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Assessing the Suitability of Countries for Debt-for-Climate Swaps: Creating and Comparing Indices

by

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Abstract: This thesis creates multiple indices to score and rank developing countries with regard to their suitability for engaging in debt-for-climate swaps, and thus identify the most suitable country candidates. The origin of debt-for-climate swaps lies in the 1980s, and after a period of diminished use and attention they have become a topic of discussion again, especially in the last two years. Despite this, there has been little attempt in the literature to systematically identify the countries that are most suitable for such a policy instrument. This thesis builds upon the most serious and detailed attempt, (International Institute for Environment and Development, 2020), by tackling its shortcomings to create some new indices with updated data and methodologies. The findings indicate that countries such as Djibouti, Papua New Guinea, and Mozambique are some of the most suitable countries for debt-for-climate swaps, contrary to the recent focus on SIDS.

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Table of Contents

- 1 Introduction 1**
 - 1.1 Background and Motivation of Topic 1
 - 1.2 Research Problem, Aim, and Motivation 2
 - 1.3 Outline of the Thesis 4
- 2 Literature 5**
 - 2.1 Early History of Debt-for-Climate Swaps 5
 - 2.2 Criticisms 6
 - 2.3 Recent History 8
 - 2.4 Suitability Indices 9
 - 2.4.1 NCI Paper: Climate, Covid, and Debt 10
 - 2.4.2 IIED Paper: Climate, Biodiversity, and Debt 10
- 3 Methodology and Data 13**
 - 3.1 Overarching Methodological Approach 13
 - 3.2 IIED Index Methodology and Data 13
 - 3.3 Alternate Index Methodologies and Data 15
 - 3.4 Limitations 20
- 4 Results and Analysis 21**
 - 4.1 IIED Indices Results 21
 - 4.2 Dual Index Indices Results 23
 - 4.3 Triple Index Results Breakdown 25
 - 4.4 Comparison Between IIED, Dual, and Triple Indices 27
- 6 Conclusion 29**
 - 6.1 Research Aims 29
 - 6.4 Future Research 31
- References 32**
- Appendix A 40**

List of Tables

Table 1: <i>Comparison of the metrics and structure of the data for the four primary indices discussed in this thesis.</i>	16
Table 2: <i>Comparison of original IIED Index with updated and corrected versions.</i>	22
Table 3: <i>Comparison of Dual Index approaches using different climate indicators.</i>	24
Table 4: <i>Breakdown of the scores of the top 20 countries in the Triple Index.</i>	26
Table 5: <i>Comparison of the three primary, new indices presented in this thesis.</i>	28

1 Introduction

1.1 Background and Motivation of Topic

In November 2021, the Central American country of Belize agreed to a debt-for-climate swap with the U.S.-based non-governmental organisation The Nature Conservancy. This agreement entailed The Nature Conservancy lending the money to Belize so that it could buy back its own 'superbond' of \$553 million debt at a discounted price. It managed this by separately issuing \$364 million in bonds with the support of Credit Suisse and the U.S. government's development bank, the International Development Finance Corporation. Although this is a complicated process, the result was that Belize had its external debt reduced by a huge 10% of GDP and also agreed to spend about \$4 million a year on marine conservation until 2041, with an endowment fund of \$23.5 million to last after that (International Monetary Fund, 2022a).

Debt-for-nature swaps have been around since the 1980s, but after a period of falling out of fashion they are now becoming a much-discussed topic once again. Prestigious newspapers are covering them (The Economist, 2021), heads of state and government are calling for them (Climate Change News, 2022), and after much internal conflict the International Monetary Fund is now producing reports on them to analyse their design and implementation (Reuters, 2021b; International Monetary Fund, 2022b). Why now?

It is of course impossible to say, but it seems reasonable to suppose that it has been influenced by the urgency of the particular climate crisis that the world is facing. The concentration of carbon dioxide in the atmosphere in 2019 was higher than at any time in at least the last 2 million years, and the earth is on track to continue this trend, exceeding the Paris Agreement targets of 1.5-2°C, unless very drastic changes are made now. Countries all over the world are experiencing extreme weather events, which many attribute as being at least influenced by global warming, which has been established to increase the frequency and/or intensity of some weather and climate extremes (Intergovernmental Panel on Climate Change, 2021). There appears to be a high general awareness of the climate crisis, and perhaps more awareness of the unequal historical responsibility for emissions between countries around the world (Our World in Data, 2019). Environmental organisations such as Greenpeace (2022) have drawn attention to the global injustice around who is responsible for climate change and who is bearing its impacts. In 2021, lower income countries spent over five times more on external debt payments than projects to protect people from the impacts of climate change (Jubilee Debt Campaign, 2021). At the UNFCCC's COP16 in 2009, developed countries agreed to provide \$100 billion annually by 2020 to developing countries to address their climate needs, which they have struggled to fulfil since (UN Independent Expert Group on Finance 2020). Debt-for-climate swaps were explicitly put forward by some as an alternative

to that \$100 billion fund (Fenton, Wright, Afionis, Paavola, & Huq, 2014). However, establishing a simple ‘loss and damage fund’ at COP26 in 2021, which was seen to involve acknowledgement of responsibility and compensation by developed countries of their role in the climate effects that are now disproportionately besetting developing countries, caused so much trouble that it was postponed (Reuters, 2021a).

There is also the increasingly high levels of debt, especially as a result of the lockdowns and great expenditure that the Covid-19 pandemic caused. This global health crisis led to a 12% increase in the debt of low-income countries alone in 2020, to a record total of \$860 billion, which forced the creation of the Debt Service Suspension Initiative (DSSI) by the G20 to defer payments until the end of 2021 (World Bank, 2021). International Debt Statistics do not yet exist publicly for 2021 and 2022 but the United Nations Conference on Trade and Development has provided preliminary figure which show that the total external debt service of Least Developed Countries, which reached \$31 billion in 2020, has in fact risen to \$50 billion in 2021 (UNCTAD, 2022). And despite worries in the developed world and the impacts of inflation due to factors such as the Covid pandemic and invasion of Ukraine, a stronger value of the US dollar impacts developing countries who have dollar-denominated debt to repay by making them even more expensive (Financial Times, 2022).

Lastly, debt is also all about responsibility and what is owed between people, or peoples. As the developed world begins a new reckoning with its colonial past, which has again built momentum even in the last two years, there is a greater awareness being given to the historical debts owed between countries. 2022 saw the Belgian King express regrets about the country and his ancestor’s violent colonial past in the Congo, while visiting the country (although without an apology) (Reuters, 2022). It also saw an edition of the former Prime Minister of Trinidad and Tobago, Eric Williams’, book ‘Capitalism and Slavery’ in print from a UK publisher again after it was rejected 84 years before. The book argues that the wealth of the British Empire relied immensely on the exploitation of slaves, primarily in the West Indies (The Guardian, 2022). Furthermore, it saw The New York Times (2022) draw attention to the little-known story that after the Haitians won their freedom in a 1791 revolution, their French colonial masters forced them to pay an ‘independence debt’ for generations. Greater explicit attention and consideration being given to these issues, by the developed world especially, brings a country’s modern financial debt relationship with others into a different perspective.

1.2 Research Problem, Aim, and Contribution

These issues all likely feed into the dynamics and subject matter of debt-for-climate swaps in this recent period. However, despite this new attention to, and all this discussion of, these issues, much of the previous research centres on past examples of swaps in practice or theorising how they should operate, and much of it is quite old. What literature does exist more recently tends to be reports by policy research institutions rather than academic scholars publishing in journals. Debt-for-climate swaps are still a niche topic and this thesis seeks to contribute to the relatively small amount of knowledge on them. In particular, it seeks to fill

the gap of exactly which countries are suitable to receive debt-for-climate swaps, for which there is very little systematic knowledge. An up-to-date index which can identify which countries are the most suitable candidates for debt-for-climate swaps can provide great help in steering the possible use of the policy instrument towards actual use by focusing the discussion to a selection of specific contexts, which can then be explored in greater detail.

Therefore, the research question of this thesis is: 1) *Which developing countries are the most suitable candidates for debt-for-climate swaps?*

The aim of this thesis is to provide some answer to this question by creating an index to score and rank developing countries for suitability. There are obviously many different factors which affect suitability, many too context-specific for a general cross-country index to capture, but the aim is to give a broad indication. Considering that the concept the index seeks to measure is so broad, there are numerous possible approaches that could be taken to constructing it – this thesis proceeds by first adopting the methodology of the primary existing index, from IIED (2020). It contributes to this existing research by updating the index with newer data to see how it changes with the first year of the Covid pandemic, as well as correcting a possible but impactful mistake in the manner in which it is scored.

Thus, there is a sub research question of: 1.1) *How has the Covid-19 pandemic changed which developing countries are the most suitable candidates for debt-for-climate swaps?*

It then develops alternate methodologies for assessing country suitability for swaps and compares the results to see how this changes suitability and find the best overall approach. This contributes to the literature by providing a much more thorough investigation of cross-country suitability and index approaches than could be found already published.

Thus, there is a final sub research question of: 1.2) *Which index methodology to assess the suitability of developing countries as candidates for debt-for-climate swaps is the best overall?*

It should be clearly noted that whether debt-for-climate swaps have worked well in the past or should be pursued in the future is considered largely irrelevant to this thesis. The objective is merely to contribute to the literature and provide an informative guidance for policymakers and future research. As a first step to knowing whether or not they are an effective or appropriate tool for a country, it is helpful to know which countries they are most likely to be an option for.

1.3 Outline of the Thesis

Following this Introduction, this thesis begins with Part II: Literature which gives a deeper explanation of debt-for-climate swaps, their history and criticisms of them, and the overall extent of the literature that exists on them. It also introduces the IIED (2020) paper and some criticisms of it, including a potential mistake. In Part III: Methodology and Data, this thesis covers the IIED methodology and datasets in more detail, and then the changes that are made in updating and correcting both. It subsequently covers the alternate index methodologies created for this thesis to assess a country's suitability for debt-for-climate swaps and the data they utilise. In Part IV: Analysis, the results from these indices are presented and analysed, comparing them with other findings and each other and seeking to explain them. Finally, Part V: Conclusion concludes with the extent to which the research questions were answered and where the thesis leaves future research.

2 Literature

2.1 Early History of Debt-for-Climate Swaps

Debt-for-climate swaps come in many different forms based on the type of financial tools employed and the conditions attached. In essence they are a variation of debt-for-equity swaps – more particularly they are in fact debt-for-expenditure swaps where the expenditure is conditionally tied to the environment, i.e. a country's debt is reduced or cancelled in exchange for its commitment to some environmental expenditure. It can be seen as a win-win-win for firstly the debtor country, who gets their debt reduced and the additionality of climate investment that would not have occurred otherwise, for the creditor who gets a potentially unsustainable debt managed and taken off its books while being able to claim its contribution to climate action, and for the planet and nature, which gets greater investment in its protection and conservation. It is important to note that this is not conceived on the basis that the two issues are causally linked; while it may be the case the efforts to repay debt by developing countries have led to greater environmental destruction (Sarkar & Ebbs, 1992), the tool simply aims to solve “twin problems” in a way that promotes more than either of just the individual parties' own interests (Lachman, 1989, p.142) or to “kill two birds with one stone” (Essers, Cassimon & Prowse, 2021).

Debt-for-*nature* swaps as an explicit concept have only really been around since about the 1980s (Cassimon, Prowse, & Essers, 2011). In 1984, Thomas Lovejoy, Vice President for Science of the World Wildlife Fund, wrote an opinion piece in *The New York Times* proposing a new twist on debt-for-equity swaps that would preserve undeveloped lands in developing countries in return for debt reductions (Thapa, 1998). The first debt-for-nature swap appears to be generally regarded as having occurred in Bolivia just three years later in 1987 (Hamlin, 1989; Hansen, 1989; Deacon & Murphy, 1997; Thapa, 1998; Cassimon, Prowse, & Essers, 2011). The US-based non-governmental organisation Conservation International agreed to cancel \$650000 of Bolivia's foreign debt in exchange for \$100000 worth of local currency being invested in the Beni Biosphere Reserve within the Amazon Basin (Thapa, 1998). This first debt-for-nature swap provides a strong warning about the policy instrument in that it resulted in a significant contribution to conservation efforts in Bolivia but a reduction of its foreign debt by less than 1% (Hansen, 1989), and also resulted in disagreement and dissatisfaction between both parties (Deacon & Murphy, 1997).

Over the following year, the World Wildlife Fund negotiated debt-for-nature swaps with Ecuador, Costa Rica, and the Philippines, reducing debt in return for protecting nature (in particular, forests) (Hamlin, 1989). The fact that debt-for-climate swaps date to this period is not that surprising considering the high debt levels in the Global South beginning in the 1970s (Sachs, 1982) and building in the 1980s with the 1982 Debt Crisis (Kaminsky & Pereria,

1994). After the debt crisis, the development of a secondary market for commercial debt, where debt was traded and sold at discounted rates, reflected the growing concern that debt was not worth its face value. It also presented the opportunity for third parties to purchase and then cancel some of a country's debt in exchange for conditional environmental expenditure, without which most of the early swaps would not have been possible or viable (Bedarff, Holznagel & Jakobeit, 1989). It is also not surprising that they began in Latin America, which was the part of the world hit most with high debt burdens in this period as its once-promising development progress began to stall (Dornbusch, 1985). Furthermore, it is not surprising as this was also the period when environmentalist movements and science began to build, from the founding of the United Nations Environment Programme in 1972 to the founding of the Intergovernmental Panel on Climate Change (IPCC) in 1988 (United Nations Environment Programme, 2022). From this confluence of debt and the environment as pressing issues, debt-for-nature swaps were born.

Not only were they born conceptually, but they took off in practice too – between 1987 and 1997 debt-for-nature swaps accounted for \$134 million worth of *commercial* debt in developing countries (Cassimon, Prowse, & Essers, 2011). They were 'private' swaps in that they were negotiated and funded by private, international organisations who focused on conservation, such as Conservation International, The Nature Conservancy, and the WWF. While *public* swaps between governments did occur, including Sweden, they were much rarer (Deacon & Murphy, 1997). When the Paris Club – a group of most of the world's developed countries created for collectively restructuring debt – permitted their usage in 1991 this opened some new doors (Cassimon, Prowse, & Essers, 2011). In 1992, one of the largest debt-for-nature swaps was made when the Paris Club agreed to forgive half of Poland's \$32 billion debt, which was unsustainably high after the fall of the U.S.S.R., and the EcoFund was established to disburse the money as environmental investments (Buckley, 2009). After having passed two debt-for-nature related pieces of legislation in 1989 and 1991, the U.S. passed the Tropical Forest Conservation Act in 1998 which allowed developing countries with a lot of rainforest cover to reduce some of their debt to the U.S. in exchange for protecting that rainforest (Lewis, 1999). By 1997, there had been about 46 separate debt-for-nature swaps (Thapa, 1998) involving at least 19 different developing countries as diverse as Costa Rica, the Philippines, Nigeria, and Poland (Deacon and Murphy, 1997), and by 2003 the value of all swaps was estimated to have reached over \$1 billion (Buckley, 2009).

2.2 Criticisms

Even at the very beginning, though, researchers were aware of the problems and concerns around swaps. The World Bank itself produced a report in just 1988 which expressed concern about some issues, including skewing local development decisions inappropriately, undermining their own credit rating system, and inflationary pressures (Sarkar & Ebbs, 1992). Inflationary concerns were probably the primary economic problem put forward in the literature, due to the issuance of relatively large amounts of local currency for the environmental investment (Bedarff, Holznagel & Jakobeit, 1989). In the Costa Rican swap, a bond was established as the means of issuing the money for climate investment and the

payments from it were planned to coincide with necessary spending for the environmental action in order to minimise inflationary effects. When debt-for-nature swaps concern small amounts of money, their inflationary impact is also likely to be small; however, this is an obstacle to any potential large-scale implementation (Sarkar & Ebbs, 1992).

As well as inflation, Lewis (1998) identifies three other concerns put forward in the literature: national sovereignty, indigenous sovereignty, and enforceability. These three are interrelated. The biggest of these, at least among developing countries early on, was over national sovereignty and the possibility that swaps could lead to “a new ecological colonial system” (Bedarff, Holznagel & Jakobeit, 1989, p.446), “eco-colonialism” (Alagriri, 1992, p.501), or “eco-imperialism” (Sadler, 1990, p.336). For example, Jose Sarney, the former President of Brazil, explicitly characterized the swaps as unacceptable forms of ‘colonialism’ (Minzi, 1993). This was probably greatly influenced by the type of nature that was a concern in environmentalism at the time – forest. Both Hamlin (1989) and Sarkar and Ebbs (1992) describes the two problems that motivate debt-for-climate swaps as being excessive debt and specifically the destruction of tropical rainforest. This environmental concern came from the apparent realisation that, through its industrialisation, the developed world had destroyed its natural environment, but it now realised the value and importance of nature and so required developing countries to conserve and preserve theirs (Hansen, 1989). Concern over national sovereignty was likely in part due to the emphasis on rainforest and hence on *land*, and also to false reporting of that first debt-for-nature swap in Bolivia which claimed that the American NGO Conservation International now owned the nature reserve. However, even though this was not true, it was true that the indigenous peoples of the area were disregarded during the entire swap process – not even consulted. They had in fact been attempting to obtain the land titles to the reserve themselves, and were negatively impacted by the conditions attached to swap which prohibited many traditional activities. Thus, concerns over indigenous sovereignty were also continually raised (Knicley, 2009). The flip-side to sovereignty concerns among developing countries and indigenous peoples were the concerns of the party cancelling the debt that they would not be able to enforce the environmental expenditure conditions on the debtor if it fails to adhere to them (Bedarff, Holznagel & Jakobeit, 1989). The Bolivian swap did not actually include an arbitration clause and so there was little that Conservation International could do if the country repudiated or even delayed (Minzi, 1993; Hrynik, 1990). Relations such as this one, and many of the other debt-for-nature swaps which also involved Latin American countries and US-based NGOs, were made more problematic by the prior and contemporary history of the US interfering in Latin American domestic affairs. Resolving the conflict between the concern of developing countries over environmental colonialism and the more developed world’s concerns over enforcing environmental conditions was a key part of debt-for-nature swaps (Hamlin, 1989). When public swaps between governments, bilaterally such as Costa Rica and the Netherlands, or multilaterally involving the Paris Club and Poland, began to occur – sometimes referred to as the second generation of swaps – enforcement terms were made explicit and the developed countries often had veto powers over expenditure (Deacon & Murphy, 1997).

It is important to note that at each stage in their development, debt-for-nature swaps attempted to tackle these criticisms and improve. After the worries fuelled by the false reports of Conservation International gaining ownership of the nature reserve land, the second ever swap, in Ecuador, included local NGOs in major decisions over which projects would be

funded and third ever swap, in Costa Rica, gave the money directly to local NGOs to decide what to do with themselves. No inflationary effects have been tied to swaps, perhaps because they have tended to be relatively small amounts of investment, nor have there been major problems with enforcement. While indigenous peoples were better included in the swaps in the Philippines and Madagascar, there was not much overall improvement in this regard, however (Lewis, 1998; Knicley, 2012).

Finally, many scholars agree that debt-for-nature swaps have been more beneficial for environmental action than for tackling debt (Sarkar & Ebbs, 1992; Deacon & Murphy, 1997; Lewis, 1999; Thapa, 1998). This is because the amount of investment in environmental action is relatively large compared to the counterfactual situation of if there had been no swap, whereas the debt reduction usually is only a very small fraction of a country's total debt. This does not mean that they are a failure, conceptually or in practice so far, but rather that any hopes of them making large gains in tackling the debt or environmental crises would require swaps to be dramatically scaled up, which has not been tried and would amplify and introduce some problems (Sarkar & Ebbs, 1992).

2.3 Recent History

Around the turn of the of the millennium debt-for-nature swaps of any type became much rarer. This was probably in part due to the criticisms of them and in part due to the general rise in the prices on the secondary market for debt, as well as the movement towards more structured and comprehensive global programmes for debt relief and management (Essers, Cassimon & Prowse, 2011). Unsurprisingly, the quantity of literature on them appears to have reduced too, after having exploded into existence in the late 1980s and early 1990s. Despite all this, debt-for-nature swaps have still continued to persist as a concept and policy solution, especially in the last ten years, as awareness of the climate crisis has risen, in the specific form of debt-for-*climate* swaps. In 2009, the US and Indonesia agreed one that cancelled \$30 billion worth of debt for committing to spend to protect Sumatra's rainforests (Cassimon, Prowse, & Essers, 2011). In 2012, a swap was put into practice between Antigua and Barbuda and Brazil, and in 2018 between Seychelles and the Paris Club along with South Africa. Together these amounted to \$48 million (IGSD, 2020).

Whereas much of the early focus of debt-for-climate swaps was on Latin America, a fair amount of the recent debt-for-climate swap literature centres on examining these new countries as case studies and drawing lessons from them, or simply highlighting the potential role of swaps in other Caribbean or generally Small Island Developing States (SIDS) (Charles, 2022; Alleyne & Pantin, 2022; Piemonte, 2021; Silver & Campbell, 2018; Rambarran, 2018, Fuller, Zamarioli, Kretschmer, Thomas & De Marez, 2018). The reason for this is because they are generally regarded as one of the most vulnerable habitats to climate change and many of them are also viewed to bear high levels of debt (Piemonte, 2021). Alternatively, others have put the focus onto China and its modern role as a creditor to developing countries, especially through its Belt and Road Initiative, and the particular issues

and potential around it as a creditor and climate leader (Simmons, Ray, Yang & Gallagher, 2021; Yue & Wang, 2021).

The legacy of debt-for-nature swaps and the fact that swaps still have been periodically occurring means that they have also been periodically returned to again and again in reports as a possible policy instrument by major international institutions. In 2007, the Organisation for Economic Cooperation and Development (OECD) produced a report on lessons learned from debt swaps thusfar (OECD, 2007). In 2009, the Commonwealth Secretariat and Organisation Internationale de la Francophonie collaborated on a report at the request of the Government of Guyana investigating debt relief to combat climate change (Development Finance International, 2009). In 2010, the United Nations Development Programme published a discussion paper on debt sustainability and the Millennium Development Goals in SIDS, in particular the Maldives, and explored the potential of debt-for-climate swaps (UNDP, 2010). In 2015 and 2016, the Commonwealth Secretariat, on its own this time, published two discussion papers outlining a debt-for-climate scheme for Commonwealth small states, exploring the reasoning behind it and features of how it would operate in practice (Commonwealth Secretariat, 2015; 2016). The legacy of debt-for-nature swaps in Latin America means that they have continually been a policy instrument that is in discussion, or even use, by the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) (UNECLAC, 2020), and in 2021 the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) explored the topic of debt-for-climate swaps for Asian SIDS (UNESCAP, 2022). Finally, the International Monetary Fund itself has also just released a working paper examining past performances and investigating best design and implementation practices for debt-for-climate swaps (IMF, 2022b). This all shows how debt-for-climate swaps have remained a policy instrument that important international institutions have continued to explore in the last fifteen years.

They have also been continually brought back, explored, and advocated for by policy and research institutions, most especially in the last two years (Boston University Global Development Policy Center, 2022; European Centre for Development Policy Management, 2022; African Forum and Network on Debt and Development, 2022; Think7, 2020; IGSD, 2020; Heinrich Böll Stiftung, 2020). Political groups are also an important part of this research, driving it and drawing from it, and a part of the attention and discussion that has been devoted to the topic of debt-for-climate swaps. For example, the Vulnerable Twenty (V20) Group of Ministers of Finance issued a statement ahead of the UN Framework on Climate Change Convention meeting in 2021 which called for a major restructuring of debt which would be “a sort of grand-scale climate-debt swap where the debts and debt servicing of developing countries are reduced on the basis of their own plans to achieve climate resilience and prosperity” (V20, 2021, p.2).

2.4 Suitability Indices

It should be clear from the dates of the works cited in this section that debt-for-climate swaps have been undergoing a ‘moment’ for the last little while, but especially the last two years.

However, aside from the work on SIDS and China, little of it has been academic. It has also mostly focused on exploring the history of them and examining how swaps should be performed, based on theory and past examples, including the various forms they can take and the parties who tend to be involved. Despite these general calls, by research and policy institutes, in the media, and by political actors, there is little concrete understanding of which specific countries are actually suitable right now for debt-for-climate swaps. This would be very helpful in order to ascertain on a more granular level which countries are in a prime position to explore this policy, and to establish a next step to this discussion by supplying a group of top candidates whose debt and climate situation can be explored in more detail. Aside from some limited attempts by the Commonwealth Secretariat (2015), there only appears to be two papers to have explored actual indicators of countries around the world and identified which countries, if any, have the conditions necessary for debt-for-climate swaps to be suitable. Both of these two are by research policy institutes: New Climate Institute (NCI), and the International Institute for Environment and Development (IIED).

2.4.1 NCI Paper: Climate, Covid, and Debt

The NCI paper (2021) initially creates a simple longlist of heavily indebted poor countries, least developed countries, or countries that qualify for debt relief mechanisms. Then, they create indices that evaluate countries in four component areas consisting of governance, climate ambition, emissions, economy. The top priority candidate countries they identify are predominantly SIDS: Dominica, Granada, Samoa, St. Vincent and the Grenadines, and Tonga; as well as Bhutan and Rwanda (NCI, 2021). However, the use of an emissions component – composed of an indicator for per capita carbon emissions, proven fossil resources, planned or operating fossil fuel infrastructure, and an electricity emission factor – is very strange. Most developing countries, and especially SIDS, contribute very few carbon emissions relative to the rest of the world, currently and historically (Our World in Data, 2019). The understandable manner in which this intention could have been approached might have been instead to prioritise countries for their ability to act as natural carbon sinks due to forest cover, in which case the climate investment part of the debt-for-climate swap would be helping to mitigate climate change. However, mitigation – as opposed to adaptation (actions taken in response to the current or future effects of climate change) or biodiversity protection – seems to make less sense in this context. Additionally, although tables of the scores for each indicator and component area are included in the Annex, no overall index is made so it is relatively difficult to sift through and compare countries or understand the overall ranking (NCI, 2021). The IIED Index provides a better option and greatly influenced the basis of the methodology of this thesis.

2.4.2 IIED Paper: Climate, Biodiversity, and Debt

The International Institute for Environment and Development (IIED) Issue Paper entitled “Tackling the Triple Crisis: Using debt swaps to address debt, climate and nature loss post-COVID-19” (2020) was co-authored by Paul Steele, Chief Economist at IIED, and Sejal Patel. The 48-page report provides an overview of the current triple crisis situation of debt,

climate, and biodiversity loss, explores the possible advantages of debt-for-climate swaps in such a situation, and then tackles some of the problems that their implementation would face. It provides certainly one of the most focused and recent explorations of the possible policy instrument, but probably also the most thorough and detailed attempt to measure which countries are the most suitable for debt-for-climate swaps through the creation of an index.

The IIED index is composed of four components: i) climate vulnerability and risk, ii) biodiversity richness, iii) indebtedness, and iv) creditworthiness. Countries are ranked on each area based on their respective indicator and then given a score, which is totalled up to provide an overall score. Sorting countries by their overall score creates a “ranking of priority countries” (IIED, 2020, p.32) for debt-for-climate swaps. The index provides a hugely useful indication of which countries are the most important and relevant to the discussion of debt-for-climate swaps, with a much more thorough, global, and evidence-based approach than had previously been done. The authors do not appear to believe that the index is a definitive prescription, but rather state in a note in Annex 1 that the index merely provides “an indication of which countries” should be prioritized, or alternatively a “guidance”, and that “country context and other country specific factors” are also important (IIED, 2020, p.36).

Nonetheless, there are quite some limitations to the paper and index as they stand currently and their ability to provide a trustworthy and reliable indication of country prioritization. This thesis notes at least five ways in which the IIED paper and index could be improved upon: i) the scoring system, ii) a balanced dataset, iii) the sample size, iv) different indicators, and v) different component areas. These points are more technical and will be discussed mostly in the next section, Methodology and Data. However, the most obvious and important limitations are worth mentioning here and play a large role in motivating this thesis to revisit the index.

In general, there just appears to be plenty more depth and discussion that could have been devoted to the index within the paper and to the decisions taken in its creation. Regarding the scoring system, the paper lists 67 countries that scored between 10 and the maximum of 16 in the index – many of these countries thus receiving matching scores and being sorted alphabetically (for example, both Cabo Verde and Vietnam received a 15 but Cabo Verde is listed first because ‘C’ comes before ‘V’ in the alphabet). At about a third of the world’s countries, this is a large number to score so highly and a lot of countries to receive matching scores. Although the index is only meant as an indication, this scoring system risks it being too broad an indication altogether that provides hardly any differentiation or prioritization. The top 14 countries in the index are presented in the text on pages 25-26 in Chapter 3 with just a revisiting of the eligibility criteria, but the results themselves of the index and which countries top the rankings in the end are not even discussed (IIED, 2020).

Regarding the different index indicators, the authors provide no real discussion of the limitations of the data or indicators or the implications of their selection as a group in terms of balance or overlap, simply stating that they are “the closest match to what we are trying to measure” and that “there are limitations to what the indices capture” (IIED, 2020, p.25). In relation to the different index components, in Chapter 1 the authors provide background and evidence on why each of the four components – climate vulnerability, biodiversity richness, indebtedness, and creditworthiness – are separately important and introduce the indicators for

each, but they write very little of any *particular* motivation for the inclusion of these four areas as against any others, or fewer ones.

Choosing the component areas of the index is an important aspect in the decision-making which hopefully was given a fair amount of thought even if is not explicated in the paper itself. Probably the most explicit statement that they make argues that “countries at the intersection of indebtedness, climate vulnerability, biodiversity loss and limited access to credit would benefit most from debt for climate and nature programme swaps” (IIED, 2020, p.14). However, if this is the case, it seems to imply an error in the scoring method which would undermine the IIED index’s ability to be trusted as even a broad guidance. In all cases – the measurement of the four indicators, the score for each component area, and in the overall score – a higher value is taken to indicate that a country is relatively more suitable for a debt-for-climate swap (see Table A2 in Annex A (IIED, 2020, p.36)). But, in the case of creditworthiness (which is the term the authors consistently use to refer to this component area including in the title of Section 1.4 and in the indicator’s respective column in the overall index), countries are thus rewarded for having high creditworthiness scores, which is the exact opposite of prioritizing them for having “limited access to credit”, from the quote above. Scoring the index in this way could likely also unfairly punish countries who have poor creditworthiness due to internal conflict or natural or humanitarian disasters, including climate-related ones. It is difficult to know whether this is an error in the scoring or a misstatement in the quote, but it seems more reasonable to indeed prioritize countries for debt-for-climate swaps, i.e. debt forgiveness in exchange for investing that sum in climate and biodiversity actions, when those countries already have limited access to credit for such investments. In this case, the result would be that it is an error in the scoring system and one quarter of the index is scored in reverse. The authors note that the paper was reviewed by a colleague in the IIED and an anonymous, independent reviewer, as well as received comments from two other IIED colleagues (IIED, 2020, p.2). Ultimately, this shows that as well as there being little literature in general on debt-for-climate swaps, even the paper that has probably contributed the most in recent years has many limitations that warrant further exploration of the topic.

3 Methodology and Data

3.1 Overarching Methodological Approach

This thesis uses a descriptive quantitative methodology to create and compare indices to rank the suitability of countries for debt-for-climate swaps. There are many ways in which such an index could be approached and constructed, and these options could greatly affect the results achieved, and so this thesis proceeds with a method that constructs some of these options and explores their various implications. There are three primary indices created in this thesis: i) IIED Index 2.0, an updated version of the index from IIED (2020) with the creditworthiness score reversed, ii) Dual Index WRI, a simple, two-component index measuring each country's *ability to handle* its debt and respond to extreme climate events, and iii), Triple Index, a three-component index that measures a country's debt, exposure to extreme climate events, and its human development. Three variations are also produced: the IIED Index with updated data but the creditworthiness scoring kept the same as in the 2020 paper, and the Dual Index with two alternate measures of ability to handle the impacts of climate change as a robustness check. The specific methodologies in the construction of each index, and the data used, are described in the rest of this section.

3.2 IIED Index Methodology and Data

This thesis firstly copies this IIED index methodology and data sources but using updated data where it is available, to see how the situation might have changed with recent developments – most particularly the effects of the Covid-19 pandemic on indebtedness. Since the IIED index is probably the most thorough and detailed attempt to measure which countries are the most suitable for debt-for-climate swaps, its methodology provides an important guide, in the senses of both what to do and what not to do, for the approach used in this thesis. Although there may be some problems with the IIED methodology, it is still broadly useful and it is interesting to be able to compare how the same index changes with more recent data which better reflects the present situation.

It assesses countries in four areas, and then groups them into quartiles to assign each country a value of 1-4 in each of these four areas depending on their performance relative to each other. These four values are then summed up into one overall score with a range of 4-16, and the countries are then ranked into the index with a higher score meaning that a country is a relatively better candidate for a debt-for-climate swap. The four components again are i) climate vulnerability and risk, ii) biodiversity richness, iii) indebtedness, and iv) creditworthiness. For example, the top country, Cabo Verde, received a 4 in climate

vulnerability, a 3 in biodiversity richness, a 4 in indebtedness, and a 4 in creditworthiness, which means that it achieved a total score of 15. The different indicators for these components are explained in Annex 2 of the paper (IIED, 2020).

Climate vulnerability and risk are measured using the World Risk Index as created by Bündnis Entwicklung Hilft, the German Development Aid Alliance. The WRI seeks to assess the global risk of disasters and covers 181 countries. Despite its broad name, the index focuses specifically on natural disasters – earthquakes, cyclones, floods, droughts, and sea-level rise – and so acts rather well as a measure more specifically of risk to countries due to extreme climate events made more common by climate change. It is made up of two distinct parts – exposure to risk, which relates to geophysical factors, and vulnerability, which relates to social, developmental, or institutional factors. The WRI index is in fact quite complicated in its composition, consisting of almost thirty different indicators, and its scale is not so easily understood, with countries ranging in 2021 from 0.3 to 47.7 (Bündnis Entwicklung Hilft, 2021).

Biodiversity richness is measured using the Benefits Index for Biodiversity developed by the Global Environment Facility (GEF). This index is designed to quantify the potential global benefits that can be realized from biodiversity related activities in each country. It was created as a method of ranking countries' achievements in meeting the objectives of the GEF, which is the financial mechanism for the Convention on Biological Diversity (CBD). It consists of a terrestrial and a marine measure of biodiversity, weighted differently. The terrestrial indicator is itself composed of four components, concerning represented and threatened species and ecoregions, and the marine measure very simply of represented fish species. As such a consequential global quantifier of biodiversity, the GEF Benefits Index for Biodiversity was developed in conjunction with a number of important groups such as the IUCN, WWF, Birdlife International, and the World Bank (Global Environment Facility, 2005a). Similarly to the WRI, the GEF Index does not have an easy scale, ranging from 1 to 570 (Global Environment Facility, 2008).

Indebtedness is measured using World Bank data on total external debt stocks, expressed as a percentage of GNI. Total external debt is debt owed to parties outside of the relevant country, and is the sum of all public, publicly guaranteed, and private non-guaranteed long-term debt, short-term debt, and use of IMF credit. GNI is of course the Gross National Income which consists of the sum of all value added by *residents* as well as net receipts of primary income from outside the country. This indicator is part of the World Bank's International Debt Statistics database, and as a percentage it presents a more intuitive grasp of the extent of a country's debt (World Bank Group, 2022a).

Lastly, creditworthiness is also measured using a World Bank indicator: the IDA (International Development Assistance) Resource Allocation Index, known as the IRAI (World Bank Group, 2022b). The World Bank performs Country Policy and Institutional Assessments (CPIA) annually, examining sixteen criteria in four areas: i) economic management, ii) structural policies, iii) policies for social inclusion and equity, and iv) public sector management and institutions. The overall score a country receives in this index assessment is referred to as the IRAI, which plays an important part in determining the development assistance available to countries from the World Bank. This index consequently

only exists for countries that the World Bank considers eligible for IDA, and helpfully ranges from 1 to 6 (World Bank Group, 2022c).

The original IIED index relied upon total external debt stocks from 2018, and the IRAI and WRI from 2019; this thesis recreates it with the most recent data available: total external debt stocks and the IRAI from 2020, and the WRI from 2021. The original IIED index also used the GEF data from 2008 presumably because the authors could not find any better biodiversity data that was more recent. Since the data was so old anyway, it is perhaps not surprising that it has still not been updated in the two years since the IIED paper, and perhaps it has been abandoned. However, the data nonetheless listed in the 2008 index do not in fact match the data used in the IIED paper (Global Environment Facility, 2008; IIED, 2020). The only source from the Global Environment Facility cited in the paper appears to be a technical note that does not contain the index (Global Environment Facility, 2005b). This is very strange but, with no access to the data used in the IIED paper, nor to more recent data, the GEF index was recreated with the data that was available in that 2008 paper. The first debt-for-climate index presented in this thesis, then, is the ‘IIED Index New Data’ which utilises the same methodology and data sources but with newer datasets.

The IIED index’s potential problem concerning the scoring of its creditworthiness component was previously described. Since the justification for including the creditworthiness component and its indicator are uncertain, it is difficult to know how to judge the situation. This thesis proceeds on the assumption that it is more relevant to any debt-for-climate index to prioritize countries with limited access to credit and so creates a version of the index, referred to as ‘IIED Index 2.0’, which includes the newer data but also reverses the creditworthiness scoring system.

3.3 Alternate Index Methodologies and Data

Table 1 below provides a useful breakdown of the structural and data differences between the three primary new indices and the original IIED index from the 2020 paper to guide the following descriptions. As mentioned before, there are at least five ways in which the IIED paper and index could be improved upon in further research: the scoring system, a balanced dataset, the sample size, different indicators, and different component areas. The following indices seek to improve upon the IIED approach with regard to these factors.

Ultimately, this thesis operates under the framework that there are really only two important aspects to an index for suitability of debt-for-climate swaps: a country’s relationship with debt, and its relationship with climate change. This is perhaps somewhat obvious given the name but, as described in Part 2, debt-for-climate swaps were originally created as debt-for-nature swaps, and IIED (2020) considers the biodiversity crisis to be the third crisis motivating the use of swaps at the moment, after the debt and climate crises. However, in the United Nations the biodiversity crisis is actually considered to be one of three *environmental* crises, along with the climate and pollution emergencies (United Nations Environment Programme, 2021). It was considered to find an indicator for each of these three

TABLE 1: Comparison of the metrics and structure of the data for the four primary indices discussed in this thesis.

Sources: IIED (2020); own research

	IIED Index Original	IIED Index 2.0	Dual Index WRI [ND-GAIN] {CRI}	Triple Index
Number of Countries	67*	81	60 [62] {59}	116
Fully Balanced	No	No	Yes	Yes
Scoring System	16	16	8	300
Indicators	World Risk Index 2019 GEF Benefits Index for Biodiversity 2008 World Bank Total external debt stocks % of GNI 2018 World Bank IRAI IDA resource allocation index 2019	World Risk Index 2021 GEF Benefits Index for Biodiversity 2008 (alternate) World Bank Total external debt stocks % of GNI 2020 World Bank IRAI IDA resource allocation index 2020**	World Risk Index 2021 Joint Bank-Fund Debt Sustainability Analyses 2022*** [ND Global Adaptation Initiative Index 2020] {Global Climate Risk Index 2021}	World Risk Index 2021 (Exposure only) Human Development Index 2019 World Bank Total external debt stocks % of GNI 2020
Component Areas	Climate (ability) Biodiversity Indebtedness Credit-worthiness	Climate (ability) Biodiversity Indebtedness Credit-worthiness	Climate (ability) Indebtedness (sustainability)	Climate (risk) Indebtedness Development

**No total number is given in IIED (2020) for how many countries were included in the index, but 67 is the number of countries in Annex 1 since all achieved above a score of 10.*

***Data from 2013, 2015, and 2019 had to be used for 9 countries. IIED (2020) also had to do this for 9 countries, although a slightly different set. The countries recorded with older data in this index are Angola, Armenia, Bosnia and Herzegovina, Georgia, and India (2013), Bolivia and Vietnam (2015), and Sri Lanka and Mongolia (2019).*

****Debt Sustainability Analyses also vary from 2019-2022 due to their collection.*

environmental factors to include in the index, but the only good data that could be found available at country-by-country level for pollution was for air pollution (Health Effects Institute, 2020). This would be quite a narrow indicator for a crisis that concerns not only air but all types of chemical pollution as well (United Nations Environment Programme, 2021). The GEF Benefits for Biodiversity Index data used in the IIED index is of course from 2008 in any case, could not be matched from the GEF report and the IIED paper, and biases towards countries with larger areas. Again, alternatives for a biodiversity indicator were explored, such as the Red List Index, which shows trends in overall extinction risk for species at a country level (United Nations Department of Economic and Social Affairs, 2022). Although available more recently, this data is of course also biased by land area. It was decided that the alternate indices created for this thesis would focus solely on climate change, rather than any broader environmental metrics. This is partly because of the awkward unsuitability of the format or narrow focus of much of the data available. It is also partly because of the extreme impacts of climate change already taking place in the Global South and the Global North's predominant role in causing it, as outlined in Part 1, which is more specific to climate change than biodiversity or pollution. And it is also of course partly to remain true to the 'debt-for-climate' term.

The climate component remains in all indices created in this thesis, although other indicators were also used. As outlined above, the Bündnis Entwicklung Hilft's World Risk Index is very comprehensive, easy to use, and in particular measures a country's exposure or vulnerability to extreme climate events rather than a simple geophysical or environmental science indicator as many environmental ones are. Nonetheless, for the sake of robustness and to compare how substituting alternate sources of a similarly good quality would affect the result, two other indicators were used. The first is the Notre Dame Global Adaptation Index (ND-GAIN) which summarizes a country's vulnerability to climate change and other global challenges as well as its readiness to improve its resilience. Similarly to the WRI, it is composed of two parts, one measuring vulnerability and relating more to actual geophysical aspects, and the second measuring readiness and relating more to social and institutional aspects. It is composed of 45 different indicators, made up of 75 variables, and covers 182 countries. It is also helpfully measured a scale from 1-100 (Notre Dame Global Adaptation Initiative, 2022b). The second alternate climate indicator is Germanwatch's Global Climate Risk Index (CRI) which indicates a country's level of exposure and vulnerability to extreme climate events. It exists for 180 countries and has four components, measuring fatalities and economic losses from extreme natural weather events, and accounting for differences in population and GDP. It does not appear to have a specific scale, with a range of 2.67 to 188 in the dataset (Germanwatch, 2021). Unlike the others it does not include an aspect measuring a country's ability to respond to these events.

On the presumption that creditworthiness was included in the IIED index in order to prioritize countries with limited access to credit, it does contribute positively to the index on the basis that this is a reasonable criterion for prioritization and it does bear a relevance to a country's ability to access credit for climate investment. Nonetheless, the condition does not seem as important as the two main aspects of debt and climate, and since it was covered in the IIED Index 2.0 it was decided to create the alternate indices without it. While the final component of the IIED index, total external debt stocks, especially when expressed as a percentage of GNI, do present a great indicator to compare across countries, it is still true that some countries can manage a higher percentage of debt without it being a major problem. In order to account for this, and to recapture some of what the creditworthiness component attempted to measure, the Dual Indices all use an indicator for *unsustainable* debt. This similarly highlights countries that most badly need the money or most badly need to have their debt relieved, but sticks simply to a different measurement of debt to achieve it. While a country in distress due to unsustainable debt might be better served by various debt relief mechanisms, these are often not so straight-forward either and debt forgiveness, even on the condition of climate spending, is likely to be welcome. There is little data on sustainability out there, perhaps in part because judging the sustainability of debt is not easy. The indicator used in this thesis was from the Debt Sustainability Analyses produced jointly by the World Bank and the International Monetary Fund under the Joint Bank-Fund Debt Sustainability Framework for Low Income Countries. These are performed on a country-by-country basis and produced in country-specific reports, rather than annual aggregated data, which means that the most recent data from countries varied from 2019-2022 based on the most recent respective analysis. Countries are simply ranked on a scale with four options concerning the risk of external debt distress: i) low, ii), moderate, iii), high, and iv) in distress. The methodology behind this process is much less clear and prescriptive but relies on various data on a country's debt, scenario modelling, and staff judgement (World Bank Group & International Monetary Fund, 2022a; 2020b).

The motivation for the composition of the Dual Index was mostly to simplify the IIED Index by removing the biodiversity and creditworthiness components, and to include debt *sustainability* rather than simply indebtedness so that, along with the WRI climate component, the Dual Index would give an indication specifically of a country's *ability* to handle its debt situation and its *ability* to respond to the impacts of climate change on it. However, because of the simple scoring method of the Debt Sustainability Analyses and in an effort to keep the climate component equally weighted, the Dual Indices are scored only with a maximum value of 8, half that of the IIED Index. Furthermore, in the cases of both the creditworthiness and unsustainable debt indicators, the sample set of countries was relatively small because the countries who are deemed eligible for International Development Assistance or who are deemed to have unsustainable debt are relatively few. It is true that this may not be a major downside because that just emphasizes the fact that these are then the most relevant countries to be looking at for debt-for-climate swaps. However, it would be better to evaluate a bigger sample where possible; the IIED index tried to solve this problem by using an unbalanced dataset, where some countries (e.g. Costa Rica) were included even though they did not receive a creditworthiness score (IIED, 2020). However, this unfairly disadvantages these countries as they are only evaluated on three components and cannot receive the maximum score.

The Triple Index was motivated by an attempt to follow the same approach of measuring a country's *ability* to handle its debt and climate impacts, rather than simply the extent of its debt and climate impacts themselves, while also using a more differentiating scoring system and examining a broad sample of countries while maintaining a balanced dataset. The Triple Index maintains the World Bank data on total external debt stocks (as a percentage of GNI) which was used in the IIED index as it is one of the most common measures of debt and it does so very straight-forwardly. Most of the other options available through sources such as the World Bank's International Debt Statistics databank simply allow for measuring more specific types of debt or in alternate form, such as monetary value, which were deemed to be too narrow or worse for cross-country comparison. The WRI, as used in the IIED index as well, was used again here, except *only* the exposure part of it – not the vulnerability score. The reason for this was to measure *only* the extent of a country's debt and *only* the extent of its exposure to climate change, and not what position it might be in to respond to those problems. Partly in order to isolate this effect, a third component was added: the Human Development Index. The fact that social, economic, and institutional factors are included in both the climate and creditworthiness indicators in previous indices means that it is hard to appreciate their importance within the overall scoring; some countries may be geographically quite at risk from climate change impacts or have a high level of debt but they might not be in a terrible position to respond to them due to other social, economic, and institutional reasons, and the effect of these factors would therefore be explicitly seen in its HDI score. Although the HDI cannot provide a very comprehensive measure of all of these possible factors on its own, it does at least provide a general measure of development which it seems reasonable to suppose correlates to some extent with a country's ability to handle its debt and climate impacts. It also just generally indicates the degree to which a country could benefit from development help and so how valuable a debt-for-climate swap might be for it – although a debt-for-climate swap might only reduce its debt by a relatively small amount and increase spending on climate action rather than explicitly human development aims, both of these aspects are likely to still be of benefit to the country, and of more benefit the less developed it is. The HDI is composed of three components: i) a health dimension as assessed by life expectancy at birth, ii) an education dimension as measured by mean of years of schooling for adults and expected years of schooling for children, and iii) a standard of living dimension as measured by gross national income per capita. The scores for these three components are then aggregated into an overall index using a geometric mean. It exists for 189 countries and is measured from 0-1 (United Nations Development Programme, 2022). As can be seen from *Table 1*, the three components of the Triple Index result in a much bigger sample of countries as well as the possibility of scoring each component using percentiles such that the total score is 300.

To explain the methodology of the scoring systems in more detail, the IIED Index Original, IIED Index 2.0, and the Dual Indices all divided their respective country samples into quartiles for each component. Each country was then assigned a score of 1-4 depending on which quartile it fell into for each component. The overall score and the ranking that it provides the basis for is achieved by simply totalling these component scores; for the IIED Indices there are four components so the maximum overall score is 16, for the Dual Index there are two components so the maximum is 8. The Triple Index operates similarly, but is scored using percentiles, so the maximum overall score from its three components is 300. It is

also important to note that this means that falling into a higher quartile in a dataset, which results in a higher component score, means that a country should be more suitable for a debt-for-climate swap. Just as the IIED Index 2.0 created in this thesis reverses the creditworthiness score to account for this, the scores for the ND-GAIN and CRI datasets as well as for the HDI indicator were reversed.

3.4 Limitations

In general, the data used in these indices appear to be of good quality. The only concern in that regard is the 2008 GEF Benefits for Biodiversity Index used in the IIED Index 2.0 which does not match the data used in the IIED Index Original in IIED (2020). Some of the datasets evaluate a very large sample of countries, but the biggest limitation across the data is the smaller sample sizes and in particular the fact that many of the countries which are not featured in these datasets, because of internal conflict, humanitarian disaster, or simply less robust statistical monitoring, are likely to be countries quite affected by issues such as climate change and debt. This point was noted explicitly by the authors in relation to the Climate Risk Index (CRI) (Germanwatch, 2021). Since the aim was to maintain a fully balanced dataset for the new indices, any country for which data did not exist in even one component was eliminated, but it would have been severely disadvantaged in the scoring in any case.

Obviously, there are many limitations to how well any of the indices created in this thesis can adequately indicate a ranking of the suitability of countries for debt-for-climate swaps. This is a very undefined concept to measure and many of the most important factors that could affect suitability are likely only apparent in more country-specific analysis, and so what the indices aim to do is already limited. Additionally, the ability of any of the variables, despite good quality and recent data, to fully capture the debt or climate situation in a country is also limited. Finally, the small sample sizes and low scoring systems of the IIED and Dual Indices definitely restrict their usefulness.

4 Results and Analysis

4.1 IIED Indices Results

The full results of the various indices created for and discussed in this thesis, including not only the overall scores of each country in each sample set but also the constituent scores for each component of the index, can be found in the Appendix, which consists of *Tables A1-A6*. *Table 2* below presents the Top 20 results from the IIED Index Original, as produced in IIED (2020), from the IIED Index New Data, as produced in this thesis using the exact same methodology as in IIED (2020) but utilising newer datasets for two variables (and an alternate one for one that could not be matched), and lastly from the IIED Index 2.0, which utilises the same methodology again and the newer data again but differs in that the scoring for the creditworthiness component is reversed. Countries that appear in all three indices are highlighted in matching colours; countries that appear in only two are not highlighted but still noteworthy.

The first point to notice about the results is that they definitely do change from one index to another. In fact, just slightly more are different across the three (11) than match (9). The most important fact to keep in mind in this regard, however, is that the IIED methodology scores countries on a scale of 4-16 and here it can be seen that eight countries in both IIED Index Original and 2.0 have a matching score of 13, and eight countries in the IIED Index New Data have a matching score of 14. This means that each of these sets of eight countries are ranked alphabetically, and so a country's rank can change dramatically based on how many countries it matches scores with and where it falls in the alphabet. For example, Cambodia and Sri Lanka both have matching scores in IIED Index Original and New Data but Cambodia is in 7th and 2nd respectively and Sri Lanka ends up 12th and 9th.

Examining first the changes between the Original and New Data indices, which show the effects of 2020 data on debt and creditworthiness and 2021 climate risk data, the biggest jump in rank is that of Ivory Coast – moving from 18th to 4th. Its actual score only changes by 2, due to an increase in both the debt and credit scores. This is an intriguing result, implying that although its debt stocks increased its creditworthiness score also improved (since the IIED Index Original prioritises higher creditworthiness). It also benefited from its place in the alphabet, however. It is also noteworthy that more countries scored a 14 or 15 with the New Data than in the Original, indicating that more of them as a proportion of the total sample are in a more dire debt or climate situation, or more creditworthy, than they were before. It should also be noted that countries such as Cabo Verde, Kenya, Senegal, Uganda, Ivory Coast, and Ethiopia feature in both Top 20s but are not highlighted in colour because they are not in the IIED Index 2.0 – this means that actually only four countries in each Top 20 are not matched. Overall, it is hard to read too much into any single change in position because of the scoring

TABLE 2: Comparison of original IIED Index with updated and corrected versions.

Sources: See IIED (2020) and Tables A1 and A2 in Appendix A.

Rank	IIED Index Original	Score	IIED Index New Data	Score	IIED Index 2.0	Score
1	Cabo Verde	15	Vietnam	15	Angola	16
2	Vietnam	15	Cambodia	14	Papua New Guinea	16
3	Honduras	14	Cabo Verde	14	Sudan	14
4	Kenya	14	Ivory Coast	14	Cambodia	13
5	Nicaragua	14	Honduras	14	Congo, Rep.	13
6	Papua New Guinea	14	Kenya	14	Honduras	13
7	Cambodia	13	Mozambique	14	Madagascar	13
8	Kyrgyzstan	13	Nicaragua	14	Mozambique	13
9	Madagascar	13	Sri Lanka	14	Nicaragua	13
10	Mozambique	13	Angola	13	Sri Lanka	13
11	Senegal	13	Cameroon	13	Zambia	13
12	Sri Lanka	13	Dominica	13	Cameroon	12
13	Uganda	13	Papua New Guinea	13	Djibouti	12
14	Vanuatu	13	Senegal	13	Guyana	12
15	Angola	12	Uganda	13	Haiti	12
16	Bosnia and Herzegovina	12	Bolivia	12	Laos	12
17	Cameroon	12	Ethiopia	12	Liberia	12
18	Ivory Coast	12	Fiji	12	Nigeria	12
19	Djibouti	12	Ghana	12	Vietnam	12
20	Ethiopia	12	India	12	Zimbabwe	12

system, but perhaps most interesting is that the newer data did not change the Top 20 dramatically. As mentioned, the data for 2022 or even 2021 is not yet available from the World Bank's Debt Statistics and it may be that the effects of increased loans to tackle the Covid-19 pandemic, especially in developing countries, did not impact until then.

Turning to the results of the IIED Index 2.0, there is a greater change from the two previous indices. Angola and Papua New Guinea have both jumped up and hit the maximum score. This is indeed because both Angola and Papua New Guinea's creditworthiness scores swapped from a 1 to a 4 – their other scores stayed the same. Vietnam, on the other hand dropped from a 4 to a 1. Interestingly, five of the countries in the Top 10 match between the New Data and 2.0 indices – their creditworthiness scores only changing by a value of 1, from 2 to 3 or 3 to 2. This scoring system does mean that the effects of entirely reversing a quarter of the index is probably reduced a great deal, but nonetheless the position of Angola and Vietnam do show how it makes a considerable difference.

4.2 Dual Indices Results

Table 3 shows the results from the three variations on the Dual Index. Each one uses data on debt sustainability and then pairs it with a different climate risk and vulnerability indicator. Again, countries that appear in all three indices are highlighted in matching colours, and again it is immediately apparent that there are many countries that match (9) and just slightly more that differ (11). It is also very important once again to keep in mind the scoring system – here it is an even lower maximum (8) which means that the differentiation between countries is even further reduced and the importance of a country's position in the alphabet even greater. In this way, it is wrong to read into the fact that Djibouti scored a 7 and Afghanistan a 6 that Djibouti is *much* more of a suitable candidate.

What these indices do aim to achieve though is to remove the effects of creditworthiness and the old biodiversity data and put more emphasis on climate risk and in particular the effects of debt *sustainability*. There are countries on these lists that were not at all in the IIED Top 20, such as Comoros or Burundi, and ones that are much more dominantly important across all three Dual indices than they were in any of the IIED ones, such as Zimbabwe, Afghanistan, and Sudan; conversely important countries like Honduras, Nicaragua, and Papua New Guinea have disappeared. Of the Top 20 in the Dual Index WRI, only Chad, Republic of Congo, Mozambique, Sudan, and Zimbabwe scored a 4 in debt unsustainability (being 'in distress'), but there were a lot more '4's in climate. This is because the debt unsustainability scores were assigned based on four categories (low, moderate, high, in distress) and not proportionately distributed using quartiles, and thankfully relatively few countries in the world are categorised as in distress. But it does likely mean that countries that are in severe debt distress, which might make them good candidates, are also ones such as Sudan and Afghanistan which have seen much internal unrest in the last year, which might conversely make them less likely to be in a position or interested to negotiate debt-for-climate swaps.

TABLE 3: Comparison of Dual Index approaches using different climate indicators.

Sources: See Tables A3, A4, and A5 in Appendix A.

Rank	Dual Index WRI	Score	Dual Index ND-GAIN	Score	Dual Index CRI	Score
1	Chad	8	Chad	8	Mozambique	8
2	Burundi	7	Congo, Rep.	8	Sudan	8
3	Cabo Verde	7	Somalia	8	Zimbabwe	8
4	Cameroon	7	Sudan	8	Afghanistan	7
5	Comoros	7	Zimbabwe	8	Comoros	7
6	Congo, Rep.	7	Afghanistan	7	Gambia	7
7	Djibouti	7	Central African Rep.	7	Kenya	7
8	Dominica	7	Guinea-Bissau	7	Malawi	7
9	Gambia	7	Haiti	7	Burundi	6
10	Guinea-Bissau	7	Mozambique	7	Cameroon	6
11	Haiti	7	Burundi	6	Central African Rep.	6
12	Kenya	7	Comoros	6	Congo, Rep.	6
13	Mozambique	7	Congo, Dem. R.	6	Ghana	6
14	Papua New Guinea	7	Ethiopia	6	Haiti	6
15	Sudan	7	Kenya	6	Lao PDR	6
16	Tonga	7	Liberia	6	Madagascar	6
17	Zimbabwe	7	Madagascar	6	Mauritania	6
18	Afghanistan	6	Malawi	6	Niger	6
19	Benin	6	Mali	6	Papua New Guinea	6
20	Burkina Faso	6	Micronesia	6	Uganda	6

It is very interesting to see how much the three indices here do differ from each other considering they each only differ by one indicator which are all supposed to be measuring the same thing. This does show the power and importance of indicator selection. A rather surprising result is that despite these differences, Chad is in the top position in both the WRI and ND-GAIN indices. Zimbabwe, Mozambique, and Sudan are the only three countries to score a 7 or 8 in each index. Also, the number of countries in the Top 20 assigned a score of 7 or 8 using the WRI is a good deal more than using the ND-GAIN or CRI indicators, which are more selective of the top scorers.

The three climate risk and vulnerability indicators were used as kind of robustness check to see how much varying the indicator would affect the result. The sample size in these indices were smaller than even the IIED ones, but the fact that there were only two indicators means that the weight given to any differences between the results of each indicator are probably amplified a good deal, despite them being supposed to measure the same thing. At the same time, the limitation of a scoring system with a range of 8, as is the case with these Dual indices, even when looking at the entire Top 20, is quite apparent when it comes to inferring anything from a country's position.

4.3 Triple Index Results Breakdown

Table 4 shows the results from the Triple Index, broken down not only with the overall score but also the scores of the three component areas: indebtedness, measured using total external debt stocks, climate, using the exposure aspect of the WRI, and development needs, which is the Human Development Index reversed in order to prioritise countries that score low on it. The scoring system with a maximum of 300 allows for a much better differentiation between countries, rather than matching scores and alphabetical ordering. The breakdown here also shows the relative importance of each component for each of the Top 20 countries to see in more detail how a country scored so highly.

To begin, it is interesting that the Top 2 countries, Djibouti and Papua New Guinea, both scored very highly in all three areas. Cabo Verde, in third place, scored highly in indebtedness and climate but not so high in development needs; that is to say, it is relatively more developed than either of the other two. Conversely, the fourth-place country, Mozambique scored very high in indebtedness and development needs, but is not actually as exposed to climate risk as other countries at all, with just a 41. Mozambique is a country that featured in the Top 20 of every single one of the other indices, but the advantage of isolating the human development component here in the Triple Index allows some insight into the fact that perhaps it was scoring so high with the other climate indicators, such as the WRI and ND-GAIN, because they incorporate a country's *ability* to respond to the impacts of climate change – and Mozambique, with a development needs score of 93, the third highest in the Top 20, does not have a good ability to do so.

TABLE 4: Breakdown of the scores of the top 20 countries in the Triple Index.

Sources: See Table A6 in Appendix A.

Rank	Country	Indebtedness	Climate	Development Needs	Score Sum
1	Djibouti	80	85	82	247
2	Papua New Guinea	75	91	72	238
3	Cabo Verde	91	94	52	236
4	Mozambique	95	41	93	228
5	Nicaragua	85	87	53	226
6	Cambodia	68	88	65	221
7	Guinea-Bissau	54	74	91	220
8	Senegal	70	66	84	219
9	El Salvador	78	91	50	219
10	Angola	91	59	67	218
11	Jamaica	94	86	35	216
12	Sudan	89	39	86	214
13	Vanuatu	44	100	61	205
14	Gambia	39	77	87	203
15	Kyrgyz Republic	90	65	47	202
16	Niger	25	75	99	199
17	Belize	84	70	42	196
18	Dominica	66	98	30	194
19	Zimbabwe	72	52	69	193
20	Sierra Leone	52	45	95	191

The component scores give even further valuable insight. Examining the data for just the pure *exposure* component of the WRI climate indicator, the five most exposed countries are Vanuatu, Tonga, Dominica, Solomon Islands, and Costa Rica. This is why the SIDS have been focused on so much in recent debt-for-climate swap literature. Looking at *Table 4*, countries such as Vanuatu and Dominica are in the Top 20, but they are in a way the opposite of Mozambique in that they score extremely high in climate exposure but relatively low in indebtedness and development needs. This is important to keep in mind, because although some datasets in the previous indices didn't have data for some countries which were thus dropped, the Triple Index has a sample of 116, and it includes all of the SIDS identified as top priority by the New Climate Institute (NCI) index: Dominica, Granada, Samoa, St. Vincent and the Grenadines, and Tonga (NCI, 2021). Interestingly, it also includes Belize (which agreed to a debt-for-climate swap at the end of 2021), which is indeed included in the Top 20; none of the other indices even feature Belize in their full lists in the Appendix since it was only available in some datasets and was thus always dropped.

Djibouti, in first place, received an overall score of 247, and #20 on the list is Sierra Leone with 191. This is a considerable difference, certainly compared to the differences in the other indices. It is interesting that the score mostly progresses quite regularly between the two, however – there are no especially big divides, with 29 points between #1 and #10, and 27 points between #10 and #20. This greater differentiation between countries is helpful and really does give greater awareness to the top few, but it is still not to be taken that Djibouti or Papua New Guinea are the only two reasonable candidates or definitely will engage in a swap in the near future.

4.4 Comparison Between IIED, Dual, and Triple Indices

Finally, *Table 5* simply displays results from the IIED Index 2.0, from *Table 2*, and the Dual Index WRI, from *Table 3*, along with the overall scores from the Triple Index, from *Table 4*. The results from each of these individually have been seen before, so the important aspect here is the comparison of the three, each being a new index created for this thesis with a very distinct methodology.

Most immediately, it is apparent that there are only five countries that are common across all three indices: Djibouti, Papua New Guinea, Mozambique, Sudan, and Zimbabwe. Except for Zimbabwe, in the 15-20 range in each, there is no consistent position for any of them across all three indices. Again, many of the countries are common to two of the indices, just not all three. This is partly the reason why the Top 20 from each index has been shown in each table, however, because the results are so varied.

TABLE 5: Comparison of the three primary, new indices presented in this thesis.

Sources: See Tables A2, A3, and A6 in Appendix A.

Rank	Triple Index	Score	Dual Index WRI	Score	IIED Index 2.0	Score
1	Djibouti	247	Chad	8	Angola	16
2	Papua New Guinea	238	Burundi	7	Papua New Guinea	16
3	Cabo Verde	236	Cabo Verde	7	Sudan	14
4	Mozambique	228	Cameroon	7	Cambodia	13
5	Nicaragua	226	Comoros	7	Congo, Rep.	13
6	Cambodia	221	Congo, Rep.	7	Honduras	13
7	Guinea-Bissau	220	Djibouti	7	Madagascar	13
8	Senegal	219	Dominica	7	Mozambique	13
9	El Salvador	219	Gambia	7	Nicaragua	13
10	Angola	218	Guinea-Bissau	7	Sri Lanka	13
11	Jamaica	216	Haiti	7	Zambia	13
12	Sudan	214	Kenya	7	Cameroon	12
13	Vanuatu	205	Mozambique	7	Djibouti	12
14	Gambia	203	Papua New Guinea	7	Guyana	12
15	Kyrgyzstan	202	Sudan	7	Haiti	12
16	Niger	199	Tonga	7	Laos	12
17	Belize	196	Zimbabwe	7	Liberia	12
18	Dominica	194	Afghanistan	6	Nigeria	12
19	Zimbabwe	193	Benin	6	Vietnam	12
20	Sierra Leone	191	Burkina Faso	6	Zimbabwe	12

5 Conclusion

5.1 Research Aims

1.1) *How has the Covid-19 pandemic changed which developing countries are the most suitable candidates for debt-for-climate swaps?*

In revisiting the research questions after having analysed the results, it is apparent that a more detailed analysis is necessary to properly answer this first sub-question. In comparing the IIED Index Original and IIED Index New Data there certainly were changes between them in that updating the data altered the ranking somewhat. However, to simply compare the Top 20 of the two indices is not enough – it is probably necessary to compare the same country across the two to see how its debt levels have changed and how that has affected its score. This would need to be done systematically for multiple countries to gauge an overall effect. Ultimately, it was decided that this was not worth it since the data only exists for 2020 and, based on UNCTAD preliminary results, it appears that the total external debt service of Least Developed Countries increased much more between 2020 and 2021 than between 2019 and 2020. The economic impacts of Covid-19 may have been more delayed than in the hyper-globalised and connected developed world which entered lockdowns frequently in 2020. On this basis, using more recent data from 2020 and 2021 did change the IIED index but not in any way that the impact of Covid-19, if there was any, was deemed yet capable of being evaluated.

1.2) *Which index methodology to assess the suitability of developing countries as candidates for debt-for-climate swaps is the best overall?*

Six different index methodologies were used in this thesis: two IIED ones (one simply copying the original, one reversing the creditworthiness score), three Dual ones (using the WRI, ND-GAIN, and CRI indicators), and the Triple Index. The strictest way of evaluating which one of these had the best methodology should really be by seeing which one produced the best results in how well they can identify countries that *do* actually engage in debt-for-climate swaps in the next short period. Adding in variables that could fully account for the complexities of a decision to negotiate and agree a debt-for-climate swap and be able to identify or predict it accurately would be ideal, but this is highly unlikely if not impossible. And since so few countries engage in swaps, using an index's results to evaluate its success would be rather difficult.

All of the indices include some measure of a country's relationship with debt and climate, which are the two most important and obvious criteria, and all of them have benefits and arguments for the regarding their other components and composition. However, the realistic

goal of an index was only ever that it could be a broad indication of suitability, and for that certain aspects are more useful than others.

Firstly, the IIED Index Original is ruled out due to its creditworthiness scoring which seems opposite to the aims of the index. The ND-GAIN and CRI Dual indices were only included as robustness checks, and although the ND-GAIN indicator in particular is of good quality, the WRI remains the default after the IIED. This leaves the IIED Index 2.0, Dual Index WRI, and Triple Index. Ultimately the smaller sample sizes and lower scoring systems of the first two make them less trustworthy and less useful.

Although there is an important reminder in the common matching scores in these indices, it is also easy to forget that one country is ranked ahead of another simply because of its first letter. It also creates a very large list of countries who rank very highly (e.g. 67 above 10 in the IIED) such that it becomes *too* broad. The converse worry is that in an index such as the Triple, having clearly differentiated scores will naturally cause people to assign too much truth to them and fully buy into the idea that Djibouti is absolutely the best next place for a debt-for-climate swap. This, however, is a problem with all scoring systems, and the sheer helpfulness of identifying a more select group, the bigger sample size, and the ability to break apart its components and understand where a country's scores are coming from much more easily than any other index and make a more nuanced case-by-case judgement, all lean in favour of the Triple Index.

1) *Which developing countries are the most suitable candidates for debt-for-climate swaps?*

The top five countries in the Triple Index are certainly a good selection of countries to consider suitable and investigate further: Djibouti, Papua New Guinea, Cabo Verde, Mozambique, and Nicaragua. Nonetheless, the Triple Index is still only meant as a broad indication, even among other indices. In a way, it was slightly surprising that there was not a more consistent, select group of countries that each index identified. However, with different indicators, given very large weights in the overall index this also makes sense. One of the most interesting aspects of the results was in seeing in *Table 5* which countries managed to make the Top 20 under three very different methodologies: Djibouti, Papua New Guinea, and Mozambique again, and Sudan and Zimbabwe. These five present as very obvious cases for further study as they obviously have a well-rounded high suitability.

Of these, all are in Africa aside from Papua New Guinea. However, recent literature on debt-for-climate swaps, as well as the New Climate Institute index, has highlighted the suitability of SIDS for debt-for-climate swaps. As was discussed, the unimportance of SIDS in the indices in this thesis – including those using the original IIED methodology – is probably explained by their high exposure to climate change effects but better performance on debt, ability to respond to climate impacts, levels of development, creditworthiness, and so on. These factors do not make them unsuitable, but merely mean that they qualify extremely well on one metric and then further investigation of their debt and other factors may be warranted on a country-by-country basis.

5.2 Future Research

This thesis sought to provide some answer to the question of which countries are most suitable for debt-for-climate swaps by creating an index to score and rank developing countries, and it has done that. There are more methodologies that could and should be taken to such indices to refine and improve them, especially by seeking to complicate the index with more components without narrowing the search too much through the features prioritised and also simply through the sample sizes of the data available.

If debt-for-climate swaps do take off in practice once again, there will be plenty to study in their implementation once more and perhaps in the new and bigger form they take, especially by academic scholars to provide solid, peer-reviewed research as opposed to it being predominantly performed by policy institutes. However, the primary next step in future research that is seen is to engage in case-study analysis of the most suitable candidate countries identified in this thesis and investigate their suitability in a more contextual and country-specific manner. This would include analysing who their debt is owed to and the type and extent of natural resources they have or climate exposure they experience. Further investigation of these topics at a national level would help to identify factors that might rule out a country despite its apparent suitability, which would also help to improve and strengthen any index methodology by seeking to incorporate more of these aspects. As Lachman (1989) notes, each debt-for-nature swap is different because each case is very different – “The simplicity of the concept disguises the complexity of the negotiation. Debt-for-nature swaps are multiparty, multi-issue, multidisciplinary, and multinational” (Lachman, 1989, p.143). Therefore, there will be plenty left to research.

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Appendix A

TABLE A1: IIED Index New Data

Sources: Bündnis Entwicklung Hilft (2021), WRI Climate and disaster risk; Global Environment Facility (2008), GEF Benefits Index for Biodiversity; World Bank Group (2022), External debt stocks (% of GNI), World Bank Group (2022), IDA resource allocation index

Rank	Country	Climate	Biodiversity	In-debtedness	Credit-worthiness	Score Sum
1	Vietnam	4	4	3	4	15
2	Cambodia	4	3	4	3	14
3	Cape Verde	4	2	4	4	14
4	Cote d'Ivoire	4	3	3	4	14
5	Honduras	4	4	3	3	14
6	Kenya	4	4	2	4	14
7	Mozambique	3	4	4	3	14
8	Nicaragua	4	3	4	3	14
9	Sri Lanka	3	4	4	3	14
10	Angola	4	4	4	1	13
11	Cameroon	4	4	2	3	13
12	Dominica	4	1	4	4	13
13	Papua New Guinea	4	4	4	1	13
14	Senegal	4	1	4	4	13
15	Uganda	3	3	3	4	13
16	Bolivia	2	4	3	3	12

17	Ethiopia	3	4	1	4	12
18	Fiji	4	3	2	3	12
19	Ghana	3	2	3	4	12
20	India	3	4	1	4	12
21	Madagascar	4	4	2	2	12
22	Mauritania	3	2	4	3	12
23	Pakistan	3	3	3	3	12
24	Rwanda	3	1	4	4	12
25	Tanzania	3	4	2	3	12
26	Vanuatu	4	2	3	3	12
27	Zambia	3	3	4	2	12
28	Armenia	2	1	4	4	11
29	Benin	4	1	2	4	11
30	Bhutan	1	2	4	4	11
31	Bosnia and Herzegovina	2	1	4	4	11
32	Costa Rica	4	4	3	X	11
33	Djibouti	4	1	4	2	11
34	Dominican Republic	4	4	3	X	11
35	Georgia	2	1	4	4	11
36	Guyana	4	3	2	2	11
37	Jamaica	4	3	4	X	11
38	Kyrgyz Republic	3	1	4	3	11
39	Lao PDR	2	3	4	2	11
40	Liberia	3	3	3	2	11

41	Mali	4	2	2	3	11
42	Mongolia	1	3	4	3	11
43	Nigeria	4	4	1	2	11
44	Samoa	2	2	3	4	11
45	St. Lucia	2	2	3	4	11
46	Sudan	3	3	4	1	11
47	Uzbekistan	3	1	3	4	11
48	Zimbabwe	3	2	4	2	11
49	Burkina Faso	4	1	1	4	10
50	Chad	4	2	2	2	10
51	Congo, Dem. Rep.	3	4	1	2	10
52	Congo, Rep.	3	3	3	1	10
53	Ecuador	3	4	3	X	10
54	Gambia, The	4	1	3	2	10
55	Grenada	1	1	4	4	10
56	Indonesia	4	4	2	X	10
57	Lesotho	3	1	3	3	10
58	Mauritius	3	3	4	X	10
59	Myanmar	3	4	1	2	10
60	Niger	4	1	2	3	10
61	Sierra Leone	3	2	3	2	10
62	Solomon Islands	4	3	1	2	10
63	Togo	4	1	2	3	10
64	Tonga	4	1	2	3	10
65	Bangladesh	4	2	1	2	9

66	El Salvador	4	1	4	X	9
67	Haiti	4	3	1	1	9
68	Malawi	3	3	1	2	9
69	Maldives	1	2	4	2	9
70	Sao Tome and Principe	1	3	3	2	9
71	St. Vincent and the Grenadines	1	1	3	4	9
72	Tajikistan	2	1	4	2	9
73	Afghanistan	3	3	1	1	8
74	Burundi	4	1	1	2	8
75	Central African Republic	3	2	2	1	8
76	Comoros	4	2	1	1	8
77	Guinea	3	2	1	2	8
78	Guinea-Bissau	4	1	2	1	8
79	Kazakhstan	1	3	4	X	8
80	Nepal	2	2	1	3	8
81	Timor-Leste	4	1	1	1	7

TABLE A2: IIED Index 2.0

Sources: Bündnis Entwicklung Hilft (2021), WRI Climate and disaster risk; Global Environment Facility (2008), GEF Benefits Index for Biodiversity; World Bank Group (2022), External debt stocks (% of GNI), World Bank Group (2022), IDA resource allocation index

Rank	Country	Climate	Biodiversity	In-debtedness	Credit-worthiness	Score Sum
1	Angola	4	4	4	4	16

2	Papua New Guinea	4	4	4	4	16
3	Sudan	3	3	4	4	14
4	Cambodia	4	3	4	2	13
5	Congo, Rep.	3	3	3	4	13
6	Honduras	4	4	3	2	13
7	Madagascar	4	4	2	3	13
8	Mozambique	3	4	4	2	13
9	Nicaragua	4	3	4	2	13
10	Sri Lanka	3	4	4	2	13
11	Zambia	3	3	4	3	13
12	Cameroon	4	4	2	2	12
13	Djibouti	4	1	4	3	12
14	Guyana	4	3	2	3	12
15	Haiti	4	3	1	4	12
16	Lao PDR	2	3	4	3	12
17	Liberia	3	3	3	3	12
18	Nigeria	4	4	1	3	12
19	Vietnam	4	4	3	1	12
20	Zimbabwe	3	2	4	3	12
21	Afghanistan	3	3	1	4	11
22	Bolivia	2	4	3	2	11
23	Cape Verde	4	2	4	1	11
24	Central African Republic	3	2	2	4	11
25	Chad	4	2	2	3	11

26	Comoros	4	2	1	4	11
27	Congo, Dem. Rep.	3	4	1	3	11
28	Costa Rica	4	4	3	X	11
29	Cote d'Ivoire	4	3	3	1	11
30	Dominican Republic	4	4	3	X	11
31	Fiji	4	3	2	2	11
32	Gambia, The	4	1	3	3	11
33	Guinea-Bissau	4	1	2	4	11
34	Jamaica	4	3	4	X	11
35	Kenya	4	4	2	1	11
36	Mauritania	3	2	4	2	11
37	Myanmar	3	4	1	3	11
38	Pakistan	3	3	3	2	11
39	Sierra Leone	3	2	3	3	11
40	Solomon Islands	4	3	1	3	11
41	Tanzania	3	4	2	2	11
42	Vanuatu	4	2	3	2	11
43	Bangladesh	4	2	1	3	10
44	Dominica	4	1	4	1	10
45	Ecuador	3	4	3	X	10
46	Indonesia	4	4	2	X	10
47	Kyrgyz Republic	3	1	4	2	10
48	Malawi	3	3	1	3	10
49	Maldives	1	2	4	3	10

50	Mali	4	2	2	2	10
51	Mauritius	3	3	4	X	10
52	Mongolia	1	3	4	2	10
53	Sao Tome and Principe	1	3	3	3	10
54	Senegal	4	1	4	1	10
55	Tajikistan	2	1	4	3	10
56	Timor-Leste	4	1	1	4	10
57	Uganda	3	3	3	1	10
58	Burundi	4	1	1	3	9
59	El Salvador	4	1	4	X	9
60	Ethiopia	3	4	1	1	9
61	Ghana	3	2	3	1	9
62	Guinea	3	2	1	3	9
63	India	3	4	1	1	9
64	Lesotho	3	1	3	2	9
65	Niger	4	1	2	2	9
66	Rwanda	3	1	4	1	9
67	Togo	4	1	2	2	9
68	Tonga	4	1	2	2	9
69	Armenia	2	1	4	1	8
70	Benin	4	1	2	1	8
71	Bhutan	1	2	4	1	8
72	Bosnia and Herzegovina	2	1	4	1	8
73	Georgia	2	1	4	1	8

74	Kazakhstan	1	3	4	X	8
75	Samoa	2	2	3	1	8
76	St. Lucia	2	2	3	1	8
77	Uzbekistan	3	1	3	1	8
78	Burkina Faso	4	1	1	1	7
79	Grenada	1	1	4	1	7
80	Nepal	2	2	1	2	7
81	St. Vincent and the Grenadines	1	1	3	1	6

TABLE A3: Dual Index (WRI)

Sources: World Bank Group & International Monetary Fund (2022), Debt Sustainability Analyses; Bündnis Entwicklung Hilft (2021), WRI Climate and disaster risk

Rank	Country	Debt Unsustainability	Climate	Score Sum
1	Chad	4	4	8
2	Burundi	3	4	7
3	Cabo Verde	3	4	7
4	Cameroon	3	4	7
5	Comoros	3	4	7
6	Congo, Rep.	4	3	7
7	Djibouti	3	4	7
8	Dominica	3	4	7
9	Gambia, The	3	4	7
10	Guinea-Bissau	3	4	7

11	Haiti	3	4	7
12	Kenya	3	4	7
13	Mozambique	4	3	7
14	Papua New Guinea	3	4	7
15	Sudan	4	3	7
16	Tonga	3	4	7
17	Zimbabwe	4	3	7
18	Afghanistan	3	3	6
19	Benin	2	4	6
20	Burkina Faso	2	4	6
21	Central African Republic	3	3	6
22	Côte d'Ivoire	2	4	6
23	Ethiopia	3	3	6
24	Ghana	3	3	6
25	Guyana	2	4	6
26	Madagascar	2	4	6
27	Malawi	3	3	6
28	Mali	2	4	6
29	Mauritania	3	3	6
30	Nicaragua	2	4	6
31	Niger	2	4	6
32	Senegal	2	4	6
33	Sierra Leone	3	3	6
34	Solomon Islands	2	4	6
35	Timor-Leste	2	4	6

36	Togo	2	4	6
37	Vanuatu	2	4	6
38	Zambia	3	3	6
39	Bangladesh	1	4	5
40	Cambodia	1	4	5
41	Congo, Dem. Rep.	2	3	5
42	Grenada	4	1	5
43	Guinea	2	3	5
44	Honduras	1	4	5
45	Kyrgyz Republic	2	3	5
46	Lao PDR	3	2	5
47	Lesotho	2	3	5
48	Liberia	2	3	5
49	Rwanda	2	3	5
50	Samoa	3	2	5
51	Sao Tome and Principe	4	1	5
52	Tajikistan	3	2	5
53	Tanzania	2	3	5
54	Uganda	2	3	5
55	Maldives	3	1	4
56	Myanmar	1	3	4
57	St. Vincent and the Grenadines	3	1	4
58	Uzbekistan	1	3	4
59	Nepal	1	2	3
60	Moldova	1	1	2

TABLE A4: Dual Index (ND-GAIN)

Sources: World Bank Group & International Monetary Fund (2022), Debt Sustainability Analyses; Notre Dame Global Adaptation Initiative (2022), ND-GAIN Country Index 2020

Rank	Country	Debt Unsustainability	Climate	Score Sum
1	Chad	4	4	8
2	Congo, Rep.	4	4	8
3	Somalia	4	4	8
4	Sudan	4	4	8
5	Zimbabwe	4	4	8
6	Afghanistan	3	4	7
7	Central African Republic	3	4	7
8	Guinea-Bissau	3	4	7
9	Haiti	3	4	7
10	Mozambique	4	3	7
11	Burundi	3	3	6
12	Comoros	3	3	6
13	Congo, Dem. Rep.	2	4	6
14	Ethiopia	3	3	6
15	Kenya	3	3	6
16	Liberia	2	4	6
17	Madagascar	2	4	6
18	Malawi	3	3	6

19	Mali	2	4	6
20	Micronesia	3	3	6
21	Niger	2	4	6
22	Papua New Guinea	3	3	6
23	Sao Tome and Principe	4	2	6
24	Sierra Leone	3	3	6
25	Uganda	2	4	6
26	Benin	2	3	5
27	Burkina Faso	2	3	5
28	Cameroon	3	2	5
29	Gambia, The	3	2	5
30	Grenada	4	1	5
31	Lao PDR	3	2	5
32	Mauritania	3	2	5
33	Tonga	3	2	5
34	Zambia	3	2	5
35	Bangladesh	1	3	4
36	Cabo Verde	3	1	4
37	Cambodia	1	3	4
38	Côte d'Ivoire	2	2	4
39	Djibouti	3	1	4
40	Dominica	3	1	4
41	Ghana	3	1	4
42	Guinea	2	2	4
43	Lesotho	2	2	4

44	Maldives	3	1	4
45	Myanmar	1	3	4
46	Nicaragua	2	2	4
47	Samoa	3	1	4
48	Senegal	2	2	4
49	Tajikistan	3	1	4
50	Tanzania	2	2	4
51	Togo	2	2	4
52	Vanuatu	2	2	4
53	Bhutan	2	1	3
54	Guyana	2	1	3
55	Honduras	1	2	3
56	Kyrgyz Republic	2	1	3
57	Nepal	1	2	3
58	Rwanda	2	1	3
59	Solomon Islands	2	1	3
60	Timor-Leste	2	1	3
61	Moldova	1	1	2
62	Uzbekistan	1	1	2

TABLE A5: Dual Index (CRI)

Sources: World Bank Group & International Monetary Fund (2022), Debt Sustainability Analyses; Germanwatch (2021), Global Climate Risk Index 2021

Rank	Country	Debt Unsustainability	Climate	Score Sum
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1	Mozambique	4	4	8
2	Sudan	4	4	8
3	Zimbabwe	4	4	8
4	Afghanistan	3	4	7
5	Comoros	3	4	7
6	Gambia, The	3	4	7
7	Kenya	3	4	7
8	Malawi	3	4	7
9	Burundi	3	3	6
10	Cameroon	3	3	6
11	Central African Republic	3	3	6
12	Congo, Rep.	4	2	6
13	Ghana	3	3	6
14	Haiti	3	3	6
15	Lao PDR	3	3	6
16	Madagascar	2	4	6
17	Mauritania	3	3	6
18	Niger	2	4	6
19	Papua New Guinea	3	3	6
20	Uganda	2	4	6
21	Zambia	3	3	6
22	Bangladesh	1	4	5
23	Chad	4	1	5
24	Congo, Dem. Rep.	2	3	5
25	Djibouti	3	2	5

26	Dominica	3	2	5
27	Ethiopia	3	2	5
28	Grenada	4	1	5
29	Lesotho	2	3	5
30	Maldives	3	2	5
31	Myanmar	1	4	5
32	Nepal	1	4	5
33	Nicaragua	2	3	5
34	Rwanda	2	3	5
35	Senegal	2	3	5
36	Sierra Leone	3	2	5
37	Tajikistan	3	2	5
38	Tanzania	2	3	5
39	Cabo Verde	3	1	4
40	Côte d'Ivoire	2	2	4
41	Guinea	2	2	4
42	Guinea-Bissau	3	1	4
43	Liberia	2	2	4
44	Mali	2	2	4
45	Samoa	3	1	4
46	St. Vincent and the Grenadines	3	1	4
47	Tonga	3	1	4
48	Vanuatu	2	2	4
49	Benin	2	1	3
50	Burkina Faso	2	1	3

51	Cambodia	1	2	3
52	Guyana	2	1	3
53	Honduras	1	2	3
54	Kyrgyz Republic	2	1	3
55	Solomon Islands	2	1	3
56	Timor-Leste	2	1	3
57	Togo	2	1	3
58	Moldova	1	1	2
59	Uzbekistan	1	1	2

TABLE A6: Triple Index

Sources: World Bank Group (2022), External debt stocks (% of GNI); Bündnis Entwicklung Hilft (2021), WRI Climate and disaster (exposure only); United Nations Development Programme (2022), Human Development Index 2019

Rank	Country	Indebtedness	Climate	Development Needs	Score Sum
1	Djibouti	80	85	82	247
2	Papua New Guinea	75	91	72	238
3	Cape Verde	91	94	52	236
4	Mozambique	95	41	93	228
5	Nicaragua	85	87	53	226
6	Cambodia	68	88	65	221
7	Guinea-Bissau	54	74	91	220
8	Senegal	70	66	84	219
9	El Salvador	78	91	50	219

10	Angola	91	59	67	218
11	Jamaica	94	86	35	216
12	Sudan	89	39	86	214
13	Vanuatu	44	100	61	205
14	Gambia, The	39	77	87	203
15	Kyrgyz Republic	90	65	47	202
16	Niger	25	75	99	199
17	Belize	84	70	42	196
18	Dominica	66	98	30	194
19	Zimbabwe	72	52	69	193
20	Sierra Leone	52	45	95	191
21	Zambia	97	28	66	191
22	Mauritius	96	84	10	190
23	Chad	28	61	97	187
24	Rwanda	78	32	77	187
25	Mauritania	73	40	74	187
26	Liberia	50	43	91	184
27	Solomon Islands	17	97	70	184
28	Honduras	47	79	56	182
29	Mali	27	59	96	182
30	Burkina Faso	16	66	95	178
31	Panama	98	71	7	176
32	Cote d'Ivoire	38	59	78	175
33	Cameroon	24	78	71	173
34	Haiti	6	81	86	173

35	Vietnam	46	82	46	173
36	Togo	22	67	83	172
37	Benin	23	72	75	171
38	Dominican Republic	60	84	26	171
39	Comoros	14	83	73	170
40	Madagascar	34	56	80	170
41	Montenegro	97	72	1	170
42	Guatemala	22	93	53	167
43	Kenya	33	69	64	166
44	Ghana	41	64	60	165
45	Guyana	20	96	49	165
46	Albania	76	78	11	165
47	Tonga	28	99	38	165
48	Burundi	12	54	97	163
49	Tanzania	36	47	79	162
50	Nigeria	8	76	78	161
51	Costa Rica	53	97	9	158
52	Georgia	93	57	8	158
53	Ecuador	59	73	24	157
54	Indonesia	35	80	41	157
55	Armenia	88	49	19	156
56	Tunisia	86	38	32	156
57	Bangladesh	9	89	57	155
58	Uzbekistan	53	63	39	155
59	Uganda	43	36	76	155

60	Timor-Leste	3	90	62	154
61	North Macedonia	82	51	20	153
62	Philippines	16	95	41	152
63	Bhutan	92	5	54	152
64	Lebanon	99	24	28	152
65	Lao PDR	83	9	59	151
66	Lesotho	47	22	81	150
67	Tajikistan	69	30	51	150
68	Central African Republic	32	18	98	148
69	Congo, Rep.	61	19	68	148
70	Fiji	26	92	29	147
71	Guinea	19	34	92	146
72	Sri Lanka	71	62	13	146
73	Malawi	15	41	89	145
74	Pakistan	42	28	72	141
75	Mongolia	100	6	34	140
76	South Africa	49	42	44	135
77	Morocco	57	28	48	134
78	Colombia	59	53	21	133
79	Gabon	51	35	47	133
80	Serbia	77	46	9	132
81	Ethiopia	18	25	88	131
82	Jordan	81	12	36	129
83	Sao Tome and Principe	63	4	58	125
84	Congo, Dem. Rep.	4	26	91	122

85	Samoa	55	23	43	122
86	Afghanistan	5	31	84	121
87	Maldives	84	3	32	120
88	Romania	58	58	2	117
89	Eswatini	11	44	60	116
90	Myanmar	9	37	66	112
91	Moldova	67	16	27	110
92	Thailand	37	53	18	108
93	Bosnia and Herzegovina	72	20	14	105
94	Mexico	41	47	16	105
95	Azerbaijan	30	48	26	104
96	Peru	31	55	18	104
97	Kazakhstan	87	13	3	103
98	Ukraine	79	7	16	103
99	Paraguay	56	8	37	101
100	Turkey	62	34	5	101
101	India	10	33	55	98
102	Algeria	2	68	28	97
103	Bulgaria	65	27	6	97
104	Bolivia	40	14	41	95
105	Belarus	74	9	4	87
106	Nepal	13	11	63	87
107	St. Lucia	45	17	24	86
108	Argentina	66	16	0	82
109	Grenada	64	2	16	82

110	St. Vincent and the Grenadines	48	1	33	82
111	China	7	50	22	79
112	Brazil	34	22	22	78
113	Egypt, Arab Rep.	29	3	45	77
114	Botswana	3	10	34	48
115	Russian Federation	21	15	3	39
116	Iran, Islamic Rep.	1	21	12	34