Size or sovereignty? Adaptive capacity and sargassum management in Caribbean small sub-national island jurisdictions (SNIJs)

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ABSTRACT: Small, sub-national island jurisdictions (SNIJs) tend to perform much better on most socio-economic indicators than small island developing states (SIDS). The most commonly cited reason is that SNIJs derive a range of economic benefits from their autonomy without full independence, including cash transfers, freedom of movement, and the ability to engage in forms of enclave capitalism (i.e. financial services) that are protected by the metropole. In this paper we explore whether these arguments about the advantages of remaining sub-national also apply to transnational environmental issues, using sargassum management in the Caribbean as a case study. Specifically, we employ a bespoke diagnostic self-assessment tool to compare perceived sargassum management capacity in Caribbean SIDS and SNIJs. Contra conventional wisdom, we find smallness is a much better predictor of sargassum management capacity than political status. We hypothesize that this is because, in SNIJs, with their typically low tax regimes, local government lacks discretionary funding. Yet, associated metropolitan powers are unwilling to underwrite the required level of government intervention at scale to address significant transnational environmental threats. The fact that the advantages of remaining sub-national do not compensate for the (dis)economies of scale in select environmental policy areas has significant implications for climate adaptation and disaster risk reduction.

Keywords: adaptive capacity, Caribbean, climate adaptation, sargassum, Small Island Developing States (SIDS), Sub-national island jurisdictions (SNIJs), political status

Introduction

One of the longest standing puzzles in the study of small states and territories is why the economies of small, sub-national island jurisdictions (SNIJs) tend to perform much better than small island developing states (SIDS). The main explanation for this pattern, which holds across world regions (Baldacchino and Bertram, 2009), is that autonomy without full independence enables small island communities to better exploit niches in the global economy (Baldacchino, 2010; Rezvani, 2014; Corbett, 2023) and this offsets the (dis)economies of scale generated by smallness. Specifically, SNIJs have had considerable success in growing economies that revolve around sectors such as financial services, which are partly dependent on foreign capital having confidence that metropolitan powers will ensure political stability, while also benefiting from freedom of movement, and cash and skills transfers (Bertram and Poirine, 2018). The conclusion is that, while the advantages of autonomy without full independence do not overcome the challenges of smallness, they can offset them; and, in doing so, provide island communities who are nimble and agile enough with increased opportunities to exploit niches created by global capitalism.

The 'SIDS vs SNIJs' discussion has typically revolved around post-colonial questions, including the merits of self-determination and its relationship to economic growth (Corbin, 2009; Hepburn and Baldacchino, 2012). The latter was employed as a proxy for state viability, especially during the decolonization period (Corbett, 2023). But the Anthropocene has raised new existential concerns for small island communities. Specifically, climate change is increasingly viewed as the primary threat to the survival and sustained development of small island states and territories due to the impact of sudden transnational shocks, such as more intense hurricanes, increased drought and flood risk, sea-level rise, and biodiversity loss, on livelihoods (Robinson, 2020a; Bishop et al., 2024). In this context, it is imperative that we ask: do the well-documented advantages of autonomy without full independence for economic policy also apply to environmental issues?

There are good reasons to expect that they would, including that higher levels of economic wealth are likely to positively impact the capacity of small jurisdictions to adapt to climatic change across all policy domains; and that other advantages, such as freedom of movement and skills and cash transfers, would accrue in environmental policy, too. But it is also plausible that the challenges of smallness would reassert themselves in this policy domain specifically because, all other things being equal, the advantages of autonomy without full independence are contingent on the benign neglect of metropolitan governments whereas environmental policy requires a level of intervention at scale that the state has typically been unwilling to provide (Bishop and Payne, 2012). This has potentially serious consequences for SNIJs amidst a rapidly changing climate.

In this paper, we explore these contending theories, and in doing so contribute to broader debates about the advantages of autonomy without full independence for small island communities, by way of a comparative study of the management of sargassum – also known as common gulfweed *(Sargassum natans*), a type of holopelagic brown macroalgae (seaweed) that began inundating Caribbean beaches on a seasonal basis more than a decade ago (Arellano-Verdejo, Santos-Romero, and Lazcano-Hernandez, 2022; Putman and Hu, 2022). When sargassum arrives to shore in massive quantities, it can create severe adverse impacts for island communities, including disruption of coastal livelihoods (particularly in the fisheries and coastal tourism sectors), property damage and health complications (Marsh et al., 2021). In some instances, massive sargassum influxes have overwhelmed the capacities of public agencies with the responsibility for management (Devault et al., 2021), resulting in some island

states, like Barbados, declaring a state of national emergency (Alleyne et al., 2023). Unlike tropical cyclones, earthquakes, and excess rainfall, sargassum does not attract quick short-term liquidity from insurance policies offered to Caribbean and Central American governments by the Caribbean Catastrophe Risk Insurance Facility.

We employ a bespoke capacity self-assessment tool to compare the experience of SIDS and SNIJs in the management of sargassum. The Sargassum Monitoring and Management Capacity Assessment Tool allowed public-, private- and non-governmental organisations whose mandate includes sargassum monitoring and management to self-assess their institutional capacities to respond to influx events and employ adaptive strategies. In employing the tool to compare between SNIJs and SIDS, we found that both report similar capacity deficits. The implication is that, when it comes to sargassum, the disadvantages of smallness do not appear to be offset by the advantages of autonomy without sovereignty. We might therefore reasonably expect that the inability of SNIJs to attract government intervention at scale might also impact their ability to respond to other transnational climate related changes.

To substantiate this argument, the article is structured as follows. Next, we review debates about the effects of state size and sovereignty on governance capacity and its impact on economic development. In doing so, we highlight the need to apply the findings of previous studies to debates about environmental policy given the implications for climate adaptation. The subsequent section outlines why sargassum management is an important test case and introduces the self-assessment tool we used to interrogate it. The body of the article reports our findings thematically to tease out differences between SIDS and SNIJs. We find that both SNIJs and SIDS have poor adaptive capacity when it comes to sargassum inundations. Neither have sargassum-specific legislation; and, even though all the five SIDS and two of the seven SNIJs reviewed had sargassum management strategies or plans in place, none were consistently implemented. Factors contributing to this include frequently changing sargassum leadership, under-staffed departments, and the absence of dedicated budgets for sargassum management. Coordination in SNIJ multi-island territories was particularly challenging and inequitable. In both SNIJs and SIDS, decisions regarding sargassum policies were usually based on incomplete evidence, as there was a lack of real-time data collection and analysis. The conclusion returns to the main arguments and highlights their implications for the management of small island environments under the conditions of climate change.

Size or sovereignty: Governance capacity in small islands

Small population size is commonly believed to undermine or restrict governance capacity (Jugl, 2019). Indeed, conventional wisdom in the study of public administration is that there is an inevitable trade-off between state capacity on the one hand and coordination and inclusion on the other (Gerring and Veenendaal, 2020; Corbett et al., 2021). This trade-off is typically believed to benefit larger states because, the bigger they are, the more capacity they have to act in society. The claim is that economies of scale generate economies of scope that translate into better services for citizens. To be sure, largeness can create coordination challenges, especially when a state occupies a large territory, and a democratic deficit as governors are often far removed from the citizens whose lives they seek to improve. But the claim is that these downsides can be offset by multilevel institutions. And while this remedy is not seamless, it is still widely believed to be better than the alternative in which a small government has a high level of inclusiveness and coordination but no capacity to effect change.

SIDS are said to suffer acutely from this problem. These arguments have been apparent since the late colonial period – they partly explain why polities in the Caribbean and Pacific were late to decolonise – and have dominated debate about the self-sufficiency or viability of small island communities ever since (Corbett, 2023). Put simply, the claim is that sustaining basic services requires a level of state capacity that small island polities cannot afford due to their having a correspondingly small domestic tax base. The ability to engage in sovereignty sales, lease fishing rights and leverage other forms of rentier income can partly offset this problem. But even when it does, human resource capacity constraints intervene. The upshot is that many commentators argue that the best route to viability is regional integration, which enables small communities to share the cost of increased governance capacity with other similar states (see, famously, Lewis, 1965). In the absence of regional integration, the only alternative is to remain dependent on a larger metropolitan power.

The latter course is the one pursued by SNIJs: they have retained a dependent relationship with a metropolitan power and leveraged the advantages of ceding sovereignty to improve the quality and availability of government services (Baldacchino, 2010; Connell and Aldrich, 2020; Corbett, 2023; Rezvani, 2014). There are several ways in which the economic advantages of autonomy without full independence offset the disadvantages of smallness. The first, as alluded to above, is that autonomy without sovereignty creates economic opportunities in the form of 'niches' or 'enclaves' that small island communities can exploit. The classic example here is the financial services sector that depends on small island communities being able to set their own (low) tax rates; while the stability of the government and court system is underwritten by a larger metropolitan power, which provides investors with confidence in its durability (Vlcek, 2008). But there are other ways in which autonomy without full independence solves the capacity problems of smallness. This includes the boost that freedom of movement provides to the pool of skilled labour, cash transfers from the metropole that can be used to improve government services and invest in key infrastructure, and the savings generated by outsourcing foreign affairs and defence to a larger state. The upshot is that, for many commentators, SNIJs enjoy "the best of both worlds": they have considerable autonomy over domestic policy; yet enjoy higher levels of GDP per capita than SIDS (McElroy and Pearce, 2006).

These arguments and patterns are well-established (e.g. Bertram 2004). What is less clear is whether they hold under the conditions of rapidly advancing climate change. Indeed, for the most part, the debate has revolved around classic post-colonial concerns: the merits of self-determination and its relationship to economic growth and development. But the Anthropocene raises new questions. It also likely demands a greater level of government intervention than was required of states during the post-colonial era. The increased frequency and intensity of natural disasters - such as floods, king tides, hurricanes, and droughts - will require greater investment in the emergency management apparatus of the state. Likewise, sea level rise will necessitate a level of infrastructure investment on a much larger scale than is typically required or expected of small island governments. The upshot is that the size-sovereignty trade-off has become even more pertinent a question for small island communities amidst a rapidly changing climate.

There is limited research on the impact of autonomy without sovereignty on environmental policy and climate impacts. The work that does exist suggests that SNIJs have little interest in obtaining full independence, and this be could because it would result in the local government assuming official responsibility during natural disasters for the SNIJ (Kelman, 2006). But by and large, public administration concerns about capacity have not been prominent subjects of research. We rectify this gap. The science on whether or not sargassum

influxes are caused by climate change is the subject of intense research (Almela et al., 2023). The nature of the change means that it serves as an important proxy for climate impacts and their implications for state capacity either way because: a) the change was sudden and hard to predict; b) it is transnational in character, originating as it does in the Atlantic Ocean; and c) it is beyond the capabilities of single governments to resolve. The combination of these factors means that Sargassum influxes add another layer of complexity to the governance of marine spaces and resources for both SIDS and SNIJs. Solutions to the issue will ultimately require combining strategies from environmental management, disaster risk management, climate change adaptation, and commercial innovation and entrepreneurship. It also requires collaboration between state and non-state actors at different governance levels, combining both scientific and local knowledge at scale (McConney et al., 2023).

Data and methodology

Over the past decade, the Caribbean coasts have been inundated with anomalous amounts of pelagic sargassum, resulting in large mass strandings. The first reports of these strandings date back to 2011, and since then, they have occurred almost yearly, with some degree of variability. The years 2011, 2014, and 2015 witnessed high influxes of sargassum, but the situation reached unprecedented levels in 2018 (Doyle and Franks, 2015; Gower and King, 2011; Hinds et al., 2016; Hu et al., 2016; Oxenford et al., 2016). The record-breaking beaching events of 2018 attest to the fact that larger quantities of pelagic sargassum are affecting the Caribbean region with greater frequency and prolonged duration than previously observed (CRFM, 2019; UNEP, 2018). In 2022, sargassum influxes were closely analogous to those of 2018 in terms of quantity and frequency, albeit with some fluctuations throughout the year (Cox, Irvine, and Oxenford, 2022). These strandings have attracted considerable research. In this paper, we consider the impact of political status on sargassum management (see also Van Der Plank et al., 2022; Cumberbatch et al., 2024).

To understand the relationship between political status and sargassum management we needed to assess the capacities of key agencies tasked with undertaking adaptation. These include environmental bodies, governmental departments, and research institutions in the Caribbean who play a pivotal role in coordinating responses to sargassum influxes. Respondents represented both administrators and field operatives. Guided by a review of the literature on adaptive capacity (Dixit et al., 2012; European Union, 2015; FAO, 2018; USAID, 2016), we developed a Sargassum Monitoring and Management Capacity Assessment Tool in the format of a questionnaire organized around seven thematic components. Each thematic component was designed to elicit specific insights, enabling a comprehensive and detailed self-assessment of the organization or entity's readiness and capabilities in managing sargassum. Table 1 describes each component.

Table 1: The seven components of the Sargassum Monitoring and Management Capacity Assessment Tool.

Thematic Component	Description
Governance/Enabling Environment	Assesses the presence of policies, regulatory frameworks, and overarching governance mechanisms to guide sargassum management.
Institutional Sargassum Risk Assessment and Adaptation Planning	Investigates the organization's ability to conduct risk assessments related to sargassum influxes and the effectiveness of its adaptation planning processes. Specifically asks about staff's knowledge, qualifications and competencies, and access to training.
Implementation of Monitoring Measures	Evaluates activities associated with monitoring, collecting and storing data on sargassum influxes, along with the integration of results into early warning systems (EWS) at either sectoral or national level. Specifically asks about staff roles and responsibilities.
Resources	Assesses the availability and adequacy of financial and equipment resources dedicated to sargassum management efforts.
Coordination and Stakeholder Engagement	Investigates the extent and nature of national or community coordination and collaboration among government entities, non-governmental actors, and other stakeholders to facilitate support for the monitoring and management of sargassum. Specifically asks about staff capacity and training.
Information and Communication	Examines the organization's communication strategies and information dissemination mechanisms.
Monitoring, Evaluation and Learning	Examines whether organizations had Monitoring and Evaluation (M&E) systems, frameworks, or procedures established to aid their sargassum management efforts, and assessed if there was a systematic exchange and review of best practices. Specifically asks about staff qualifications and access to training

We used the self-assessment tool to address open-ended questions, with participants providing scores in response to each question on a scale of 0 to 5 (see Table 2). The mean score of the responses to the questions within each thematic component was then calculated, followed by the determination of the overall average across all seven components. This statistical analysis offered a consolidated view of how stakeholders perceived their capacities in specific areas, allowing for a more informed understanding of strengths and areas for improvement. The tool also allowed the key informants to provide evidence to validate and/or elaborate on their ratings. Additionally, they were also asked to describe interventions that could potentially strengthen their capacities in each component.

Table 2: Self-assessment scoring system.

0	none and/or an assessment area is not applicable to the agency
1	very low capacity
2	low capacity or initial progress achieved
3	moderate capacity or progress somewhat achieved
4	high capacity or capacity embedded and being improved
5	full capacity

The tool was first applied to representatives of 38 organizations in five SIDS that have responsibility for and/or have a vested interest in sargassum management and adaptation (Cumberbatch et al., 2024). The SIDS were Barbados, Dominica, Grenada, St. Lucia, and St. Vincent and the Grenadines. For the analysis presented in this paper, we extended the study to seven Caribbean SNIJs. Key informants were selected using a stakeholder map developed based on a desk review, which included primary and secondary stakeholders from the US Virgin Islands (USVI), Bonaire, St. Maarten, St. Martin, Anguilla, Turks and Caicos Islands (TCI) and the British Virgin Islands (BVI). We could not cover all SNIJs anymore than we were able to study all SIDS. We sought variation in the metropolitan power – UK, US the Netherlands and France – while acknowledging that our reliance on existing contacts privileges UK Overseas Territories in particular. As with all studies that rely on a selection of cases, if we had chosen different polities, we may have generated different results. Only further research can verify this.

The stakeholders we consulted have broad interests in sargassum in terms of hazard management/adaptation and as a potential commercial opportunity. As with SIDS, they comprised government agencies, academia, tourism associations and environmental organisations. We used a combination of telephone and Zoom video conferencing to facilitate interviews. The aim was to provide these individuals with the opportunity to reflect on their capabilities, identify areas for improvement, and contribute to a collective regional effort to address the challenges and opportunities related to sargassum.

Basic data analysis was conducted in Microsoft Excel to highlight the main trends and make general comparisons among countries, stakeholders and capacity areas. The percentage contribution was then calculated to determine how each of the seven components contributed to adaptive capacity by and among polities. This metric quantifies the extent to which each value contributes to the sum of a given set of values. The resultant ratio is expressed as a percentage and is calculated using the equation:

[(self-assessment value x component weight) ÷ polity average] x 100.

Equal weights were assigned to each of the seven components, following a commonly used technique in calculating percentage contributions (Beccari, 2016).

This capacity self-assessment offered several advantages. First, it allows organisations and agencies to evaluate their own strengths and weaknesses in relation to sargassum monitoring and management. This can help them to identify areas where they need to improve and to develop strategies for addressing these areas. Second, and relatedly, it potentially provides a way for organisations to measure any progress over time, adjusting as needed.

Finally, capacity self-assessment can help organizations to demonstrate their effectiveness and accountability to stakeholders, including funders, partners, and the public. However, it is important to note that the findings of the self-assessment are subjectively interpreted. They reflect the participants' individual perception of organizational capacity, rather than the researcher's 'objective' assessment based on external observation. Nonetheless, these subjective interpretations are highly revealing, providing insights into the lived reality of sargassum management in the Caribbean.

The interviewers faced several limitations and challenges. Some agencies declined to participate, citing a perceived lack of significance of sargassum management within their organization. Additionally, respondents displayed uncertainty regarding the jurisdiction of sargassum management within their respective countries. The response rate to our surveys is also a result of the limited number of agencies involved in sargassum management in the SNIJs, reflecting a constrained capacity. Sargassum management typically falls under a single government entity responsible for addressing various pressing environmental issues. This reflects that, despite ongoing discussions and projects to improve management, this field is characterised by restricted resources and capacity. Consequently, sargassum management is only prioritized during periods of substantial influx due to these limitations.

Comparing sargassum management in SNIJs and SIDS

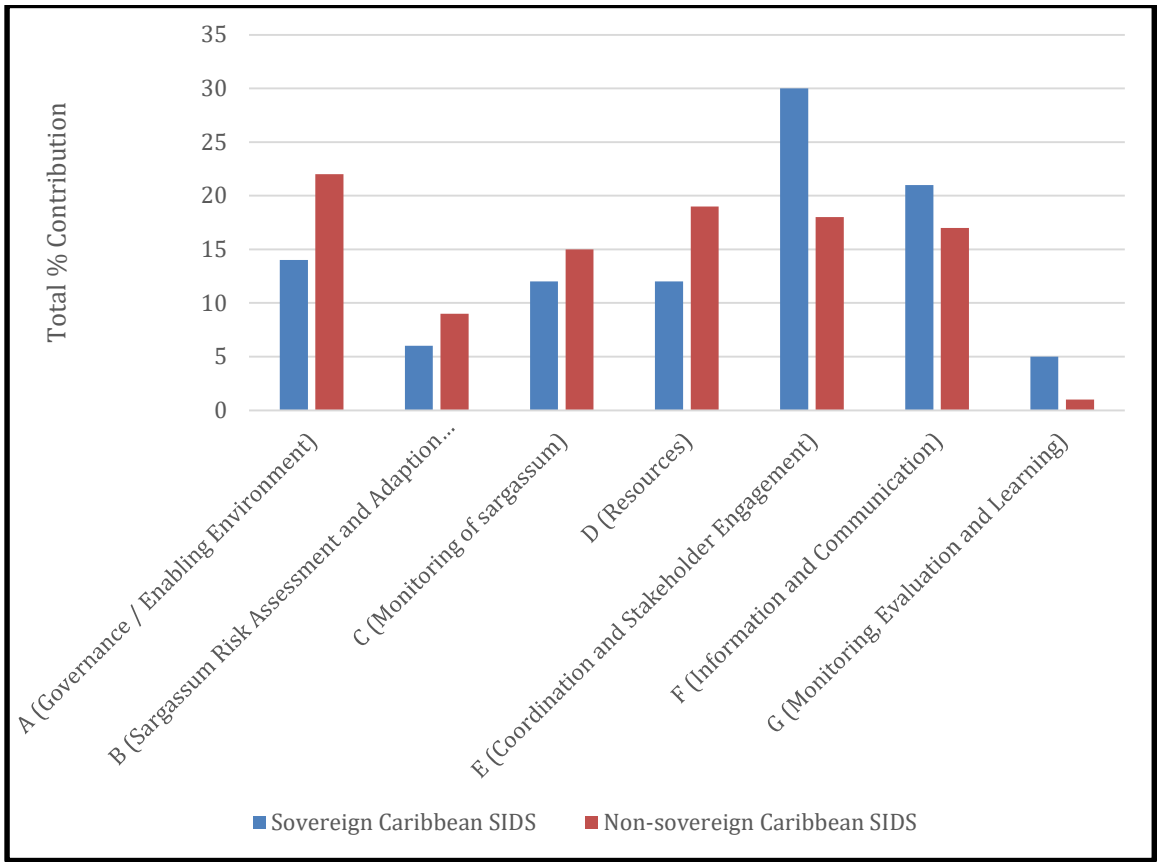
This section presents a comparative analysis of the results of the adaptive capacity self-assessments from the SNIJs and the SIDS. Both SNIJs and SIDS scored very low individually out of a total score of 5 (see Table 3). The SNIJ scores ranged from 0.40 in St. Martin to 1.84 in St. Maarten, and the SIDS ranged from 0.39 in Dominica to 1.04 in Barbados. This overwhelmingly confirms that none of these Caribbean states and territories self-assess that they have high adaptive capacity for sargassum management. The overall average shows that the SNIJs scored 0.95 and the SIDS 0.82, indicating slightly higher capacity for the former, but both still very low overall. Based on these results, it can be inferred that both SNIJs and SIDS believe they have poor adaptive capacity in managing sargassum.

Table 3. Comparing sargassum adaptive capacity self-assessment in SNIJs and SIDS.

SNIJs	St. Martin	USVI	Anguilla	TCI	BVI	Bonaire	St. Maarten	Total Average of Components
Total Averages	0.40	0.62	0.81	0.81	0.84	1.34	1.84	0.95
SIDS	Dominica	St Vincent and the Grenadines	Saint Lucia	Grenada	Barbados			Total Average of Components
Total Averages	0.39	0.69	0.95	1.02	1.04			0.82

An examination of the percentage contributions of the seven components to adaptive capacity revealed that *Governance and the Enabling Environment* was the highest contributor in the SNIJs, and *Coordination and Stakeholder Engagement* and *Information and Communication* together attributed to slightly over half of the total adaptive capacity score in the SIDS (see Figure 1). Both SNIJs and SIDS had lowest scores for *Monitoring, Evaluation and Learning*. Notwithstanding the low adaptive capacity for sargassum management in all the territories that were covered in this study, the SNIJs had slightly higher scores in four of the seven categories: notably, *governance, risk assessment, monitoring and resources*. But the small difference between SIDS and SNIJs, combined with the limited number of cases we have considered, means that we cannot place too much significance on these minor variations. Rather, the similarities are more robust and revealing.

Figure 1: Disaggregated sargassum adaptive capacity in Caribbean SNIJs and SIDS.



All 12 jurisdictions being studied have acknowledged the limitations surrounding the improvement of their adaptive capacity. These constraints are primarily related to the inadequacy of financial resources and trained personnel, as well as the absence of consistent sargassum research. Addressing these limitations will be crucial for augmenting their ability to adapt to sargassum influx events. Four themes emerged most strongly from the analysis of the qualitative responses from the SIDS and SNIJs related to governance. We have therefore structured the empirical discussion around these four themes, each of which combines components from the self-assessment: a) policy and planning, which drew on the responses to the questions in Component 1; b) evidence, implementation, monitoring and evaluation, based on the responses to Components 2, 3 and 7; c) resourcing and staffing based on responses to Components 2 and 4; and d) coordination, communication and stakeholder engagement, which was based on responses to Components 5 and 6.

Sargassum policy and planning

None of the seven SNIJs considered in this study, nor the five SIDS, have sargassum-specific legislation. To further compound the situation, only the five SIDS along with Anguilla and the Turks and Caicos Islands (TCI) have sargassum management plans or strategies. Consequently, sargassum management is solely dependent on other legislation or plans related to coastal activities such as fisheries and conservation or to disaster management. In Bonaire, for example, the Nature Conservation Framework Act (BES) and the Stichting Nationale Parken Bonaire (STINAPA) Response Plan, serve as guiding documents for sargassum management.

Even in instances where there are sargassum management plans, as in the five SIDS as well as Anguilla and Turks and Caicos, implementation has been patchy. In Anguilla, the local government developed and approved the Sargassum Management Strategy in 2016, but although a budget was proposed, it has not been realized in practice. In the Turks and Caicos Islands, a Sargassum management strategy is being developed and the Department of Environment and Coastal Resources (DECR) has Standing Operating Procedures (SOPs) for response to sargassum influx events, which still need to be accepted by Cabinet and gazetted.

The absence of a policy framework for sargassum management in SNIJs and SIDS means that sargassum management happens in an ad-hoc, unplanned and sometimes disorganised manner. In the SNIJs, respondents indicated that sargassum policies do not exist because sargassum is not perceived as a priority by the local government, and management responses are limited mainly to clean-up activities, when necessary. Additionally, the absence of a clearly defined policy framework for sargassum management poses a significant challenge in identifying the responsible parties. Respondents in the SNIJs were unsure which agency was responsible for sargassum management in their country. In the SIDS, Sargassum leadership was often quite unclear, with frequent changes in responsibilities.

The lack of clarity underscores the need for a more robust and comprehensive approach that considers all the various stakeholders involved and the need to assign dedicated staff to sargassum management. Typically, in both the SNIJs and the SIDS, these new responsibilities have been allocated to understaffed agencies such as the Fisheries or Environmental Departments, which are already burdened with heavy workloads. In SIDS, this was made more difficult due to inadequate budgets to address the ecological and technical challenge of managing sargassum influxes.

Participants reflected that developing an effective sargassum policy framework would provide the requisite guidance and direction for managing this multifaceted issue in a sustainable and efficient manner, considering factors such as environmental impact, socio-economic implications and sector-specific concerns. Such a framework could also include measures such as identifying effective monitoring and early warning systems, developing efficient removal and disposal methods, and fostering international cooperation to address the transboundary nature of the issue.

In the interim, respondents indicated that existing legislation could be amended to include sargassum management. The suggested measures include the Nature Ordinance for Bonaire, which aims to safeguard the local flora and fauna, and the Environmental Policies in St. Maarten and the BVI, which focus on mitigating the adverse impact of human activities on the

environment. Anguilla recommended the Biodiversity and Heritage Conservation Act, which seeks to preserve the cultural heritage and promote biodiversity, and the Beach Protection Plan and the Land Development Control Act, which aim to regulate the usage of land and the protection of beaches. For the TCI, the Fisheries Policy, which aims to promote sustainable fishing practices and conservation of marine resources, was deemed the most suitable piece of legislation. By comparison, Saint Lucian respondents suggested integrating sargassum management into Sectoral Adaptation Strategies and Action Plans for key sectors, as well as reviewing and updating the National Tourism Strategy and Action Plan 2020-2030, which includes climate considerations but did not specify sargassum influxes. In Grenada, inclusion within the National Sustainable Development Plan and Tourism Development Plan were the recommendations.

These results are consistent with analogous research on climate change adaptation in SIDS (Cumberbatch et al., 2024), especially concerning the regulatory, legal, and statutory mechanisms. Sargassum vulnerability requires urgent intervention that is able to keep up with the specific needs of the recipient country (Robinson, 2020a; 2020b).

Sargassum planning evidence, implementation, monitoring and evaluation

The ability to make policy decisions based on scientific evidence was one of the weakest areas reported by both the SNIJs and SIDS. Respondents noted that their decisions regarding sargassum policies were usually based on incomplete data on the impacts of sargassum, both positive and negative. Instead, the usual approach was to rely on informal or anecdotal assessments often drawn from projects carried out in collaboration with external funding partners. Bonaire is an exception where risk assessment and adaptation planning is undertaken at the national level. Early detection, real-time monitoring, customisable alerts, data sharing and resource allocation are some of the things that Bonaire hopes to achieve using this technology. Respondents in St. Maarten also reported knowledge of the Sargassum Outlook Bulletin, developed by the Centre for Resource Management and Environmental Studies (CERMES), University of the West Indies (UWI), Barbados. The respondents highlighted that the Bulletin confers several advantages to their untrained staff and in the absence of early warning systems, predictive modelling and other highly technical analyses, allows the country to make decisions based on regional scientific research.

A similar pattern was observed for monitoring. Respondents from both SNIJs and SIDS gave their lowest scores to the Monitoring, Evaluation and Learning components of the self-assessment tool. Most SNIJs reported a dearth of monitoring and evaluation practices, with 4 out of 7 indicating no monitoring and evaluation at all. However, in Bonaire, STINAPA's personnel and volunteers are well-versed in the intricacies of sargassum monitoring and evaluation, enabling them to draw on lessons learned for future activities. This approach, however, is in its infancy and needs to be further enhanced to function optimally. Respondents from St. Maarten recommended the regional implementation of sargassum monitoring and evaluation strategies, with communities leveraging the information provided to design their own approaches. In the BVI, there is a plan to undertake training in sargassum monitoring and evaluation to improve decision-making regarding sargassum influxes.

Resourcing and staffing for sargassum management

When asked to consider questions about financial resource allocation for sargassum management, respondents from both the SNIJs and SIDS echoed similar sentiments of

inadequacy. While there may be a desire to undertake monitoring, stakeholder consultations and clean-up activities, there was no funding allocated strictly for sargassum management. Funding for these activities usually comes from budgetary allocations within the environmental or fisheries sections. Respondents also emphasized the need to use advanced technologies that would enhance data collection in sargassum quantification and monitoring. These include GIS software and mapping equipment like drones, hydrogen sulphide meters to measure the levels of the gas emanating from the decaying sargassum, and clean-up equipment.

The lack of trained personnel in sargassum management is another critical issue that can lead to a range of negative impacts. Without adequate knowledge and skills, it can be challenging to effectively monitor, manage, and mitigate the impact of sargassum on the environment and local communities. Sargassum 'experts' can provide critical support in developing and implementing effective monitoring programs and management strategies, work with local communities and stakeholders to raise awareness of the issues associated with sargassum and provide guidance on how to mitigate its impact. This is essential for preventing further environmental damage, protecting local communities and maintaining the economic stability of SNIJs.

Due to these apparent inadequacies, respondents strongly recommended capacity building for staff and public education and awareness campaigns for the public. Capacity building is essential for effective sargassum management and involves providing the necessary knowledge, skills, and resources to stakeholders involved. Capacity building can enhance understanding, identify best practices and innovative solutions, and foster collaboration. It is critical for enabling a proactive and sustainable approach to managing this environmental issue and is necessary to change the current mode of operation (McBean and Rodgers 2010). Capacity building can include workshops, training programs, mentoring, job shadowing and other knowledge and experience-sharing initiatives that focus on enhancing the knowledge and skills of individuals and organisations involved in sargassum management.

Coordination

A unique challenge of some SNIJs from this study, specifically the USVI, TCI and BVI, is that they are multi-island polities. Multi-island jurisdictions face additional challenges related to governance, including issues related to representation, decentralization, and resource allocation. Additionally, governance structures in multi-island polities must be designed to accommodate the diverse needs and interests of multiple island polities. Effective multi-island governance requires a holistic approach that considers the unique characteristics of each island, while also ensuring that policies and practices are consistent and equitable across all islands. This involves developing governance structures that are responsive, transparent, and accountable, and that are designed to promote sustainable development and social justice across the whole country and its population (Greenidge, 2017).

Multi-island governance has implications for policy and practice in sargassum management. The heterogeneous distribution of sargassum influx events across various islands poses a significant challenge to the coordination of sargassum-related activities by archipelagic jurisdictions. The lack of uniformity in the severity and frequency of these events results in varying levels of urgency for sargassum management on different islands. Additionally, this could lead to increased costs and complexities of coordination for the authorities. For example, in the TCI, the island of Grand Turk receives frequent sargassum inundations along the east coast. However, this is mainly a residential area, with a general absence of fishing and tourism-

related activities. On the other hand, Providenciales, the primary tourism centre of TCI, experiences relatively low occurrences of sargassum inundation. As a result, its government has not prioritised implementing measures to mitigate the effects of sargassum influx events.

Respondents from both SIDS and SNIJs also highlighted that inter-agency coordination is comparatively simpler to organize than coordination between government departments and the private sector. In Bonaire, St. Maarten, Anguilla and the TCI, there are informal networks to manage the sargassum, on a as needs basis. These networks do not receive any government funding but depend largely on the availability of staff and good working relationships among agencies. Additionally, in both the SIDS and SNIJs, respondents said that while fisherfolk, hoteliers, and residents have expressed interest in being involved in sargassum management, they often face uncertainty regarding the initial steps.

Communication and stakeholder engagement

Respondents indicated that there was no communication strategy (planned or *ad hoc*) for sharing information on sargassum. There were also very few public education and awareness programmes on sargassum and information on sargassum was usually obtained from online sources or word of mouth. In TCI, the DECR has included some information on sargassum at their training workshop for fisherfolk; and, in Anguilla and the BVI, some training has been undertaken by the Caribbean Natural Resources Institute (CANARI) under different environmental projects. Moving forward, developing a communication strategy for sargassum management is crucial to ensure effective coordination and collaboration among the diverse stakeholders involved in the process because it would facilitate the dissemination of accurate information regarding sargassum management and adaptation planning in a clear and concise manner. This would help stakeholders understand the challenges and opportunities associated with the process. It would also enable stakeholders to share their experiences, knowledge, and expertise, which would foster a sense of ownership and responsibility towards the process.

Participants expressed similar observations regarding stakeholder involvement in managing and adapting to sargassum in SNIJs. Respondents easily picked out the key stakeholders, which included fishers and fishing cooperatives, restaurant and hotel owners, government agencies, tourism associations and affected residents. However, the difficulty arose in determining how these stakeholders could collaborate effectively to contribute to the management of sargassum. In Bonaire, there is a good working relationship between STINAPA, the fishers and the pilots for warning systems. However, there is very little collaboration in other areas. In St. Maarten, a Steering Committee has been established to oversee sargassum management; however, it has been defunct from 2020. In Anguilla, the Sandy Hill Community Group members come together to undertake clean-ups in collaboration with private hotels and heavy equipment operators.

The results of this study emphasize the need for developing a comprehensive stakeholder engagement framework that facilitates effective communication, collaboration, and participation among the diverse stakeholders involved in sargassum management and adaptation planning. The framework should address the complexities and nuances of stakeholder engagement while taking into account the socio-economic, political, and environmental factors of both SIDS and SNIJs. It should be a transparent and equitable process, including all stakeholders, regardless of race, class, socio-economic status, religion and educational background. All voices matter and all stakeholders especially those belonging to

vulnerable groups (women, elderly, disabled, minority groups), should be given the opportunity to contribute to sargassum management (Thomas, 2023).

Conclusion

Self-assessment has inherent limitations. As outlined, they are a subjective data collection tool that reflects individual perceptions of organizational capacity. What our approach has revealed is that key stakeholders face similar challenges in dealing with sargassum and hold similar views about their capacity to respond. They may be wrong, and capacity varies considerably. We think this unlikely given the well-documented likeness between the political economies of Eastern Caribbean states in particular. But only further research can verify this. It may also be the case that the sargassum experience is not comparable to other transnational climate or disaster-related shocks. We think this is also unlikely given the main effect of sargassum is that it impacts the tourism industry, which is the main driver of private sector activity in each of the island polities we studied. In short, despite the limitations of self-assessment, we think our findings provide novel insights that can be tested further by additional research.

What the research has revealed is that there are considerable similarities between SIDS and SNIJs. Indeed, while we have drawn on SNIJ examples here, we could easily have substituted them for SIDS (but see Cumberbatch et al., 2024). These similarities are thus the main findings we report. To be sure, there were minor variations in their overall score – 0.95 out of 5 for SNIJS compared to 0.82 for SIDS – but these are not statistically significant given the nature of our self-assessment tool.

The similarities in sargassum management capacity between SNIJs and SIDS have numerous practical implications, including for the types of regional coordination and development partner assistance that might facilitate and improved government response. But they also raise theoretical questions since they enable us to examine whether autonomy without full independence advantages SNIJs in addressing transnational environmental issues. Our analysis suggests that it does not and that this represents a considerable problem amidst a rapidly changing climate. Indeed, it may well be that the governance model SNIJs have relied upon since the 1970s and 1980s will require considerable amendment if these polities are to maintain the high standards of living they have enjoyed by comparison to SIDS over recent decades. We conclude by providing an initial explanation as to why this might be the case.

The success of the SNIJ model has depended on a combination of: a) the guarantee of metropolitan oversight; and b) the relative autonomy it has provided to island communities. To be sure, there has always been variation between islands: the French and Dutch territories have experienced much greater integration into the metropole than British and US jurisdictions, for example. However, the basic model is similar in that the guarantee has enabled SNIJs to generate wealth via forms of enclave capitalism, such as financial services, because the oversight of London, Paris, Washington DC or The Hague provides investors with confidence that the legal system and rule of law will be maintained. In turn, the ability of SNIJs to exploit these opportunities and generate high levels of GDP per capita has ensured that they do not draw too heavily on the reserves of metropolitan treasuries. This high standard of living, combined with the relative autonomy that metropolitan powers delegate to the SNIJ government most of the time, has led to the extensive popularity of the autonomous but not fully independent model among local populations (Hepburn and Baldacchino, 2012). Indeed, while many metropolitan powers would like to jettison these territories, which represent for

them a reminder of their colonial past, most SNIJs citizens remain firmly in favour of the status quo (Clegg, 2012; Clegg et al., 2022).

The existing model works fairly well if measured by its ability to generate GDP per capita. But one potential downside is that it is crucially dependent on relatively low levels of state intervention. Indeed, the economic model is premised on most SNIJs being low tax regimes. In contrast, responding to transnational environmental issues at scale requires significant state intervention and therefore capacity. In this, SNIJs appear to confront the same size-related constraints that are commonly observed among SIDS. Specifically, they do not have the tax base, natural resources, or human capacity to mobilize significant data collection and policy management frameworks, let alone infrastructure programs, to respond to sargassum beaching events caused by changing climatic conditions in neighbouring continents. The result is a type of incapacity we more commonly observe in SIDS.

There are several ways in which both SIDS and SNIJs might overcome these challenges. These include the old solutions to the problem of small scale (such as deeper regional integration, discussed above); or newer solutions (such as the burgeoning number of global financing mechanisms for climate adaptation). We would also expect that the relative wealth of SNIJs provides them with greater capacity to outsource solutions to consultants, for example, although this does not seem to be occurring at the moment. And there is always the possibility that metropolitan powers can be persuaded to provide the required intervention at scale for their constituent small islands. But while this might present itself as a solution to this specific environmental issue, if the logic of our argument holds, then sargassum inundation is the first of many similar environmental challenges that will arise under the conditions of accelerating climate change. We therefore require a new research agenda that fleshes out and tests our nascent finding that the tried and tested advantages of autonomy without sovereignty for economic growth cannot straightforwardly be applied to environmental issues for SNIJs.

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APPENDICES

Appendix 1

List of agencies that participated in self-assessment for SNIJs.

COUNTRY	ORGANISATION	TYPE
US Virgin Islands	Sapphire Beach Marina	Private sector
	USVI Hotel and Tourism Association	Private sector
	Bioimpact Inc.	Private sector
	USVI Department of Planning and Natural Resources - Division of Coastal Zone Management	Government organisation
	University of the Virgin Islands	Private sector
Bonaire	Tourism Corporation Bonaire	Government organisation
	STINAPA (Stichting Nationale Parken Bonaire)	Non-governmental organisation
	World Wildlife Fund Caribbean	Non-governmental organisation
	Mangrove Maniacs	Non-governmental organisation
	Ministry of Agriculture, Nature and Food Quality	Government organisation
St. Maarten	Nature Foundation St. Maarten	Non-governmental organisation
	Dutch Caribbean Nature Alliance	Non-governmental organisation
St. Martin	Tourist Office French Side	Government organisation
	VROMI (Ministry of Public housing, Spatial Planning, Environment and Infrastructure)	Government organisation
Anguilla	Department of Disaster Management	Government organisation
	Anguilla National Trust	Statutory body
	Department of Natural Resources, Environment Unit	Government organisation
Turks and Caicos Islands	School for Field Studies	Educational Institution
	Department of Disaster Management and Emergencies (DDME)	Government organisation
	Department of Environment and Coastal Resources (DECR)	Government organisation
British Virgin Islands	Ministry if Natural Resources and Climate Change in the BVI	Government organisation
	Saba Rock Resort	Private sector

Appendix 2

List of agencies that participated in self-assessment for SIDS.

COUNTRY	ORGANISATION	TYPE
Barbados	Environmental Protection Department (EPD)	Governmental
	Ministry of Maritime Affairs and the Blue Economy (MMABE)	Governmental
	The National Conservation Commission (NCC)	Governmental
	Barbados Defence Force (BDF)	Governmental
	Barbados National Union of Fisherfolk Organizations (BARNUFO)	Fisherfolk
	Barbados Hotel and Tourism Association	Non-Governmental organisation
	Barbados Game Fishing Association (BGFA)	Non-Governmental organisation
	Caribbean Youth Environment Network (CYEN)	Non-Governmental organisation
Dominica	Fisheries Division, Ministry of Blue and Green Economy, Agriculture and National Food Security	Governmental
	Dominica Solid Waste Management Cooperation (DSWMC)	Governmental
	Local Areas Management Authority (LAMA)	Non-governmental organisation
	National Association of Fisherfolk Co-operative (NAFCOOP)	Fisherfolk organisation
Grenada	Grenada Tourism Authority (GTA)	Governmental organisation
	Grenada Hotel and Tourism Association (GHTA)	Private sector
	Fisheries Department; Ministry of Climate Resilience, the Environment, Forestry, Fisheries and Disaster Management	Governmental organisation
	Environmental Health Division; Ministry of Health, Social Security and International Business	Governmental organisation
	National Disaster Management Agency (NaDMA)	Governmental organisation
	Gouyave Fishermen Co-Operative Society Limited	Fisherfolk organisation
	Grenville Fishers/Grenville Fish Aggregating Device (FAD) Fishers Organization	Fisherfolk organisation
	Ocean Spirits	Non-governmental organisation
Saint Lucia	Department of Sustainable Development; Ministry of Sustainable Development, Energy, Science and Technology	Governmental organisation
	Saint Lucia National Conservation Fund (SLUNCF)	Non-governmental organisation
	Department of Tourism; Ministry of Tourism, Information and Broadcasting	Governmental organisation
	Department of Fisheries; Ministry of Agriculture, Fisheries, Physical Planning, Natural Resources and Co-operatives	Governmental organisation

COUNTRY	ORGANISATION	TYPE
	Department of Environmental Health; Ministry of Health and Wellness	Governmental organisation
	National Conservation Authority (NCA)	Governmental organisation
	Saint Lucia National Trust (SLNT)	Non-governmental organisation
	Castries Fisher's Society	Fisherfolk organisation
	Goodwill Fisherfolk Cooperative	Fisherfolk organisation
Saint Vincent and the Grenadines	Environmental Health Division; Ministry of Health and the Environment	Governmental organisation
	Fisheries Division; Ministry of Agriculture, Forestry, Fisheries, Rural Transformation, Industry & Labour	Governmental organisation
	National Parks Rivers and Beaches Authority (NPRBA)	Governmental organisation
	Solid Waste Management Unit (SWMU); Central Water and Sewerage Authority	Governmental organisation
	St. Vincent and the Grenadines Hotel and Tourism Association (SVGHTA)	Private sector
	St. Vincent and the Grenadines National Fisherfolk Cooperative (SVGNFO)	Fisherfolk organisation
	Sustainable Grenadines Inc.	Non-governmental organisation
	Tourism Board Union Island	Governmental organisation
	Union Island Fisherfolk Organization	Fisherfolk organisation