

Environmental committee

(EC)

Topic B:

Mitigating the impact of climate change on Small Island Developing States (SIDS)



I. Introduction

Over the last couple of decades climate change has become a growing issue throughout the world and if it hasn't already it certainly will affect every nation on earth. However, Small Island Developing States (SIDS) stand at the forefront of this major crisis. SIDS are states that already are some of the most challenging places to live on earth due to the extreme remoteness, lack of resources, dependence on other countries and fragile ecosystems. In addition, these states are, as the name implies, developing. The average HDI (Human development index) for SIDS is 0.684 (only SIDS countries not including territories and also excluding Singapore) which is quite a bit below than the world average (0.728). This means that SIDS have less developed education and health systems compared to the rest of the world. SIDS also have a GNI per capita (2011 PPP \$) of almost half of the world average (8,614 compared to a world average of 15,295). This means that SIDS have much fewer economic funds compared to the rest of the world.¹ SIDS are also some of the least environmentally damaging countries in the world and have historically and presently had some of the lowest climate impact compared to other groups of countries. Tuvalu for instance is one of the countries with the lowest carbon footprint and was one of the first countries to aim for complete carbon neutrality. However, although these countries arguably contribute the least to climate change they will certainly experience the worst effects of it. SIDS states are grappling with both rapid-onset events, such as storms and flooding, and slow-onset processes including sea-level rise, land erosion, and changes in the global water cycle. Some of the environmental impacts of climate change on SIDS include:

1. Sea-level rise and land loss:

Sea-level rise causes habitat contraction, shifts coastal species, and has and may lead to the loss of low-lying pacific islands.

¹ <https://sustainabledevelopment.un.org/content/documents/27969UNDP.pdf>

2. Extreme weather events and flooding:
Tropical storms intensified by sea-level rise result in significant impacts, such as hurricanes causing coastal flooding in Caribbean SIDS.
3. Coral bleaching and Algal Blooms:
Marine heatwaves and ocean acidification result in coral bleaching, impacting fisheries and causing negative effects like sargassum seaweed blooms. Such as what has been observed near caribbean SIDS.²
4. Changes to coastal wetlands and ecosystems:
Ocean acidification and the gradual increase in ocean temperature contribute to coastal wetlands loss, threatening vital ecosystems like mangrove forests and seagrass.
5. Freshwater availability and drought:
Sea-level rise, storms, and precipitation changes stress freshwater sources, leading to droughts and impacting reliable water access.

These are just a couple of the problems SIDS around the world are facing. Because of the lack of development and fragile economies in SIDS as mentioned above, such environmental impacts becoming more frequent and more damaging will only lead to worsening quality of life of SIDS inhabitants and potentially the complete loss of populations living in these states.³

II. Definition of key terms

SIDS: SIDS (Small Island Developing States) are a collection of 57 developing nations (39 sovereign states and 18 dependent territories) that are characterised as small islands, sharing common sustainable development hurdles. Some common characteristics of SIDS are: growing populations, remoteness, limited resources, susceptibility to natural disasters, vulnerability to external shocks, excessive dependence on international trade, and fragile environments. These are generally grouped into 3 different regions: {Caribbean}, {Pacific} and {Africa, Indian Ocean, Mediterranean and South China Sea (AIMS)}. Although only adding up to 65 million people (<1% of global population), they face some of the most pressing social, economic and environmental challenges. In particular surrounding increasing consequences of climate change.^{4 5}

² <https://earthobservatory.nasa.gov/images/151188/a-massive-seaweed-bloom-in-the-atlantic>

³ <https://www.annualreviews.org/doi/10.1146/annurev-environ-012320-083355>

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https://en.wikipedia.org/wiki/Small_Island_Developing_States#:~:text=The%20Small%20Island%20Developing%20States,share%20similar%20sustainable%20development%20challenges.

⁵ [https://www.un.org/ohrlls/content/about-small-island-developing-states#:~:text=Small%20Island%20Developing%20States%20\(SIDS,social%2C%20economic%20and%20environmental%20vulnerabilities.](https://www.un.org/ohrlls/content/about-small-island-developing-states#:~:text=Small%20Island%20Developing%20States%20(SIDS,social%2C%20economic%20and%20environmental%20vulnerabilities.)



https://upload.wikimedia.org/wikipedia/commons/e/e6/SIDS_map_en.svg

HDI: HDI (Human Development Index) is a measure of a country's level of development relative to other countries. It was developed by the UN in 1990. It is measured using three different key dimensions:

1. Health: Health is measured using a country's average life expectancy in years at birth. This is a great measure of how well a country is doing as it accounts for many factors such as infant mortality rate, how well the healthcare system works, likelihood to die from external factors such as homicide and therefore also how well a country's criminal system works.
2. Knowledge: Education is measured using a country's mean and expected years of schooling. Mean years of schooling is the average number of years of education people aged 25 have received. Meanwhile, expected years of schooling represents the total number of years of schooling expected for a child just entering school.
3. Standard of living: The quality of life is measured using a country's GNI (Gross National Income per Capita) and PPP (Purchasing Power Parity). It takes a country's GNI which is the nation's gross domestic product (GDP) in addition to the income it receives from overseas sources.^{6 7}

III. Background information

Economic Challenges and future growth:

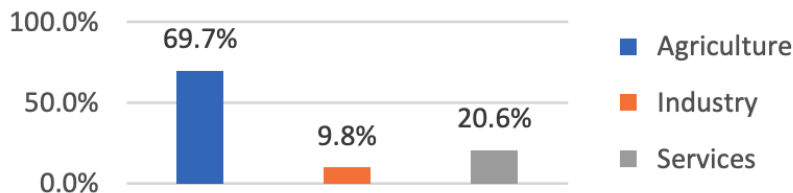
SIDS face economic challenges due to their remote geography, resulting in high import and export costs and irregular international traffic. This has an enormous effect on the economies of SIDS, as they have to grapple with expensive transportation logistics. Therefore hindering their competitiveness in the global market, meaning that SIDS often have a low secondary sector (industry and

⁶ <https://www.investopedia.com/terms/g/gross-national-income-gni.asp>

⁷ <https://hdr.undp.org/data-center/human-development-index#/indicies/HDI>

manufacturing). This means that most of SIDS's workforce work in the tertiary (services such as tourism) or primary sector (agriculture), which generally have lower pay, lower domestic product and less opportunities for growth.^{8 9}

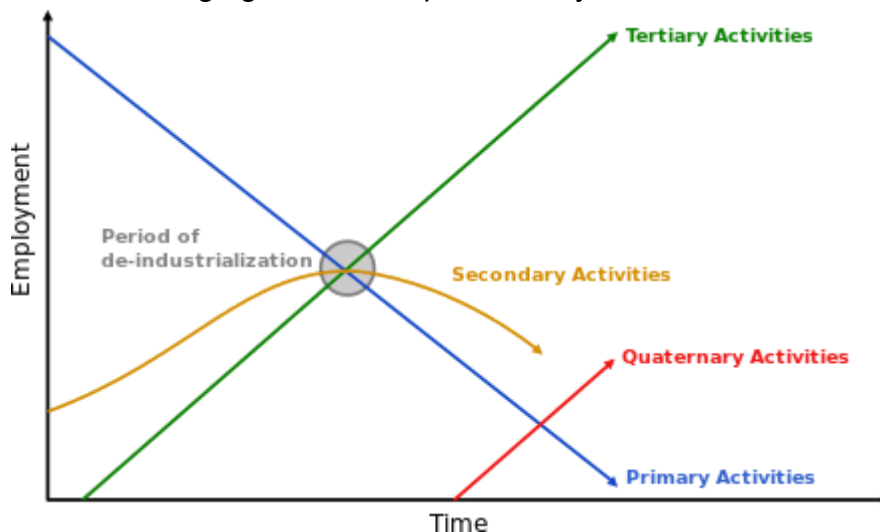
Employment by sector, 2018 (15+ years)



Employment by sector; Solomon Islands, 2018

https://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/documents/publication/wcms_627566.pdf

This is particularly concerning when looking at the Clark-Fisher model (see below) which compares the distribution of workforce in each economic sector over the development of a country. Which clearly shows how as a country develops, its secondary sector (industry) grows in the process of industrialization to go from being a developing to emerging country and then falls during deindustrialization to develop from an emerging to a developed country.



Clark-fisher model, employment in sector vs time/development

Many SIDS will probably see increased tertiary sector employment through increased tourism and increase in pay, and will also probably see a decrease in the primary sector as other jobs offer higher wages. However, because of high transportation costs, it will be very hard to grow the secondary sector in many SIDS,

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https://unctad.org/system/files/non-official-document/aldc2021_sids_4march_backgroud_paper_rev3_en.pdf

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https://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/documents/publication/wcms_627566.pdf

resulting in many SIDS finding it difficult to develop beyond a medium level of development.

Biodiversity importance:

Biodiversity is crucial for SIDS' economies as tourism and fisheries often contribute over half of the GDP. The EEZ (Exclusive Economic Zones) controlled by SIDS are, on average, 28 times the country's land mass, conveying their reliance on ocean resources. The importance of biodiversity also extends beyond simply for economic purposes, as biodiversity holds aesthetic and spiritual importance for many island communities. For centuries, such communities have relied on biodiversity in the form of food, clean water, preventing beach erosion, sand formation and protection from storm surges.

Regional support:

SIDS are supported on a more regional level by intergovernmental organisations including CARICOM (Caribbean Community), PIF (Pacific Islands Forum) and IOC (Intergovernmental Oceanographic Commission).

IV. Major countries and groups involved in the issue

When discussing this issue, countries can generally be split into two groups:

The first group of countries (and dependent territories) is SIDS and other island nations. These states are of course the ones that will be the most affected by the issues caused by climate change. These states are developing nations and are generally very small and have therefore contributed very little to cause climate change and global warming compared to other countries, yet they are the most affected, and therefore feel that they should get aid to solve their climate related issues. Some of these states are already suffering a lot because of the effects of climate change and therefore may require urgent/emergency aid e.g. islands experiencing water shortages may require imported water or desalination plants. Although this is just the case for a few islands, all SIDS recognise the fact that sea-levels are rising and will continue to do so, resulting in more frequent flooding in the short term and complete submersion in the long term. Therefore, most countries in this group are very motivated to solve this issue quickly. The only thing that may be disagreed on between these states is what problems to address and where, as not all island states are for example experiencing large scale, record breaking Sargassum blooms such as the ones seen in the caribbean(see 'Major Issues' section, issue 1.c), but on a large scale and in the long term all states wish to address climate change and require UN funding to do so.

The other group of countries are countries that will not be as heavily affected by climate change as SIDS and their climate change related issues are also likely to be very different to the ones of SIDS. Therefore these countries have a lower incentive

to spend UN funding on these issues. These countries are generally the countries who have contributed more to climate change e.g. the USA, one of the countries that releases the largest amount of CO₂ per capita,¹⁰ and China, the country that releases the most amount of CO₂ per year.¹¹ These countries would of course not like to spend a lot of UN funding to solve this issue as the money comes indirectly from these countries.

These two groups of countries divide the two main approaches countries will have to this problem. However, these groups certainly do not represent the actual alliances and contributions to resolutions countries will actually have. Larger countries in the second group often support smaller countries in the first group when it comes to addressing such problems. Therefore, these two groups should be used as a guide on what a country thinks but not what alliances it will make, as the USA and China would probably not make an alliance together even though they have similar views on this issue.

V. UN Treaties and Historical Events

1992: IN 1992 SIDS were acknowledged as a special case for their unique environmental and developmental challenges at the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, Brazil.

1994: In 1994, the Barbados Programme of Action (BPoA) outlined actions for SIDS to achieve sustainable development, reaffirming principles from Agenda 21. The Conference also adopted the Barbados Declaration, expressing political will to support BPoA commitments at national, regional, and international levels.

2005: In 2005, the Mauritius Strategy for further implementation of the BPoA was adopted to address remaining gaps in implementation.

2014: In 2014, the global international community convened in Samoa for the Third International Conference on SIDS (Small Island Developing States). It established the SAMOA pathway to chart a sustainable development course for these nations. The pathway acknowledges the detrimental effects of climate change and rising sea levels on SIDS. The SAMOA pathway has the following 5 key objectives:

1. Promoting sustainable economic growth through inclusive economic growth with decent work for all, sustainable consumption and production and sustainable transportation
2. Climate change mitigation and adaptation through the implantation of sustainable energy and disaster risk reduction programs.
3. Biodiversity and environmental health: Managing invasive species, chemicals, water, hazardous waste, and protecting oceans and seas.

¹⁰ <https://ourworldindata.org/grapher/co-emissions-per-capita?time=1988>

¹¹ https://ourworldindata.org/grapher/annual-co2-emissions-per-country?country=~OWID_WRL

4. Human health and social development through increased focus on food security, nutrition, water and sanitation, non-communicable disease reduction and gender equity.
5. Partnerships and goals through the fostering of collaboration among SIDS, UN agencies, development partners and others.

2017: Hurricanes Harvey, Irma, Maria, and Nate in 2017 highlighted the tangible impact of climate change on SIDS, causing devastation to infrastructure, homes, and ecosystems.⁷

VI. Main issues

As climate change is destined to continue over the coming decades, current impacts of it are guaranteed to worsen and be more damaging to the inhabitants of SIDS, both Human and Animal. In addition, over the coming years we will also see an emergence of completely new issues caused by climate change across SIDS around the world.

1. Current Impacts:

a. Sea-level rise:

Because of the release of greenhouse gases over many years, the earth has been becoming warmer. Compared to pre-industrial levels the earth's atmosphere has increased in temperature by about 1 degree celsius. Which already poses many risks, but global temperature is predicted to warm by about 1.5 degrees celsius by 2050 and between 2-4 degrees celsius by 2100, which will only result in more damage and higher sea levels.¹² This is predicted to result in an ocean rise of 26 to 77 cm by 2100 or according to other sources 65 cm by then.^{13 14} This would of course result in widespread flooding across the world but SIDS will definitely get affected the most and are actually already facing many problems surrounding this issue. Sea-level rise has already resulted in habitat contraction, shifts in coastal species' locations, loss of biodiversity and reduction in ecosystem services at many SIDS. This is the most evident to SIDS in the pacific. Some islands have already been completely submerged by the ocean including Kale, Rapita and Rehana in the northern Solomon Islands. Many islands in the region are also experiencing severe erosion due to

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[https://dnr.wisconsin.gov/climatechange/science#:~:text=Since%201880%2C%20average%20global%20temperatures,7.2%20degrees%20Fahrenheit\)%20by%202100.](https://dnr.wisconsin.gov/climatechange/science#:~:text=Since%201880%2C%20average%20global%20temperatures,7.2%20degrees%20Fahrenheit)%20by%202100.)

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<https://www.nationalgeographic.com/environment/article/sea-level-rise-1#:~:text=But%20forecasting%20how%20much%20and,temperatures%20warming%201.5%20%C2%B0C.>

¹⁴ <https://climate.nasa.gov/news/2680/new-study-finds-sea-level-rise-accelerating/>

high sea levels. For instance the islands of Hetaheta and Sogomou also in the northern Solomon islands have experienced 62% and 55% island loss, respectively, having lost a combined 266 600 m² since 1947. On the island of Nautambu, 51% land loss in the village and 50% house loss directly lead to the shoreline receding and has forced the relocation of some communities.¹⁵ Rising sea-levels has also led to more frequent tidal flooding, which is when low-lying coastal areas are inundated during high tides.¹⁶

b. Extreme weather events:

More frequent and more dangerous extreme weather events, such as tropical storms, result in significant impacts in island nations. Examples include hurricanes Irma (2017), Maria (2017), and Dorian (2019), where these extreme storms that rapidly intensified prior to making landfall, resulted in population centres not being able to prepare quickly enough, leading to extensive damage on several Caribbean SIDS. Sea-level rise has also increased the damages caused by coastal flooding from tropical cyclones and storms. This is because of increasing storm surge and incidences of overwash events, flooding reaches farther inland, resulting in much more damage compared to a couple decades ago.

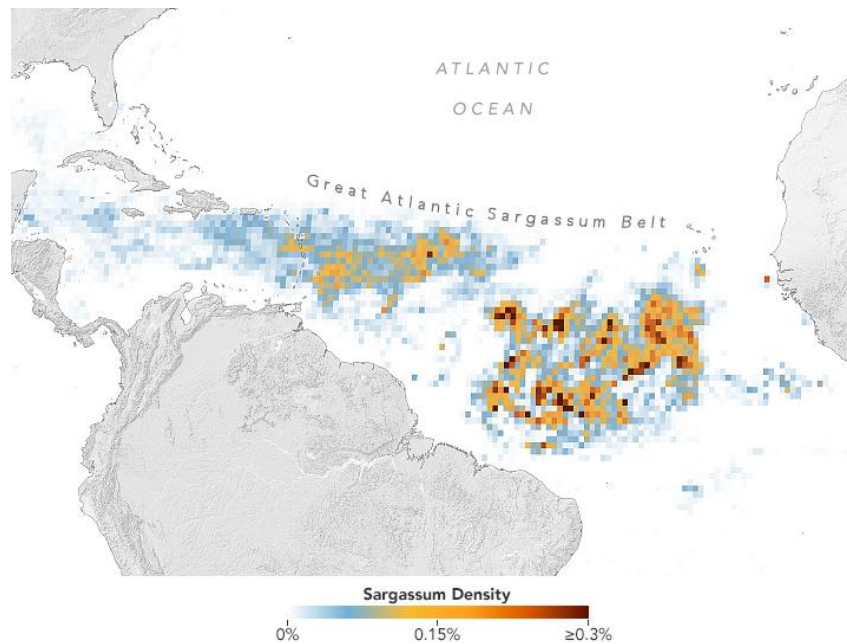
c. Marine heatwaves and ocean acidification:

Marine heatwaves and ocean acidification have led to large-scale coral bleaching events, impacting coral reefs that serve as critical habitats for fish. Coral reef loss has cascading effects on fisheries, with fish becoming scarcer and challenges to fisheries governance. Moreover, increased algal blooms, particularly Sargassum seaweed, negatively affect food security, tourism, local economies, and human health in SIDS. For instance the “Great Atlantic Sargassum Belt” which stretches from off the coast of west Africa to the gulf of Mexico. In March of 2023 scientists measured the amount of Sargassum floating in this area to

¹⁵ <https://iopscience.iop.org/article/10.1088/1748-9326/11/5/054011>

¹⁶ <https://repository.library.noaa.gov/view/noaa/30823>

have been at an all time record.



Sargassum bloom in the Atlantic ocean, March 2023, University of South Florida²

d. Changes to Coastal Wetlands and Ecosystems:

The changes to ocean characteristics including ocean acidification and temperature increases due to climate change, in addition to human activities, have resulted in half of coastal wetlands across the globe being lost. Marine wildlife are also declining in number and have been geographically moving away from the tropics and towards the poles. This has led to drastic changes in ecosystem structure at and around SIDS. These ecosystems include mangrove forests and seagrass which are extremely important to SIDS as they act as carbon stores, prevent coastal erosion, provide protection from extreme sea-level events such as flooding by acting as sponges and support biodiversity.

e. Freshwater availability and droughts:

Many SIDS continue to have the issue of a lack of reliable, safe, sustainable and affordable access to drinking water. An example of this is the water scarcity in Tuvalu where the rising sea levels have led to contaminated groundwater sources (73% of SIDS face groundwater pollution) and extremely limited rainfall caused by climate change have also led to lowered access to safe, clean drinking water.¹⁷ Many Caribbean islands have also experienced water shortages as dry seasons have become longer, average temperatures have increased

and rainy seasons have become shorter. According to UNESCO “71% of SIDS face a risk of water shortage”.¹⁸

2. Future Risks:

a. Increased flooding frequency:

Tropical regions, including small islands, are predicted to experience double the amount of coastal flooding by 2050 compared to now. In addition, extreme sea levels and wave-driven coastal flooding risks are projected to become more common, making some atoll islands (such as Tuvalu) uninhabitable. Flooding will also increase through the tropical cyclones becoming more intense with climate change. This is because although climate change is predicted to decrease the number of total storms, the number of those storms that become intense is expected to increase. This will certainly have the largest impact on SIDS as 6 out of the 10 countries most at risk from a one-in-250 year cyclone are SIDS and as these states are developing and therefore have less resources to rebuild after such extreme weather events.¹⁹

b. Economic Losses:

Economic risks for SIDS (Small Island Developing States) are projected to surpass the global average, with climate change predicted to cause substantial GDP losses. These projections indicate that by 2030, Pacific SIDS may experience average annual losses (AAL) between 0.75%, on the low end, to 6.5%, on the higher end, compared to the global average of 0.5%. In the Caribbean, if no actions are taken to adapt to climate change, damages caused by it are expected to grow from 5% of GDP in 2025 to around 20% of GDP by the end of the century.

Impacts on Tourism, Fisheries and Agriculture:

Coastal tourism, a crucial economic sector for many SIDS, confronts heightened risks due to climate change events including heat waves, storms, and depletion of beach and coral reef assets. The decline of coral reefs has a dual consequence, firstly, coral reefs are crucial to fisheries and therefore the decline of them poses a threat to their livelihoods, and secondly, also puts the tourism sector at risk which heavily relies on them. Agriculture also faces increased risks, including the disruptions to food supply, changes in crop yield and threats to high-value crops due to extreme weather and freshwater stress (mentioned above).

¹⁸ <https://www.unesco.org/en/articles/small-islands-meeting-challenges-freshwater-resilience>

¹⁹ UN-OHRLLS. "Small Island Developing States in Numbers: Climate Change Edition 2015." (2015).

c. Risks to Human Health:

Climate change also poses many significant health risks at SIDS, including an increased prevalence of vector-borne (any living agent that carries and transmits an infectious pathogen)²⁰ diseases, food and water-borne diseases, and undernutrition. Rising average temperatures and more frequent extreme temperatures contribute to adverse health impacts. The susceptibility of low and middle income societies, such as SIDS, is underscored by these health risks. Given these challenges, urgent international cooperation is required in order to create and implement strategies for mitigating climate change's impacts on SIDS, ensuring their resilience and sustainable development in the face of this global crisis.

Overall, there are many issues faced by SIDS due to climate change. Some of these issues are currently being experienced by these islands, but some of these risks have not yet materialised or are not yet being experienced by most SIDS and are therefore predicted risks that may occur in the future if climate change is addressed or stopped.

VIII. Possible solutions

When it comes to solving issues caused by climate change and experienced by Small Island Developing States (SIDS), there are many possible solutions as there are many consequences of climate change. However, one possible solution of course stands out, which is 'simply' solving climate change and global warming. This solution would of course prevent almost all the issues outlined in the 'main issues' section. This solution (Sustainable Development Goal 13)²¹ would also solve all possible future risks from occurring. The problem with this is of course that this is a massive undertaking and is already the heart of many UN (and MUN) debates and is arguably the biggest and most difficult out of all the SDGs. In addition, it is a much larger problem than just SIDS and it is therefore probably not the best way to tackle this specific topic. Apart from solving the core problem, in this case climate change itself, different solutions are to simply address each issue on its own. For example, the issue of increased flooding due to rising sea levels could be mitigated using flood barriers around SIDS at risk. A different solution is to extend beaches by adding sand or rocks, or adding natural infrastructure such as native forests and flora, which both act as natural sponges to absorb excess water. However, both of these solutions have the problem of being extremely expensive and as SIDS are "developing states", meaning they are most likely economically infeasible. Alternatively, these solutions could be acquired using the UN budget, but it would still be an enormous sum. Lastly, these solutions are unsustainable both financially and in terms of protecting these islands as sea-levels will just continue to rise and

²⁰ https://en.wikipedia.org/wiki/Disease_vector

²¹ <https://www.undp.org/sustainable-development-goals/climate-action>

flooding will just continue to happen. Therefore solving this problem is extremely difficult.

Other issues such as the water shortages have simpler solutions, but still cost very large amounts of money. The solution for water shortages on SIDS is to build desalination plants. For instance, in 2012 Australia provided aid to Tuvalu when it was facing water insecurity to provide emergency water and build desalination plants. The problem with this solution is that this aid added up to 1.4 million USD.

Other issues such as ocean acidification are almost impossible to solve on a small scale. Therefore, the only real solution is to solve climate change, but, as mentioned above, this is far from easy/realistic in the context of this topic surrounding SIDS.

Overall, there are many issues caused by climate change, many of which have some form of solution. The only problem is balancing the cost of these solutions and who is going to pay for them.

Bibliography

1. Human development on SIDS:
<https://sustainabledevelopment.un.org/content/documents/27969UNDP.pdf>
2. Seaweed bloom in the Atlantic:
<https://earthobservatory.nasa.gov/images/151188/a-massive-seaweed-bloom-in-the-atlantic>
3. Climate Change and Small Island Developing States:
<https://www.annualreviews.org/doi/10.1146/annurev-environ-012320-083355>
4. Small Island Developing States(SIDS):
https://en.wikipedia.org/wiki/Small_Island_Developing_States#:~:text=The%20Small%20Island%20Developing%20States.share%20similar%20sustainable%20development%20challenges.
5. UN SIDS:
[https://www.un.org/ohrls/content/about-small-island-developing-states#:~:text=Small%20Island%20Developing%20States%20\(SIDS,social%2C%20economic%20and%20environmental%20vulnerabilities.](https://www.un.org/ohrls/content/about-small-island-developing-states#:~:text=Small%20Island%20Developing%20States%20(SIDS,social%2C%20economic%20and%20environmental%20vulnerabilities.)
6. GNI:
<https://www.investopedia.com/terms/g/gross-national-income-gni.asp>
7. HDI:
<https://hdr.undp.org/data-center/human-development-index#/indices/HDI>
8. Development Strategies for SIDS:
https://unctad.org/system/files/non-official-document/aldc2021_sids_4march_backgroud_paper_rev3_en.pdf

9. Solomon Islands Employment and Environmental sustainability fact sheet:
https://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/documents/publication/wcms_627566.pdf
10. Per capita CO₂ emissions:
<https://ourworldindata.org/grapher/co-emissions-per-capita?time=1988>
11. Annual CO₂ emissions:
https://ourworldindata.org/grapher/annual-co2-emissions-per-country?country=~OWID_WRL
12. Climate change:
[https://dnr.wisconsin.gov/climatechange/science#:~:text=Since%201880%2C%20average%20global%20temperatures,7.2%20degrees%20Fahrenheit\)%20by%202100.](https://dnr.wisconsin.gov/climatechange/science#:~:text=Since%201880%2C%20average%20global%20temperatures,7.2%20degrees%20Fahrenheit)%20by%202100.)
13. Sea-level rise:
<https://www.nationalgeographic.com/environment/article/sea-level-rise-1#:~:text=But%20forecasting%20how%20much%20and.temperatures%20warming%201.5%20%C2%B0C.>
14. Sea-level rise:
<https://climate.nasa.gov/news/2680/new-study-finds-sea-level-rise-accelerating/>
15. Sea-level rise:
<https://iopscience.iop.org/article/10.1088/1748-9326/11/5/054011>
16. Sea-level rise and flood frequency:
<https://repository.library.noaa.gov/view/noaa/30823>
17. Water shortages in Tuvalu:
<https://reliefweb.int/report/tuvalu/securing-tuvalu%E2%80%99s-water-supply#:~:text=The%20two%20major%20factors%20leading,state%20of%20emergency%20last%20September.>
18. Water shortages on small islands:
<https://www.unesco.org/en/articles/small-islands-meeting-challenges-freshwater-resilience>
19. UN-OHRLLS. "Small Island Developing States in Numbers: Climate Change Edition 2015." (2015).
20. Disease vector:
https://en.wikipedia.org/wiki/Disease_vector
21. Sustainable Development Goal 13:
<https://www.undp.org/sustainable-development-goals/climate-action>

