



The dynamics of institutional arrangements for climate change adaptation in small island developing states in the Atlantic and Indian Oceans

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Abstract

The successful design, implementation and management of the institutional arrangements for climate change adaptation are critical components of sustainable development. This is especially true for small island developing states (SIDS), a group of 58 countries spread across three main geographic regions, which are acknowledged as being disproportionately vulnerable to the impacts of climate change. In many instances, the dynamics of these arrangements in SIDS are poorly understood and documented. This study helps to fill this gap by identifying and analyzing “networks of action situations” through semi-structured interviews with 14 national and international climate change officials and practitioners in four SIDS (Comoros, Maldives, Seychelles, and Singapore) in the Atlantic and Indian Oceans region. We find that there are a few strategic actors involved in multiple, mutually reinforcing and sometimes conflicting arrangements, which are simultaneously being shaped and reshaped at different scales. We also find varying patterns of power, politics and participation that act as both drivers of and barriers to adaptation in these countries. By deconstructing institutional interlinkages and strategic feedback loops, this paper contributes to a broader understanding of the complexities of environmental governance in small jurisdictions.

Keywords Adaptation · Institutions · Networks of action situations · Participation · Politics · Power

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Introduction

The climate change adaptation governance field, in investigating the complexity of the adaptation process itself, has sought to disentangle collective action and barriers within institutions and their arrangements (Bisaro et al. 2018; Oberlack and Eisenack 2018; Roggero et al. 2018). Institutions refer to the wider set of rules, norms and agreements that structure human interactions (Sauerland 2015). Institutional arrangements are the different regimes and coalitions for collective action and inter-agent coordination, which range from public–private cooperation and contracting schemes, to organizational networking, to policy arrangements (Sauerland 2015). These arrangements can also be either formal or informal. Laws and written rules are examples of formal arrangements, while norms, beliefs, values and other established ideas and perspectives are examples of informal arrangements (Hadler 2015). They exist and are simultaneously shaped by socio-cultural norms, economic exchange,

and political regimes at various spatial scales—from the local to the global—and may give rise to compliance or resistance while possessing the capacity to mutually influence each other within a framework of complex interlinkages and strategic feedback loops (Sauerland 2015). They may also provide welfare, identity, solidarity, and a sense of belonging (Friel 2017); the coexistence of various institutional arrangements may also lead to hybrid regimes. Given the wide spectrum of possible outcomes, actor–structure interactions frequently include ambiguities and competing and/or conflicting claims that result from path dependence (Cingranelli and Filippov 2020; Prado and Trebilcock 2009).

Dynamic changes in institutional arrangements are likely to take place at the interface of different spatial scales. Collective action may result in bottom-up pressure, while (inter)national reform policies may result in top-down changes in competitive conditions that invoke institutional adjustments (Prado and Trebilcock 2009). This is likely to create tensions that result in a frequent misalignment between exogenous and endogenous drivers of change in the arrangements themselves (Koning 2016), as well as their implications for whether adaptation efforts can be deemed ‘good’, ‘adequate’, ‘effective’ and/or ‘successful’ (Robinson 2019b). This does not necessarily require more institutional arrangements. Instead, adaptation requires the development of arrangements in the human system that complement classic hierarchical models of (public and private) administration with forms of horizontal governance based on interactive decision-making, self-regulation, network management and co-production (Lovan et al. 2004). Irrespective of whether these arrangements are new or pre-existing, they should be relevant and appropriate to local circumstances (Robinson 2019a). Within this, particular attention should be paid to the endogenous nature of the arrangements in the adaptation process itself, and to the role of self-interest, power and participation in enforcing coordination within and across institutional arrangements (Sauerland 2015).

An analysis of the dynamics of institutional arrangements, within the context of governance research is, therefore, crucial to understanding adaptation. In service of this, several frameworks have emerged to unpack the complexity of institutions that coordinate the adjustments to actual and/or expected climate and its effects across different sectors, actors and barriers, and different scales and levels. Examples include the Institutional Analysis and Development (IAD) Framework, the Social–Ecological System (SES) Framework and the Combined IAD and SES (CIS) Framework, introduced by Cole et al. (2019). “Networks of action situations” (NAS)—the web of environments in which actors’ decisions result in collective outcomes (Kimmich and Tomás 2019), and which incorporates actors and their positions and actions, information and outcomes along with their costs and benefits (Gritsenko 2018)—lay at the heart of each of

these frameworks. In this paper, we analyze the emerging and changing institutional arrangements for adaptation in small island developing states (SIDS), with an emphasis on NAS. We conduct semi-structured interviews with 14 national and international climate change officials and practitioners in four SIDS (Comoros, Maldives, Seychelles, and Singapore) in the Atlantic, Indian Ocean, Mediterranean and South China Sea (AIMS) region. As a contribution to a special issue on NAS, our aim is to better explain (1) the factors that contribute to or impede the emergence or structure of formal and informal institutional arrangements for adaptation in SIDS, (2) how these arrangements and the interrelations between them contribute to or impede the outcome of adaptation efforts, (3) the role of power distribution and the ways in which different actors at different levels are (mis)represented and/or (dis)empowered by the arrangements and work as drivers of or barriers to other actors or institutions, and (4) the roles and functions of networks for social interaction, political representation and collective action.

To explore these issues, we have organized the remainder of this paper into five sections. The next section explains the CIS framework and NAS as analytical approaches. “**Materials and methods**” delves into the particular susceptibility of SIDS to climate and non-climate related impacts, and how we selected the case study countries and analyzed the semi-structured interview data. “**Results**” presents the four NAS we identified through our interviews. “**Discussion**” situates and discusses the four NAS in the context of recent adaptation literature. Finally, in “**Conclusion**”, we offer some concluding remarks around the insights we derived from using the CIS Framework and NAS to analyze the institutional arrangements for adaptation in these small countries.

The CIS framework and NAS as analytical approaches

The analytical approach of action situations is becoming increasingly popular as a basis for systematically understanding complex policy and institutional networks (Cole et al. 2019; Kimmich and Tomás 2019). Action situations are environments in which actors’ decisions result in collective outcomes (Kimmich and Tomás 2019), incorporating actors and their positions and actions, information, and outcomes along with their costs and benefits (Gritsenko 2018). Actors can actively make endogenous decisions, affecting the institutional framework (McGinnis 2011), although actions—or choices—are shaped by institutional rules and procedures, rights, and other external factors (Gritsenko 2018; Oberlack et al. 2018). There are three levels of action situations: operational choice (i.e., actors’ choices which have direct impact on outcomes), collective choice (i.e., policy-making in which actors create rules for operational choices), and

constitutional choice (i.e., decisions which shape collective-choice rules and determine the actors that are involved) (Cole et al. 2019). The CIS Framework takes the strengths of the Institutional Analysis and Development (IAD, more dynamic) and Social–Ecological System (SES, more detailed) Frameworks—it allows for the continued focus on the dynamism of NAS, while incorporating further detail and organization with more variables (Cole et al. 2019). As “no single action situation can be fully understood without careful consideration of the web within which it resides” (Cole et al. 2019, p. 5), NAS explores how contemporaneous action situations in the form of decision-making processes or institutions are connected and interact with each other to shape outcomes and governance (Gritsenko 2018).

Action situations are linked, or “adjacent”, if the outcome of one directly influences the rules of another (Kimmich and Tomás 2019). Links occur in the forms of biophysical transactions, information, institutions, and involved actors (Kimmich and Tomás 2019) and can be split into structure, function, and process. In the context of structural links, which center on how working components (i.e., position, boundary, choice, information, aggregation, payoff, and scope rules) affect others, a network is made up of seven rules that influence its working components, which may be defined by outcomes of various action situations (McGinnis 2011; Mincey et al. 2013). Governance functions, which can provide insight into a system’s effectiveness, include motivations, provision, production, financing, rule-making, monitoring, dispute resolution, information, and coordination (McGinnis 2011; Mincey et al. 2013). From these, dynamic processes may occur as flows of resources, rules, or information (McGinnis 2011). NAS are, therefore, important—they can be used to disentangle the links that generate and shape outcomes and also to analyze institutional dynamics across scales and levels that determine policy and governance outcomes (see Mewhirter et al. 2018; Therville et al. 2019).

To identify the NAS in adaptation in SIDS, we focused only on the most relevant action situations and linkages (i.e., physical, actor, informational, and institutional links) (Cole et al. 2019; Kimmich and Tomás 2019; Oberlack et al. 2018), including their working components, and the interactions or overlaps between these situations (Gritsenko 2018; Möck et al. 2019). We achieved this through triangulating the interview data with our field notes and through repeat coding. We then aggregated the action situations data, following the CIS Framework. This included the relevant or ‘focal’ action situations, which shape or are shaped by the outcomes of various action situations, as well as the variables, or driving forces affecting the networks themselves, including resource systems, resource units, actors, and governance systems—each with their own sublevel of variables—taken from the SES Framework (see Ostrom 2009). The selection criteria for identifying action situations were

grounded in the environments at which a nexus of decision-making produced an outcome(s) relevant to adaptation. To center our analysis, we diverged from the use of temporal change in the CIS Framework and re-focused our attention on the IAD Framework’s approach of isolating the immediate structure affecting processes and structures, which provides an understanding of how outcomes are generated and how they, their interactions, and evaluative criteria affect action situations and contextual factors.

Our analysis of the dynamics of institutional arrangements using the CIS Framework and NAS as analytical approaches has two fundamental connotations. First, it refers to the particular contributions of different types of institutional arrangements to adaptation processes. Here, we pay special attention to the significance of institutions at the national and sub-national levels, and these interactions with the international level. Second, it refers to the fact that institutional arrangements are not static, but—on the contrary—are continuously in development themselves. That is, they are subject to change and transformation and, as such, also adapting to emerging demands from actors in the adaptation process. By bringing these two fundamental connotations together, this study of adaptation processes in SIDS not only refers to the internal dynamics of actor-structure configurations, but also to those processes of change required for broader societal transformation in the fight against climate change.

Materials and methods

Contextualizing the adaptation challenge in SIDS

Adaptation is “shaped and implemented through processes of governance, where the interactions and decision-making among actors lead to the creation and reinforcement of institutions” (Mesdaghi et al. 2022, p. 119). It is heterogenous, incorporating different sectors, actors, and barriers (Bisaro et al. 2018). It depends on a complex network of actors and their sustained engagement at the sub-national, national, regional, and international levels (Robinson et al. 2022). Because of this, the adaptation governance systems in place in SIDS are crucial to the development and implementation of a variety of institutional arrangements. Irrespective of whether these arrangements are new or pre-existing, it is important that they are relevant and appropriate to local circumstances, especially considering the unique vulnerabilities and adaptive capacities of SIDS (Robinson 2019a).

There is consensus in the literature that SIDS are distinct from other developing countries (Mycoo et al. 2022) and have been flagged for special attention by the international community (Robinson 2020a; Kalaidjian and Robinson 2022). The 58 countries spread across three main geographic

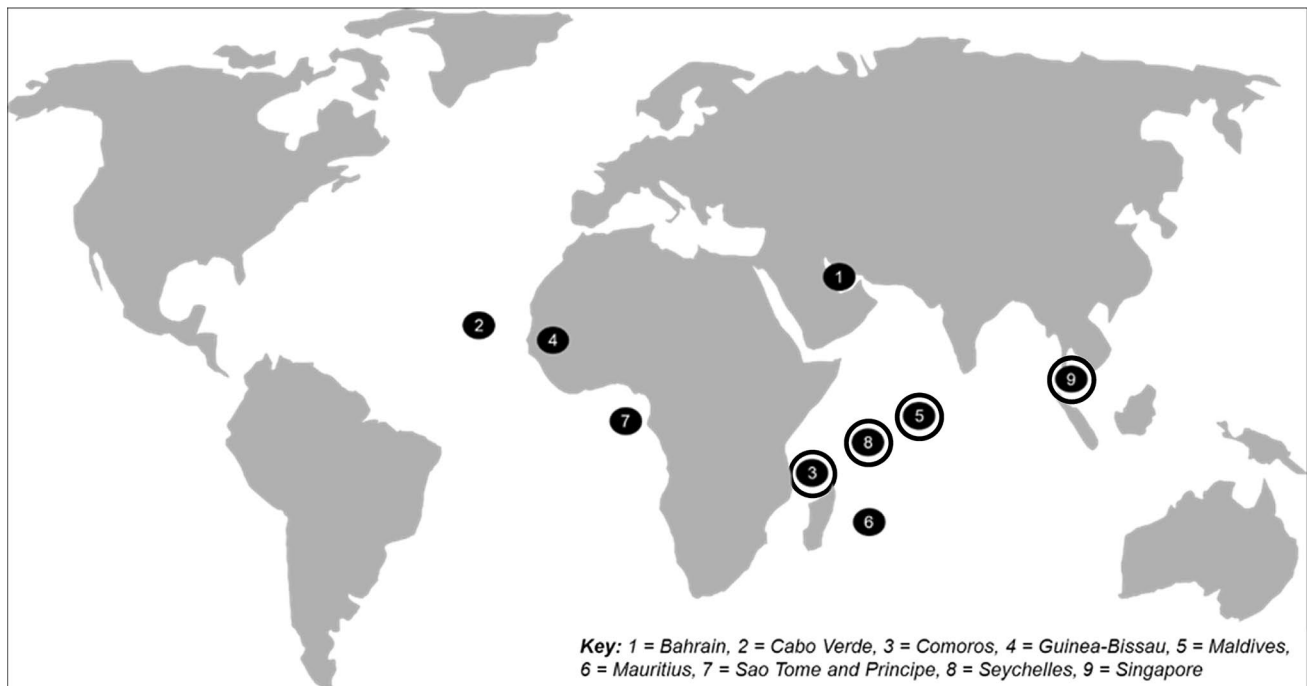


Fig. 1 Approximate location of the nine AIMS SIDS

regions—AIMS, Caribbean, and Pacific—though heterogeneous in nature, exhibit a set of ‘special’ economic, environmental, social, and political vulnerabilities (Robinson 2020a). These vulnerabilities are inextricably linked to their adaptive capacity (IPCC 2014). Limited funds and personnel, the complexity of resource distribution to adaptation-related sectors, including coastal zone and water resource management, and inadequate data and monitoring and evaluation mechanisms all lead to a significant reliance on international support without long-term vision (Robinson 2020b; Thomas et al. 2020).

Selecting case study countries

To better explain the institutional factors that help or hinder adaptation in SIDS, we selected four SIDS in the AIMS region—Comoros, Maldives, Seychelles and Singapore—because of the representativeness of the diversity of environmental, economic, political, and social circumstances in this region, including experiences of poverty and political instability as social justice issues. These countries provide an avenue to investigate the ways in which actors and actions at different levels of governance can influence policy outcomes. The AIMS region is the smallest of the three main geographic regions in which SIDS are located. It comprises nine countries—the four countries listed above plus Bahrain, Cabo Verde, Guinea-Bissau, Mauritius, and Sao Tome and Principe (see Fig. 1; twice-circled numbers are the

countries included in this study). Together, these SIDS are already experiencing warming temperatures and sea-level rise, among other climate, climate-related, and climate-amplified impacts. Supplementary Appendix 1 contains a more detailed account of the climate change impacts in the AIMS region.

Collecting and analyzing interview data

We conducted semi-structured interviews with 14 adaptation policy- and decision-makers across the AIMS region either in person or online via Skype[®] video-conferencing. In-person interviews coincided with the 23rd Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC), which was held in Bonn, Germany, in November 2017. Skype[®] interviews were conducted between December 2017 and February 2018. The names of potential interviewees were derived from the UNFCCC Secretariat website and from official government documents. Email invites were sent to 44 officials. The response rate was 32%. Interviewees were senior in their respective organizations, directly responsible for adaptation, and considered experts in the field (see Fig. 2). They spoke in their personal capacities and their views do not reflect the views of their organizations. The interview topic guide comprised 10 questions (see Supplementary Appendix 2), which were grounded in the CIS Framework and which focused on considering networks of adjacent action situations and

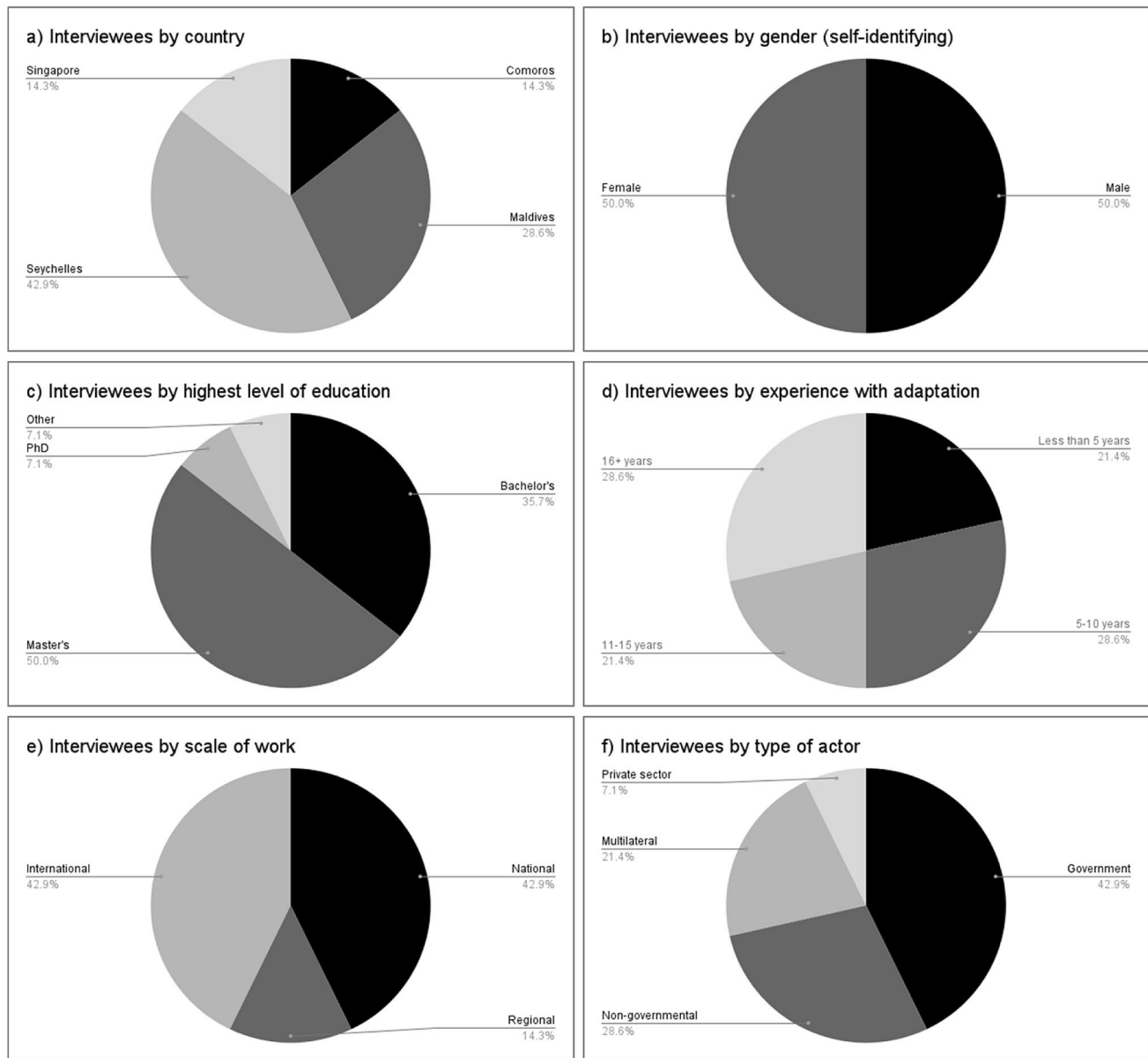


Fig. 2 Interviewee background

identifying the variables and outcomes at play. Interviews were conducted in English and French and ran for up to 90 min each.

In addition to voice recording the interviews with permission, we also took field notes, following the guidance in Phillippi and Lauderdale (2017). We noted the setting of the interview (e.g., point in the UNFCCC negotiations, room, other persons present, consent for voice recording and note-taking), participants' demeanor (e.g., baseline non-verbal behaviors), and the interview itself (e.g., participants' response to the interview as a whole, overarching non-verbal behaviors, changes to questions based on the interview setting). After the interview, each interviewer intentionally

reflected on the interview as a whole as well as on their handling of it, both as a participant in the narrative and as an interviewer. We used our field notes to add critical non-verbal context. We listened to the interview audio twice and read our field notes several times. We manually coded the data and followed previous analytical approaches by focusing only on the most relevant action situations and linkages. We created a table to aggregate the action situations data, following the CIS Framework. Using the table, we then created a figure showing the NAS for each country—the action situations, descriptions, and the linkages between each—and the contextual factors involved and affecting these patterns (see Supplementary Appendix 3). Repeat coding helped to

increase the reliability of our results, which are presented in the next section. We use direct quotes to highlight key points. Where this is done, the interviewee to which the quote is attributed is identified by a randomly selected number between #1 and #14.

Results

We find that the four countries—Comoros, Maldives, Seychelles, and Singapore—have four similar action situations within their institutional arrangements for adaptation. These action situations are: (1) policy-making, project development, and implementation, (2) participation in supranational regulatory spaces, (3) funding and related support, and (4) research, emerging actors, and indirect opposition to adaptation policy-making. Supplementary Appendix 3 illustrate them.

Action situation #1: adaptation policy-making, project development, and implementation

In all four countries, the national or central government is the main driver of adaptation, and its interactions constitute the focal action situation. Each country has a named government ministry dedicated to environmental protection and responsible for developing and implementing adaptation policy, programs and projects, but often within an expansive ministerial portfolio. In the Maldives, for example, the work of the Ministry of Environment and Energy also covers water and sanitation, sewerage, and meteorology. Its mandate very explicitly includes the development of mitigation projects and the coordination of related activities, but nothing about adaptation. In fact, a ministerial focus on adaptation is neither pertinent nor well established across the countries. A Maldivian interviewee suggested that “the country is still finding its balance” between mitigation and adaptation, and also between adaptation and competing development priorities (#5). Of special note here is that these ministries, irrespective of the scope of their responsibilities, have varying levels of importance and influence within and outside each country. A policy-maker from the Seychelles noted that their Ministry of Environment, Energy and Climate Change is “one of the most powerful in the world” (#3). They noted that “[the power] is not something you [can] put in a structure, it’s [...] developed over the years” (#3), acknowledging that the Ministry’s formal establishment and the power it wields were cemented after years of discussion, planning, and strategizing, which are important for “getting things done” (#3).

The presence and the power that non-governmental organizations (NGOs) have in this action situation vary across countries, as is the extent that they are able to participate in

adaptation policy-making vis-a-vis project development and implementation. Their interactions constitute adjacent action situations. NGOs in the Seychelles, for example, were identified as strong adaptation actors, particularly those who push the hardest for their priorities to be heard—“survival of the loudest” (#6). Organizations such as The Nature Conservancy and the Clinton Foundation support adaptation financing initiatives across the country.

More generally, NGOs across the four countries also participate in lobbying and advocacy work, act as watchdogs of the government, and identify and address local climate change issues. Yet, to an extent, these actors remain almost wholly dependent on the support of the central government. This is especially pronounced in the Maldives where the ability of NGOs to participate in adaptation agenda setting is ambiguous and heavily regulated by the power of the President and other select government officials. This power supersedes and influences the work of its Environmental Protection Agency. These and other agencies “do not have independence” (#10) from the government and, therefore, do not have enough power to prosecute violators or challenge the government. Another dimension of the central government’s power in the Maldives is encapsulated in an interviewee’s quip—“without the government’s blessing, you can’t go anywhere” (#3). They went on to suggest that the government regulates both the entities that participate in the decision-making process as well as the depth of their participation. Citing the example of an impending coastal development project, the interviewee noted, “The Government didn’t even give five days of time for us to prepare [...] Even though we haven’t seen the approved document yet, half of the mangrove is already reclaimed. Within the span of like ten days” (#3). The government, therefore, acts as a gatekeeper by controlling access to information and notice periods, acting quickly and without full and inclusive stakeholder consultation.

In each country, the central government’s interconnected and overlapping priorities, and complementary programming help shape current and future adaptation policy-making, project development, and implementation. Addressing climate change through adaptation and conserving natural resources is seen as critical to economic development. The economic importance of the oceans and their sustainable use are pronounced in the Seychelles, evidenced in the government’s quest to create and promote a blue economy. One interviewee’s perspective is perhaps commonly held among residents that “You cannot think about the future of development without thinking about the future of climate change” (#4). Another interviewee shared that “The country itself has instituted environmental education from a very young age and it has been in place [for a long time]” (#8). This has not only created a strong “environmental ethos” (#8), but also centered environmental protection in national

strategies, plans, and projects. In Singapore, as one interviewee explained, its “environmental strategy is underpinned by the Sustainable Singapore Blueprint, which lays out Singapore’s strategies for economic growth in a way that is environmentally sustainable” (#14). This approach suggests that adaptation is an important feature of development pathways in SIDS. However, in this action situation, adaptation strategies, plans, and projects are more prominent than adaptation laws. Despite this, interviewees pointed out that sometimes there is a significant difference between a written policy and its actual implementation. In discussing the 2015 Maldives Climate Change Policy Framework, one interviewee commented that “policies in the Maldives are really good on paper. But the implementation part is not so good. That’s why it’s not very ideal to say this policy stuff is actually very much successful” (#10). This view could justify a call for more robust legal regimes as an avenue for strengthening this action situation.

Action situation #2: participation in supranational adaptation regulatory space(s)

As SIDS, each country participates in supranational regulatory space(s) for adaptation, which are understood as domains of regulation that transcend the nation-state, and that develop and apply international rules across nations. These spaces include the UNFCCC, the World Trade Organization, and the World Bank, among others. Here, the outcomes of the action situation, including the rules, duties and plans, outline and shape other action situations within the network along with its working components. For example, developing country Parties to the 1992 UNFCCC were required to submit their first National Communication¹ within three years of entering the Convention, and every four years thereafter. The 2015 Paris Agreement requires all Parties to submit reports on their national greenhouse gas inventories and on their progress toward implementing their Nationally Determined Contributions.² In the Seychelles, an interviewee noted the ways in which the discourse of and reporting framework set up by the Paris Agreement helped (re)shape adaptation and policy-making within the country, and ultimately its sectoral foci and priorities. The interviewee said, “What is new is how the oceans fit into the equation. That is a result of the Paris Agreement

[...] It means that the next submission by the Seychelles to the UNFCCC will have to include the oceans and the blue economy as one of the elements of adaptation” (#8). Despite this, the extent of influence of this action situation’s outcomes, and the alternative focus on localized systems and actions within each country varies. In the case of the Comoros, interviewees hinted that the Government’s adaptation actions are directly connected to the country’s National Adaptation Programme of Action.³ However, despite the eleven-year gap between the Comorosian Government submitting its National Adaptation Programme of Action to the UNFCCC in 2006 and our interviews in 2017, interviewees suggested that this document had remained central to adaptation in the country, and an integral component of its related institutional arrangements.

Besides the policy-makers in the Seychelles, the role of supranational regulatory spaces in shaping national adaptation policy-making, beyond finance provision, was largely unmentioned in the interviews. Instead, we found a disconnect between a heightened focus on adaptation to climate-, climate-related and climate-amplified vulnerabilities in supranational regulatory spaces, and national adaptation priorities at the local level. This was particularly evident in the Singapore interviews. For example, an interviewee said, “We don’t pay a lot of attention to adaptation, particularly from the Government’s perspective” as the vulnerabilities are “really distant” (#14). According to the interviewee, “The main issue people complain about are [sic] when there are floods”, mostly because of threats to productivity such as disruptions to train schedules and to rich areas. The interviewee continued by saying, “These rich areas [that] have been flooded [...] have underground car parks [...] with nice cars, so they complained” (#14). This suggests that issues such as fluvial flooding are viewed as local problems that are disconnected from global climatic changes. It also suggests how social class plays a role in local adaptation framing and response priorities, at least in high-income SIDS.

Where local vulnerabilities are viewed as being “really distant” (#14) and are overshadowed by more visible atmospheric changes such as haze and smog, this can give way to national climate change policies being more focused on mitigation, which in turn influences the country’s negotiating position in the UNFCCC. Without explaining that Singapore is a major hub for many of the palm oil industry’s companies, one interviewee mentioned that the Minister of

¹ National Communications contain national inventories of anthropogenic greenhouse gas emissions by sources and removal by sinks, a general description of steps taken or envisaged to implement the UNFCCC, and any other information relevant to the achievement of the objective of the UNFCCC.

² Nationally Determined Contributions contain each country’s best efforts to reduce emissions and to adapt to the impacts of climate change.

³ With the help of development agencies such as the United Nations Development Programme, least developed countries such as the Comoros developed prioritized lists of adaptation projects for responding to their most urgent and immediate adaptation needs. These lists were communicated to the UNFCCC through National Adaptation Programmes of Action, and projects were eligible for financing from the Least Developed Countries Fund.

Environment and Water Resources would “probably take up the issue of palm oil haze air pollution” at the 23rd Conference of the Parties (#14). They suggested that this interest in addressing palm oil haze air pollution might not be immediately clear to other SIDS, given the expectation that SIDS will prioritize adaptation because of their negligible contribution to global greenhouse gas emissions. However, about four years prior, Singapore’s Pollutant Standards Index hit the highest recorded level when haze from palm oil plantation fires across Sumatra in Indonesia increased emissions and transboundary air pollution. Indonesia, an immediate neighbor of Singapore, is one of the two largest producers of palm oil in the world. Additionally, the foci of national climate mitigation policies are sensitive to the political interests of the government, and perhaps to specific ministers. In the context of a recent political transition in the Maldives, one interviewee noted, “The previous government wanted to make the country carbon neutral but then this government came in when they drafted the NDC [Nationally Determined Contribution], and they are now talking about reducing it by 30% or so” (#4). In light of greater political emphases being placed on mitigation efforts and of the precariousness of national climate policies, adaptation needs are increasingly being side-lined, which warrants the attention of relevant actors.

Action situation #3: adaptation funding and related support

Adaptation funding and related support—a third action situation—generally results in the provision of resources, including information and financial and technical support. It is significantly interlinked with the first action situation we identified—adaptation policy-making, project development, and implementation. Besides direct program and project beneficiaries in each country, actors in this action situation are generally multilateral organizations, NGOs, and foreign governments, though the specifics of this action situation, particularly the relevant actors and their prominence, vary across countries.

Across all interviews, with perhaps the exception of Singapore, the United Nations Development Programme was repeatedly noted as being a key actor. In the Maldives, for example, one interviewee said that “though they are not a State partner, they have a really big say and go closely with the government” (#4). Another interviewee highlighted that the agency’s strong presence in financing and implementing adaptations in the Maldives developed over several years saying, “2004 onwards, there’s been a lot of effort on climate change adaptation” (#5). Other actors identified in the interviews include country-specific NGOs such as Banda Bitsi in Comoros, which focuses on education and employment for Comoros’ youth through environmental protection,

multinational NGOs such as The Nature Conservancy, and multilateral financial institutions such as the World Bank, the Global Environment Facility, and the Green Climate Fund. These actors interact with each other but tend to be more active in some sectors than others. The water sector in the Maldives is an example of a sector that has received significant national and international attention over the years. An interviewee explained, “Looking at water security in unpredictable weather cycles, in the last five, ten years, communities have sort of been running out of fresh drinking water” (#5). Thus, to address this issue, the interviewee explained that, with help from the Adaptation Fund, “integrated water resource management centers”—mostly desalination with the cost offset by solar photovoltaic technology and rainwater harvesting—were “piloted in three communities, and further used by USAID [United States Agency for International Development] in another project and also formed the basis of a bigger project with the Green Climate Fund, which we are now starting” (#5). This latter project created a water distribution network throughout 49 islands—four of which were chosen as hubs, with larger facilities. These and similar aid agencies are especially focused on the most vulnerable islands and have been working with the government to increase water security in the Maldives. The Seychelles interviewees also mentioned several ecosystem-based adaptation initiatives such as coral reef and mangrove restoration, but we noted that similar projects had differing prominence across the other AIMS countries. For example, in the Comoros, there seems to have been a greater emphasis on infrastructure-related adaptation, e.g., sea walls along with some community-based initiatives seeking to increase climate change education and awareness.

Given Singapore’s high-income, high-development status, it is unsurprising that interviewees did not mention the role of international adaptation funding in initiating local projects and bringing them to completion. There is a perception that Singapore is not a developing country, which suggests that it has the capacity to self-finance its projects. One interviewee spoke to the country’s classification as a SIDS. They said, “Singapore has an identity as a SIS [small island state] but I would not go so far as to say it is a SIDS, but it does find itself in alliance with SIDS [climate negotiating] groupings like the G77 [Group of Seventy-Seven] and we have also set up [the informal and non-ideological grouping] FOSS [Forum of Small States]” (#14).

Country classifications aside, funding and related support are experienced in a range of ways across the other countries. Interviewees flagged the significance of international adaptation financing for adaptation processes in the Comoros, Maldives, and Seychelles. In Comoros, an interviewee expressed the significance and extent of this assistance saying, “There are certain countries that help us. They’ve invested largely in the scope of climate change. The EU [European Union]

is amongst them. There's also the French cooperation which helps as well. There's Japan, an Italian project [...] on trash. So, there aren't just a few countries that aid us" (#2). In the Maldives, key donors include large multilateral adaptation donors such as the Green Climate Fund, the Global Environment Facility, and the Adaptation Fund. These donors are considered "the most important in terms of providing resources to do the work", often working in tandem with the national government and the United Nations Development Programme, which is said to have contributed significantly to adaptations in the country's water sector (#5). In the Seychelles, important donors have included the Green Climate Fund, the Global Environment Facility, the World Bank, the European Union, and the United Nations Environment Programme. Of special note is the Government's ongoing partnership with The Nature Conservancy, which resulted in a debt for nature swap in 2016. This traded a part of the national debt for the creation of 13 new marine protected areas. One interviewee explained, "There was no model for this, it is based on [the innovation of] individuals [and relationships]" (#7). The interviewee emphasized that SIDS need to think "outside the box" if they are to adequately confront the climate challenge (#7).

Action situation #4: adaptation research, emerging actors, and indirect opposition to adaptation policy-making

Within adaptation research, emerging actors, and indirect opposition to adaptation policy-making, emphasis is placed on those activities that center the management of environmental impact, risk, and vulnerability. Actors span those involved in higher education and/or research institutes, local businesses, NGOs, and the general community, acting across numerous spaces. Examples are the cost–benefit analyses that are required by the Seychelles Minister of Environment and Energy and Climate Change as part of project approval processes, and which are used to provide project information to community members as part of public consultations. Each of these activities is linked to other action situations in the network, which may (re)define the actors that are involved in adaptation. In several interviews, youth were highlighted as increasingly important actors in environmental action. Interviewees in Seychelles emphasized this, with one interviewee stating that there is a "strong interest in engaging young people at that level of platform" (#4), referring to the inclusion of youth representatives in the country's national delegations to UNFCCC meetings. At the local level, there is confidence that the involvement of young people in climate action in the Comoros will lead to better outcomes. One interviewee said, "In the future, it will be better. Because of the youth" (#2). Policy-makers in Singapore also suggested that young people are an integral part of local social movements aiming

to increase climate change awareness, particularly through their use of social media. An interviewee noted, "There is a hashtag online on Twitter – #SGFloods. You see plenty of interesting photos of cars, buses, people wading in the water knee deep" (#14). The emergence of youth as players in—or drivers of—this action situation establishes their presence in institutional arrangements for adaptation, especially as they contribute to spotlighting the urgency of adaptation needs and priorities, as well as to advocating for the protection of the rights of future generations.

While it was unanimously agreed that there is no direct opposition to adaptation policy-making, project development, and implementation in the countries, several interviewees mentioned indirect forms of resistance that interact with and shape other action situations. This is believed to be the result of cultural norms around behavioral and economic expectations, and community members' perceptions of their vulnerability to climate impacts. A Comoros interviewee mentioned that there was some reluctance on the part of the public to support adaptation and other environmental regulations that would restrict the participation of vulnerable groups such as women and the poor in the sand mining industry, which is a major source of income but also a major contributor to coastal erosion in the country. They said, "We stopped taking sand [from the beaches], for example, but there are people in villages who continue to take sand" (#2). In the Maldives, resistance has taken the form of the Government's prioritization of the quest for economic growth and development over adaptation. This is seen in an example of the preservation of mangrove cover not fitting the President's agenda. An interviewee explained, "According to the EIA [environmental impact assessment], it said the [clearing of the] mangrove [forest] will bring so many damages which are irreversible [...] and some of the economic benefits they mentioned, doesn't [sic] outweigh the environmental impact that it would bring. And while some of the people were protesting, [...] the government brought a dredger and reclaimed half of the mangrove [to construct a new airport]" (#4). This suggests that some of the actors centered in broader development projects are also involved in indirect resistance, for which there was also evidence of in the Seychelles. Though one interviewee sought to clarify that "opposition to climate action" might not be the most accurate descriptor, they acknowledged that "there have been instances in which developers and companies are reluctant to comply with whatever regulations there are" (#7).

Singapore similarly experiences indirect resistance but from large segments of the population living urban- and capitalist-centric lifestyles, grounded in limited understandings of the scope of the island's vulnerability to climate threats. An interviewee said, "It's an island, but it's a developed city. I'm not at the beach every day. I don't see creeping water and there's heavy rain but drainage is decent" (#14). This

lack of awareness surrounding climate change and adaptation among residents also emerged in the other interviews, but interviewees noted it to be connected to the limits placed on the flow of information between and among stakeholders, which serves to re-center government power. In the Maldives, this took the form of concerns about government transparency. In response to a question about the top issues relating to adaptation, one interviewee explained, “The first thing would be the whole secrecy with the government, or whoever is the implementer. Because they are very, very closed and there’s not much information available. So to have that sort of dialogue or to raise a concern, it is very impossible [...]” (#10). In the Comoros, increasing civil unrest interrupted the flow of information and destabilized segments of the society, all while the power of the President was expanded per constitutional changes. These considerations shape actors’ involvement in action situations, and are particularly pertinent to the success of the first action situation we identified—adaptation policy-making, project development, and implementation.

From action situations to networks: interdependencies and interlinkages between and across action situations

We also found that interdependencies occur between action situations at different governance levels (#1 and #2) and between various governance tasks (#3 and #4). Generally, Action situations #1 and #2 provide the access, rights, and rules that create the environment for Action situations #3 and #4—Action situation #1 could also be seen as including two different levels—the collective-choice level and the operational-choice level. At a greater scale, the environment that makes up Action situation #1 is partially determined by the outcomes of Action situation #2. Meanwhile, Action situation #1 is contingent on the information, funds, and technical support resources available from Action situation #3. Together, these relationships drive the structure and environments of each action situation.

While the other action situations may influence the level of funding or support received, Action situation #3 can, in turn, shift the environment, and thus the outcomes of the other three action situations, as well. For example, the policy and project development and implementation of Action situation #1 is contingent on the resources available, as is the research and local-level action that are included in Action situations #3 and #4. This is especially true for Comoros, which requires more external support and resources, given its classification as a least developed country.

Action situation #4 is also informed by other action situations in the network. Both Action situations #1 and #2 provide and shape the access, rights, and rules that form the environment of this action situation. This action situation in

turn informs the others—for example, the level of funding or support that is received is dependent on what adaptation research has emerged or the extent to which actors are driving the conversation around funding. Similarly, the research and/or actions of actors can impact Action situation #2, such as the extent to which the country’s struggles are reflected and/or included in global climate conversations.

Lastly, each of the action situations described above is interconnected in the information that it provides to the other; some have more influence than others on the other action situations. Thus, much of this network is intertwined—made even more complex by the extent of influence that various factors in each action situation have on each other.

Discussion

One of our main findings is the centrality of national governments in driving the adaptation process, and the varying influence they have as a collective and as a conglomerate of individually powerful ministers acting as arbiters of the quality and longevity of adaptation policies and participation. This finding is consistent with that of Robinson (2017, 2019b) who concluded that national governments are central actors in adaptation in SIDS across the three main geographic regions, and that the work and contribution of ‘champions’ and/or gatekeepers are integral components of mainstreaming adaptation in the Caribbean and Pacific. As a result of this, national governments act as both drivers of and barriers to action (Westoby et al. 2021), particularly through the demonstration of political ambition and commitment, provision of subsidies and other funding, and cooperation between government agencies (Petzold and Magnan 2019; Runhaar et al. 2018).

Political ambition and commitment, however, can have both benefits and disbenefits. On the one hand, a government’s ambition to have an environmentally literate populace and its commitment of resources thereto, for example, are a clear benefit. Our Seychelles interviewees noted that the government has promoted and invested in public environmental education, which has engendered a strong environmental ethos among residents, and made it easier to implement and monitor environmental regulations, including those related to climate change and adaptation. Selby and Kagawa (2018, pp. 1 & 7) noted that environmental education is taught across the curriculum in primary and secondary schools in the Seychelles to “reinforce [a] holistic understanding of the environment and environmental issues”, and that this approach is “markedly eclectic in their rich blending of practice”. At the tertiary level, real-world sustainability learning laboratories such as a North–South

cooperation effort between ETH Zurich in Switzerland and the University of the Seychelles and the Ministry of Environment, Energy and Climate Change have also been trialled with likely positive future outcomes (Krütli et al. 2018).

On the other hand, where a government's ambition and commitment are disrupted by political instability and/or civil unrest, or where they run counter to a progressive adaptation policy agenda, this is a clear disbenefit. Both Comoros and the Maldives have long histories of coups. In 2014, there was a centralization of power in the Maldives, and there are ongoing tensions between the President and the Parliament (Mallempati 2017). Our interviewees painted a picture of a President with unbridled power, and suggested that the Maldivian agenda is dependent on who is in power and the reinforced hierarchical nature of its governance structure. Hirsch (2017) also provided examples of this, including controversial policy shifts from conventional industrial development to carbon neutrality. This leads us to conclude that support for a strong environment and adaptation focus is dependent on the priorities of the individual and administration 'in charge', and is less likely to withstand political transitions and strong swings in political agendas.

In some respects, a government and ministers that do not affirm adaptation can be considered as opposing adaptation, though our interviewees did not label this as such. Instead, they said there was no direct opposition to adaptation, but that indirect resistance is prevalent in the institutional arrangements. The academic literature also supports the notion that governance can produce indirect resistance to adaptation (e.g., see Holland 2017; Runhaar et al. 2018). This can manifest as limited coordination between and across national and subnational or local government agencies (Kuruppu and Willie 2015; Clar 2019; Therville et al. 2019), and where prioritized or accepted development efforts are maladaptive (Work et al. 2019). In the Comoros, sand mining operations persist (see Betzold and Mohamed 2017); in the Seychelles, developers are reluctant to comply with environmental regulations, though this is not unique to SIDS.

The incompatibility of some development and adaptation objectives calls for, at least, a cursory look at adaptation framing in countries' NAS. This plays into the specifics—and success—of the institutional arrangements for adaptation, which are further dependent on the backing of the central government. In practice, it is often difficult and complicated to distinguish between adaptation and development (Church and Hammill 2019). The fact that adaptation occurs on a continuum suggests that it can range from a single action that exclusively targets climate change, to a series of actions that can be classified as development-oriented adaptation (McGray et al. 2007).

In some cases, as seen within our NAS, development priorities are in competition with adaptation for attention and

funding. One interviewee in the Maldives cited the President's approval of mangrove clearing to build a new airport almost without public consultation as an apt example. These and similar cases have led scholars to emphasize the importance of integrating adaptation into development policies, or 'mainstreaming', to increase the likelihood of adaptation success and the sustainability of development pathways (Robinson 2019b; Runhaar et al. 2018). Where this is done, adaptation would look very similar to development.

Despite this, Robinson (2018) found that only 2% of adaptation efforts in SIDS can be classified as 'mainstreaming'. A more recent study by Atteridge et al. (2020) further found limited overlaps between SIDS' development plans and Nationally Determined Contributions, and thus between adaptation and development policies and practices, suggesting the existence of some barriers to this type of integration. Etongo (2019) and Clissold et al. (2020) noted that many adaptation barriers in SIDS are related to cultural norms around behavioral and economic expectations, and community members' perceptions of their vulnerability to climate impacts. This aligns with one of the three broad categories of adaptation barriers identified in the literature—social, cultural, or institutional barriers (e.g., see Jones 2010).

Of note is that the other two broad categories of barriers—(1) physical limitations, mostly related to the natural environment, and (2) limitations related to information, technology, or the economy (Jones 2010)—were largely unmentioned by our interviewees. We should point out here that, at the subnational or local level, the interaction between adaptation needs and social norms is especially complex (e.g., see Therville et al. 2019). Our interviews revealed that in Singapore, for example, large segments of the population are living urban- and capitalist-centric lifestyles, which overshadow recognition of the need for adaptation. This shows that adaptation experiences are shaped by the heterogeneity of multiple factors, including culture and class (Nielsen and Reenberg 2010).

While national governments appear to be the primary adaptation actors in the four countries, the level of power of other actors such as multilateral development organizations, external donors, and NGOs not only plays a significant role in shaping the operation of each country's NAS, but also in altering the nature, robustness, trajectory and sustainability of adaptation policies (e.g., see Sovacool et al. 2012). These actors are relied on to provide extensive financial and technical support. In the Maldives especially, our interviewees described the United Nations Development Programme in similar ways to Malatesta and di Friedberg (2017, pp. 58 & 59)—as "partner", "promoter", and "leading voice"—and also suggested that it has an oversized role in crafting the vulnerability narrative, determining the most vulnerable segments of the population, helping to address their needs, and setting the agenda (also see McNamara et al. 2019). In the

case of the Comoros, it was integral in preparing the country's National Adaptation Programme of Action. But besides concerns around the inclusiveness of national adaptation committees (see Holler et al. 2020), and the utility of the document beyond being a mere 'shopping list' of projects marketed for international adaptation financing support, one interviewee suggested that adaptation policy-making had not progressed beyond its preparation. This perspective framed the National Adaptation Programme of Action as a barrier to more ambitious adaptation action.

The interdependencies outlined in our findings show the complexity of these action situations. Action situations at different governance levels (Action situations #1 and #2) are interlinked in countries' institutional arrangements. The broader literature also supports the finding of Baldwin and Tang (2021) that different institutional arrangements (mandates, markets, and planning) can collectively determine outcomes (implementation of renewable energy), or policy and planning. These NAS have implications for policy and planning in the context of adaptation in SIDS. Further, these interlinkages also occur at the level of governance tasks (Action situations #3 and #4). Interconnections between action situations at this level include rules, information, and resources that shape the environment of the others, whether as a driver or barrier of the action situation itself. McGinnis (2011) identified these interdependencies between various governance tasks, outlining that there are numerous factors that have effects on an arrangement. The actors involved play a central role in these interdependencies, as does who has ownership and what their priorities are. For example, coordination is centered within these interlinkages—this includes both at the state and governance level as well as at the level of community action (McGinnis 2011).

Conclusion

In this paper, we set out to analyze the dynamics of institutional arrangements for adaptation in four AIMS SIDS—Comoros, Maldives, Seychelles, and Singapore. We offered better explanations of how the arrangements are (1) shaped, (2) shape adaptation efforts, (3) affected by power and participation, and (4) spur further interactions and collective action. Overall, we found a few strategic actors across four action situations—(1) adaptation policy-making, project development, and implementation, (2) participation in supranational adaptation regulatory spaces, (3) adaptation funding and related support, and (4) adaptation research, emerging actors, and indirect opposition to adaptation policy-making—that are central to collective action and outcomes. In turn, the strategic actors impact each other and the action situations themselves. We also found that patterns of power, politics, and participation lead to adaptation

being more advanced in some countries. The same actor groups are, however, participating in the action situations across all four countries—the national or central government, NGOs, foreign governments, multilateral and regional organizations, and local community members. Yet, the specific actors that are prominent within these groups—and their level of power—vary. This suggests that there may be limited scope for informational and institutional spillover where both home and neighboring institutions simultaneously affect each other or are jointly determined by a set of shared factors (i.e., particular susceptibility to climate and non-climate related impacts).

Using the CIS Framework and NAS created an opportunity for us to begin unpacking the complexity of institutional arrangements for adaptation in four small jurisdictions. This approach allowed us to analyze the differences in each country's action situations and networks, as well as in the working components (i.e., resource systems, resource units, actors, and governance systems) that can shape these environments in and beyond SIDS. However, our study has some limitations. First, our interviewees were delegates at the 23rd Conference of the Parties to the UNFCCC. This resulted in the interviewee country distribution being affected by delegation size. The largest number of interviewees were from the Seychelles, while the rest were nearly equally distributed across the other three countries. For Comoros and Maldives (a former least developed country), this can be understood by their lower capacities and, therefore, smaller delegations (e.g., see Andrei et al. 2016). Second, as we diverged from the use of temporal change by Cole et al. (2019) and re-focused our attention on the IAD Framework's approach of isolating the immediate structure affecting processes and structures, our findings are descriptive of the institutional arrangements in the early post-Paris period. These limitations aside, the approach and findings of this paper contribute to a better understanding of the complexities of governance systems and adaptation institutional arrangements in small jurisdictions, and particularly in SIDS.

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