●●●
	4.3. Does specific and sustainable funding exist that is specifically dedicated to managing climate-related coastal risk and adaptation?	1.5		●●●
5. Is progress being made in actually reducing current and future climate risk (including reducing hazards locally and managing long-term vulnerability)?	**5.1.** Is there evidence of risk reduction today?	1.7	1.5	●●○
	5.2. Are there indications that the implemented policies and actions contribute to minimize the risk of maladaptation on the long run?	1.0		●●○
	5.3. Are there indications that the society is aware of the need to tackle both current and future coastal climate risks?	2.0		●●●
6. Is a pathway-like approach considered?	**6.1.** Are adaptation goals established in the short to medium and long-term (multi-decadal scale), and articulated with each other (i.e. how does reaching present-day goals support reaching longer-term ones)?	1.7	1.4	●●●
	6.2. Are synergies and trade-offs between various adaptation-related options considered?	1.7		●●●
	6.3. Are options planned in a sequenced manner and alternative strategies considered?	1.0		●●●
Aggregated final score (case study-level)			1.8	

* Low ●○○ | medium ●●○ | high ●●●

FIGURE 4. Detailed results for Senegal.



- 1. KNOWLEDGE ON CURRENT AND FUTURE CLIMATE RISK
- 2. PLANS IN PLACE AND IMPLEMENTED
- 3. ADEQUATE ACTIONS IN PLACE
- 4. INSTITUTIONAL, TECHNICAL & FINANCIAL CAPACITIES
- 5. EVIDENCE ON ACTUAL CLIMATE RISK REDUCTION
- 6. PATHWAY-LIKE APPROACH

Mean score for the overarching questions | Mean score for the sub-questions | Country-level mean score (all questions)

Confidence level: High ●●● ●●○ Medium ●○○ Low

Contribution to adaptation progress (assessment scores; mean across experts): None 0 | Very low 1 | Low to Moderate 2 | Moderate to High 3 | High 4

2.3.3. Findings at the overarching question level

Q1. Does scientifically-based knowledge on current and future climate risks exist at the appropriate scale?

Q1, mean score 2.1; rather high confidence - Overall, climate hazards and the anthropogenic drivers of climate risk are assessed in Senegal. However coastal-related **climate risks** are not assessed comprehensively (e.g., coastal erosion is well documented, but marine flooding remains poorly studied) and/or only for some specific areas (e.g. urban settings for anthropogenic risk drivers). The understanding of natural drivers of exposure and vulnerability is also limited to specific case studies and lacks an upscaled national perspective. Last, studies are only emerging on future risks and hazard trends.

Coastal hazard studies (**Q1.1**, mean score 2.3; high confidence) have been developed over the last several decades in Senegal. Since the 1980s and especially the mid-1990s, studies have been undertaken on the historical evolution of the coast and beach seasonal patterns, with a focus on urban areas.[19] Coastal erosion (estimated on average between 0.5 and 2 m/year) is by far the most documented hazard, using methods such as remote sensing, Geographical Information Systems (GIS), topo-bathymetric surveys and statistical tools such as Digital Shoreline Analysis System (DSAS). Other climate-related coastal hazards such as waves, sea-level change, marine flooding and soil salinization have been less investigated except in a few specific locations. For example, concerning waves, data has been collected in the near ocean, meaning that waves at the coast—which are of interest for understanding risk—are poorly documented.

Studies on coastal erosion have considered some **physical drivers of exposure and vulnerability** (**Q1.2**, mean scores 2.0; medium confidence) especially for sandy coasts, including geomorphology, shoreline change, coastal slope, the average height of the swells, tide range, etc. Some knowledge is available on the degradation of mangrove ecosystems—a quarter of the total surface area of Senegal's mangroves has been destroyed since the 1970s—as a result for example of droughts, deforestation for timber, and road and infrastructure construction. This knowledge however focuses on specific case studies but has not been extrapolated to most of the Senegalese coastline.

The **drivers of exposure and vulnerability of human systems** (**Q1.3**, median score 2.8; high confidence) have been extensively considered in the development of the National Adaptation Plan of Action (NAPA, 2006) and the Nationally Determined Contribution (NDC, 2020) to the UNFCCC, and based on some reports such as the *Adaptation au Changement de climat – Réponse au changement du littoral et à ses dimensions humaines en Afrique de l'Ouest dans le cadre de la gestion intégrée du littoral* (ACCC) final report[20] in 2014 and scientific papers.[21] Some drivers such as beach sand mining, coastal development, limited urban planning, rural-urban migration and obsolete sanitation systems have been emphasized. A socio-economic vulnerability index (IVéco) has also been developed that includes socioeconomic indicators (population, cultural heritage, roads, railway lines, land use and conservation designations) and has been applied to selected locations (Saint-Louis, Saly and Casamance). One issue is that most of the problems encountered at the coast (overfishing, erosion, etc.) are now referred to as consequences of climate change, whereas these problems are older and very much linked to human occupation of the coast and associated pressure on the environment and natural resources, and as such are rather drivers of risk than impacts of climate change. Nevertheless, climate change will indeed exacerbate the situation, leading to higher vulnerabilities. Lastly, this knowledge focuses on some densely populated areas.

Future risks (**Q1.4**, mean score 1.5; high confidence) are poorly documented as no comprehensive projections of climate change scenarios are considered when evaluating coastal risks. Studies on the vulnerability of the Senegalese coast to sea-level rise with associated simulations of flood levels, erosion and submersion are limited, though some studies have been carried out on some portions of the coast (e.g. Cape Verde peninsula and the Saloum delta).

Q2. Are there national to local plans in place and are they implemented?

Q2, mean score 1.8; high confidence - The expert group has identified a disconnection between national-level policies dealing with adaptation, including those that are progressively put in place, and the nascent development of local-level plans. The evaluation also points to a low involvement of non-state actors in the design and implementation of adaptation plans. The expert group concludes that there is an important implementation gap between existing adaptation plans and the operationalization of those policies and plans on the ground at multiple scales.

In Senegal, there are national-level climate change **adaptation policy documents** in place (**Q2.1**, mean score 1.8; high confidence) that identify some priority sectors and areas. However these documents do not provide practical guidance to support a wide implementation on the ground, nor do they have a monitoring and evaluation system in place to track activities and progress either at the national level or across scales. As a result, only some pioneering local plans are in place. At the national level, the NAPA (2006) only consisted of a list of prioritized options (including for coastal areas) without any implementation plan or monitoring and evaluation system. The country also developed a National Adaptation Plan (NAP; process started in 2017) aimed at strengthening the capacity of sectoral ministries, local governments and communities to

19 E.g. Niang-Diop (1994) and Faye (2016).

20 Mbengue (2014). Project "Adaptation au Changement de Climat—Réponse au changement du littoral et à ses dimensions humains en Afrique de l'Ouest dans le cadre de la Gestion Intégrée du Littoral".

21 E.g. Sadio *et al.* (2019).

better assess the implications of climate change, and adjust existing policies and budgets to integrate medium- and long-term climate change risks and adaptation measures. The NAP process in Senegal has started with the preparation of sectoral plans, including for coastal areas (as well as agriculture, livestock, fisheries, water, biodiversity, tourism, health, flood-related disaster management, and land transport infrastructure). Once all the sectoral NAPs will be ready the overall national plan could then be developed. To date, however, the overall national plan has not been endorsed by the government as it depends first on the finalization of the underlying sectoral plans, which have not yet been completed. In 2013, in parallel to the adaptation process (NAPA, NDCs, etc.), the Senegalese government developed the first phase of its Integrated Coastal Zone Management (ICZM) Strategy with the support of the European Union. This strategy has not been validated at the political level to date, therefore delaying its implementation. Nevertheless, the second phase of this Senegal ICZM project was launched in 2020, but it is unclear whether it will be scalable beyond the pilot cases where actions will be implemented to address coastal erosion (tree planting) and marine flooding (construction of dykes). The expert group estimates that the consideration and integration of these national framings at the local scale are limited. Out of 571 localities (not all coastal), only 3 coastal cities have initiated, on a voluntary basis for some, the development of a climate plan, including Dakar and Fatick that have integrated territorial climate plans (PCTI) dealing with both adaptation and mitigation, and Pikine that is in the process of finalizing its PCTI. One of the limitations encountered by one of these cases is however that the PCTI process took place just before an important decentralization reform, which has resulted in a document designed for a governance framework that no longer exists. To note, an inter-communal climate plan has also been established for the coastal localities of Saly, Mbour, Malicounda, Somone and Ngaparou.

The **implementation** of adaptation-related plans is limited to pilot case studies (**Q2.2**, mean score 1.8; high confidence). A number of coastal protection activities have been implemented for decades, and many are still under implementation at national and subnational levels, for example for pilot cases under the ICZM project and with the support of international funding (e.g. a protection infrastructure project on the beaches of Sally). Despite this, the expert group concludes that there is an important implementation gap between adaptation plans and their operationalization at multiple scales. This is due to limited local-scale knowledge on climate change hazards (see Q1.1) and impacts on different sectors and communities, as well as financial constraints. Moreover, very few economic assessments are available to showcase the economic impacts of climate change in Senegal—including the costs and benefits of adaptation taking into account different climate scenarios. This adds to a general lack of political willingness to prioritize proactive adaptation responses. In addition, the decentralization of responsibilities to local municipalities is rarely supported by adequate resources (for climate adaptation and disaster risk reduction), which means that local municipalities generally lack the financial and technical capacities to implement appropriate adaptation initiatives (see Q4).

Participatory processes (**Q2.3**, mean score 2.0; high confidence) are mentioned in policy frameworks, however in practice, the expert group estimates that non-state actors are insufficiently involved in the implementation of projects and not included in the design and planning of adaptation policies and plans. Some participatory processes however exist, such as the COMNACC (National Committee on Climate Change). The involvement of the private sector is especially limited. International donors (e.g. GIZ that supports the Scientific Support Project for National Adaptation Plan Processes, PAS-PNA) play an important role in funding a majority of climate adaptation activities in Senegal, and so have an influence on framing projects and their implementation. Last, as funding for climate adaptation is channeled directly to national authorities or NGOs, and does not typically involve local governments, nationally-driven strategies often fail to recognize existing community adaptation action and align with local priorities, which may undermine existing resilience strategies.

Q3. Are adequate actions taking place at a relevant scale to reduce climate risks?

Q3, mean score 2.1; high confidence -- Various risk reduction actions are implemented on the ground especially to deal with coastal erosion, yet these actions tend to address the outcomes of hazard-generated processes (e.g. soft/hard protection to respond to marked erosion) rather than the root causes of exposure and vulnerability in terms of the urbanization of flood-prone areas or the cleaning of coastal vegetation. The expert group stresses that answering question Q3 is complex due to a lack of available and centralized information (and that is comparable across cases).

In terms of the **hazards considered** (**Q3.1**, mean score 2.3; high confidence), most of the actions undertaken on the ground address coastal erosion, especially through soft measures (e.g., mangrove planting, etc.) and hard protection (e.g., dykes, seawalls, groynes and breakwaters). Warning bulletins are also issued by the meteorological service for alerting fishermen about strong winds and storm surge.

The main **drivers of natural systems' exposure and vulnerability** (**Q3.2**, mean score 2.0; high confidence) are considered in actions dealing with mangrove and filaos reforestation (e.g. in the Saloum delta and Casamance), or biological measures to protect soils against erosion (GCF project), but rather in a limited way as these actions tend to be reactive rather than anticipatory. As a result, the expert group estimates that the extent to which the underlying drivers of damages to the natural systems are addressed remains unsatisfactory. Some interventions are reported that touch on NGO awareness campaigns to help reduce beach sand mining activities through working on people's perception, but such interventions remain limited. It is important to note here that the expert group acknowledges a lack of centralized information on projects (location, objectives, outcomes), which limits the assessment of Q3.2.

The expert group raised a similar concern regarding the extent to which actions in place sufficiently address the **drivers of human systems' exposure and vulnerability** (**Q3.3**, mean score 2.0; high confidence). Urban planning tools are in place in some areas, but they poorly consider coastal hazards and future changes in these hazards, and therefore remain weak in providing clear guidance on urbanization in erosion- and flood-prone areas. Responses to coastal erosion are most often about building hard engineered structures, which sometimes contribute as additional risk drivers, as in the case of the dyke erected in Rufisque (Adaptation Fund project), for example, that disturbs sediment transport processes and actually reinforces the exposure of the city of Bargny located further south.

Q4. Are there sufficient institutional, technical (and expertise) and financial capacities to implement adaptation at the required scale?

Q4, mean score 1.6; high confidence - Overall, many national-level institutions are involved in climate adaptation, but most have a sectoral entry point, and the ones that have a more cross-cutting entry point have low influence and capacities to organize coordination concretely. More problematic is the fact that there is also a general lack of technical capacities at the local level, while at the same time local municipalities are responsible for key public services (including risk management) as a result of the decentralization process of the 1970s and the 1990s. Last, adaptation funding comes from external partners under a project-based approach, and there is no dedicated budget for adaptation at the national or local levels.

As mentioned for Q2, there is an important implementation gap between existing adaptation plans and the transfer into projects, and this gap partly results from limitations of Senegalese **institutions to coordinate interventions** (**Q4.1**, mean score 2.0; high confidence). One issue raised by the expert group is the multiplicity of institutions (National Agency for planning, Direction of environment, Direction of water and forests, Direction of fisheries protection and surveillance, Direction of civil protection) involved in coastal management, but almost all the time with sectoral approaches that are not suitable to address cross-cutting challenges such as climate adaptation. Some climate change-specific institutions have been created at the national level to facilitate the dialogue between institutions, representatives of all sectors of activity, universities and research centers, associations, local elected representatives, etc. (COMNACC established in 2003) and enhance synergies between national actors involved in the decision-making processes relating to climate change plans and strategies (Climate Change Division in the 2000s under the Ministry of Environment and Sustainable Development; National Platform for Science-Policy Dialogue for the Adaptation of Agriculture and Food Security to Climate Change, PCCASA/Senegal). However, according to the expert group, the influence of these climate change-specific institutions on more sectoral and historical institutions remains limited. One reason among others is that these coordination processes have proved to not be very functional (limited access to information, limited meetings, financial resource issues, etc), therefore raising significant needs in terms of capacity building.

The question on **expertise and technical capacities** (**Q4.2**, mean score 1.5; high confidence) is connected to the previous one (institutional capacities). Capacity building programs are operating in Senegal, for example through training on climate change, vulnerability and adaptation assessment, waste management etc., and through local NGOs acting on the ground. One key issue in terms of human capacities is the limited number of people engaged in coordination activities. At the national level, the Climate Change Division (DCC) consists of a team of about ten people with only five permanent staff, and whereas a climate focal point is designated in each ministry, most of the time this function is additional to the other tasks and thus receives little attention. At the local level (e.g. municipalities), there is no representative in charge of or dedicated to coastal risk management and climate adaptation, which raises serious concerns given the important role local institutions have to play within the decentralized governance framework for managing key areas of public services.

Last, the expert group acknowledges that there is no sustainable national **budget dedicated to coastal risk management** (**Q4.3**, mean score 1.5; high confidence), and the local level faces a similar situation. The Investment Programme (PTIP) 2015-2017, for example, identified two national-level budget lines, for adaptation in agriculture and adaptation related to risks and catastrophes, but not specifically for coastal adaptation. Bilateral and multilateral cooperation agencies (JICA, AFD, World Bank), regional institutions (L'Union économique et monétaire ouest-africaine (UEMOA)) as well as international organizations (AF, Green Climate Fund) play a dominant role in terms of providing funds for climate adaptation, but they operate on a project-based approach that is not suitable for long-term planning, and have difficulties being well aligned to local communities actual needs.

Q5. Is progress being made in actually reducing current and future climate risk (including reducing hazards locally and managing long-term vulnerability)?

Q5, mean score 1.5; high confidence - A general issue is that concrete adaptation-related actions undertaken are not systematically reported (e.g. to inform a regional- or national-level database or platform), leading to a lack of understanding on what is implemented on the ground and what outcomes are observed and/or anticipated.

Current risk reduction is hard to assess and the expert group estimates evidence on this is rather low in Senegal (**Q5.1**, mean score 1.7; medium confidence). Some pilot projects delivered positive outcomes in terms of risk reduction today. For example, beach restoration and the deployment of groynes and breakwaters in Saly helped slow down coastal erosion and allowed hotels to keep operating; and a groyne (made of wood and sand bags) deployed in November 2019 on the Casamance coastline resulted in 300 m^3 of sand accumulation in three months; while the Thiawlène dyke (south of Dakar) substantially reduced risk to a nearby cemetery. There are however no studies carried out

on the potential future trends of such outcomes, and therefore of what needs to be done (e.g. dyke maintenance, beach nourishment, etc.) to ensure positive outcomes will keep pace with sea-level changes. Citizens are also developing their own coping strategies (e.g. non-cemented walls, hand-made groynes, vegetation waste piled, etc.) that are usually not very efficient in the face of extreme events, and not sustainable in the long-term. Other initiatives focus on community-based adaptation against flood risk in Dakar (Butterfield *et al.,* 2017), but actual outcomes on risk reduction remain difficult to assess. In conclusion, it seems that most of the local interventions that have been reported in the literature deal with coastal erosion and related risks to built assets, and more rarely with risks induced by marine flooding or even coastal soil salinization, and in general remain weak in bringing evidence on risk-related outcomes.

There is no indication in policy documents or the literature that the policies and actions implemented contribute to **minimizing the risk of maladaptation** in the long run (**Q5.2**, mean score 1.0; medium confidence). What can however be identified is that to date, plans and actions that are implemented do not sufficiently take into account the future impacts of climate change, and so have limited ability to generate evidence to inform a voluntary approach to minimize the risk of maladaptation. The expert group also highlights a lack of overall coordination and collaboration between the different initiatives, which limits stocktaking on how they interact and so on potential trade-offs and associated maladaptive outcomes. On this, the Senegalese situation is representative of many other country contexts: when nationally-driven strategies fail to align with local priorities (see Q5.1) and there is inequitable stakeholder participation in the whole process from design to implementation (see Q2.3), local actors are in a way forced to apply ex-post responses to climate impacts with the collateral effect of potentially increasing the risk of maladaptation.[22]

In Senegal, **society's awareness** of the need to tackle both current and future coastal climate risks remains under-documented (**Q5.3**, mean score 2.0; medium to high confidence). Initiatives dealing with coastal protection for example are often associated with training and awareness-raising activities, which helps communities to better understand coastal climate risks, at least current ones. The fact that local communities implement actions (e.g. coastal protection, vegetation replanting) on a voluntary basis provides evidence of their awareness of the need to respond to current hazards; but there is no clear indication about perceptions of future hazards and incentives to carry out anticipatory adaptation action. The expert group estimates that some perception of climate risk exists in national-level institutions.

Q6. Is a pathway-like approach considered?

Q6, mean score 1.4; medium confidence - The expert group estimates that due to various limitations in information collection and availability, as well as gaps in local-level capacities and cross-scale coordination, this question dealing with the extent to which a forward-looking approach is considered should be scored low.

As in many contexts, Senegal lacks a set of **well-defined adaptation goals** (**Q6.1**, mean score 1.7; medium confidence). While short-to-medium term ICZM objectives are in place that could help structure long-term coastal adaptation pathways, no formal link has been established in current policies and strategies. Some environmental assessments carried out by consultants (usually in preliminary phases of action implementation) require to consider various criteria for prioritizing adaptation options,[23] including "medium and long-term sustainability" and "compatibility with the adaptation options already in place"; but they are not driven by larger-scale targets in terms of what sustainability means in a changing climate, or option comparison criteria. For example, while Senegal's recent Nationally Determined Contribution (NDC) (2020) defines adaptation goals for coastal zones at the 2025-2030 and 2040-2050 time horizons (+2°C and +4°C scenarios, respectively), these goals remain very vague, leading to multiple interpretations and a lack of clear guidance. The same applies to the national-level ICZM framing. As a result, objectives remain very generic (e.g. implementation of monitoring systems, updating of the legal and institutional framework pertaining to coastal zones, morphodynamic modeling of coastal zones, identification of key risks and zones at risk, land-use planning, etc.) and do not directly address how reaching present-day goals support reaching longer-term ones. As an additional issue, the established goals are not accompanied with the allocation of responsibilities and resources for implementation, which leads to ineffective operationalization and outcomes.

The **synergies and trade-offs between different adaptation options** are rarely taken into account (**Q6.2**, mean score 1.7; medium confidence), or at least such information and relevant assessments to compare various options to address a given climate-related hazard are either not available or hard to track. Rare examples exhibit some information, as for example in Thiawlène (Rufisque, south of Dakar) where experts have tried to find synergies between the protective function of a dyke and waste management. Even projects funded by international organizations (e.g. the Green Climate Fund) are not explicit about how actions promoted in the projects have been selected.

Some of the gaps mentioned above combine to explain that adaptation-related actions are largely conducted in siloes, thereby no **forward-looking sequencing** of actions/adaptation options over time is considered (**Q6.3**, mean score 1.0; high confidence). Besides the difficulty to access underlying information that supports the decision for a given option (Q6.2), the

22 Eriksen *et al.* (2021).

23 Sadio *et al.* (2021).

limited technical and financial capacities, as well as expertise reported for local-level institutions and actors (Q4.1) play as key barriers to multi-option dynamic planning. This is reinforced by gaps, among others, in fragmented adaptation projects and limited multi-scale coordination across stakeholders that are involved in adaptation-related policies and interventions (Q2.1, Q4.1).

2.4. Synthesis (cross-cases)

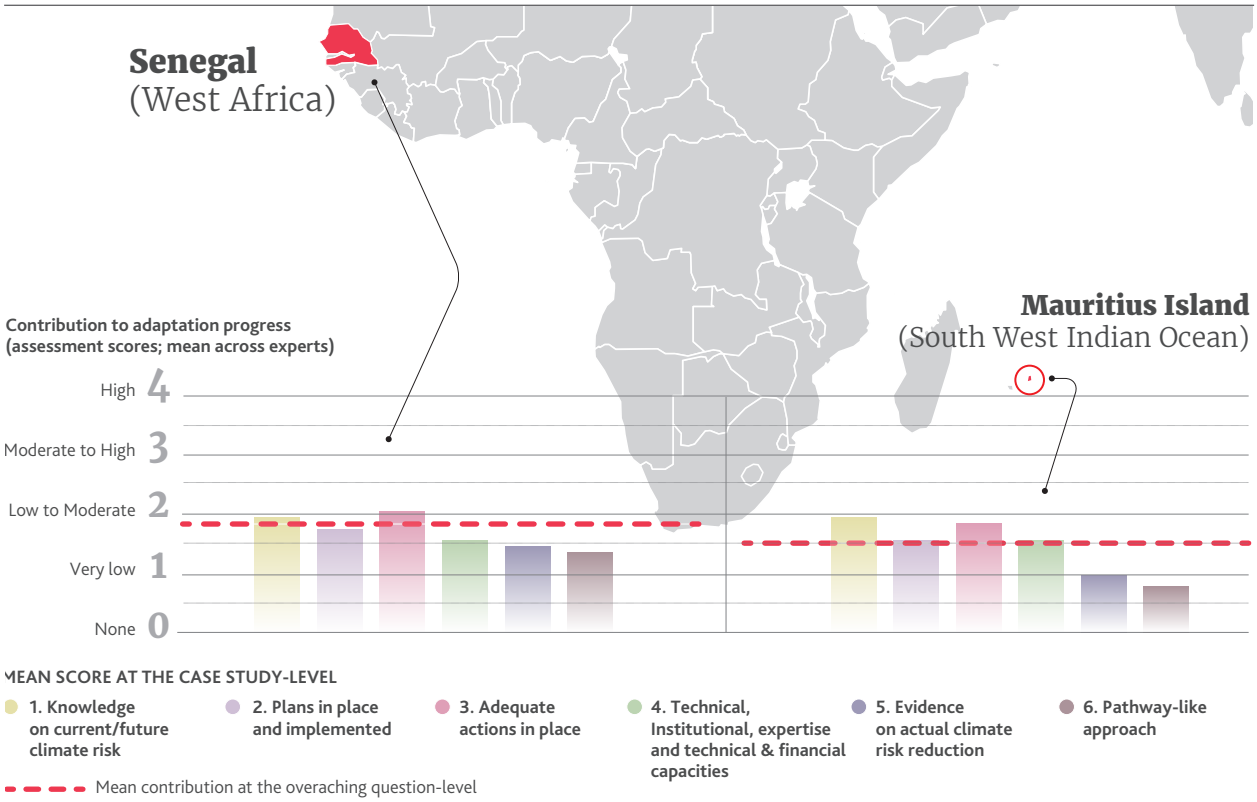
Considering multiple parameters together—as framed by the GAP-Track six overarching questions informed by 19 sub-questions—helps provide a comprehensive understanding of the country's current contribution to climate adaptation progress dealing with coastal risks (**Figure 5**). The two expert groups estimate this multi-dimensional contribution in Mauritius and Senegal rather low (aggregated mean scores 1.5 and 1.8, respectively; rather high confidence; **Tables 2** and **3** and **Figures 3** and **4**). Among key reasons is an evident gap in both countries in planning, implementing and monitoring a cross-scale, long-term strategy for coastal adaptation. This is not specific to Mauritius Island and Senegal, as many territories around the globe face similar constraints and challenges. The GAP-Track assessment helps to identify the most significant components ensuring or hampering effective adaptation progress in different contexts, as well as understand the underlying reasons and therefore highlight key areas of improvement.

Given the assessment of the two case studies, knowledge on climate risks (overarching question Q1) is the area where the most progress have be identified by the expert groups, followed by actions on the ground (Q3), planning and capacities (Q2 and Q4 respectively), and last, evidence of risk reduction and the pathway-like approach (Q5 and Q6, respectively). Such a ranking is not surprising a priori, as several dimensions of adaptation are known to be poorly understood, not only in Mauritius and Senegal, including the contribution of non-state actors (Q2.3), the consideration of the underlying drivers of natural and human vulnerability (Q1.2, Q1.3, Q3.2 and Q3.3), long-term financing (Q4.3), risk reduction measurement (Q5.1 and Q5.2), societal awareness about the adaptation challenges (Q5.3), the definition of climate adaptation goals (Q6.1) and the understanding of how to sequence various options over time (Q6.2 and Q6.3).

The two expert groups mentioned various underlying reasons for an overall low mean score for Mauritius and Senegal. First, there is a lack of scientific projections on climate hazards (further downscaling needed) and, more importantly, a gap in putting this information together with a comprehensive analysis of current and future drivers of exposure and vulnerability in natural and human systems. That is, climate risk as a whole is not well captured.

Second, both expert groups reported a difficulty to coordinate activities across scales (top-down or bottom-up information sharing processes) and allow for lessons to be learnt and processes to be adjusted to multiple local contexts. This is related to cross-scale and multi-stakeholder coordination and communication processes that are still not operational in the two countries studied, or at least not operational enough in the

FIGURE 5. Results' overview for Mauritius and Senegal at the overarching question level.



face of the acceleration (and future prospects) of risk issues at the coast. Both Mauritius and Senegal have some experience with implementing adaptation-related measures, but such an experience has to date not been capitalized enough.

Third, the lack of a forward-looking approach in terms of policy planning, funding mechanisms and implementation (still multi-year project at best) is an additional concern as this limits the ability of these countries to anticipate climate risks in the long run as well as ensure synergies with development processes at large.

Last, the overall results show that more technical dimensions such as knowledge on risk (Q1), policy framings (Q2), implementation (Q3) and capacities (Q4) are in a way better informed than adaptation outcomes in terms of risk reduction (Q5). This partly explains why Q-level mean scores are higher for the former than for the latter.

While such findings could help develop policy guidance especially at the national-level, for example in the design of relevant monitoring and evaluation frameworks, no specific recommendations are provided in this report. Recommendations by the expert group will probably be included in briefing notes (main results and key recommendations) that will be shared with the Mauritius and Senegalese authorities, as well as made available to a wide diversity of local stakeholders (for example through the GAP-Track webpage[24]).

24 https://www.iddri.org/en/project/assessing-global-progress-climate-adaptation-gap-track-2021

3. LESSONS LEARNT ON METHODOLOGICAL ASPECTS

This chapter draws the main lessons learnt from the pilot phase in terms of the question matrix, the case study results, some methodological emerging questions, the selection of the experts, and potential and limitations for a broader application.

3.1. Main methodological takeaways

3.1.1. Framing of the approach: review of question matrix

The six overarching questions and 19 sub-questions set the foundation of the assessment by framing the different dimensions of adaptation to be considered in the expert judgement. In the first application of the GAP-Track in the pilot study, these questions were developed by IDDRI and then refined based on discussions with the expert groups. The review process of the question matrix with the experts allowed to ensure that questions represented a variety of different settings of adaptation processes and contributed to a common understanding of the assessment protocol, specifically on language. It was important that nuances could be incorporated into the refining process while maintaining a breadth of questions that would not be specific to coastal adaptation nor to a given scale (e.g. national). The intention of the pilot study was to explore the application of the question matrix and assessment process, while **ensuring that the questions remained broad enough to facilitate future applications to a wide diversity of *Representative Adaptation Challenges*, study contexts and scales of analysis**. Therefore, they form an advanced foundation for a broader application of the GAP-Track (see section 4.1).

3.1.2. Main takeaways from the two case-studies

The pilot phase demonstrated that the approach works well at the national-level by providing a comprehensive evaluation of several adaptation dimensions in a given country for a specific *Representative Adaptation Challenge* using information sources at multiple scales. In the pilot study, experts provided a full range of resources to inform their assessment including national climate change adaptation policies or legislations including reporting mechanisms on adaptation (UNFCCC communications), research experiences on the ground and engagement with local stakeholders and communities on adaptation projects. This facilitated a cross-scale understanding of adaptation progress, for example: making links between what is planned at the national level to what is implemented in specific locations; including ground rooted knowledge on the strengths and gaps in cross-scale coordination; and the extent to which local-scale studies on coastal risk feed into a national-level understanding or policy design.

The GAP-Track could **encourage some new ways of thinking about adaptation tracking** at a national scale, including the development of relevant monitoring and evaluation frameworks or perhaps complementary national adaptation planning processes inspired by the question matrix. However, upscaling the approach to a global scale based on national assessments raises questions on capacities and resources: such a model would entail one expert group per country and per *Representative Adaptation Challenge*. For a set of three *Representative Adaptation Challenges*, for example, that would require mobilizing a total of about 600 expert groups (3 x 196 countries), which seems to challenge the feasibility of a global country-level assessment.

In addition, at the time of writing this report, the results of the pilot phase had not been shared with the national authorities in Mauritius and Senegal. The two expert groups suggested that beyond the results themselves (means scores in chapter 2), the general question-based framing could potentially support national authorities in policy and planning tools especially on framing and language, by bringing multiple dimensions of adaptation together (risks, exposure and vulnerability, governance, capacities, planning, practice, etc.), and guide the development of national-level reports such as Adaptation Communications. In addition, the approach could serve as a method to gather a wide variety of data on adaptation that could be useful at multiple scales in the planning and implementation process. These points will have to be developed further, which will be addressed in two-page summaries that will be shared with national authorities in both countries in November 2021. This will provide indications on the potential usefulness of the GAP-Track not only to assess adaptation progress, but also to guide policy and action at a national level.

3.1.3. Some questions that surfaced

During the pilot study, several questions were raised by the coordinator, the expert groups and the Steering Committee members that will thereafter need specific attention. Among these questions are:

How to ensure that the experts within the same expert group have the same understanding of both the questions and score descriptions? The Mauritius and Senegal expert groups highlighted the importance of starting the assessment process with a group meeting to hold in-depth discussion on the overarching questions, the sub-questions and the score description. The aim is to align expert's understanding of the scope and scale of each (sub-) question as well as of the narratives of each score and the qualitative gradation of the descriptions from scores 0 to 4. One of the lessons learnt was that at the start of applying the GAP-Track, it is critical to ensure that all experts agree on language (which reflects the scores) to avoid as much as possible personal interpretations of broad questions.

How to ensure that all the dimensions highlighted in the question matrix are well addressed by the expert group? The added-value of the GAP-Track is to allow bringing multiple dimensions of adaptation together, from risk knowledge to planning, implementation, evidence on outcomes and a forward-looking perspective. One of the core methodological principles of the GAP-Track is that each expert needs to score all these dimensions (via the sub-questions) in order to increase the robustness of the process as a whole and, for example,

avoid drawing conclusions based on one or two experts' judgment only, and ensure a final group-level thinking. This however requires the individual experts to have a broad knowledge and understanding of both the *Representative Adaptation Challenge* analysed, and the study context, which makes the identification of such experts more challenging. The Mauritius and Senegal experts expressed concerns around the fact that some experts may have less expertise than others, and so can find it difficult to answer all of the questions. However, they also recognized that different levels of expertise could help bring nuance to the conclusions. This question relates to the selection of the experts as discussed in section 3.2, but also to the strengthening of the group-level thinking process. This latter could be done through both a transparent deliberative process among experts and between assessment rounds (see point below), and an internal peer-review process conducted by both the coordinator(s) of a given expert judgment exercise and the general secretariat of the whole initiative (see structure of **Figure 7**).

How to ensure a transparent deliberative process over the individual assessment rounds, and therefore limit decision bias? The two rounds of individual assessments have been acknowledged as a critical component to ensure robustness of the approach and results. However, the question was raised on the potential bias that could occur from one assessment round to another. Indeed, after each assessment round, an intermediary synthesis gathers all individual assessments into a single sheet (illustrating together individual scores, justifications and sources of information) and develops some cross-experts material (mean score and confidence level). This approach allows for each expert to gain a sense of the other experts' inputs in terms of scores and justifications, so that they can enrich their own perspective and either confirm their initial score (by maybe strengthening justifications), or modify it because of the convincing arguments provided by others. This process aims at ensuring more confidence in the final group-level scores. Nevertheless, it does however pose a risk that individual experts may be susceptible to an influence by others due, for example, to a lack of confidence in their own expertise on some dimensions assessed, or the predominant intellectual influence of some experts compared to others. The next phase of the GAP-Track will have to address this component of the method, and build on experience of expert judgement exercises in other fields - for example by making the individual assessments anonymous.

3.2. Selecting experts

A limited set of experts is required for the application of the GAP-Track to facilitate engaged discussions among experts. For the Mauritius and Senegal case studies, there were four and five experts, respectively. Depending on the context and scale of analysis (see section 4.1), we could estimate a maximum of 10-12 participants per expert group (and therefore per *Representative Adaptation Challenge* and per study context).

There is no universal way to identify participants for the expert judgment exercise. In the 2021 pilot phase, we applied four main key selection criteria:

— Experts should have a robust **scientific background** in the *Representative Adaptation Challenge* considered (e.g., coastal risk management and climate adaptation). The relevance of the GAP-Track lies in its scientifically-based approach especially when it comes to the justification of the scores for the sub-questions;
— Experts should demonstrate **in-depth knowledge of the study context**. The 2021 pilot focused on a national-level assessment and called for in-depth knowledge of what is currently developed in Mauritius and Senegal in terms of coastal risks, risk management and climate adaptation (planning, implementation, capacities, etc.);
— Experts should have a **broad area of expertise** covering most of the topics considered in the GAP-Track approach: climate risks (including future projections; overarching question Q1), risk management and adaptation planning (Q2-Q6), and measures implemented to address current and future coastal risks (Q3 and Q5). It is indeed important that each participant is in capacity to fill all—at least the greatest majority—of the score cells in the assessment matrix, in order to allow for group discussions and a comprehensive final assessment at the expert group level;
— Experts should show **good collaboration skills**: individual assessments are at one point gathered in order to come up with a group-level outcome, which calls for participants to be open-minded and able to challenge their own expertise based on the inputs by other participants (e.g. different scoring and justifications; see section 3.3).
— The criteria above calls for involving **experts from the study region** as they can have an in-depth understanding of both the scientific evidence and the policy context. There is an added value to the assessment process if the experts have been involved in projects and have been in dialogue with relevant authorities at multiple scales, national to local (but also sometimes regional). The pilot phase however also shows that **experts who are not based in the study region** bring important external contributions that can add some nuance to the overall understanding and scoring.

3.3. Potential and limitations for a broader application

In terms of the potential for future applications at different scales and for different adaptation contexts, the pilot phase showed that the expert judgment approach is suitable to:

— Bring various types of information together, therefore allowing to go **beyond the usual constraints in adaptation assessments related to scarce information** (difficulties in finding centralized databases). The expert judgment approach therefore helps create aggregated information that brings multiple sources of information of varying natures together in order to come up with a synthesis-level understanding);
— Develop a scientifically robust assessment even in the case of gaps in information, therefore allowing for some **flexibility in data analysis**;

— Deliver **results within a limited time-frame**. It took four months (June-September 2021) for the Mauritius and Senegal expert groups of the pilot phase to develop the full methodological protocol and come up with refined results (scores and syntheses). For the next steps of the GAP-Track, there is room for more in-depth kick-off discussions and group-level result analysis, as well as possibly some time for cross-expert group exchange (as recommended by the two pilot expert groups). These additional steps will require additional time, but according to the Mauritius and Senegal expert groups, and the coordinator of the pilot phase, a six-month period for the implementation of the full process appears realistic.
— Be **complementary to other existing approaches** that are indicator-based or use policy documents (see further inputs in section 4.1)

In terms of **limitations**, the pilot phase helped highlight key methodological challenges on the consistency across the way experts understand questions and scores; the ability of the experts to inform the overarching questions and sub- questions of the assessment matrix and therefore assess adaptation progress in a comprehensive way; and the enhancement of a transparent deliberation process (see section 3.1.3). In addition to these more technical and scientific aspects, important policy questions raised are:

— How to make sure that the GAP-Track approach, which aims at being scientifically-based and independent from policy processes in place for example within the UNFCCC context, will **inform such policy processes**, and especially the Global Stocktake in 2023 and beyond (for example if implemented every five years)?
— How could the question-framing of the GAP-Track **help structure or guide** adaptation planning and action, including prioritizing topical and geographical areas as well as types of interventions, across scales, i.e. from national to local levels for example? The idea behind this question is the extent to which implementing the GAP-Track approach can help enhance consistency by developing a common framing of adaptation across scales.

These two last questions raise an important point on the **underlying legitimacy and salience of the GAP-Track approach** from a policy perspective, which in turn requires an open process and clarity around the role of the expert panel(s) and the results coming out of the work from the outset. It is critical that the assessment process as a whole is recognized as robust outside of the experts and institutions involved in the implementation of the GAP-Track (see landscape in **Figure 7**), which will rely on two main aspects. First, there is a need for a peer-review process to validate the robustness of the group-level assessment(s) (see section 3.1.3 for example). While externalizing this peer-review process (e.g. forming another set of experts to review the assessment of the core expert group) would add too much complexity, this role could be assumed by the coordinator(s) of each expert group, together with a some coordination at a higher level (across expert groups) as suggested in section 4.3). Second, the approach calls for engaging science-policy interaction/dialogue from the start of the assessment process in order to ensure that policymakers and practitioners can interpret how the findings could inform their activities.

4. CONTRIBUTING TO THE 2023 GLOBAL STOCKTAKE

4.1 Policy context: filling the gaps

The Paris Agreement 2015 introduced the Global Stocktake (Article 14) to measure progress on mitigation and adaptation efforts every five years and the first round will take place in 2023. The adaptation assessment framing is nested under the Global Goal on Adaptation (Article 7) and its components: *enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change*. In the lead up to COP26, Parties are discussing the modalities for the Global Stocktake on adaptation further to Decision 19/CMA.1 as the first information collection and preparation phase is set to start in 2022. Ahead of COP27, synthesis reports and a technical assessment will be carried out, which will inform a final synthesis report and the consideration of the findings and implications at the heart of COP28 in 2023. Given this time-line, the next year will be critical for surveying the different approaches available to inform and contribute to the Global Stocktake on adaptation.

While the mitigation community is geared up towards a common target (reaching 1.5 C) with available metrics, the adaptation side confronts several technical and methodological challenges that make committing to one modality for informing the stocktake at a global level complex (Beauchamp *et al.,* 2021; UNFCCC 2021). Some of these challenges were explored in this report, relating to a lack of common metrics or indicators to measure adaptation, limited data availability in some cases, difficulty to aggregate information across scales, the risk of standardized methods and trade-offs concerning local context-specificities, and difficulty to capture adaptation as a process (adaptation as outputs and outcomes). In addition, there are important political tensions on adaptation tracking such as varying models for monitoring and evaluation that are in many cases in a nascent stage or still under development, and the implications of progress on international climate finance and potentially loss and damage. Indeed the Global Stocktake aims, in addition to taking stock of adaptation progress globally, at helping Parties to inform activities and areas of support for achieving the long-term goals in the Paris Agreement. Therefore, for some countries this international process provides a first substance to estimate adaptation needs and therefore the allocation of funding (i.e. *adequacy and effectiveness of support for most climate vulnerable countries and developing countries on enhancing adaptation*). In other cases, countries have called for more clarity on common adaptation goals, for example, South Africa which has presented a view on precise targets under the GGA (Farand, 2021).

The UNFCCC Adaptation Committee has been working on providing support to Parties on adaptation progress tracking issues, including a technical paper that gives an overview of existing approaches (UNFCCC, 2020) and supplemental guidance on reporting processes under the UNFCCC (UNFCCC, 2018). On the second point, and despite the final conclusions of the Adaptation Committee will only be available between June and November 2022, some draft guidance has been circulated and used for revising Adaptation Communications[25] ahead of COP26. While these communications could be tracking instruments, zooming in on the text of the Paris Agreement, consideration is on how to assess progress towards reviewing the adequacy and effectiveness of adaptation. This is one component of a much larger contention on how to capture the full dimensions of adaptation. Against this backdrop, it is increasingly recognized that multiple approaches are needed and that the Global Stocktake should be flexible *(learning by doing*) (SBSTA & SBI, 2021).

Several initiatives are informing adaptation progress tracking (see **Table 4**) and could contribute to the Global Stocktake. For example, the UNEP Adaptation Gap Report conducts a national level analysis of adaptation progress in planning, financing and implementation with the aim of feeding into the UNFCCC process. The OECD Adaptation Task Force and member countries are working on surveying methods to evaluate progress, with emphasis on creating indicators. The UK has pioneered an innovative method using questions and looks at sector-oriented climate risks, however outcomes are country specific. The landscape of approaches offers ways of using different sources of information to contribute to the Global Stocktake; however, some gaps remain including attention to transboundary risk issues and data availability problems. In addition, as approaches are framed at national scales, there are questions on how assessments might help inform setting some global priorities for action and international cooperation on adaptation.

The GAP-Track approach offers a complementary approach to unlock some of these gaps. The question matrix for assessment and scoring system sets a framing that facilitates wide application across scales and for different kinds of *Representative Adaptation Challenges*, since the questions are not context nor risk specific. On upscaling (Section 4.2) for a global perspective, the method offers a lens to incorporate transboundary risks into the assessment process. These climate risks that spill across borders are increasingly considered in both the scientific and policy communities (see for example Benzie, 2021). In addition, the framing and methodological protocol based on expert judgement allows flexibility for assessment of scores where information and data might not be available. As a result, the approach helps develop an additional information pool on progress for various dimensions of adaptation that could be complementary to existing approaches. This assumes a legitimacy of the approach and that the expert group is recognized by both the scientific and policy community (see section 3.3).

Given these added benefits of the GAP-Track approach, there is opportunity to further expand on and upscale the approach

25 Adaptation Communications are one of the main tools at disposal for Parties to report on adaptation information, priorities and implementation (plans and actions); and can be a standalone contribution, or be part of a diversity reporting documents (e.g. NDC, NAP, within a National Communication, etc.).

from the national pilot study in 2021 to a global perspective. The following sections offer some potential ways forward on the architecture of future applications, including the scope and identification of global adaptation challenges, as well as on the operationalization of the approach at the relevant scale.

4.2 Upscaling from case-studies to a global perspective

Upscaling the GAP-Track from a national application - as explored in the pilot study - to a global perspective leads to consider two structuring aspects: firstly, the set of *Representative Adaptation Challenges* for a global level assessment and how to identify them. Secondly, the scope of such an analysis, whether by regions, sectors, socio-geographical systems or other hybrid approaches. These structural aspects are further explored in this section.

4.2.1. Defining the relevant Representative Adaptation Challenges to focus on

The GAP-Track focuses on major *Representative Adaptation Challenges*. For a global-scale application, it will be important to identify these major adaptation challenges posed by a wide range of climate risks worldwide. Identifying adaptation priorities of worldwide importance, and then a series of associated *Representative Adaptation Challenges*, calls for a close dialogue between science and policy on methods for appraising risks from climate change. This is because firstly, there remains uncertainty on climate risk projections which means some risk significance can change relative to mitigation scenarios in terms of likelihood and impacts. Secondly, the importance of a given risk is partly determined by societal values, which can vary from one context to another, and overtime. It is therefore important that both a scientific and a policy perspective are represented in the identification of global adaptation challenges, and that these are reviewed periodically.

In considering potential future applications, here we propose to build on the IPCC risk assessment framing. In the Fifth Assessment Report published in 2014 (AR5, contribution of the Working Group 2 on "Impacts, Vulnerability and Adaptation"), a set of eight "Key Risks" have been identified and defined as potentially severe risks describing the 'dangerous anthropogenic interference (DAI) with the climate system', as stated in the UNFCCC Article 2. These key risks refer to a wide diversity of environmental, geographical and socioeconomic systems and sectors (**Table 4**; Oppenheimer *et al.*, 2014), and have been considered in the AR5 as relevant at the global level. The AR6 will move a step further by proposing a repackaging of the AR5 Key Risks in an updated list of "Representative Key Risks" including more than those identified in the AR6, e.g. on peace and mobility. Using the AR5 or AR6 framing as a starting point allows highlighting a series of major adaptation challenges in different systems (coastal, urban, rural, ecosystems, etc.) and sectors (health, food, infrastructure, security, etc.). In addition, relying on this IPCC risk framing provides some scientific legitimacy, as well as some policy support in that the outcomes of the IPCC work have been officially approved by the Parties to the UNFCCC. This context supports the GAP-Track approach that aims to be scientifically independent but policy relevant.

Figure 6 in section 4.2.1 proposes some of these potential *Representative Adaptation Challenges*. It has opted to avoid the demultiplication of study systems and *Representative Adaptation Challenges* in order to avoid multiplying the assessment expert groups for each system, and therefore limit cumbersome procedures as much as possible (see section 4.2.1). Instead, it identifies for each study system one *Representative Adaptation Challenge* that closely reflects major risk and adaptation priority areas.

TABLE 4. The Key risks from climate change identified in the Fifth Assessment Report of the IPCC. Source: Oppenheimer *et al.* (2014).

Coding	Heading
(i)	Risk of death, injury, ill-health, or disrupted livelihoods in low-lying coastal zones and small island developing states and other small islands due to storm surges, coastal flooding, and sea-level rise
(ii)	Risk of severe ill-health and disrupted livelihoods for large urban populations due to inland flooding in some regions
(iii)	Systemic risks due to extreme weather events leading to breakdown of infrastructure networks and critical services such as electricity, water supply, and health and emergency services
(iv)	Risk of mortality and morbidity during periods of extreme heat, particularly for vulnerable urban populations and those working outdoors in urban or rural areas
(v)	Risk of food insecurity and the breakdown of food systems linked to warming, drought, flooding, and precipitation variability and extremes, particularly for poorer populations in urban and rural settings
(vi)	Risk of loss of rural livelihoods and income due to insufficient access to drinking and irrigation water and reduced agricultural productivity, particularly for farmers and pastoralists with minimal capital in semi-arid regions
(vii)	Risk of loss of marine and coastal ecosystems, biodiversity, and the ecosystem goods, functions, and services they provide for coastal livelihoods, especially for fishing communities in the tropics and the Arctic
(viii)	Risk of loss of terrestrial and inland water ecosystems, biodiversity, and the ecosystem goods, functions, and services they provide for livelihoods

4.2.2. Defining the scope for a global-level analysis

Section 3.1.2 highlights that reproducing the national-level approach developed in the pilot study would not make sense for a global scale application, for several reasons including the risk of country comparison (at the detriment of the global-scale picture), the difficulty to deal with country-related data gaps, and the practical challenges of an application to 196 countries. Therefore, alternative applications need to be considered. As a first reflection on ways forward, we propose several options on the scope of a global scale application, each of them presenting advantages and limitations (see **Table 5**). While the GAP-Track could take a similar approach as the IPCC aegis that operates directly at a global scale while focusing on *Representative*

Adaptation Challenges as discussed in the previous section, other options may provide opportunities to expand the scope of assessment and allow gathering supplementary information and resources on adaptation tracking. As shown in **Table 6**, this includes applications by large regions, by socio-geographical systems, by sectors, or a hybrid approach.

The "large regions" (see examples in **Table 5**) lens of analysis could offer insights into transboundary issues, especially regional adaptation planning and cross border cascading effects of climate change risks and adaptation. Such a categorization for the assessment could trigger similar constraints as the national-level approach (3.1.2.) in terms of a risk in making comparisons across groups of countries, or of sur- or under- representing national circumstances depending on contrasted availability of information. The "large regions" approach might therefore fall into similar political frictions as confronted by a national scale assessment.

Sectoral approaches (see examples in **Table 5**) have the advantage of steering away from country or regional comparison, and of bridging human and ecological systems. However, they have already been explored in other approaches, for example, Global Commission on Adaptation and Race to Resilience and, to a lesser extent, the UNEP Adaptation Gap Report. Given these existing initiatives, the GAP-Track aims to avoid duplication, and instead provide an approach with the benefit of presenting new information. As a side note here, this point raises the question on how diverse approaches will be combined to offer a comprehensive picture of adaptation progress for the Global Stocktake. This point goes beyond the sectoral approach and beyond the GAP-Track, and will need further discussions at a later stage.

A promising approach would start from the identification of socio-geographical systems composed of environmental components, natural and non-natural resources, and human dimensions. They would represent a wide diversity of territorial systems (environment and society) across the globe, but without considering national or regional boundaries. For example, *coastal socio-geographical systems* could focus on climate risks to socio-ecological systems located in coastal areas around the world, from the tropics to the Poles, and across all levels of development. To encounter the risk of the homogenization of context-specificities, the use of underlying key territorial archetypes could be introduced in the assessment. Moreover, the socio-geographical systems approach would be well suited to explore a diversity of adaptation policies and options, including ecosystem-based, community-based, technical, behavioral, and more. The socio-geographical systems to be considered could refer to the main types of human settlements that can be substantially affected by climate change, for example coastal/ocean, urban, rural, mountainous, in arid regions, in Polar regions, etc.

TABLE 5. Examples of potential scopes for a global-level GAP-Track, and some examples of advantages and limitations.

Scope	Examples	Advantages	Limitations
By large regions	Several clusters could be envisaged here, for example: • By continent (Africa, South America, North America, Oceania, etc.) • By sub-regions (or Mediterranean, Tropical countries, Amazonian region, etc.)	• Big picture for groups of countries • Material in upcoming IPCC AR6 WG2 • Could inform the UNFCCC process?	• Risk of cross-region comparison
By socio-geographical systems	Big urban systems, major rural systems, coastal and ocean systems, mountain systems, forest systems, ardi systems, polar systems, etc.	• Cross-region/ country, focus on socio-ecological territorial systems	• Can't cover all systems around the world; must focus on « key » systems (how to define « key »?)
By sectors	Health, food, water, energy, infrastructure, etc.	• Big picture for critical sectors • Avoid country comparison • Material in upcoming IPCC AR6 WG2	• Difficulty to represent various types of contexts/ populations • Analytical lens already considered by others (e.g. GCA), so no real added-value of GAP-Track
Hybrid	Both socio-geographical systems and sectors	• Cross-region/ system + cross sectors • Material in upcoming IPCC AR6 WG2	• Consistency/ comparability across systems/ *Representative Adaptation Challenges*

The framing above offers several advantages as systems can be found in different parts of the world thereby ensuring a broad coverage (cross-region and countries) that could also inform adaptation gaps and areas for action specific to certain types of geographical systems. However, human interaction with adaptation and issues of health, equity and security (for instance) across geographical systems and settlements, are missing, which could be a major gap in the assessment. As a result, the GAP-Track could explore a hybrid approach, by identifying some key socio-geographic systems and sectors. **Figure 6** presents some first thoughts on a category of systems that could be included in such a hybrid application to feed into an evaluation of adaptation progress at a global scale. Further discussion with adaptation experts and policy makers could help inform other types of systems to include in the assessment. For each system, the GAP-Track could offer a method for bringing together dispersed adaptation information systematically and through worldwide representation of scientific experts bringing a real benefit to the tracking and progress assessment landscape.

FIGURE 6. Example of a hybrid framing for systems and representative Adaptation Challenges to be considered in a global-scale GAP-Track application.

SOCIO-GEOGRAPHICAL SYSTEMS	**System #A (e.g. coasts) RAC#1: coastal adaptation**	**System #B (e.g. big cities) RAC#2: urban adaptation**	**System #C (e.g. mountains) RAC#3: mountain adaptation**
	System #D (e.g. inland rural) RAC#4: rural adaptation	**System #E (e.g. Arctic regions) RAC#5: Polar adaptation**	**System #F (e.g. transboundary ecosystems) RAC#6: ecosystem adaptation**
SECTORS	**System #G (e.g. Human health) RAC#7: Adaptation in health**	**System #H (e.g. infrastructure &energynetwoks) RAC#8: Adaptation in I&E**	**System #I (e.g. Food & Water) RAC#9: Adaptation for F&W security**
	System #J (e.g. Peace and mobility) RAC#10: Adaptation to human insecurity		

4.3 Operationalizing a global-scale approach to adaptation progress tracking?

To deploy the GAP-Track for a global perspective, it would require to set up a governance framework in order to structure and coordinate the assessment(s) of a series of systems and *Representative Adaptation Challenges* by different expert groups. As shown in **Figure 7**, it could be composed of:

— A General Secretariat to lead the work plan and time-line; coordinate the expert groups and carry out the synthesis work. The permanent staff of the General Secretariat could be about 2-3 persons (full time positions).

— Coordinators to oversee the different expert groups and discuss the implications of findings with the Secretariat (for example 10 as in **Figure 19**; but this number will depend on the number of systems assessed).

— Expert groups (one for each system; 10 in **Figure 7**) consisting of an average of 5-10 experts in each group (equivalent to a total of approximately 50-100 experts).

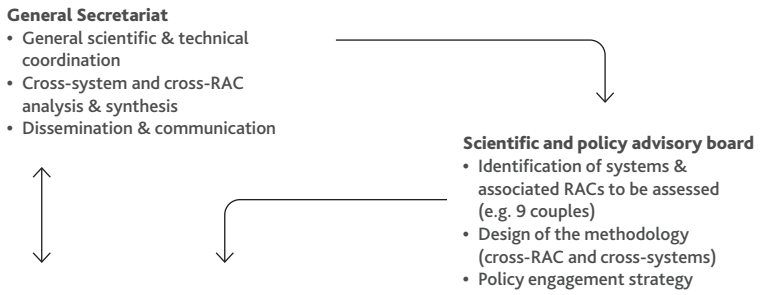
— A Steering Committee to provide scientific feedback on the assessment process and policy engagement; including designing of the GAP-Track work plan.

The Secretariat would also carry out literature reviews to keep up to date with new information on adaptation tracking issues as well as policy engagement to support the GAP-Track approach and ensure its relevance in policy discussions on adaptation (policy, planning, implementation, financing).

In terms of the general scope, **Figure 7** presents a set of 10 potential systems/*Representative Adaptation Challenges* for a first global assessment. This structure can help to ensure the approach will be implementable from one Global Stocktake to the other (for example). The systems/*Representative Adaptation Challenges* presented in **Figure 7** are only illustrative of the kind of framing that could be considered for a global GAP-Track; however, these systems/*Representative Adaptation Challenges* will need to be collectively discussed and decided by the leading consortium of the global GAP-Track in close consultation with representatives of the international adaptation scientific and policy communities. In addition, it will be important that once decided, the structuring of the set of systems/*Representative Adaptation Challenges* will not be changed, as their regular assessment over time will allow for identifying trends in adaptation progress.

In terms of the timeframe, the full first round of a global assessment will need to be carried out within the next two years in order to prepare complementary information at a global scale ahead of the first Global Stocktake. Following this first timeframe, it could be repeated in cycles of five years, in line with the Global Stocktake cycle.

FIGURE 7. A framework for a global-scale GAP-Track application.



SOCIO-GEOGRAPHICAL SYSTEMS	**System #A: coasts and ocean** **RAC#1: coastal adaptation**	**System #B: big cities** **RAC#2: urban adaptation**	**System #C: mountains** **RAC#3: mountain adaptation**
	Coordinator #A • System-level coordination • Expert recruitement • Syntheses (interm. & final) ⇩ **Expert group #1** 5-10 experts Assessment	**Coordinator #B** • System-level coordination • Expert recruitement • Syntheses (interm. & final) ⇩ **Expert group #2** 5-10 experts Assessment	**Coordinator #C** • System-level coordination • Expert recruitement • Syntheses (interm. & final) ⇩ **Expert group #3** 5-10 experts Assessment
	System #D: inland rural **RAC#4: rural adaptation**	**System #E: Arctic regions** **RAC#5: Polar adaptation**	**System #F: transboundary ecosystems** **RAC#6: ecosystem adaptation**
	Coordinator #D • System-level coordination • Expert recruitement • Syntheses (interm. & final) ⇩ **Expert group #4** • 5-10 experts Assessment	**Coordinator #E** • System-level coordination • Expert recruitement • Syntheses (interm. & final) ⇩ **Expert group #5** • 5-10 experts Assessment	**Coordinator #F** • System-level coordination • Expert recruitement • Syntheses (interm. & final) ⇩ **Expert group #6** • 5-10 experts Assessment
SECTORS	**System #G: Health** **RAC#7: Adaptation in health**	**System #H: infrastructure & energy netwoks** **RAC#8: Adaptation in I&E**	**System #I: Food & Water** **RAC#9: Adaptation for F&W security**
	Coordinator #G • System-level coordination • Expert recruitement • Syntheses (interm. & final) ⇩ **Expert group #7** • 5-10 experts Assessment	**Coordinator #H** • System-level coordination • Expert recruitement • Syntheses (interm. & final) ⇩ **Expert group #8** • 5-10 experts Assessment	**Coordinator #I** • System-level coordination • Expert recruitement • Syntheses (interm. & final) ⇩ **Expert group #9** • 5-10 experts Assessment
	System #J: Peace and mobility **RAC#10: Adapt. to human insecurity**		
	Coordinator #J • System-level coordination • Expert recruitement • Syntheses (interm. & final) ⇩ **Expert group #10** • 5-10 experts Assessment		

RAC: Representative Adaptation Challenge

5. CONCLUSION

The GAP-Track approach developed by IDDRI offers a new avenue for tracking adaptation progress globally and providing the international community with complementary, scientifically robust and multi-source information.

A pilot phase in 2021 explored an application of the GAP-Track approach to coastal adaptation—identified as a one of the important *Representative Adaptation Challenges* globally—in two country case studies (Mauritius Island in the South West Indian Ocean, and Senegal in West Africa).

The results confirm that the approach offers a promising way to complement existing approaches ahead of the UNFCCC Global Stocktake in 2023 (Chapters 2 and 3) by providing a lens to understand adaptation progress, gather different sources of information on adaptation challenges at multiple scales, and allow to fill gaps where data sources are missing. Accordingly, the lessons learnt discussed in this report lead to consider further applications, specifically on expanding the scope and upscaling the approach to a global perspective. With this respect, three key issues at the science-policy interface are discussed in this report (Chapter 4), including concrete proposals and a discussion on associated methodological challenges.

How to organize an assessment for adaptation at a global level? The GAP-Track recommends to focus on *Representative Adaptation Challenges,* *which brings to question how to identify these?* The report suggests that global-scale *Representative Adaptation Challenges* can be identified across scales and national circumstances, and that relates to coastal systems, urban systems, water, health, energy—for example. Some scientific works, including from the IPCC on representative key risks at the global level (in AR5 and in the upcoming AR6) could give some first ideas, which would require additional policy discussions to ensure fair representation and selection.

Moving away from a national framing to a global perspective: how can the GAP-Track pave a way towards setting global adaptation priorities? Applying an assessment to 196 countries and for several *Representative Adaptation Challenges* would not be feasible in the lead up to the Global Stocktake in 2023. Instead, it could be valuable to move beyond the country lens and understand adaptation progress and gaps at a global level—for example, by large regions, critical sectors, or socio-geographical systems (coasts, cities, arid regions, etc.). The former options (by country or large regions) risk confronting political tensions on financing adaptation, while the sectoral approach has been developed by recognized partners, for example the Global Center on Adaptation (see 2020 report). The report suggests that the socio-geographical approach could offer opportunities to go beyond territorial issues and bring a diversity of national circumstances together around a series of cross-scale adaptation challenges: coastal, urban, mountain, etc.

How to operationalize a global-scale GAP-Track? The architecture needed to support an application of the GAP-Track at a global level would entail mobilizing a multi-partner coalition and worldwide experts to address the identified *Representative Adaptation Challenge* with the support of a general secretariat (oversight and coordination) (see **Figure 7** for an overview). In addition, a technical support unit and a multi-partner advisory board could help guide the GAP-Track project and ensure close ties between the science-policy interface on advancements in adaptation tracking issues. The aim of launching a global-scale GAP-Track in 2022 is to ensure the preparation of results—even partial—ahead of the Global Stocktake in 2023, and full results for the next cycle in 2028. This calls for discussions between the scientific and policy communities to identify ways forward for operationalizing the GAP-Track.

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ANNEXES

A1. Summary of the available GAP-Track documents

— GAP-Track webpage: https://www.iddri.org/en/project/assessing-global-progress-climate-adaptation-gap-track-2021
— Methodological report (pdf): https://www.iddri.org/sites/default/files/PDF/Projets/GAP-Track_Methodological%20report%20(D1)_September%202021.pdf
— Assessment grid including overarching questions, sub-questions and score description (excel file) -- Available on the GAP-Track webpage (see link above)
— Full result database (excel file) -- Available on the GAP-Track webpage (see link above)

A2. Overarching questions and sub-questions of the assessment matrix

OVERARCHING GUIDING QUESTION

1. Does scientifically-based knowledge on current and future climate risks exist at the appropriate scale?

SUB-QUESTIONS (INCLUDING SCOPE AND SCALE DESCRIPTION)

1.1. Are current climate-related coastal hazards known?
— Scope: erosion, marine flooding, river flooding, salinization (soils, groundwater) and consideration of hazards from both extreme events (e.g. storms and cyclones) and slow onset changes (e.g. Sea-level rise)
— Scale: includes national to local levels

1.2. Are current drivers of exposure and vulnerability of natural systems known?
— Scope: drivers influencing the dynamics of key natural coastal systems (beach-dune systems, wetlands, coral reefs, coastal vegetation, etc.)
— Scale: includes national to local levels

1.3. Are current drivers of exposure and vulnerability of human systems known?
— Scope: drivers related to populations, assets (buildings, infrastructure, etc.) and economic activities (beachside tourism, fisheries, aquaculture, etc.) as well as decision-making processes (public authorities, local communities, private sector). Postulate: while drivers are by definition context-specific, here we focus on drivers that are generic from one case to another (e.g. role of urban densification in flood-prone areas, loss of social capital in face of disasters)
— Scale: includes national to local levels

1.4. Are future climate risks projected (at a relevant/useful scale)?
— Scope: touches on a forward-looking approach for sub-questions 1.1 + 1.2 + 1.3. I.e., integration of knowledge on future trends in hazards, exposure and vulnerability (for both natural and human systems), for example based on modeling and scenarios. Ideally, projections bringing climate, environmental and socioeconomic scenarios together
— Scale: includes on national to local levels

OVERARCHING GUIDING QUESTION

2. Is there a plan(s) in place?

SUB-QUESTIONS (INCLUDING SCOPE AND SCALE DESCRIPTION)

2.1. Is there an adaptation plan(s) (national to local)?
— Scope: plans and policies specific for climate adaptation, or mainstreaming of adaptation into existing plans and policies. For example, a national plan that has granular / local level interventions scores high on the evaluation scale. Doesn't include implementation aspects (concrete measures and institutional means of implementation are captured in sub-questions 2.2 and 4.1, respectively). Considers that local governments often play a more prominent role than national governments.
— Scale: includes national to local levels

2.2. Are there adaptation plan(s) (national to local) implemented?
— Scope: plan implementation on the ground. Implicitly includes dimensions of governance and multi-level coordination. Includes processes for monitoring and evaluation
— Scale: includes national to local levels

2.3. Are the main non-state actors contributing to the design and implementation of national and local plans/policies?
— Scope: considers the extent to which non-state actors (private sector, communities, NGOs, etc.) are involved in consultations or drafting coastal adaptation strategies. Participation processes to involve the local community in the planning process and adaptation option implementation is considered (key to support implementation).
— Scale: includes national to local non-sate actors

OVERARCHING GUIDING QUESTION

3. Are adequate actions taking place at a relevant scale to reduce climate risks?

SUB-QUESTIONS (INCLUDING SCOPE AND SCALE DESCRIPTION)

3.1. Are there actions targeting the most prominent climate hazards on the coast

— Scope: actions that address the main climate-related hazards identified in sub-question 1.1 (i.e. erosion, marine flooding, river flooding, salinization from both extreme events and slow on-set changes). This includes both nature-based and community-based adaptation activities aimed at directly limiting climate hazards (e.g. through enhanced coastal protection, ecosystem services or coastal defense options). The risk of maladaptation (in relation with context-specificities) is also considered
— Scale: the focus is on the local scale, with a national-level perspective included

3.2. Are there actions addressing the main drivers of exposure & vulnerability of natural systems?

— Scope: actions addressing the most influential drivers of exposure and vulnerability of natural systems (e.g., mangrove clearing, coral and beach mining). Encompasses both measures to preserve or restore ecosystems and their services, and the existence of measures having detrimental effects on ecosystems
— Scale: focus on local scale, with a national-level perspective included (as scores increase)

3.3. Are there actions addressing the main drivers of exposure & vulnerability of human systems?

— Scope: actions addressing the most influential drivers of exposure and vulnerability for human systems (people, tangible and intangible assets (including infrastructure), economic activities). The risk of maladaptive outcomes is also considered.
— Scale: focus on local scale, with a national-level perspective included (as scores increase)

OVERARCHING GUIDING QUESTION

4. Are there sufficient institutional, technical (including expertise) and financial capacities in place (for planning and implementation)?

SUB-QUESTIONS (INCLUDING SCOPE AND SCALE DESCRIPTION)

4.1. Are there governance arrangements in place to support institutional capacities to coordinate adaptation activities (multi-level governance and mainstreaming across policy areas/sectoral plans)?

— Scope: the focus here is on governance arrangements and institutional capacities to support implementation, not on plans and policy documents (captured in sub-question 2.1). These governance arrangements ensure cross-institutional coordination (across multi-level government and horizontally across policy areas/sectors and planning tools), to allow for implementing cohesive adaptation-related plans and policies. For example, does a climate adaptation unit exit in a specific Ministry or at the local government level (e.g. municipalities and district councils)?
— Scale: includes national to local levels of government, including but not limited to the often critical role that local governments play in the implementation of activities, especially in regards to land use and urban planning (e.g. all land use change permits are given at the local government level).

4.2. Are technical capacities and expertise capacities in place at the relevant scale and at both national and local levels?

— Scope: focus on human means of implementation of plans and policy documents. Considers together the number of people working on adaptation-related dimensions; their level of training in terms of coastal risk management and adaptation; and the level of consistency between number/training and actions/decisions on the ground and in(national and local institutions
— Scale: includes national to local levels, and considers the critical role that local governments play

4.3. Does specific and sustainable funding exist that is specifically dedicated to managing climate-related coastal risk and adaptation?

— Scope: This sub-question does not aim at assessing whether available funding for adaptation is enough or not, but rather at describing the finance context for adaptation. Besides the amount of funding available, the main problem encountered in many places is that, first there is no dedicated budget for coastal risk and coastal adaptation, and second, when it exists, it is generally available for a few years (e.g. through externally-funded projects in developing countries). So the challenge is around (i) dedicated funding support, and (ii) sustainable (long-term) funding, including from the private sector.

— Scale: includes national to local levels, and considers institutions and the private sector

OVERARCHING GUIDING QUESTION

5. Is there evidence of effective climate risk (current and projected) and long-term vulnerability reduction?

SUB-QUESTIONS (INCLUDING SCOPE AND SCALE DESCRIPTION)

5.1. Is there evidence of risk reduction today?

— Scope: understand the level of evidence showing to what extent plans, policies and actions in place are actually contributing to coastal risk reduction.
— Scale: includes national to local levels, all types of interventions and stakeholders (public, private, NGOs, etc.)

5.2 . Are there indications that the implemented policies and actions contribute to minimize the risk of maladaptation on the long run?

— Scope: besides bringing evidence of actual risk reduction, there is a need to ensure that adaptation responses (actions and policies) are not contributing to increasing risk in the future, especially through increased exposure and vulnerability
— Scale: includes national to local levels, all types of interventions and stakeholders (public, private, NGOs, etc.)

5.3. Are there indications that the society is aware of the need to tackle both current and future coastal climate risks?

— Scope: understand the extent to which the local population is prepared to support adaptation-related responses (actions and policies), as population acceptance is key to the design and implementation of coastal risk reduction strategies at multiple scales
— Scale: includes a national scale analysis (census) and local communities

OVERARCHING GUIDING QUESTION

6. Is a pathway-like approach considered?

SUB-QUESTIONS (INCLUDING SCOPE AND SCALE DESCRIPTION)

6.1. Are adaptation goals established in the short to medium and long-term (multi-decadal scale), and articulated with each other (i.e. how does reaching present-day goals support reaching longer-term ones)?

— Scope: understand the extent to which clear goals on coastal risk reduction in the future (and in connection with goals dedicated to current coastal risk reduction) have been established, and their level of precision (generic/vague vs. precise/operational)
— Scale: national level mainly, but also considering local-level situations when they have the potential to inform broader scale situations

6.2. Are synergies and trade-offs between various adaptation-related options considered?

— Scope: understand the extent to which synergies and tradeoff between multiple adaptation responses (actions and policies) are studied (on scientific bases)
— Scale: national and local level

6.3. Are options planned in a sequenced manner and alternative strategies considered?

— Scope: understand the extent to which synergies and tradeoff between multiple options are studied (on scientific bases) and considered in the design and implementation of coastal adaptation strategies at the national and/or local level
— Scale: national and local level

A3. Examples of the scoring system developed for some sub-questions

This table is an extract of the full description of the scoring system developed during the 2021 pilot phase of the GAP-Track. The full matrix is available on the GAP-Track webpage (https://www.iddri.org/en/project/assessing-global-progress-climate-adaptation-gap-track-2021).

SUB-QUESTION

1.1. Are current climate-related coastal hazards known?

SCORE DESCRIPTION

NA = Not assessed (either

0 = No information on current climate-related coastal hazards at the coast

1 = Partial knowledge on a very limited number of coastal areas and/or on only one of the main hazards considered

2 = In-depth knowledge for more but still a limited number of coastal areas and/or on only one or two of the main hazards considered. The knowledge is well understood for the case studies, but these latter are too specific (e.g. in terms of physical features) to be representative of most of the non-studied areas

3 = In-depth knowledge for a limited number of coastal areas and/or for most of the main hazards considered. The coastal areas studied are representative enough (in terms of physical features) of most of the other areas, therefore allowing for some lessons to be learnt

4 = Wide understanding of hazards, including a wide diversity of coastal case studies representing the various situations at the country level.

SUB-QUESTION

2.1. Is there an adaptation plan(s) (national to local)?

SCORE DESCRIPTION

Dimensions considered: whether a national exist + is supported by local plans (to support implementation on the ground) + existence or not of a monitoring and evaluation system

NA = Not assessed

0 = None

1 = A national policy exists that covers a wide diversity of settlements/sectors/communities but only consists of a list of options without any guidance on prioritization and/or relevant timescales for implementation. No local plans exist to support implementation on the ground. No monitoring and evaluation system.

2 = A national policy exists (wide diversity of settlements/sectors/communities, list of options) and provides some guidance (action prioritization, timescales for implementation), but only for settlements/sectors/communities at higher risk (hotspots). Only very few, pioneering local plans exist to to support implementation on the ground. A monitoring and evaluation system is at an embryonic stage.

3 = A national policy exists that encompasses the main settlements/sectors/communities (not only hotspots). Several local plans exist to support implementation on the ground. The monitoring and evaluation system is advanced and (at least partly) operational.

4 = A national policy exists that encompasses the main settlements/sectors/communities (not only hotspots). Implementation is supported by a lot of local plans for the main settlements/sectors/communities (not only hotspots). The monitoring and evaluation system is fully advanced and operational.

SUB-QUESTION

3.1. Are there actions targeting the most prominent climate hazards on the coast?

SCORE DESCRIPTION

Dimensions considered: type of hazards considered, and type of actions (coastal protection, accommodation, retreat) depending on context-specificities, induced risk of maladaptation

NA = Not assessed

0 = No specific action is undertaken to control hazards at the coast

1 = A very limited number of actions are reported on the ground, without any insight on their potential to reduce risk or generate maladaptation.

2 = Only one or two of the main hazards are considered. The majority of responses are inadequate and could imply some degree of maladaptation. For example: hard protection is implemented in non-densely populated areas; accommodation measures are not at scale or only address a small part of impact; coastal retreat is not adequately planned and rather looks like an emergency response

3 = Most of the main hazards are considered. The majority of responses are adequate to address current hazards, e.g. adequately calibrated hard/soft coastal protection, adequate accommodation measures and managed coastal retreat. They are implemented in relevant places and minimize the risk of maladaptation. They however do not fully consider future changes in hazards.

4 = All the main hazards are considered. The majority of responses are adequate to address current hazards, e.g. adequately calibrated hard/soft coastal protection, adequate accommodation measures and managed coastal retreat. They are implemented in relevant places and avoid maladaptation. A forward-looking approach is considered when designing the responses (including planning for adjustments over time).

SUB-QUESTION

4.1. Are there governance arrangements in place to support institutional capacities to coordinate adaptation activities (multi-level governance and mainstreaming across policy areas/sectoral plans)?

SCORE DESCRIPTION

Dimensions considered: arrangements to ensure institutional coordination from the national and local levels (e.g., existence of an adaptation unit and its connection to other institutions)

NA = Not assessed

0 = No institutional arrangements are in place to address adaptation challenges

1 = There are limited and scattered institutional arrangements that consider adaptation challenges, and no governance measures are in place to ensure information sharing and the coordination of activities

2 = One institution is identified at the national level that is dedicated to address adaptation issues (e.g. an adaptation unit), but it remains isolated from other national institutions and is not supported by any governance arrangements to allow for multi-level coordination and communication (information-sharing) with local coastal municipalities and/or districts (e.g. only rare and pioneering ones)

3 = Institutional arrangements exist at the national level and are well connected to other national institutions via coordination and information-sharing measures with increasing influence but that remains limited. In addition, adaptation-dedicated institutional arrangements are more systematically established in local coastal municipalities and/or districts, however there is limited coordination and information-sharing upstream.

4 = Institutional arrangements exist at the national level and cross institutional dialogues are systematically carried (mainstreaming of climate change adaptation policies in other sectoral policies and planning tools). In addition, multi-level governance is in place: there are adaptation-dedicated institutional arrangements at the local/district level, and information-sharing measures are in place to ensure the upstream flow of information to national institutions.

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