United Nations University
Centre for Policy Research

WORKINGPAPER
December, 2024

Recommendations for Center of Excellence functions to leverage AI for climate resilience in the Caribbean Small Island Developing States

Nathanael Tombs, Imogen Palmer, Miguel Paulo, Alvin Lin, Vincent Leung, Eleonore Fournier-Tombs

Policy recommendations

Our recommendations are broadly that the Center of Excellence (CoE) consider:

- Creating local AI-driven solutions tailored to regional climate risks
- Attracting international partnerships to stimulate talent development in AI
- Serving as a knowledge hub for AI governance, talent development and data management
- Supporting innovation in climate forecasting, mitigation and adaptation strategies
- Promoting inclusive governance by incorporating more best practices and stakeholders into decision-making to facilitate AI usage.

In September 2024, the General Assembly of the United Nations approved the Pact for the Future, along with its annexes, the Global Digital Compact (GDC) and the Declaration on Future Generations, in the Summit of the Future conference.[1] In May 2024, the United Nations SIDS4 conference proposed a new Center of Excellence (CoE) situated in Antigua and Barbuda, which will include a Small Island Developing States (SIDS) Global Data Hub, a Technology and Innovation mechanism, an Island Investment Forum and a Debt Sustainability Service.[2] Building on several of the principles, objectives and actions committed, this working paper explores two primary thematics. The first is how this CoE can adopt specific functions to best address the regional specificities of the Caribbean Small Island Developing States (C-SIDS). The second is how it can contribute to achieving the specific objectives of the GDC.

1 United Nations Office of the Secretary-General's Envoy on Technology, n.d.
2 UN, 2024b.

C-SIDS are uniquely vulnerable to the effects of climate change.[3] Emerging artificial intelligence (AI) technologies can be used to increase climate resilience (World Economic Forum, 2024a). CoEs can adopt specific functions that help solve regional challenges by promoting use of AI technologies.[4] This is done by developing capabilities across three domains of AI governance: data, AI infrastructure and human capital.

From C-SIDS climate change to an AI-focused CoE

C-SIDS are vulnerable to the increase in frequency and severity of natural disasters in three ways.[5] First, their location and geography make them particularly vulnerable to a range of events such as hurricanes, floods, costal erosion, degradation of marine ecosystems and rising sea levels. The annual cost of damages from natural disasters in SIDS can range between 1 per cent and 8 per cent of their entire GDP.[6] Second, the impact of these events is exacerbated by their small size, import dependence on food and fuel, limited freshwater supplies and economic reliance on tourism. On average, the tourism sector accounts for roughly 15 per cent of a country's GDP; for SIDS that value is almost 30 per cent.[7] Third, these States have limited recovery options due to the disproportionate cost of these disasters. These external shocks put unsustainable pressure on these States' debt burdens.

Figure 1. Economic damage of natural disasters on C-SIDS as a per centage of GDP

Year	Event	Nation	Economic damage (per cent of GDP)
2021	Hurricane Elsa	St. Lucia	2 per cent
2019	Hurrican Dorian	Bahamas	27 per cent
2017	Hurricane Maria	Dominica	226 per cent
2016	Hurricane Matthew	Haiti	14 per cent
2015	Tropical Cyclone Erika	Dominica	90 per cent
2004	Hurrican Ivan	Grenada	200 per cent

AI can be leveraged to enhance climate resiliency programmes.[8] This includes improving techniques of disaster prediction and monitoring, optimizing disaster recovery strategies, supporting infrastructure decisions and improving community engagement.[9]

3 Lenderking et al., 2020; UNDP, 2024.
4 Oliver Wyman, 2021; World Economic Forum, 2024b.
5 ECLAC, n.d.; Ötker, 2018; UNDRR, 2015.
6 UN Department of Economic and Social Affairs, n.d.
7 UN DESA, n.d.
8 UNFCCC, 2023.
9 MIT Solve, n.d.

Many developing economies such as South Africa, Indonesia and Brazil have established similar CoE initiatives.[10] These are generally located in regions with universities that are well known for computing and research and sometimes existing innovation ecosystems. While each CoE seeks to apply AI to address the most pressing challenges in that region (ranging from agriculture to energy), there are similarities in the functional objectives of the CoEs. CoEs often focus on connecting diverse stakeholders (researchers, developers and industry leaders) to stimulate innovation and talent development in a region, reverse "brain drain"[11] and ultimately drive economic growth. CoEs have been applauded for streamlining access to disparate data sources[12] and in some cases also help secure computational power and infrastructure in a region from private partners.[13] CoEs or similar types of initiatives are also used in organizations, and specifically recommend developing an AI strategy that is tailored to the organization's level of AI maturity and goals (for C-SIDS; climate mitigation/adaptation goals), as well as regular monitoring and reporting on key performance indicators.[14]

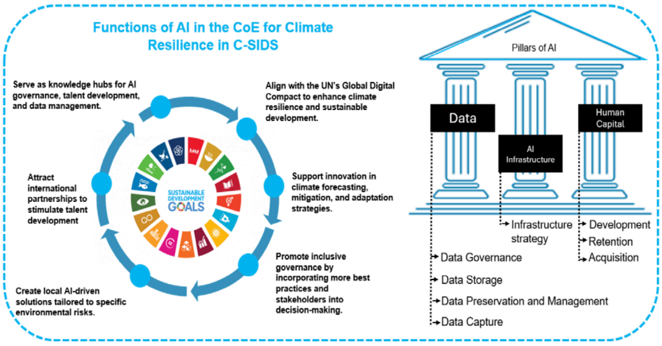
Implementing a CoE would align with the UN Secretary-General's call to develop AI technologies to supercharge climate action[15] and signify a positive step towards meeting the objectives of the GDC. These include enhancing digital trust and security for climate data, leveraging AI-driven technologies for climate resilience and AI governance. It is also in keeping with the aims of the existing United Nations Educational, Scientific and Cultural Organization (UNESCO) Caribbean AI Policy Roadmap[16] and the outcomes of the recent SIDS4 conference.[17] Using AI to tackle the climate crisis will also be discussed[18] at COP29 in Azerbaijan in November 2024, and COP30 in Brazil in 2025.

The three pillars of AI in the CoE for climate resilience

Building AI in the CoE should focus on three key pillars of data, AI infrastructure and human capital, and should develop capabilities in C-SIDS across these three domains.

10 AII SA, n.d.; Viva Technology, n.d.
11 OECD STIP, 2023.
12 Woloszko, 2024.
13 Oliver Wyman, 2021; Reuters, 2022.
14 Microsoft, 2024; Zinnov, n.d.
15 Guterres, 2023.
16 UNESCO Caribbean, 2023.
17 UN, 2024a.
18 UNFCCC, n.d.

Figure 2. Summary of three proposed pillars of a CoE and its functions



Data

As outlined in the GDC[19] responsible data practices (Objective 4.52) and interoperable systems (Objective 4.39) are key to maximizing AI's potential. Data is the cornerstone of any successful AI pipeline as it is essential for the accurate training and fine-tuning of an AI model for a particular task.

UNESCO's Caribbean Artificial Intelligence Policy Roadmap (2021) highlights five strategic components of adequate data conservation: capture, storage, preservation, management and monetization. Each of these presents specific challenges in C-SIDS.

Data capture involves the collection and recording of relevant data through national and regional preservation programmes and aims to deliver accurate digital representations of data. To address this element, the CoE could:

- Train regional partners and promote the adoption of shared data capture operational processes across the C-SIDS.
- Support regional partners in implementing data capture programmes aligned with the 38 United Nations Office for Disaster Risk Reduction (UNDRR) indicators from the Sendai Framework for Disaster Risk Reduction[20]
- Develop and augment existing regional open-source data capture platforms to facilitate the collection and sharing of key datasets between C-SIDS.

Data storage focuses on establishing secure, resilient platforms that protect data against unauthorized access or potential loss.[21] To address this element, the CoE would:

- Support regional partners in adopting best practices for disaster recovery, backups and resilience planning with an emphasis on natural disasters.
- Provide training to regional partners on best practices for secure data storage and encryption techniques.

Data preservation and management includes classifying, formatting and preparing data to ensure it is accessible for both analysis and decision-making, with machine-readable formats being ideal for analysis. To address this, the CoE could:

- Develop and distribute a digital catalogue of available data sources across C-SIDS, detailing their formats to help various organizations identify and interact with valuable data.
- Distribute datasets to established open data platforms like UN Data, World Bank Open Data and the UNDP SIDS database[22] to ensure broader accessibility, allowing researchers, policymakers and global stakeholders to easily find and utilize the information.
- Support digitization initiatives across C-SIDS, with an emphasis on the development of standardized machine-readable formats.
- Document, disseminate and link to successful use cases where the data has been applied to demonstrate its value and encourage further utilization by showing real-world impact across different sectors.
- Engage local communities by organizing hackathons and data challenges to encourage innovative solutions, foster collaboration and increase awareness of the available datasets' potential for addressing regional challenges.
- Create specialized reports on data trends for sectors like fisheries, energy and real estate.

AI infrastructure

Running AI models requires infrastructure which can be hosted by cloud providers outside of the C-SIDS or hosted locally within the C-SIDS.[23] The AI infrastructure needs for C-SIDS climate projects will depend on the specific use case that a stakeholder wishes to carry out and the associated complexity of this task. This is illustrated in the table below, using the key use case of Early Warning Systems (EWS) as an example. This use case leverages AI to predict flood risk.

19 United Nations Office of the Secretary-General's Envoy on Technology, n.d.

20 The Sendai Framework for Disaster Risk Reduction outlines a comprehensive global approach to minimizing disaster risks and protecting development achievements. With a focus on preventing new risks and reducing existing ones, the framework emphasizes an all-inclusive, multisectoral approach across its four priorities: 1) Understanding disaster risk, 2) Strengthening risk governance, 3) Investing in disaster resilience, and 4) Improving disaster preparedness for effective response and recovery. These strategies are measured by seven global targets, aimed at fostering a resilient society capable of mitigating disaster impacts and accelerating recovery: https://www.undrr.org/implementing-sendai-framework/what-sendai-framework. UNDRR, n.d.

21 UNDP, n.d.

22 UNDP, n.d.

23 Google Cloud, n.d.b.

Figure 3. AI infrastructure needs based on compute complexity

Basic	Predicting flood risk in a single coastal area of a C-SIDS with minimal historic and real-time data inputs	Personal computers or a small server.[24]
Medium	Predicting flood risk across an entire C-SIDS coastline using real-time and historic multimodal inputs (such as satellite imagery and video) and complex regional weather patterns	Cluster of servers with specialized capabilities, such as Graphics Processing Units (GPU).[25]
Advanced	Predicting flood risk as a high-fidelity environmental simulation, leveraging multimodal inputs from the land, sea and air in real-time across all C-SIDS	High-performance supercomputer or server clusters with cutting-edge specialized chips (GPU, Tensor Processing Unit (TPU)).[26]

Situating this infrastructure locally offers several benefits including direct and indirect job creation, talent development and retention,[27] investment in surrounding infrastructure and greater data sovereignty, which is often preferred by national governments.[28] These also lower the cost and barrier to the adoption of AI technologies by local partners. While large cloud providers often offer small enterprises and NGOs with free usage credits of their cloud infrastructure, these are at the discretion of the provider, can limit local competition and may result in longer-term lock-in.[29]

Development of advanced local compute capabilities such as supercomputers can be cost-prohibitive. Europe's ten super computers cost between €100 million and €550 million each.[30] Due to the rapid pace of computing innovation, these also incur significant hardware upgrade and maintenance costs.[31]

In keeping with the CoE's mission, the CoE's role in AI infrastructure should be to support the C-SIDS in the development of their infrastructure strategy, with a primary focus on medium complexity capability, and longer-term, support the development of more advanced different compute options. This aligns to the GDC goal of developing digital public infrastructure as key to sustainable development, and the GDC commits to increase investment and funding towards this in developing countries by 2030 (Objective 1. s15,16,17e). Specifically, the CoE could:

- Identify, understand and document existing local compute capabilities in the C-SIDS.
- Communicate successful use cases of local compute to partners.
- Advise partners on how best to leverage existing local compute capabilities.

24 Géron, 2015 ; Google AI, 2023; Microsoft, n.d.; Nevo et al., 2022.

25 Balaji et al., 2016; Google Earth Engine, n.d.; Sentinel Hub, n.d.; Waleed and Sajjad, 2023.

26 AWS, n.d.; ECMWF, n.d.; Google Cloud, n.d.a ; NCAR, n.d.; NVIDIA Research, 2024.

27 DCC, 2023.

28 Compu-Dynamics, n.d.

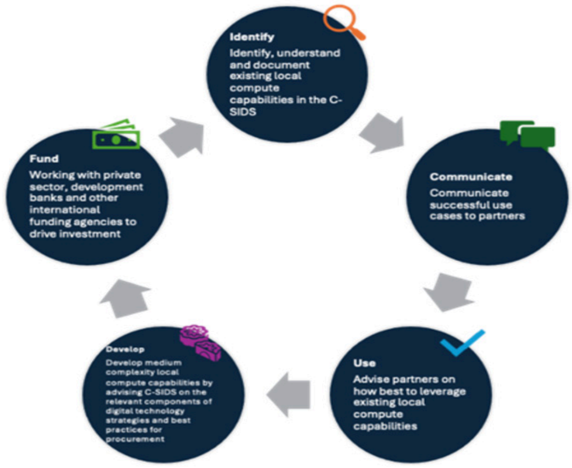
29 Google Cloud, 2023.

30 European Commission, 2023.

31 EuroHPC JU, 2024.

- Develop medium complexity local compute capabilities by advising C-SIDS on the relevant components of digital technology strategies and best practices for procurement.
- Consider working with the private sector, development banks and other international funding agencies to drive investment into local compute capabilities.[32]

Figure 4. Roles of CoE



C-SIDS face unique considerations when selecting a location to build out compute capabilities. Despite ongoing work, many C-SIDS are not yet well placed to meet the infrastructure requirements that underpin the development of successful local compute capabilities such as stable energy supply and high-speed internet connectivity.[33] Furthermore, this location would require safety from natural disasters. C-SIDS have had some success in overcoming these unique considerations. Trinidad and Tobago, situated below the hurricane belt, has invested in two high availability data centres.[34]

Human capital

The GDC emphasizes the importance of capacity-building and skills development to enable individuals to meaningfully participate in the digital economy (Objectives 1. s6,3.29,4.34). We focus here on three key areas which offer a simplified view of the Employee Lifecycle Model: development, retention and acquisition of talent.[35]

Development: STEM education and training

Addressing talent development in C-SIDS is critical to unlocking the region's long-term economic potential and fostering innovation. Tertiary education plays a pivotal role in building a skilled workforce capable of meeting global and regional challenges. However, current enrollment rates and gender disparities undermine this potential. Through strategic partnerships, the CoE can help develop the human capital necessary to sustainably grow the AI workforce and strengthen climate resilience across C-SIDS.

32 Reuters, 2022.

33 UN-OHRLLS, n.d.

34 DC Byte, n.d.; InvesTT, 2023.

35 NASEM, 2021.

Tertiary education

While the C-SIDS have high net enrollment rates for primary education, with 87.8 per cent and 88 per cent of eligible females and males enrolled in primary school,[36] these enrollment rates drop significantly for secondary and tertiary education. The tertiary education rate in the Caribbean is 21.5 per cent, compared to an OECD benchmark of 47.4 per cent.[37] There is also a growing gender gap in enrollment: the gap favouring females over males is 8.4 percentage points.[38]

Available pedagogic resources

Teacher quality and access to resources in C-SIDS vary significantly, with disparities that place the region well behind OECD peers. For example, teacher-student ratios in primary education range from 18:1 in Trinidad and Tobago to 48:1 in Guyana.[39] Additionally, in some C-SIDS, less than 50 per cent of primary school teachers are formally trained in key areas like STEM. This gap in teaching resources is also reflected in tertiary education institutions such as the University of the West Indies which has a student to teacher ratio of 23:1 at their Mona campus.[40] This compares to a ratio of 15:1 for OECD countries in both primary and tertiary education institutions.[41]

Vocational training

In C-SIDS, youth aged 16-25 who are Not in Education, Employment or Training (NEET) represent a critical issue for socioeconomic development; 28.5 per cent of young people fall into this category, a proportion significantly higher than in Latin America (23.8 per cent) and high-income countries (13.1 per cent).[42] This issue disproportionately affects males, who are more likely to leave school early due to economic pressures, with gender norms pushing boys into the labour market prematurely to contribute to family income.

The CoE should:

- Develop and fund bursary programmes targeting low-income and underrepresented students, to promote equal access to tertiary education and reduce disparities.
- Foster partnerships between C-SIDS universities and international institutions to enhance research and increase faculty development, addressing the shortage of qualified professors and improving higher education quality.
- Expand vocational and technical training programmes that align with emerging job markets, encouraging more students, especially those from underrepresented groups, to pursue tertiary education.
- Assess and refine existing funding for education grants for tertiary education (including abroad) to ensure this reflects the labour market needs in climate and AI, conditional on students studying abroad returning home to pursue employment for a fixed period. There are some examples of such programmes in other Caribbean States.[43]

36 World Bank, n.d.
37 OECD, n.d.a.
38 Bustelo, M. C. and Bosch, S., 2023.
39 Inter-American Development Bank, 2023.
40 UWI Mona, n.d.
41 OECD, n.d.b.
42 Thailinger et al., 2023.

Talent retention

Beyond developing local talent, Caribbean States have historically experienced significant "brain drain", and previously reported losing 10–40 per cent of the total labour force due to emigration to OCED countries. This is particularly the case for highly skilled workers. Up-to-date data can be hard to come by, but an International Monetary Fund report from 2006 concluded that 70 per cent of the Caribbean workforce with more than 12 years of schooling emigrated.[44] This can be due to "push" factors, such as a lack of available roles in a given country, and "pull" factors such as more financially rewarding opportunities overseas.

The CoE could develop targeted talent retention strategies that address push factors. These include:

- Developing an AI ecosystem: Promote the development of an AI ecosystem and network within the C-SIDS, which will incentivize retention and attract talent with higher salaries. As part of this:
- Encourage agile redeployment within C-SIDS: Establish a mechanism within the ecosystem to facilitate short-term exchanges and role transfers within the C-SIDS region to ensure that any oversupply of skills within particular C-SIDS can be re-deployed in an agile and more effective way.
- Coordinate with public and private sectors: Act as a channel between jobseekers and the public and private sector to matchmake the available labour to private and public sector needs, including through educational grants. Develop outreach programmes to spread awareness of opportunities in C-SIDS on a regional level, including within schools and university career fairs.
- Knowledge sharing and training: For professional development training and exchanges to countries outside of the C-SIDS, develop incentives to ensure participants "give back" on their return and knowledge share with the wider C-SIDS community.[45] Work with multinationals to promote tech training programmes in C-SIDS similar to those offered elsewhere (da Costa, 2019).

Talent acquisition

In addition to developing and retaining homegrown local talent, C-SIDS should in parallel seek to develop the conditions conducive to attracting skilled talent from countries outside C-SIDS. Tech talent is, however, highly competitive, and by 2030 it is expected that there will be a global shortage of more than 85 million tech workers (da Costa, 2019). Pull factors such as higher wages, better employment and education opportunities and higher living standards all contribute to economic migration (European Parliament, 2020). The development

43 Cayman Parent, 2024.
44 Mishra, 2006.
45 UNDP, 2019.

of an AI ecosystem, supported by the functions discussed above, will contribute to attracting extra-regional talent.

Engaging with regional stakeholders

To ensure alignment on the value delivered by the CoE, partnerships and/or agreements should be established with regional and international stakeholders in the C-SIDS such as government and public sector bodies, industry, the private sector and academia in line with Sustainable Development Goal 17 (recommendation of multi-stakeholder partnerships) (UN, 2022). The scope of engagement between the CoE and relevant C-SIDS stakeholder, as well as examples of these stakeholders, is detailed in the table below.

Caribbean intergovernmental organizations	CARICOM and affiliated institutes (e.g. CDEMA, CCREEE) and OECS.	Political support, regional integration, regulatory environment, sharing of resources, scaling and enablement of activities.
International intergovernmental organizations	United Nations system and agencies (especially ITU, UNESCO and UNDP), and OECD.	Global standards, funding opportunities, technical expertise, capacity building, policy guidance, alignment with SDGs and networking.
Telecommunications and infrastructure associations	CANTO and ITU	Technological expertise, infrastructure and shared resources.
Multinational corporations.	Google, Meta, Microsoft, Tencent, Tata Consultancy Services, Huawei and Byte Dance, for example.	Provision of cutting edge technology, funding, infrastructure development, technical expertise, mentorship, joint innovation projects, and commercialization pathways.
Caribbean academic institutions	UWI and UG, for example.	Research, training and education, talent development, local expertise, community engagement.
International research organisations	MILA, ELLIS, GPAI, AI Singapore, FAIR, Google research, Microsoft research, IEEE and OpenAI.	Advanced AI research collaboration, technical expertise, knowledge sharing, development of AI models and best practices, and providing mentorship for AI researchers and professionals.
Caribbean non-government organizations (NGOs)	CANARI and CYEN, for example.	Local and community engagement, sustainability expertise, environmental data contribution and policy development.
Regional development banks	IDB and CDB	Provide financial support for regional projects, grant funding for AI infrastructure and capacity building, technical assistance.
International financial agencies	IMF and World Bank	Provide large-scale financial support, loans, and grants for international projects with cross-border scope.

This working paper builds on the proposed CoE for AI in Antigua and Barbuda, as outlined in the outcomes of the Summit of the Future to address C-SIDS climate resilience challenges. The CoE can contribute to enhancing adaptation efforts by standardizing and securing climate-relevant datasets, enabling informed decision-making (Section 2.2.1) and supporting medium-complexity AI infrastructure tailored to regional needs (Section 2.2.2). Initiatives in education and vocational training can help address skill gaps and mitigate brain drain, ensuring the region develops and retains the talent needed to operationalize AI-driven solutions (Section 2.3.3). By aligning with the GDC's objectives to strengthen digital public infrastructure and promote equitable technology access, the CoE can help drive the implementation of AI solutions that improve disaster prediction, optimize recovery strategies, and enhance climate adaptation measures across C-SIDS.

Endnotes

- Amazon Web Services (AWS), "High Performance Computing: Accelerate innovation with managed HPC services and virtually unlimited infrastructure", Available at: https://aws.amazon.com/hpc/ (accessed on 26 October 2024).
- Balaji, Rusty Benson, Bruce Wyman and Isaac Held, "Coarse-grained component concurrency in Earth system modeling: Parallelizing atmospheric radiative transfer in the GFDL AM3 model using the Flexible Modeling System coupling framework". (2016) Geoscientific Model Development, vol. 9, No. 10 (2016) p. 3605-3616.
- Joanna Boxall, "Smart Scholarship Strategy", Cayman Parent, 15 December 2023. Available at: https://www.caymanparent.com/articles/smart-scholarship-strategy.
- Brent Cato, "Six benefits data centers bring to the community", Compu-Dynamics, 12 March 2024. Available at: https://compu-dynamics.com/blog/construction/six-benefits-data-centers-bring-to-the-community/.
- Data Center Coalition (DCC), "Data Centers Contribute $2.1 Trillion to US Economy, New PwC Study Finds", 19 September 2023). Available at: https://www.datacentercoalition.org/cpages/press-release-national-impact-study-2023.
- DC Byte, Barataria Trinidad Data Center. Available at: https://app.dcbyte.com/listing/barataria-trinidad-data-centre.
- European Centre for Medium-Range Weather Forecasts (ECMWF), [Website title retrieved from ECMWF's mission/focus on international collaboration]. Available at: https://www.ecmwf.int/ (accessed on 16 October 2024).
- "Europe's second high-end exascale supercomputer to be hosted in France," European Commission, 20 June 2023. Available at: https://digital-strategy.ec.europa.eu/en/news/europes-second-high-end-exascale-supercomputer-be-hosted-france.
- "New procurement call to upgrade LEONARDO, the EuroHPC supercomputer located in Italy", European High Performance Computing Joint Undertaking (EuroHPC JU), 19 September 2024. Available at: https://eurohpc-ju.europa.eu/new-procurement-call-upgrade-leonardo-eurohpc-supercomputer-located-italy-2024-09-19_en.
- "Exploring migration causes: Why people migrate", European Parliament, 1 July 2020. Available at: https://www.europarl.europa.eu/topics/en/article/20200624STO81906/exploring-migration-causes-why-people-migrate.
- Géron, F. (2015, August 8). A Gentle Introduction to Long Short-Term Memory Networks by the Experts. Machine Learning Mastery. Retrieved Available at: https://machinelearningmastery.com/gentle-introduction-long-short-term-memory-networks-experts/ (accessed on 11 October 2024).
- Yossi Matias, "How we are using AI for reliable flood forecasting at a global scale", Google AI, 20 March 2024. Available at: https://blog.google/technology/ai/google-ai-global-flood-forecasting/.
- Justin Keeble and Emma Fish, "Climate Innovation Challenge provides Google Cloud credits", Google Cloud, 18 April 2022. Available at: https://cloud.google.com/blog/topics/sustainability/climate-innovation-challenge-provides-google-cloud-credits.
- Google Cloud, High Performance Computing (HPC) Solutions. Available at: https://cloud.google.com/solutions/hpc (accessed on 11 October 2024).
- Google Cloud. What is a hybrid cloud?. Available at: https://cloud.google.com/learn/what-is-hybrid-cloud (accessed on 11 October 2024).
- Google Earth Engine, A planetary-scale platform for Earth science data & analysis. Available at: https://earthengine.google.com/ (accessed on 11 October 2024).
- António Guterres, "Secretary-General Urges Security Council to Ensure Transparency, Accountability, Oversight, in First Debate on Artificial Intelligence", United Nations, 18 July 2023. Available at: https://press.un.org/en/2023/sgsm21880.doc.htm.
- Elena Arias Ortiz, Cecilia Giambruno, Alejandro Morduchowicz and Bismarck Pineda, The state of education in Latin America and the Caribbean 2023 (Inter-American Development Bank, 2023). Available at: https://publications.iadb.org/en/state-education-latin-america-and-caribbean-2023.
- "Tiltak to establish data centre in Tobago", InvesTT. Available at: https://www.investt.co.tt/news-and-events/tiltak-to-establish-data/.
- Nadja Johnson, "Analysis and Assessment of the 'Brain Drain' Phenomenon and its Effects on Caribbean Countries", Florida Atlantic Comparatve Studies Journal, vol. 11 (2008-2009). Available at: https://home.fau.edu/peralta/web/facs/braindrain.pdf.
- Hania Lincoln Lenderking, Sacy-ann Robinson and Gail Carlson, "Climate change and food security in Caribbean small island developing states: challenges and strategies", International Journal of Sustainable Development & World Ecology, vol. 28 No. 3 (2020), p. 238-245. Available at: https://doi.org/10.1080/13504509.2020.1804477.
- Massachusetts Institute of Technology (MIT) Solve, "AI Solutions in Disaster Prone Areas". Available at: https://solve.mit.edu/challenges/heath-in-fragile-contexts-challenge/solutions/77749.
- Lukas Velush, "The AI Revolution: How Microsoft Digital (IT) is Responding with an AI Center of Excellence", Microsoft Inside Track, 13 October 2024. Available at: https://www.microsoft.com/insidetrack/blog/the-ai-revolution-how-microsoft-digital-it-is-responding-with-an-ai-center-of-excellence/.
- Microsoft Learn, "What is Azure IoT Edge?", 12 June 2024. Available at: https://learn.microsoft.com/en-us/azure/iot-edge/about-iot-edge?view=iotedge-1.5.
- Prachi Mishra, Emigration and brain drain: Evidence from the Caribbean (International Monetary Fund Working Paper, 2006). Available at: https://www.imf.org/external/pubs/ft/wp/2006/wp0625.pdf.
- National Academies of Sciences, Engineering, and Medicine (NASEM), Looking Ahead at the Cybersecurity Workforce at the Federal Aviation Administration (Washington, DC, National Academies Press, 2021). Available at: https://doi.org/10.17226/26105.
- "Investigating a Changing World" National Center for Atmospheric Research (NCAR). Available at: https://ncar.ucar.edu/where-we-focus/climate (accessed on 11 October 2024).
- Jaideep Pathak, Yair Cohen, Piyush Garg, Peter Harrington, Noah Brenowitz, Dale Durran, Morteza Mardani, Arash Vahdat,

Shaoming Xu†4, Karthik Kashinath and Michael Pritchard Kilometer-scale convection-allowing model emulation using generative diffusion (NVIDIA Research, 2024). Available at: https://research.nvidia.com/publication/2024-08_kilometer-scale-convection-allowing-model-emulation-using-generative-diffusion.

- Jad Haddad, Joel Ghosn, Ahmad Mourtada and Jean Salamat, "AI Centre of Excellence for Governments: Could AI help galvanize the economy?" Oliver Wyman. Available at: https://www.oliverwyman.com/our-expertise/insights/2021/nov/ai-centre-of-excellence-for-governments.html.
- Organisation for Economic Co-operation and Development (OECD) Science, Technology and Innovation Policy (STIP). (2023). Policy Initiatives [Interactive Dashboard]. Retrieved October 11, 2024, Available at: https://stip.oecd.org/stip/.
- Organisation for Economic Co-operation and Development (OECD), Population with tertiary education. Available at: https://www.oecd.org/en/data/indicators/population-with-tertiary-education.html (accessed on 26 October 2024).
- Organisation for Economic Co-operation and Development (OECD), Students per teaching staff, Available at: https://www.oecd.org/en/data/indicators/students-per-teaching-staff.html (accessed on 26 October 2024).
- İnci Ötker and Krishna Srinivasan, "Bracing for the storm: Building resilience in the Caribbean", Finance & Development, vol. 55, No. 1 (March 2018). Available at: https://www.imf.org/en/Publications/fandd/issues/2018/03/otker.
- Gail Hurley, Vikrant Panwar, Emily Wilkinson, Courtney Lindsay, Matthew Bishop and Elvira Mami, "Breaking the cycle of debt: A new approach to financing development in Small Island Developing States", ODI Working Paper, (2024). Available at: https://media.odi.org/documents/ODI_SIDS_Breaking_the_cycle_of_debt_main_paper.pdf.
- Asia Financial, "Nvidia to Build $200m Indonesia AI Centre in SE Asia Push" 8 April 2024. Available at: https://www.asiafinancial.com/nvidia-to-build-200m-indonesia-ai-centre-in-se-asia-push.
- Sentinel Hub, Daily Earth data and analytics for Broad Area Management. Available at: https://www.sentinel-hub.com/ (accessed on 11 October 2024).
- Agustina Thailinger and others, Gender gaps in the English-speaking Caribbean: Education, skills and wages (Washington, DC, Inter-American Development Bank, 2023). Available at: https://publications.iadb.org/en/gender-gaps-english-speaking-caribbean-education-skills-and-wages.
- The United Nations (UN), "Goal 17: Revitalize the global partnership for sustainable development" Global partnership for achieving sustainable development, December 2022. Available at: https://www.un.org/sustainabledevelopment/globalpartnerships/ (accessed on 26 October 2024).
- UN Framework Convention on Climate Change (UNFCCC), "Technology Mechanism Initiative on Artificial Intelligence for Climate Action." Available at: https://unfccc.int/ttclear/artificial_intelligence (accessed on 11 October 2024).
- Report of the fourth International Conference on Small Island Developing States, 27-30 May 2024 (A/CONF.223/2024/6/0). https://sdgs.un.org/sites/default/files/2024-07/EN_ A_ CONF_223_2024_6_0.pdf
- The Antigua and Barbuda Agenda for SIDS (ABAS) – a Renewed Declaration for Resilient Prosperity (United Nations publication). Available at: https://sdgs.un.org/sites/default/files/2024-04/SIDS4%20-%20Co-Chairs%20FINAL.pdf.
- United Nations Department of Economic and Social Affairs (UN DESA), "About Small Island Developing States (SIDS)". Available at: https://sdgs.un.org/smallislands/about-small-island-developing-states (accessed on 11 October 2024).
- Ugo Blanco, "A digital leap for Caribbean islands", United Nations Development Programme, 30 April 2024. Available at: https://www.undp.org/latin-america/blog/digital-leap-caribbean-islands.
- United Nations Development Programme, "Small Island Developing States are on the frontlines of climate change – here's why", Climate Promise, 30 April 2024. Available at: https://climatepromise.undp.org/news-and-stories/small-island-developing-states-are-frontlines-climate-change-heres-why.
- United Nations Development Programme, "Data Platform for the Small Island Developing States". Available at: https://sids.data.undp.org/ (accessed on 11 October 2024).
- Study on the vulnerability and resilience of Caribbean Small Island Developing States (SIDS). LC/CAR/L.354. (United Nations Economic Commission for Latin America and the Caribbean (ECLAC), 2011). Available at: https://repositorio.cepal.org/server/api/core/bitstreams/107cc2a3-85d2-45ba-a5a5-65bcc07012e5/content.
- United Nations Educational, Scientific and Cultural Organization (UNESCO) Caribbean, "Take Survey: UNESCO Caribbean AI Policy Roadmap 2023", 21 September 2023. Available at: https://caribbean.un.org/en/250439-take-survey-unesco-caribbean-ai-policy-roadmap-2023 (accessed on 11 October 2024).
- United Nations Framework Convention on Climate Change (UNFCCC), "AI for Climate Action: Technology Mechanism supports transformational climate solutions", 3 November 2023. Available at: https://unfccc.int/news/ai-for-climate-action-technology-mechanism-supports-transformational-climate-solutions (accessed on 11 October 2024).
- United Nations Office for Disaster Risk Reduction (UNDRR), Sendai Framework for Disaster Risk Reduction 2015-2030, (2015). Available at: https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030.
- United Nations Office for Disaster Risk Reduction (UNDRR), "What is the Sendai Framework for Disaster Risk Reduction?". Available at: https://www.undrr.org/implementing-sendai-framework/what-sendai-framework (accessed on 26 October 2024).
- United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UN-OHRLLS), "About Small Island Developing States". Available at: https://www.un.org/ohrlls/content/about-small-island-developing-states (accessed on 26 October 2024).
- United Nations Office of the Secretary-General's Envoy on Technology, "Global Digital Compact". Available at: https://www.un.org/techenvoy/global-digital-compact (accessed on

11 October 2024).
- University of the West Indies, Mona (UWI Mona), “Academics”. Available at: https://www.mona.uwi.edu/academics (accessed on 26 October 2024).
- Viva Technology, “CEIA - AI Center of Excellence”. Available at: https://vivatechnology.com/partners/ceia-ai-center-of-excellence (accessed on 11 October 2024).
- Mirza Waleed and Muhammad Sajjad, “On the emergence of geospatial cloud-based platforms for disaster risk management: A global scientometric review of Google Earth Engine applications”, International Journal of Disaster Risk Reduction, vol. 97, No. 104056 (October 2023).
- Andreea Zugravu and others, “Using AI in economic development: Challenges and opportunities”, McKinsey & Company, 22 May 2024. Available at: https://www.mckinsey.com/industries/public-sector/our-insights/using-ai-in-economic-development-challenges-and-opportunities.
- World Bank, “Gender Data Portal”. Available at: https://genderdata.worldbank.org/en/indicator/se-prm-enrr (accessed on 26 October 2024).
- Victoria Masterson, “9 ways AI is being deployed to fight climate change”, World Economic Forum Agenda, 12 February 2024. Available at: https://www.weforum.org/agenda/2024/02/ai-combat-climate-change/.
- Joseph Wehbe,“How to build sovereign AI talent to boost economic competitiveness”, World Economic Forum Agenda, 4 July 2024. Available at: https://www.weforum.org/agenda/2024/07/sovereign-ai-talent-improve-economic-competitiveness/.
- Nitika Goel, Adnan Furniturewalla and Sachit Bhat “Mastering AI Centers of Excellence: Key Considerations for Success”, Zinnov, 13 October 2023. Available at: https://zinnov.com/centers-of-excellence/mastering-ai-centers-of-excellence-key-considerations-for-success-blog/.

ISBN: 978-92-808-6644-5

Citation: Nathanael Tombs, Imogen Palmer, Miguel Paulo, Alvin Lin, Vincent Leung and Eleonore Fournier-Tombs, “Recommendations for Center of Excellence functions to leverage AI for climate resilience in the Caribbean Small Island Developing Statesl”, UNU-CPR Working Paper (New York, United Nations University, 2024).