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Effectively addressing the vulnerabilities and development needs of small island developing States

*Background report by Matthias Bruckner**

Abstract

International support to the sustainable development of SIDS has been on the international policy agenda for a long time, whereas challenges are intensifying. Stabilizing global economic and financial markets and international measures to reduce climate changes are indispensable to reduce vulnerabilities of SIDS, as is scaling-up of existing support measures at the national level in areas such as climate change adaptation. This paper also performs cluster and other statistical analyses of SIDS vulnerabilities to explore new approaches to SIDS support. The heterogeneity among SIDS is substantial even if only sub-groups of SIDS are considered. Therefore, a differentiated approach has merits, as uniform support would neither be effective nor efficient.

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Keywords: economic vulnerability, small island developing States, climate change, global economic and financial crisis

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Contents

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Effectively addressing the vulnerabilities and development needs of small island developing States

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I. Introduction

The sustainable development of Small Island Developing States (SIDS) came to the forefront of the policy debate at the United Nations with the adoption of the Barbados Programme of Action for the Sustainable Development of Small Island Developing States[2] (BPoA) at the global conference in Barbados in 1994. The question on how to effectively address the development challenges of SIDS gained further prominence at the Mauritius Strategy for the Further Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States[3] (MSI), adopted at the second global conference on SIDS in 2005. The recent United Nations Conference on Sustainable Development, held in Rio de Janeiro in June 2012 renewed the political commitment towards SIDS.[4] On that occasion, member States reaffirmed that SIDS were a special case in light of their unique and particular vulnerabilities, demanded enhanced efforts to assist SIDS in implementation of BPoA and MSI and called for a strengthening of United Nations support towards these countries. They also agreed to hold the third international conference on SIDS, which will be held in Samoa in 2014.

In fact, challenges to the sustainable development of SIDS continue to rise despite the global policy debates and strategies. The global economic and financial crisis in 2008/2009 and the subsequent slow recovery as well as the preceding price rises in global commodity markets highlighted the vulnerability of many SIDS to external economic shocks. At the same time, threats to the development of SIDS imposed by climate change have become clearer over time, while solutions to address this major challenge remain elusive.

The vulnerability of SIDS and possible policy responses have been the subject of numerous reports both outside and within the United Nations system, including the CDP.[5] Already in 2010, the Committee for Development Policy (CDP) had been requested to provide its independent views and perspectives on United Nations support for SIDS. It recommended concentrating on SIDS-specific issues, rather than generic developmental issues; setting targets and milestones to make the strategy more operational and ensure a systematic monitoring of efforts by SIDS and their development partners.[6] As a follow-up to that request,

1 An earlier version of the paper was circulated as background paper to the 15th CDP Plenary Session, document number CDP2013/PLEN/4. The author would like to thank Ana Cortez for very valuable discussions and suggestions. He would also like to acknowledge the comments by the CDP members Giovanni Andrea Cornia, Norman Girvan, Wahiduddin Mahmud and Patrick Plane as well as by Pierre Encontre (UNCTAD), Hiroko Morita-Lou (UN DESA) and Syed Nuruzzaman (UN ESCAP).

2 United Nations (1994), chap. I, resolution 1, annex I.

3 United Nations (2005), chap. I, resolution 1, annex II.

4 United Nations (2012).

5 In his latest report on the implementation of the MSI, the Secretary General lists a range of measures that are currently in place or under development addressing vulnerabilities and development needs of SIDS in nine areas. The report covers measures in the areas climate change adaptation, disaster risk management, biodiversity, energy, economic structure, food security, sustainable tourism, debt sustainability as well as data collection and dissemination; see United Nations (2011b).

6 CDP (2010, chapter I, para. 7, and chapter V); see also Hein (2010).

the Council asked the Committee to submit its independent views and perspectives on "how to further the full and effective implementation of the Barbados Programme of Action and the Mauritius Strategy, including by refocusing efforts towards a results-oriented approach and considering what improved and additional measures might be needed to more effectively address the unique and particular vulnerabilities and development needs of small island developing States".[7]

In this context, the paper explores areas and approaches to effectively address SIDS development challenges at the international level. After this introduction, section II discusses five main vulnerabilities and development needs of SIDS (as recognized by the international community) and their interlinkages, related to:

i) smallness;

ii) isolation and fragmentation;

iii) narrow resource and export base;

iv) exposure to environmental and natural shocks (including climate change and natural disasters);

v) exposure to external economic shocks.

Section III considers initiatives at the international level that currently tackle these five main characteristics. It notes that there is a wide range of measures and initiatives that address the problems resulting from narrow resource and export base and programmes that attempt at reducing exposure and increasing resilience to external shocks. There are also measures addressing some of the consequences of smallness, isolation, as well as the interlinkages among the various vulnerabilities these countries face. Hence, the paper argues that in these areas enhanced support could be in the form of scaling-up of existing measures (e.g., on climate change adaptation or on renewable energy), as well as by enhancing efficiency in implementation. Whereas the paper focuses on international measures in accordance to the ECOSOC mandate, it must be acknowledged that addressing vulnerabilities and development needs requires both domestic and international measures.

Vulnerability is not only the result of exposure and resilience but also depends on the frequency and magnitude of the shocks. Thus, section IV considers international measures in the areas of climate change, fisheries and economic and financial markets that would reduce the shocks. As SIDS rely relatively more on global public goods such as climate change prevention and well functioning global markets than most other countries, global responses are also relatively more important for them. Section V considers measures needed to address inherent vulnerabilities of SIDS that cannot be addressed by reducing exposure, building resilience and reducing global shocks. Existing measures for SIDS such as international disaster risk insurance could be expanded and new measures such as contingent bonds or special migration mechanisms could be developed and implemented.

In section VI, the paper considers the heterogeneity among SIDS. This heterogeneity is probably one reason for the existence of several sets of SIDS groupings in the United Nations. The list used by the United Nations Department of Economic and Social Affairs (UN DESA) includes 37 United Nations member States, two non-United Nations member States as well as twelve non-independent territories. All these States and several of these territories are members of the Alliance of Small Island States (AOSIS), a political

7 Resolution 2011/44, in United Nations (2011a).

group at the United Nations.[8] UNCTAD uses a shorter list of 29 SIDS for analytical purposes. It excludes from the UN DESA list the three largest Caribbean Islands, Singapore, the four small low-lying coastal states as well as the non-United Nations member States and territories.[9]

In order to explore the extent and implications of SIDS heterogeneity, the paper performs statistical analysis utilizing various vulnerability indicators. Whereas most existing studies focus on SIDS as a group, this paper also considers the differences between SIDS. The analysis confirms that SIDS are indeed on average more vulnerable than other developing countries, but there is also significant variation within SIDS. Moreover, areas of vulnerability vary across SIDS. Cluster analysis and principal component analysis reveal that geography is a major factor in explaining heterogeneity, as similarity is greatest among Caribbean islands and Pacific Islands, though least developed SIDS face similar vulnerabilities independently of their location. At the same time, there remains substantial variation within and similarity across SIDS clusters along many vulnerability dimensions. These findings have implications for the effective and efficient implementation of the BPoA and the MSI. Policy responses need to take into account the differences in types and magnitude of vulnerabilities among SIDS. The creation of a single or multiple SIDS groups with the purpose of providing support exclusive and uniformly for group members is unlikely to be effective. Instead, support based on differentiation according to vulnerabilities seems to be more promising in terms of potential effectiveness. Such differentiated approach could also depoliticize the controversies of a SIDS category, as SIDS status and SIDS support could be decoupled to some extent.

Section VII briefly considers the question of future monitoring of global strategies for the sustainable development of SIDS. It notes that the establishment of a robust monitoring framework would be an important new measure that could further the implementation of the BPoA and the MSI. Such framework could also facilitate the ongoing evaluation of existing and future support measures, in particular by considering the interlinkages between the various measures and, thereby, facilitating the establishment of integrated sets of support measures. Section VIII concludes.

II. Unique and particular vulnerabilities and development needs of SIDS

The vulnerabilities and development needs of SIDS have already been recognized and described in the BPoA. Besides insularity, a central characteristic of SIDS is their smallness. Most SIDS are small both in terms of area and population. Often, smallness is more pronounced in terms of area, implying high population density.[10] Many SIDS, in particular those in the Pacific region, are also geographically isolated and far away from the global markets. In addition, a number of SIDS in the Pacific and in the Indian Ocean are fragmented, as they are archipelagos spreading over vast ocean areas.

These characteristics result in certain challenges for SIDS. Smallness limits the resource base of the economy: while small population limits the base of human resources, a small area limits the natural resource base. In SIDS characterized by high population density, land resources are generally scarce. In atoll islands,

8 In addition to these 51 States and territories, the United Nations Office of the High Representative for the Least Developed Countries, Land-locked Developing Countries and Small Island Developing States also lists Bahrain as SIDS.

9 Tables 1 and 2 in annex 1, discussed further in section VI, include the DESA and UNCTAD lists.

10 The simple average of the population density of United Nations member SIDS is 412 persons/km2 for the UN DESA list and 243 persons/km2 for the UNCTAD list, whereas the number is 118 persons/km2 for non-SIDS developing countries. However, 10 SIDS (6 in case of the UNCTAD list) have a density of less than 50 persons/km2.

the low quality of land available further limits opportunities for agriculture. Freshwater scarcity is another concern of many SIDS. On the other hand, marine resources (e.g. fish) and coastal resources (e.g., beaches) are typically relatively abundant, even though smallness and external shocks often pose challenges to manage those resources. Fossil energy resources are also very scarce in a majority of SIDS, even though a number of SIDS (Sao Tome and Principe, Timor-Leste and Trinidad and Tobago) have significant reserves of oil and gas.

Smallness also leads to higher costs of providing for publicly supplied goods (e.g., infrastructure) and administrative services due to the absence of economies of scale, and the pool of human resources is small. Fragmentation exacerbates this disadvantage. High population density may in principle reduce the costs of providing basic infrastructure and public utilities. Yet, it should be noted that in certain SIDS such as Maldives and, to a lesser extent, Kiribati, extremely high population density on main islands can be paired with high degrees of fragmentation across many minor islands.

The limited resource base (both natural and human) leads to a small production base of SIDS economies, in particular to low diversification of the economy and increased exposure to shocks. For smaller and fragmented SIDS, lack of infrastructure poses further constraints to the diversification of economic activities. Within agriculture and fisheries, countries often concentrate on few commercial products, in addition to subsistence activities. The same seems to apply to services. Many SIDS specialize in a limited number of service activities, predominantly tourism but also increasingly financial and business services. SIDS endowed with exploitable non-renewable resources are involved in significant mining activities (e.g. in Papua New Guinea) and oil exploration, though the range of products is limited and the rapid exploitation of these resources has led to their depletion and the collapse of mining in some SIDS (e.g., phosphate mining in Nauru or Kiribati). Major industrial activities are limited to larger SIDS.

The small domestic production base results to a small export base, typically consisting of international services and few commodities. Many SIDS also export labour services, making remittances, including compensation of employees working abroad, a major source of foreign currency. At the same time, long-term and permanent migration, in particular of skilled labour, often implies a significant loss in human capital, exacerbating problems of limited resource base and smallness. The low production base also leads to high import dependency, even for SIDS facing high transportation costs due to remoteness and fragmentation. In many SIDS, import dependency is high not only for manufactures and energy, but also for food. The need to finance these imports makes exports of goods and services all the more important, but in view of their limited production base as described above, many SIDS also exhibit high levels of external indebtedness or high dependency on official development assistance (ODA).

Import dependency and small export base increase the exposure to external trade shocks. Volatility in global commodity markets affects both quantities and prices of products traded by SIDS. Moreover, changes in expectations as well as speculation can lead to abrupt price changes in key commodity markets even if current demand and supply conditions are stable. SIDS can also be impacted by permanent trade shocks. E.g., continuing global trade liberalization implies further erosion of tariff preferences given to many SIDS by their traditional trading partners, leading to a permanent decline in market shares by these countries if SIDS productivity gains do not offset the tariff erosion. Moreover, whereas trade liberalization and technological progress (such as the trend of using larger container ships) reduce effective transportation costs for all countries, these costs reductions are much lower for SIDS than for large developing countries.

Consequently, effective transportation costs for SIDS increase relatively to large developing countries, thereby further eroding possibilities for enlarging the export base.

Due to their location, many SIDS are highly exposed to temporary natural shocks, in particular cyclones, earthquakes, tsunamis and volcano eruptions. Smallness exacerbates the exposure, as natural hazards often affect a significant part of or even the whole country. Consequently, negative impacts often last longer in SIDS than in countries where hazards have more localized effects. Many SIDS are also highly exposed to permanent shocks associated with climate change, in particular to sea level rise, ocean acidification and global warming of atmosphere and oceans. These phenomena threaten coastal and marine resources on which the economies of many SIDS depend, aggravate resource scarcity, and further increase the exposure to natural shocks such as storm surges. In addition, SIDS are highly exposed to exogenous man-made long-term environmental shocks that threaten marine ecosystems, such as overfishing and ocean pollution. Many of these shocks are further aggravated by climate change.

For the SIDS, high exposure implies high vulnerability. It should be noted that there are different interpretations of the concept of vulnerability. This paper follows the concept used by the CDP in the context of LDC identification.[11] Vulnerability is understood as the risk of being harmed by external events. It is seen as a function of the magnitude and frequency of shocks, the exposure to these shocks and the resilience, i.e. the capacity to withstand and react to these shocks.

It is important to acknowledge that most of the challenges and vulnerability discussed here are not unique to SIDS. However, in many areas SIDS are particularly vulnerable because in SIDS typically a much larger proportion of the population is negatively affected by external shocks.[12] A unique vulnerability of low-lying atoll SIDS (such as Maldives, Marshall Islands, Kiribati and Tuvalu) is the existential risk of becoming uninhabitable and thereby perishing in their present form because of sea level rise, which is a realistic possibility according to some scientific studies.[13]

11 See CDP and UN DESA (2008).

12 While the absolute number of people at risk in SIDS is often smaller than in larger, non-SIDS vulnerable countries, in SIDS the relative number is higher. Hence, for SIDS the vulnerability at the country-level is in many cases elevated, and thus particular.

13 See, e.g., Barnett and Adger (2003).

III. Addressing SIDS development needs, resilience and exposure to shocks

Existing reviews have highlighted the nature and effectiveness of policy measures currently in place to address specific vulnerabilities and development needs of SIDS.[14] Further information can be found on the website of the United Nations offices with SIDS-specific mandates at the global, regional and national level[15] as well as at the website of relevant regional organizations.[16] Specialized international organizations also provide relevant information on lessons learnt at the country level on how to mitigate SIDS challenges, reduce the exposure to external shocks and build resilience. Whereas often the information provided covers all countries vulnerable to a given specific shock, some organizations also have SIDS-dedicated programmes or provide SIDS-focused information.[17] The SIDS information portal (www.sidsnet.org) and the knowledge platform (sids-l.iisd.org/) contain further information.

The following brief assessment of major response approaches identifies important elements for enhancing the implementation of the BPoA and the MSI. The assessment builds on the previous section, and identifies a few relevant response measures according to the five main SIDS development needs or vulnerabilities highlighted in section II.

The general policy response to resource scarcity such as land or water is sustainable resource management, aiming to increase the efficiency in production and consumption, to avoid degradation and pollution and, generally, to increase societal benefits from the resources for present and future generations. Measures include designing and implementing effective regulation, including tenure and user rights, better coordination of existing institutions, upgrading infrastructure, and harnessing often underutilized resources (such as rainwater). E.g., most SIDS have at least started with the development of integrated water resource management strategies, typically with support from regional and international organizations. Sustainable resource management is also of critical importance for resources such coastal zones, marine resources or biodiversity that are negatively affected by external shocks (e.g., climate change), even though they may in principle be abundant in SIDS. An important element of sustainable resource management is the provision of baseline information and the capacity to analyze data on these resources, which may still be insufficient in particular with regard to marine resources.[18]

14 For a recent comprehensive review, see United Nations (2010b). For more academic discussion on SIDS vulnerabilities, see, among others, Briguglio (1996) or Guillaumont (2010). For a discussion on policies, in particular domestic policies, to address these vulnerabilities, see e.g. Briguglio and others (2006).

15 See UN DESA's SIDS Unit (sustainabledevelopment.un.org/index.php?menu=203), OHRLLS (www.un.org/ohrlls/), regional offices of the UN ESCAP (www.unescap.org/epoc/) and ECLAC (cepal.org/portofspain/) as well as regional and national UNDP offices (undp.org).

16 In the Pacific, nine regional intergovernmental organizations are coordinated through the Council of Regional Organizations of the Pacific (CROP). The Secretariat of the Pacific Forum also acts as the Secretariat of CROP, see www.forumsec.org/pages.cfm/about-us/crop. In the Caribbean, the main organizations are the Caribbean Community Secretariat (CARICOM, www.caricom.org) and the sub-regional Organization of Eastern Caribbean States and its subsidiary institutions, see www.oecs.org. In the Indian Ocean, see the Indian Ocean Commission (ioconline.org).

17 The CBD has an island biodiversity programme (www.cbd.int/island), UNCTAD covers SIDS as group within its special programmes (unctad.org/en/pages/ALDC/aldc.aspx), the World Bank has a Small States Programme covering predominantly SIDS (www.worldbank.org/en/country/smallstates), FAO (www.fao.org/sids) and UNESCO (www.unesco.org/en/sids) have SIDS-specific information and UNFCCC conducts SIDS-focused meetings (e.g., see unfccc.int/adaptation/cancun_adaptation_framework/loss_and_damage/items/7058.php).

18 For a comprehensive collection of available information on natural resources in SIDS, see the Global Islands Database developed by UNEP-WCMC (gid.unep-wcmc.org/) on request by the Global Island Partnership (glispa.org/). However, more detailed information and increased national capacity may be needed for effective sustainable resource management in SIDS.

Increasingly, SIDS are also taking measures to replace scarce and/or non-existing resources (such as fossil fuel needed for electricity generation) with existing abundant resources (e.g., renewable forms of energy such as sun or wind). In fact, several SIDS have committed to achieve 100 per cent renewable energy targets (e.g., Dominica, Grenada, Guyana, and Tuvalu) or to become climate-neutral (e.g., Maldives). In addition to national initiatives, there exists also a collective initiative of SIDS (see sidsdock.org) to transform their energy sectors and to generate financial resources for climate change adaptation by connecting SIDS energy sectors to international carbon markets. However, the share of renewable energy in SIDS is currently less than in other countries, even though it should be highlighted that two SIDS (Federated States of Micronesia and Kiribati) have the highest share of solar electricity capacity.[19]

One response to implications of smallness, such as the high cost of providing public goods and administrative services, is to increase the quality of human capital by intensifying efforts to increase the overall educational attainment of the population. Such efforts also contribute to the development in general, and thus increase the resilience against any external shock. Another measure, already proposed in the BPoA and frequently employed in the Caribbean and in the Pacific region, is the joint provision of publicly supplied goods and services. Tertiary education is a case in point, as the small populations of many SIDS preclude the establishment of national institutions providing education in a sufficiently wide range of subjects. Consequently, the University of the South Pacific and the University of the West Indies can be seen as successful responses to address the smallness problem through joint provision. Generally, the effectiveness of joint provision depends on the similarity of countries, the decision making mechanisms underlying such arrangements as well as how cost and benefits are allocated among partners. Consequently, it is no surprise that the smaller, more homogeneous countries such as the member States of the Organization of Eastern Caribbean States (OECS) can benefit more extensively from deeper integration than the larger and more heterogeneous CARICOM group.[20]

A small export base and the resulting high exposure to trade shocks are to some extent mitigated by measures that promote diversification. As the underlying reason for the small export base is the structurally limited production base, the scope of diversification is certainly limited. However, given the small starting base, a small increase in the number of exported goods and services can have a significant positive impact. For example, a number of SIDS have diversified into business and financial services exports, in addition to tourism services.[21] In addition to domestic measures and international capacity-building, preferential market access can also play an important role, though experiences made with existing or past preferential regimes for SIDS and the compatibility of possible preferences to SIDS with the multilateral trading system would need to be taken carefully into account before developing concrete measures. As the production base of SIDS is small, the range of potential merchandise exports is often limited. Hence, preferential market access schemes can be effective even if only few products are covered, as long as they include those products for which SIDS have significant export potential that is underutilized due to tariffs or non-tariff trade barriers. Naturally,

19 As per data from data.un.org, in SIDS the average combined share of geothermal, hydro, solar, tide and wave, and wind in net total net installed capacity of electric power plants in 2009 was 11.7 per cent, approximately half the global average of 23.4 per cent. The share of solar was 17.9 per cent in the Federated States of Micronesia and 9.5 per cent in Kiribati.

20 CARICOM is a single economic market. It also provides for the coordination of domestic policies and for the formulation of policies and programmes. In the OECS, public services such as monetary policy, civil aviation, the Supreme Court and telecommunication regulation are provided jointly. Moreover, an economic union is under development.

21 United Nations (2011) notes the emerging specialization of SIDS such as Samoa, Seychelles, St, Kitts and Nevis or Vanuatu in these sectors, in addition to the more established exporters such as Bahamas, Barbados and Mauritius.

diversification does not fully eliminate exposure to idiosyncratic demand shocks and (by raising the role of exports in economic production) may increase the exposure to global demand shocks such as those experienced in the recent economic and financial crisis.[22] Hence, while measures for diversification have been effective, there is clearly a need to address remaining vulnerability to external shocks (see section VI) and tackle instability in international markets (see section V).

With regard to exporting labour, the absence of a global migration framework constrains the realization of benefits and limitation of costs associated with migration, in particular from the perspective of sending countries, while migrants' basic human rights remain largely unprotected.[23] A number of SIDS are included in unilateral seasonal worker schemes adopted by major developed countries, though most of these schemes are restricted to the agricultural sector. Even if the conclusion of international migration agreements may be elusive, it may be beneficial to link unilateral instruments or bilateral agreements to a global framework for migration.

Similarly, import dependency and the resulting exposure to global supply and price shocks are partially mitigated by promoting domestic production. In particular, measures for renewable energy alleviate exposure to shocks in energy markets, while measures for promoting domestic food production (both commercial and home production) reduce exposure to shocks in food markets. Decreasing import dependencies also decreases vulnerability to foreign exchange rate shocks. However, given the small production base, these efforts remain partial and measures for reducing global market instabilities and addressing remaining vulnerabilities are critical.

Policies to tackle these countries' heightened exposure and lack of resilience to natural disasters and climate change have been adopted and supported by regional and international institutions.[24] More importantly, these plans and programmes increasingly take the different conditions across SIDS into account. A main approach of these plans and programmes is to integrate climate change into the design and implementation of sectoral programs in critical areas such as food security, coastal management or water management, with the selection and concrete measures depending on specific country situations. In addition, general awareness raising as well as building technical knowledge on climate change (including climate data provision and analysis) is often included. However, implementation of programmes and projects is often still at an early stage, the provision of adequate resources is often unclear and some major projects are in a pilot stage excluding potentially beneficiary countries. Consequently, it can be conjectured that in these areas the scaling-up of activities, the continuous improvement of measures as well as strengthening of existing institutions should be accorded priority.

The programmes on disaster risk reduction and climate change adaptation are also increasingly integrated with national (sustainable) development strategies, with many international agencies providing

22 Diversification can also decrease other vulnerabilities. For example, tourism exports are often a major contributor to high food import dependency, so that diversification into other services sectors may decrease vulnerability due to rising and volatile food prices.

23 For a discussion, see among others Alonso (2013).

24 In the areas of climate change, prominent examples include the various activities by the Caribbean Community Climate Change Center (http://caribbeanclimate.bz/) or the Pacific Adaptation to Cliamte Change project executed by the Secretariat of the Pacific Regional Environment Programme (http://www.sprep.org/pacc-home). The World Bank's Pilot Program for Climate Resilience, which has pledges for over $ 1 billion, includes 9 SIDS among its 18 country programs, in addition to regional programs for the Caribbean and for the Pacific.

valuable guidance on issues such as climate change mainstreaming. In fact, to address the interlinked nature of SIDS vulnerabilities, the development and implementation of national sustainable development strategies is essential. Again, there exists a large range of support measures for such strategies. Many SIDS are already implementing such strategies, in particular the Pacific SIDS. At the same time, it should be acknowledged that integrated planning and decision-making for sustainable development can be challenging. Consequently, this area requires continued attention by the SIDS themselves and ongoing and coherent support by their development partners.

IV. Reducing shocks at the global level

As noted above, vulnerability as understood by the CDP[25] is a function of shocks (size and frequency), exposure and resilience. The previous section argued that, in many cases, measures to address SIDS exposure and resilience are in place or under development, even if implementation is often slow and the scale of measures rather small. However, measures to reduce the occurrence and magnitude of shocks are clearly insufficient. Whereas natural, environmental and trade shocks are external events from the perspective of SIDS, and hence beyond their control, trade and many major environmental shocks are endogenous from a global perspective and are indispensable part of any international strategy for SIDS. These external shocks pose development constraints for all countries. However, as SIDS are particularly vulnerable to these shocks, they are also particularly dependent on effective international responses. As SIDS themselves are only marginal contributors to global shocks, actions have to be taken by non-SIDS. The relatively high importance of international measures for the development of SIDS is also major factor in explaining the active engagement of many SIDS in the international arena.

The design of international measures to address systemic issues should take the interdependencies of the various shocks into account. For example, while using agricultural land for the production of bio-fuels may mitigate climate change to some extent it could increase level and volatility of food prices. On the other hand, expanding agricultural production through sustainable agriculture would simultaneously lead to lower greenhouse gas emissions. Similarly, reducing carbon emissions through the imposition of carbon taxes are not only expected to contribute to reducing global warming, it could also raise substantial revenue that could be utilized to address other shocks and development needs.[26]

A. Climate change

Climate change has long been identified by SIDS as one of the most important areas of concern. There is a general agreement at the international level that climate change is a significant global risk to development and well-being, which requires international action. More recently, there has also been agreement that global temperature increase of 2 degree Celsius compared to pre-industrial times (approx. 1850) would be dangerous and should be avoided. From the perspectives of SIDS, however, such temperature rises are expected to lead to detrimental development consequences and in some cases to existential threats, as key marine and coastal ecosystems are expected to be degraded already in scenarios associated with temperature rises of 1.5 degree Celsius. Consequently, many SIDS have called for more ambition in international climate change negotiations.

25 See CDP and UN DESA (2008).

26 The imposition of a tax of $ 25 per ton of CO2 emitted by developed countries is estimated to raise $250 billion per year (World Bank and others, 2011). Annual incremental investment needs to achieve sustainable development objectives have been estimated at about $ 1.93 trillion (United Nations 2011c).

Up to now, attempts to find effective international solutions have been elusive. The Kyoto Protocol, the main international response measure under the UNFCCC, covers only emissions from a limited set of countries. Moreover, emission reductions agreed under the Protocol were not very ambitious, and partially met due to the collapse of heavy industries in former central planning economies. Negotiations are underway on a second implementation period of the Protocol as well on new international measures under the Durban Platform for Enhanced Action, but their successful conclusion cannot be taken for granted. Outside the Protocol, policies pursued for non-climate objectives often result in significant GHG emission reductions. Examples include measures to reduce energy dependency, to reduce air pollution, to preserve biodiversity or to reverse the depletion of the ozone layer. However, these measures have not succeeded in sufficiently reducing the growth in GHG emissions.

Consequently, the implementation of current policy commitments is expected to lead to an increase of global temperatures by about 3 – 5 degree Celsius.[27] For most SIDS, such scenario implies dire consequences. Increased sea surface temperatures and ocean acidification are expected to contribute to large decline in live cover of coral reefs. This, in turn, would lead to declining tourism potential, reduced protection from storm surges and lower fish stocks. The productivity of SIDS fishing areas would further decline as sea surface temperature increases are expected to lead to poleward migration of fish stocks. Sea level rise would increase storm surges, further exacerbated by possible impacts of climate change on hurricane intensity. Overall, the consequence would be for many SIDS increased coastal erosion, inundation of low-lying areas, declining contribution of fisheries to food security and economic livelihood, reduced tourism revenues and reduced water supply due to saltwater intrusion. Whereas estimates of climate change impacts on precipitation remain highly uncertain at the national and regional level, there is a risk that increased droughts would lead to lower water supply and reduced agricultural production in SIDS. In addition, increased precipitation intensity raises the risk of floods. The adaptation measures referred to in the previous section would limit the negative impacts, but would be unable to completely mitigate the costs. Moreover, the implementation of climate change adaptation measures reduces the resources otherwise available for the sustainable development of SIDS.

There exist a multitude of proposals for measures that effectively mitigate climate change, including from the CDP.[28] Climate change mitigation requires massive investments in technology and infrastructure, in particular in the generation of low-carbon emission energy but also in transport and buildings. Such investments simultaneously contribute to other sustainable development objectives such as expanding access to electricity or increased eco-efficiency in consumption patterns.[29] Mitigation also requires reduced land degradation, by properly acknowledging carbon uptake in land use and management decisions, along with other benefits such as biodiversity preservation and food production. Overall, effective climate change mitigation needs to be integrated into the broader sustainable development agenda and not treated as a stand-alone environmental concern. Rather than simple technological fixes, it requires a transformation of socio-economic development paradigms. At the international level, an agreement needs to be found to reduce carbon emissions and on a fair and equitable distribution of responsibilities and costs, whether expressed in terms of emission commitments as in the Protocol or in other forms. Obviously, reaching agreement on country contributions to global common goods is inherently difficult, even more so when benefits

27 E.g., UNEP (2012).

28 See CDP and UN DESA (2007, 2009).

29 The current global context of sluggish real estate market and historic low real interest rates actually make such investments timely from an economic perspective, whereas the instability in global financial markets and the political focus on austerity measures act as investment disincentives.

fall to a significant extent to future generations. Still, uncoordinated actions by individual or small groups of countries cannot be expected to lead to sufficient emission reductions.

B. Global overfishing

For most SIDS, ocean ecosystems are critical for food security, employment and tourism. To a significant extent, sustainable management practices along the lines described in section IV translate into effective responses. The establishment and enforcement of marine protected areas and the development and implementation of appropriate systems for fishing licenses for SIDS exclusive economic zones are very important measures that could require scaling-up and international support. Joint management of resources by SIDS can be effective to address problems stemming from high administrative cost as well as cross-border externalities, but this also requires capacity building. Positive examples in this regard include the Nauru Agreement between eight Pacific SIDS on tuna fisheries management.[30,31] However, there exist risk factors for fishery resources (beyond climate change as addressed above) which can be reduced by international action only.

Global fishing fleets have a capacity far beyond the maximum sustainable yield, partly due to subsidies. Moreover, unsustainable fishing practices remain widespread and illegal, unreported and unregulated (IUU) fishing continues to be a major problem, as coverage of existing measures remains incomplete and their enforcement is difficult given the size of exclusive economic zones (EEZ). In fact, of the 20 countries with the largest EEZ per capita, 18 are SIDS.[32] Benefits from the selling of fishing licenses are in many cases not fairly distributed, as bargaining positions and internal governance structure of small developing countries are often weak. Moreover, marine ecosystems are further affected by other problems such as marine pollution, in particular from the marine transport sector. The recent recognition of the importance of oceans for global sustainable development could provide a much needed impetus to address this problem. In addition to ongoing work in regional and global fishery bodies, progress under the United Nations Convention on the Law of the Seas (UNCLOS), the Convention for Biological Diversity including the adoption of specific targets on marine ecosystems in its 2011-2020 Strategic Plan can play an important role. The highlighting of oceans in the outcome document of the 2012 sustainable development conference in Rio de Janeiro[33] and the establishment of the United Nations Oceans Compact could provide further impetus. Yet, to reduce the vulnerability of SIDS in this area, it is very important that these processes lead to the adoption of concrete measures, such as bans on unsustainable fishing practices, import bans on IUU fishing or subsidy reform in the fishery sector, as well as effective implementation mechanisms.

C. Global economic and financial shocks

The recent economic and financial crisis of 2008-2009 demonstrated the vulnerability of SIDS to a sudden decline in global aggregate demand. Consequently, measures for the stabilization of the global economic and financial system could be effective contributions to the reduction of SIDS vulnerabilities. Generally, SIDS have been found to be hit harder by the crisis than many other developing countries. On average, the decline

30 See www.pnatuna.com.

31 Transboundary multistakeholder approaches are also pursued within the initiative to designate the Caribbean Sea as special zone in the context of sustainable development, which is under consideration at the United Nations. For the latest report, see United Nations (2012b).

32 The other two countries are developed island States, Iceland and New Zealand. The ratio has been calculated by the CDP Secretariat based on EEZ data from the Ocean Health Index (www.oceanhealthindex.org/) and population data from the United Nations Population Division.

33 United Nations (2012a), paragraphs 158-177.

in GDP growth rates in SIDS has been almost 4.8 percentage points on an annualized basis, higher not only than in developing countries in general but also beyond the decline experienced by developed countries. In two SIDS (Antigua and Barbuda and the Maldives), the decline was over 10 percentage points.[34] Moreover, recovery from the crisis has been slow in many SIDS, with two SIDS (Antigua and Barbuda, and St. Kitts and Nevis) still experiencing shrinking GDP values in 2011. The magnitude of negative impact from the crisis should not be a surprise, as many SIDS are highly exposed to trade shocks in general, have high regional concentration of exports in developed countries markets, often rely on income-elastic exports such as tourism and in many cases have limited scope for macroeconomic stabilization policies. At the same time, some other SIDS exhibiting a different export basket, different spatial specialization patterns or lower role of exports in GDP have been affected by the crisis to a much lesser extent.

The financial crisis highlighted the need for improved regulation of international as well as national financial markets, including through the use of macro-prudential policies, improved international coordination of financial regulation and the reduction of excess volatility of financial flows to better mitigate the systemic risks of the financial sector.[35] It should be noted that a number of SIDS have developed financial sectors that partially rely on regulatory arbitrage and could, hence, experience reduced economic financial activity and revenues. However, internationally coordinated financial regulation might also decrease more unregulated, unilateral pressure on SIDS to adjust their financial sector in specific manners. Moreover, it should be noted that many financial offshore centers are not located in United Nations member SIDS, but rather in territories associated with major countries. Overall, improved regulation has the potential to reduce vulnerability of SIDS in general, though realization of such potential obviously depends on the detailed nature of regulatory reforms.

A second major component of policy reforms would be an increased counter-cyclical orientation of macroeconomic policies and improved international coordination. Due to the use of fixed currency pegs in many SIDS and the dominant role of developed country markets for SIDS exports, counter-cyclical monetary and fiscal policies by these countries, including the avoidance of overly stringent austerity responses to debt crisis, would entail positive spillovers to SIDS. Improved macroeconomic policy coordination would also result in more stable international exchange rate regimes. In this regard, a greater role of special drawing rights (SDR) in international monetary policy, in particular if additional SDRs are created in a countercyclical manner, could also play an important role.[36] Reforms to international economic governance would also be a relevant ingredient to a more stable system, as would be the enhancement of compensatory financing mechanisms to cope with external shocks discussed in section V of this paper.

The concurrent world food and energy price crisis highlighted also the heightened vulnerability of many SIDS to global supply shocks due to their high degree of import dependency. In particular, most SIDS are net-food importing countries and are also energy dependent, relying to a large extent on oil imports. Both stabilizing and ensuring affordability of global food markets would be important contributions to reducing the vulnerability of SIDS. Measures to reduce the volatility of global agricultural markets would fall in wide range of policy domains such as financial, macroeconomic, infrastructure, trade and agricultural policies. Increased global production and reduced price volatility also contribute to food security in SIDS,

34 Table 1 in the annex contains further results and data sources.

35 For a list of concrete recommendations within the UN context, see United Nations (2009). See also United Nations (2010), among others.

36 See also Erten and Ocampo (2012).

if coupled with domestic policies to increase local food production, to ensure equitable access and effective utilization of food.

Controlling volatility in global energy markets (particularly oil markets) could also play an important role in reducing SIDS vulnerability. However, unlike in the case of food, measures to increase global supply of oil are not likely to reduce overall SIDS vulnerability. This is because positive effects on the current account through lower import prices could be outweighed by heightened climate change impacts caused by an increase in global fossil fuel consumption. This, again, underscores the need to place responses to SIDS vulnerabilities within a broader sustainable development framework. Hence, vulnerability of SIDS to oil price shocks is generally more successfully addressed by implementing measures to reduce exposure discussed in the previous section, e.g., through switching towards renewable energy sources and, more generally, moving towards low-carbon development.

V. Addressing inherent vulnerability through external financing

The implementation of the measures discussed in the previous sections on reducing exposure and resilience to shocks (section III) and mitigating shocks themselves (section IV) would drastically reduce the vulnerability faced by SIDS. However, it is important to recognize that the underlying structural characteristics (such as smallness and insularity) and their implications discussed in section II will persist, so that SIDS will always remain vulnerable. Consequently, there is need for mechanisms that SIDS can utilize when hit by shocks, whether natural or trade related. Hence, international support to SIDS in the area of finance can be more efficient if existing contingent financing mechanism are enhanced and the terms of long-term financing are adjusted to take into account external events (discussed further below). It should be noted, though, that in addition there is a need for international support for development finance for poorer SIDS and a need for non-financial support such as capacity-building for all SIDS. Moreover, official development financing should take SIDS conditions into account, as its is partially already done by the World Bank in form of the small island exception, which currently allows 13 SIDS to access funds from the highly concessionary IDA fund even though their per capita income exceeds the standard eligibility threshold.[37] It is important to stress that the effectiveness of international financial support also depends on the functioning of domestic governance structures in SIDS.

A. Insurance

In principle, insurance mechanisms are appropriate instruments to provide resources in case of external shocks.[38] SIDS national insurance markets are too small to provide protection against economic impacts of natural disasters. Consequently, and in line with arguments made in section III, the creation of international or regional insurance markets can be effective, as long as disasters remain sufficiently idiosyncratic. In fact, the creation of the Caribbean Catastrophic Risk Insurance Facility (CCRIF)[39] has been widely heralded as innovative and effective instrument for SIDS to ensure themselves against disasters. The fund, established with international support, allows member States to buy insurance against economic damage to government property due to natural disasters (hurricanes, earthquakes and, more recently, also excessive rainfall). It only

37 For the list of IDA eligible countries and further information, see www.worldbank.org/ida/borrowing-countries.html, accessed 7 February 2013.

38 On the role of insurance policies to address vulnerability of the poor, see e.g. Reddy (2006), who also emphasizes the additional need to for risk reduction (as in section IV of this paper) and for development policies.

39 See http://www.ccrif.org/.

provides coverage against major disasters. It is a parametric insurance, i.e., for payments, losses are estimated from a risk model utilizing hazard information such as wind speed, storm surge or earthquake-induced ground shaking, rather than on actual losses incurred. Thereby, payments can be made relatively fast, providing financial resources for countries for short-term recovery.

The recent efforts to establish disaster risk insurance in the Pacific are very welcome.[40] This work also emphasized the importance of embedding regional or international risk insurance in comprehensive disaster risk reduction strategies, as insurance should be seen as complement and not as substitute to measures reducing exposure and building resilience. While building on the experiences made by the CCRIF and the recent efforts in the Pacific, further work on insurance mechanisms could expand the coverage by moving from physical damage to broader economic damage. In addition, insurance could be targeted at providing resources to alleviate impacts on the poor, for example by offering insurance contracts with payouts for disasters with strong adverse impacts on subsistence agriculture. It should be acknowledged, though, that while insurance can be an effective mechanism to mitigate the negative impact of natural disasters, it could also become a costly mechanism as the frequency and intensity of disasters increases.

B. Official compensatory development financing

In 2008 the CDP recommended that the compensatory finance architecture needed to be enhanced to provide liquidity to developing countries affected by external shocks, by simplifying existing facilities, expanding their scope, rethinking attached conditionalities, and ensuring timely disbursements at a scale proportionate to the shocks.[41] Recent reforms at the IMF established new instruments such as the Rapid Financing Instrument or, for low-income countries and SIDS covered by the small island exception, the Rapid Credit Facility that could provide some of the resources needed. However, while it is probably still too early for a detailed assessment of these instruments, the limited actual disbursements raise questions on their effectiveness to provide significant financial resources in a sufficiently fast and simple manner.[42] In fact, the CDP noted already in an early assessment in 2009 that the IMF reforms were to be welcomed, but fell short of the CDP's recommendations made in 2008.[43]

More generally, including shock-absorbing elements in official development financing are of particular interest for SIDS. For example, the most recent revision of the Cotonou Agreement between the European Union and the African, Caribbean and Pacific (ACP) group of States, which includes most SIDS, contains provisions for increasing payments in case of pre-established criteria for a decline in export earnings. Broadly speaking, a 2 per cent decline in export earnings triggers the eligibility for SIDS and other disadvantaged groups and may lead to compensation of up to 25 per cent of the export earning loss.[44] Including import price shocks into such schemes and ensuring timely disbursements could bring important benefits to SIDS.

40 The recent efforts to establish disaster risk insurance in the Pacific are very welcome.

41 CDP (2008).

42 As per IMF data accessed on 8 February 2013, there have been eight disbursements under the Rapid Credit Facility, half of them to SIDS (Dominica, St. Lucia and twice to St. Vincent and the Grenadines). No disbursements have been made under the Rapid Financing Instrument.

43 CDP (2009).

44 The provision is contained in Article 68 of the Cotonou Agreement; the eligibility criteria and implementation procedures are detailed in Annex II, Articles 8-11. See European Commission (2010).

C. Contingent bonds

Another possibility to provide SIDS with financial resources in times of global shocks is to introduce instruments that have embedded clauses which are triggered by external events such as changes in global prices for key export or import commodities. Commodity-indexed bonds are often advocated as risk-reducing tool for commodity-exporting countries.[45] However, they could also be of interest to commodity-importing countries, in particular for SIDS whose external balances are strongly influenced by price changes for oil or for food. Interest payments and/or principal repayments would be lower in times of high import prices, but higher when import prices are low. In addition to improving the terms of external financing for SIDS in line with time-varying needs, commodity price-indexed bonds could also reduce the default risk (and hence increase credit-worthiness) as negative commodity shocks could render SIDS unable to repay. However, indexed bonds also increase risk for the buyer when compared to fixed interest bonds and, hence, may require a premium.

Currently, price-contingent national bonds barely exist. Hence, implementation of such new measures would require external support for designing and marketing commodity price-indexed bonds, in addition to further studies to assess possible supply, demand and pricing mechanisms. This could be an important role for international and regional financial organizations to play. Many SIDS, however, already confront a relatively high level of external debt which further constrains access to international capital markets.[46] It should be recalled that most SIDS do not qualify for debt reduction under the existing multilateral debt reductions initiatives[47] and that debt restructuring needs frequently occur in SIDS, as demonstrated in early 2013 in Jamaica and in 2012 in Belize.

D. Other financial mechanisms

Self-insurance is another alternative for those countries that are able to set aside part of their revenues. Sovereign funds (or other accumulation of wealth such as excess foreign reserves) have the advantage of full national control and ease of access provided the appropriate governance mechanisms are in place and funds are not mismanaged or misused. Yet, self-insurance by countries is generally an inefficient instrument to protect against external shocks, as resources for the funds are not available to undertake other important tasks of development financing. Hence, they are probably attractive for SIDS that are net fuel exporters or that are pursuing counter cyclical policies by creating commodity stabilization funds to offset macroeconomic volatility brought by commodity booms and boosts.[48]

In order to react to temporary global supply shocks, SIDS could also resort to derivatives and related financial instruments. Through such instruments, SIDS could partially hedge their exposure to import price surges or (in case of commodity exporting SIDS) export price slumps. Compared to price-contingent bonds discussed above, derivatives are widely accessible financial instruments and traded on major exchanges. However, by engaging in derivatives market countries would increase their exposure to speculative markets.

45 See, e.g. Atta-Mensah (2004) or Frankel (2012).

46 According to World Bank data, the average ratio of total external debt to GNI over 2008-2010 was 65 per cent in SIDS, compared to 35 per cent in other developing countries. Eight of the ten countries with the highest external debt ratio are SIDS.

47 Among the 39 countries highly indebted poor countries (HIPC), five are SIDS: Comoros, Guinea-Bissau, Guyana, Haiti and Sao Tome and Principe.

48 In addition, a couple of Pacific SIDS have been bestowed upon independence with sovereign trust funds to mitigate their structural development needs and to provide resources in case of budget shortfalls.

Given that speculation is often a factor for price volatility, participation of individual SIDS in such markets to reduce their exposure could be seen as ironic and impose negative externalities on other vulnerable countries, including other SIDS. Moreover, it could also be questioned whether political governance structures are conducive to risk mitigation via derivatives, as spending resources without guaranteed direct benefit may be difficult to be supported politically. Long-term contracts for commodities with agreed prices may be more suitable, but entail risk for policy makers if ex-post their countries would be better-off under market compared to agreed prices. Moreover, the number of market participants for such long-term contracts may be very limited, raising the risk of additional costs for players such as SIDS that are unlikely to have market power.

VI. Heterogeneity of SIDS and implications for effective responses

As SIDS vary with respect to location, size and characteristics, it is not surprising that they also vary with regard to vulnerability and development needs. Among other things, this heterogeneity contributes to a lack of common understanding of which countries should be classified as SIDS. In order to gain insights in the extent of SIDS heterogeneity and to derive possible policy implications, quantitative vulnerability indicators can provide useful information. For this purpose, exploring the CDP's economic vulnerability index (EVI) can be instructive. The EVI was designed to measure the structural economic vulnerability of countries and is applied for the identification of least-developed countries. It has the advantages that it is a well-tested index that has been successfully utilized for country classification, has been endorsed by ECOSOC, covers a broad range of issues covered by eight different indicators, and is readily available with full data coverage for 130 developing countries.[49] At the same time, it should be stressed, that the EVI may not be well-suited to measure all specific vulnerabilities of SIDS, as its main focus is to measure vulnerability as a structural handicap to overall development. But, with this caveat in mind, the EVI provides a general idea of the degree of SIDS vulnerability vis-à-vis other developing countries, including the LDCs.

Tables 2 and 3 (in annex 2) show that, according to the EVI overall score and five of its eight components, SIDS are significantly more vulnerable than non-SIDS developing countries. For one component, namely, the share of agriculture in GDP, SIDS are significantly less vulnerable than non-SIDS, which reflects the relatively high importance of services in economic activities in many SIDS. This holds broadly for both commonly used lists of SIDS, from DESA and from UNCTAD.

Among the two main EVI sub-indices, SIDS are clearly more vulnerable on average than non-SIDS for the exposure index, whereas both country groups are non-distinguishable with regard to the shock index. A possible explanation for the difference is that despite their higher exposure, most SIDS have developed remarkable resilience. In fact, on average SIDS score higher than other developing countries with regard to the two LDC criteria (gross national income per capita and human asset index), indicating that most SIDS are relatively well equipped with income and human capital, two key factors for overall resilience to shocks. However, the difference could also indicate that the chosen indicators of the shock index do not capture some possible impacts of external shocks that could be more pronounced for SIDS, e.g. higher intensity of natural disasters or longer timeframes to recover from external economic shocks. Among the individual EVI indicators, differences between SIDS and non-SIDS are most pronounced for population, share of population living in low elevate coastal zones, remoteness, agricultural instability and export concentration. With

49 For data and historic reasons, EVI scores are not available for four smaller Pacific SIDS (Federal Republic of Micronesia, Marshall Islands, Nauru and Palau).

regard to the latter, it should be taken into account that it only includes merchandise trade but not services.

At the same time, vulnerabilities vary substantially between and among SIDS and non-SIDS groups: in fact, the less vulnerable SIDS have substantially lower EVI scores than the relatively more vulnerable non-SIDS. Annex 3 presents a series of figures that further illustrate both the high vulnerability of SIDS and the heterogeneity within the SIDS and non-SIDS categories according to the EVI, its two main sub-indices and its eight indicators. They show that while most SIDS have high EVI scores, the same is true for non-SIDS (e.g., Gambia, ranked 3rd out of 130, or Liberia, rank 5), whereas some SIDS (e.g., Barbados, rank 94, or Mauritius, rank 93) are only moderately vulnerable according to the EVI. Whereas these features hold qualitatively also for the individual EVI indicators, the vulnerability ranks of countries vary substantially across indicators. E.g., Barbados has small population size (rank 14) and Mauritius is remote (rank 25), whereas Gambia is among the least remote (rank 101) and in Liberia only a small part of the populations has been victim to natural disaster (rank 109). Even the most vulnerable SIDS, Kiribati, has only a moderate degree of agricultural instability (rank 64). It should be emphasized that the conclusion of high average vulnerability of SIDS, but significant heterogeneity within and outside the group also holds when indicators beyond those included in the EVI are considered, such as import dependency or the environmental vulnerability index.[50]

The heterogeneity of SIDS has implications on the optimal design and access to response measures, if these are to be effective and efficient. For example, whereas support for diversifying crop exports would be helpful for relatively land-abundant SIDS with fertile soils, such support is unwarranted for land deprived and soil poor SIDS. Similarly, whereas integrated water resource management activities in water-scarce SIDS may include support to access unconventional water resources such as desalinated sea water, desalination is not a needed option in water-rich SIDS. Even if vulnerabilities are common among SIDS, access to responses may be differentiated to ensure equity concerns. For example, as discussed in the previous section, regional disaster insurance can be effective to provide resources to recover from natural disasters. Relatively rich SIDS may be in the position to purchase such insurance, so international support is needed only for designing and implementing the insurance mechanisms. However, poor SDIS may not afford insurance. Therefore, international support may include subsidies to buy insurance. In case of disaster risk reduction, poorer SIDS with generally lower quality housing structures may depend on lower cost, but less effective, solutions for improving resilience of building infrastructure, coupled with public awareness campaigns.

In order to explore how SIDS heterogeneity can be taken into account in the design of international response measures, relevant insights can be won by exploring to which extent heterogeneity is reduced when only sub-groups of SIDS are considered. Relatively homogeneous sub-groups may in principle allow for the design of response measures that could be uniformly employed but still effectively address vulnerabilities and development needs of the concerned countries. As a first step towards such an approach, it is instructive to conduct a formal clustering of SIDS (k-means clustering) into different groups. Using the 13 indicators in place for the identification of LDCs and including 33 SIDS for which data are available, leads to three clusters with 16, 11 and 6 members respectively. The first cluster consists of Caribbean Island States and some SIDS in the Atlantic, Indian Ocean and South China Sea (AIMS) region. Its members are characterized by relatively high income and human assets, low shares of agriculture and low export concentration. The second cluster contains most small Pacific countries, the coastal Caribbean States as well as Maldives and Sao Tome and Principe. Its members are generally characterized by slightly lower income and human assets, large

50 Import dependency is here understood as ratio of goods and services imports to GDP. The Environmental Vulnerability Index has been developed by the South Pacific Applied Geoscience Commission (SOPAC) and the United Nations Environment Programme (UNEP), see www.sopac.org/index.php/environmental-vulnerability-index.

share of population in LECZ and large share of victims to natural disaster. The last cluster contains most LDCs and Papua New Guinea, which are mostly larger, poorer and more dependent on agriculture. Annex 4 contains further information on cluster composition and their details.

Obviously, the preliminary nature of the analysis should be taken into account and its result interpreted with caution. Nevertheless, the cluster composition is relatively robust when additional potential indicators for SIDS vulnerabilities and development needs are added to the data set.[51] Maldives, though, switches between cluster 1 and 2, and Solomon Island between cluster 2 and 3. Experimental analysis with data for the remaining four Pacific SIDS places these countries in cluster 2, as expected, which could be seen as further validation of this approach. However, the incompleteness of data on these four countries should be acknowledged. More interestingly, there remains a large degree of heterogeneity within the three clusters, as can already be seen from the fact that data variation within clusters is about the same (in fact, slightly larger) than the variation between clusters as well as from the range of vulnerability scores. To illustrate this further, annex 4 also presents graphical results from a principal component analysis (PCA). The PCA confirms the basic geographic and developmental foundations of the three clusters as well as the heterogeneity within clusters and similarities between some members of different clusters. Lastly, there exists also substantial heterogeneity within clusters and similarity across clusters in policy issues particularly relevant for SIDS. Annex 4 contains graphs illustrating this with regard to economic growth rates, economic growth volatility, population density, renewable energy, import dependency and food dependency.

These results, if confirmed in further analysis, have implications for the design of international support measures to SIDS. First, it lends support to the current practice of forming sub-groups of SIDS based on geography (Caribbean, Pacific and AIMS), as many members of geographical sub-groups share many vulnerabilities among them. This holds in particular for the Caribbean and Pacific sub-regions, which have already a number of regional institutions in place for regional cooperation and for coordinating international support. The relatively higher dispersion of SIDS in the AIMS region with regard to vulnerability and development should not come as surprise, given the geographic dispersion of the AIMS region. At the same time, the similarities across groups (whether groups are based on formal cluster analysis, other means of analysis or simple geographic groups) calls for cooperation across different sub-groups. Whereas setting up permanent cross-regional institutions for cooperation would be difficult and probably not cost-effective, existing cross-regional networks such as SIDSNET could be further enhanced and deepened.[52]

However, the analysis does not support the creation of strict sub-groups of SIDS with the purpose of developing specific support measures that are exclusively and uniformly applied for sub-group members. Due to the similarity across groups, such approach would likely not be efficient as there would be cases where different measures would have to be developed for countries with similar conditions. Rather, at least some of the support measures are more likely to be efficient if applied across regions. Moreover, due to the heterogeneity within groups uniform measures would not be effective, as there would be cases where identical measures are applied to countries with rather different conditions. Hence, even within geographic groups there is a need to tailor support measures to the varying country needs.

51 The cluster analysis was repeated with data on import dependency, the environmental vulnerability index, protein intake from fish, population density, cereal import dependency and remittances successively added to the LDC review data.

52 An example for cross-regional cooperation in the area of research is the University Consortium of Small Island Developing States, see www.uwi.edu/isd/affiliatedunits/univconsort.aspx.

Another possibility is to design and apply all measures in a differentiated manner according to the degree of a specific vulnerability; the more vulnerable the SIDS is, the more support it would be given. Defining access on the basis of quantitative vulnerability criteria, though, requires the use of indicators that are methodologically sound and for which reliable internationally comparable data is available. Consequently, further work on the selection of indicators in the different areas would be required by the concerned international organizations. Work may also be needed on the interaction of domestic policies and international support.

An approach of differentiated support to SIDS has the interesting implication that the question of who is a SIDS becomes far less relevant. For example, all low lying coastal states would be eligible for enhanced support to coastal adaptation and protection measures, whether they are considered SIDS (as in the DESA list) or not (as in the UNCTAD list). Thus, support measures could be made accessible for non-SIDS as well, if they share the vulnerabilities with SIDS in the respective areas. The preliminary analysis in annex 3 discussed above already indicates that there are a number of countries for which such support could be relevant. Consequently, this approach could also de-politicize some of the controversies behind the question whether a formal SIDS category is needed, because SIDS status would not lead to an entitlement for additional support from which non-SIDS are excluded.[53] As noted by the CDP in 2010, an agreed list of SIDS would assist in effective monitoring and more focused international support.[54] One main issue would be how to converge to a single list of SIDS that is applied consistently in the United Nations system. In any case, further work and guidance from the intergovernmental process would be needed before further developing the approach of differential support, possible alternatives such as uniform support to SIDS based on formal criteria or combinations of such approaches.

VII. Monitoring framework

The lack of an effective monitoring framework for global commitments related to the sustainable development of SIDS has been frequently noted, including in the Mauritius + 5 review and in the previous deliberations by the CDP on the topic. Already in 2010, the CDP recommended that the international strategy for SIDS should focus on issues that directly address SIDS vulnerabilities and build resilience, contain concrete targets and milestones as well as operational commitments, noting that these aspects facilitate effective monitoring.[55]

Consequently, the upcoming 2014 conference on SIDS may provide a good opportunity to establish such monitoring framework. Whereas details of such framework could be developed by designated entities after the conference, the preparation to the conference could include a common understanding of main contours of such framework. Importantly, the monitoring framework should be based on existing regional and national monitoring frameworks. However, national monitoring is often hampered by a lack of capacity. Hence, additional capacity-building activities for data collection, generation of statistics, interpretation of statistical information as well as for linking monitoring and evaluation to decision-making processes. In many cases, multiple monitoring processes at the national level could provide an important basis. These include monitoring of national (sustainable) development strategies, the vulnerability-resilience framework

53 In 2010, the CDP expressed the view that the LDC category is most important for international support, while noting that the question of a SIDS category was outside the mandate provided by the ECOSOC. See CDP (2010, p. 16).

54 *Ibid.*

55 See CDP (2010), p. 15 ff.

developed and piloted by UN DESA's SIDS Unit[56], national MDG monitoring processes as well as sectoral monitoring. At the same time, the monitoring framework should also fully utilize readily available international data on vulnerabilities, development needs and policy responses relevant for SIDS.

By building on national and regional monitoring that are already in place or under development, a new international monitoring framework avoids duplication of monitoring efforts and waste of resources at the national level. Whereas the call to avoid duplication is generally uncontroversial, it is important to recognize that using regional and particularly national frameworks reduces comparability across countries, in line with the heterogeneity of national priorities and data availability. Consequently, the analytical parts of global monitoring reports need to pay attention to the non-comparability of data.

Such framework could make a valuable contribution to further the full and effective implementation of the BPoA and MSI by strengthening accountability and facilitating exchange of experiences. In terms of coverage, the monitoring framework could include information on implementation of agreed actions included in the BPoA, MSI and other SIDS specific activities agreed in other international fora as well the progress of SIDS towards the agreed sustainable development goals and objectives in these documents. A comprehensive monitoring framework could be instrumental for an evaluation of the whole set of response measures, taking into account the interlinkages between policies. Thereby, the monitoring framework could add important insights beyond those derived from existing issue-by-issue monitoring exercises, which in turn could lead to the design of better integrated response measures.

There are a number of additional important considerations to take into account when developing such framework. First, as noted the inclusion of concrete policy recommendations, targets and milestones would facilitate the development of a monitoring framework. It should, however, not be seen as a precondition for effective monitoring, as the present difficulties in reaching agreement at the international level on policy-relevant issues should be acknowledged. Second, whilst the lack of reliable data has been recognized already in the BPoA, the problem is still very acute today. In addition to national capacity-building, the joint provision of statistical information through strengthening existing regional processes and institutions can be part of the solution. At the international level, relevant organizations are often not in the position to provide estimates for main indicators for SIDS, in particular with regard to social and environmental data. Hence, the provision of sufficient resources for producing such estimates could be an important contribution by relevant international organizations to such monitoring framework. Third, as noted already by the CDP in 2010, effective monitoring also requires that the institutions mandated to implement the monitoring itself also need to be provided with adequate resources.

56 See Mohamed (2012).

VIII. Main Conclusions

This paper recalled the particular vulnerabilities and development needs of SIDS and their implications for international support. There exist a wide range of international support instruments to strengthen the resilience and to reduce the exposure of SIDS to natural and economic shocks. However, in many cases the response measures in the areas of climate change adaptation, disaster risk reduction, renewable energy and sustainable resource management are still in a pilot stage or do not provide for sufficient resources, while the intensity of shocks increasing. In particular, impacts of climate change are expected to become more severe. Consequently, there is a need to implement, scale-up and adjust existing measures. Support for integrated policy-making, e.g. through national sustainable development strategies, needs to be continued. Existing schemes for regional provision of public goods could be further expanded and benefit from external support. In all these areas, it is important to realize that external support measures have to build on domestic policies and strategies in order to be effective. SIDS could also benefit from increased cooperation in the area of international migration, to allow them to harness the benefits of migration while avoiding harmful consequences.

On the other hand, the paper identified the need for new measures at the international level to reduce the frequency and intensity of temporary and permanent shocks, in particular to mitigate climate change, to reduce global overfishing and to stabilize financial and commodity markets. Measures to reduce the vulnerability of SIDS will always be incomplete and ineffective without addressing the underlying causes of international shocks.

Furthermore, new measures may be needed to provide SIDS with external resources in the aftermath of temporary or permanent shocks. Existing insurance mechanisms could be expanded to cover a broader range of risks and new mechanisms could be established, taking into account that insurance should be embedded in broader risk reduction strategies. Compensatory mechanisms by international financial institutions may require further reform to become adequate in scope and flexibility. It could be studied further whether bonds contingent on external events such as commodity price increases could play a role in providing SIDS with financial resources on terms commensurate with their needs. If the potential of such bonds is significant, the establishment of markets for such bonds could be supported by international financial institutions.

The paper further explored the heterogeneity of SIDS, on basis of a statistic analysis of vulnerability indicators. It finds that due to significant heterogeneity, international response measures need to allow for differentiation among SIDS in order to increase effectiveness. Cluster and principal component analyses reveal that geographical differences are a main factor in understanding SIDS heterogeneity, but least developed SIDS share distinctive vulnerability patterns independent of their location. At the same time, the differences in vulnerabilities within geographic regions and commonalities across regions call for cross-regional cooperation. Further work on defining and operationalizing differential support to SIDS would be beneficial. Finally, the paper argues for the establishment of a robust and effective global monitoring framework for the implementation of the BPoA and MSI. Agreement on such framework and its underlying principles could be included in the upcoming SIDS conference in 2014.

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Annex 1: Impact of the 2008/2009 crisis on GDP in SIDS

Table 1 below provides summary information on the impact of the 2008/2009 global financial and economic crisis on GDP in SIDS and other countries. The impact is measured as the difference in (annualized) GDP growth rates in the crisis years compared to the pre-crisis years. Obviously, this measure is also affected by cross-country differences in normal business cycles and by the simultaneous occurrence of other shocks, both domestic and foreign, and should thus be treated with caution. The period 2002-2007 is used as pre-crisis period, though using a longer 10 year period does not qualitatively change the main results.

Defining the crisis period is challenging, because comprehensive GDP data is available only on an annual basis, whereas in most countries the main decline occurred in the second half of 2008 and the first half of 2009, with substantial variation across countries with regard to timing. The table uses the 2008-2009 as crisis period, though it should be taken into account that this leads to an underestimate of the decline in economic activities compared to the use of quarterly data. The table also includes information on the recovery, indicating to which extent (if any) higher growth in 2010/2011 has compensated for the decline in 2008/2009, again compared to a 2002/2007 baseline.

Table 1: Impact of 2008/2009 crisis on SIDS

	Impact (in percentage points)	**Recovery rate (in per cent)**
World	-4.2	45.64
SIDS	-4.78	22.34
Developing countries	-3.21	43.95
Developed countries	-4.60	43.71
Transition economies	-8.46	30.05
SIDS with negative impact higher than twice the World	Antigua and Barbuda, Maldives, Trinidad and Tobago	
Other SIDS with negative impact higher than World	Samoa, Grenada, Solomon Island, Barbados, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Bahamas	

Source: CDP Secretariat calculations based on GDP growth data from UNCTAD (unctadstat.unctad.org/, accessed 12 February 2012). Country classifications based on UNCTAD, only SIDS that are United Nations members are listed in rows 7 and 8.

Annex 2: EVI and the components for SIDS: Summary statistics

Table 2: Mean, standard deviation and Wilcoxon Test Statistics, DESA SIDS list

Index	Mean SIDS (33 countries)	Mean non-SIDS (97 countries)	Standard deviation SIDS	Standard deviation non-SIDS	Wilcoxon test (SIDS/ non-SIDS)	p-values
EVI	46.2	35	12.3	11.2	4.39	0.000*
Exposure index	52.5	32.4	14.3	9.7	6.51	0.000*
Population	79.3	30.5	21.9	20.7	7.41	0.000*
Remoteness	65.2	54	14.9	23.6	2.44	0.015*
Share of pop in LECZ	34.9	13.8	32.8	18.6	4.40	0.000*
Share of agr., for. and fish. in GDP	21.5	29.8	21.4	25.3	-1.77	0.076*
Export concentration	39.9	32.6	22.2	26.1	2.00	0.046*
Shock index	39.8	37.6	13.9	16.9	1.29	0.198
Victims	62.5	60.9	26.8	28.8	0.14	0.891
Agr. Instability	33.4	26.1	20.7	21.1	2.34	0.020*
Export instability	31.7	31.7	28.5	26.9	-.07	0.942

Source: CDP Secretariat calculations, based on data of 2012 LDC review (max-min values), available at: http://www.un.org/en/development/desa/policy/cdp/ldc/ldc_data.shtml

Note: * signifies that the SIDS and non-SIDS are different with probability of 10 per cent (two-sided test).

SIDS: Antigua and Barbuda, Bahamas, Barbados, Belize, Cape Verde, Comoros, Cuba, Dominica, Dominican Republic, Fiji, Grenada, Guinea-Bissau, Guyana, Haiti, Jamaica, Kiribati, Maldives, Mauritius, Papua New Guinea, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, Sao Tome and Principe, Seychelles, Singapore, Solomon Islands, Suriname, Timor-Leste, Tonga, Trinidad and Tobago, Tuvalu, Vanuatu

Table 3: Mean, standard deviations, and Wilcoxon Test Statistics; UNCTAD SIDS list

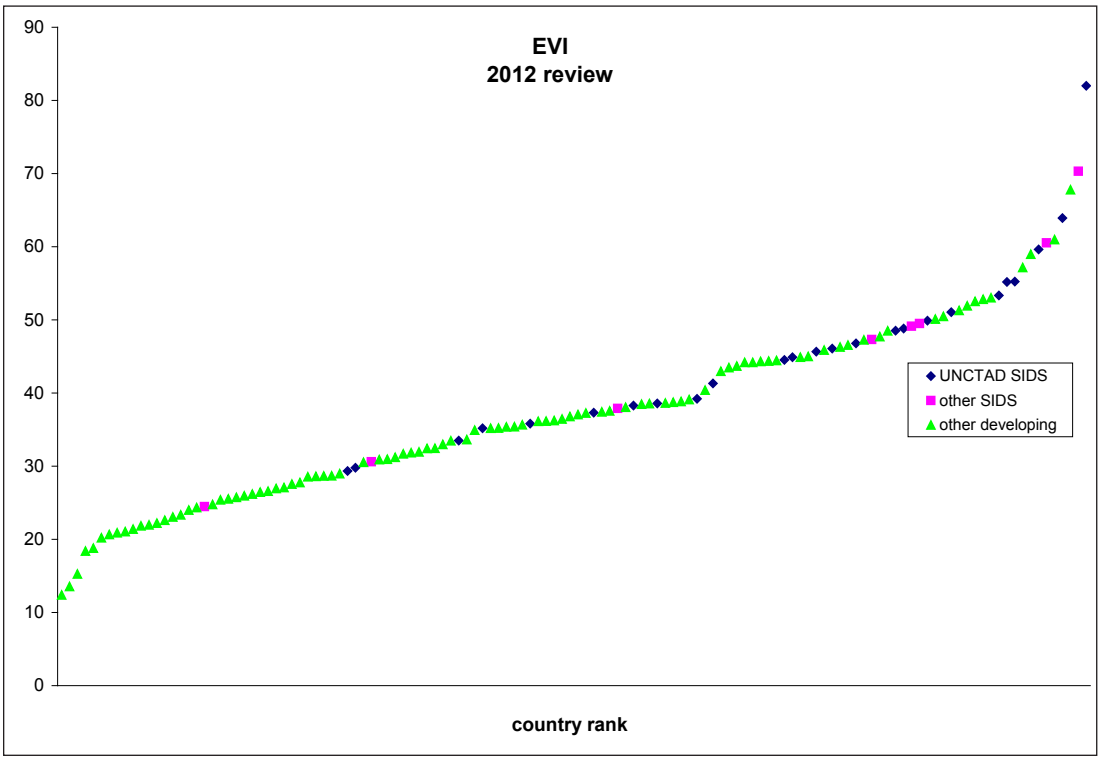
Index	Mean SIDS (25 countries)	Mean non-SIDS (105 countries)	Standard deviation SIDS	Standard deviation non-SIDS	Wilcoxon test (SIDS/non-SIDS)	p-values
EVI	46.2	35.8	11.7	11.8	3.78	0.000*
Exposure index	54.4	33.5	13.3	10.9	6.32	0.000*
Population	86.3	32.5	16.6	21.9	7.20	0.000*
Remoteness	67.9	54.2	16.1	22.7	2.63	0.009*
Share of pop in LECZ	32.8	21.1	32.8	21.2	3.37	0.001*
Share of agr., for. and fish. in GDP	21.1	29.3	21	25.2	-1.56	0.120
Export concentration	49.3	33.0	21.5	26	1.81	0.070*
Shock index	37.9	38.2	12.3	17.0	0.61	0.545
Victims	60.4	61.5	25.4	28.9	-0.49	0.624
Agr. Instability	32.8	26.8	17.9	21.7	2.06	0.040*
Export instability	29.2	32.3	24.9	27.8	-.27	0.788

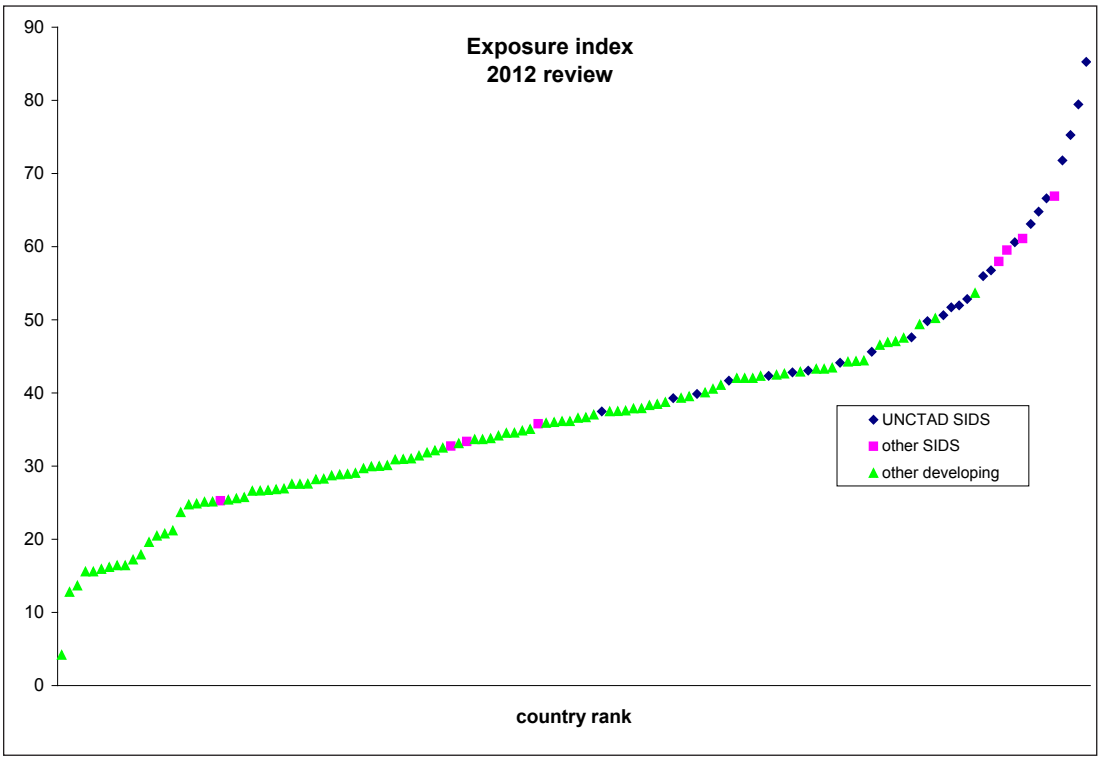
Source: CDP Secretariat calculations, based on data of 2012 LDC review (max-min values), available at: http://www.un.org/en/development/desa/policy/cdp/ldc/ldc_data.shtml

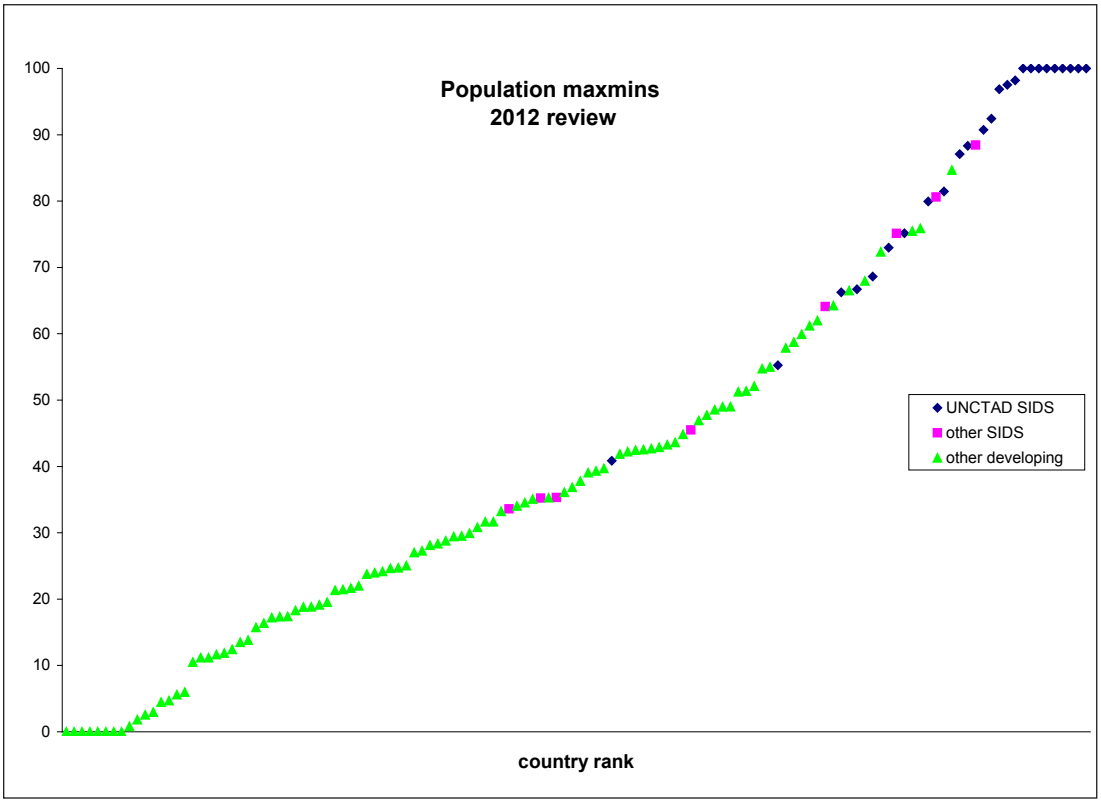
Note: * signifies that the SIDS and non-SIDS are different with probability of 10 per cent (two-sided test).

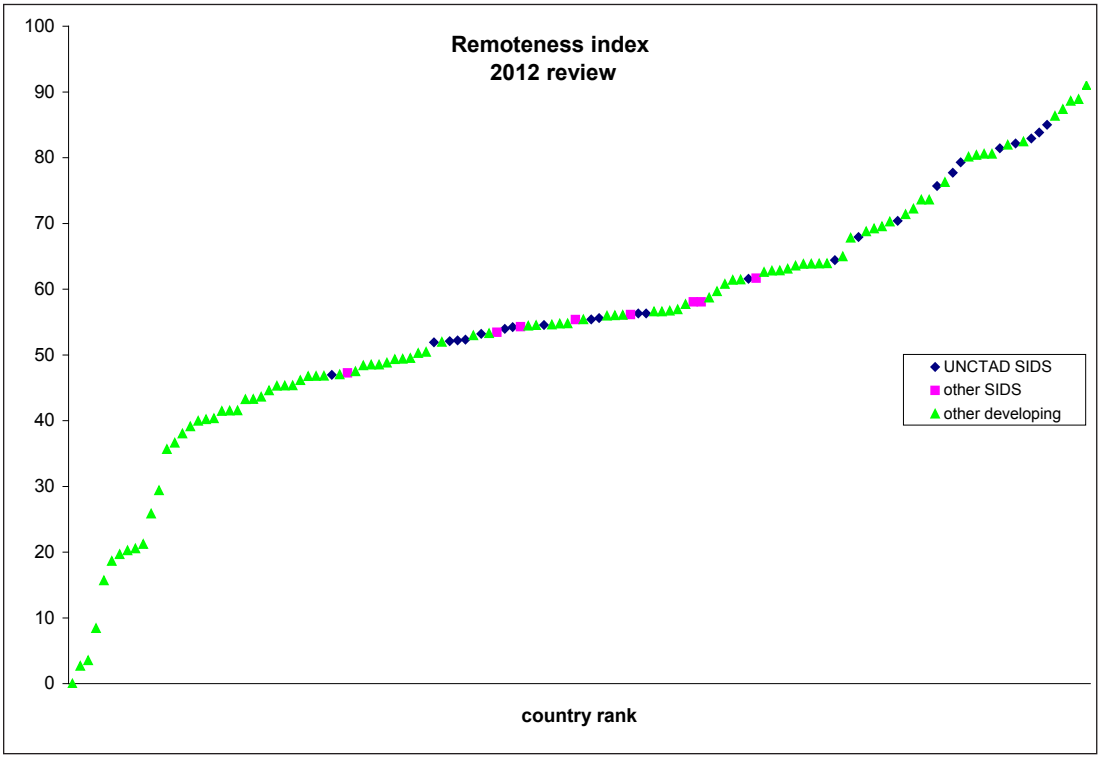
SIDS: Antigua and Barbuda, Bahamas, Barbados, Cape Verde, Comoros, Dominica, Fiji, Grenada, Jamaica, Kiribati, Maldives, Mauritius, Papua New Guinea, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, Sao Tome and Principe, Seychelles, Solomon Islands, Timor-Leste, Tonga, Trinidad and Tobago, Tuvalu, Vanuatu

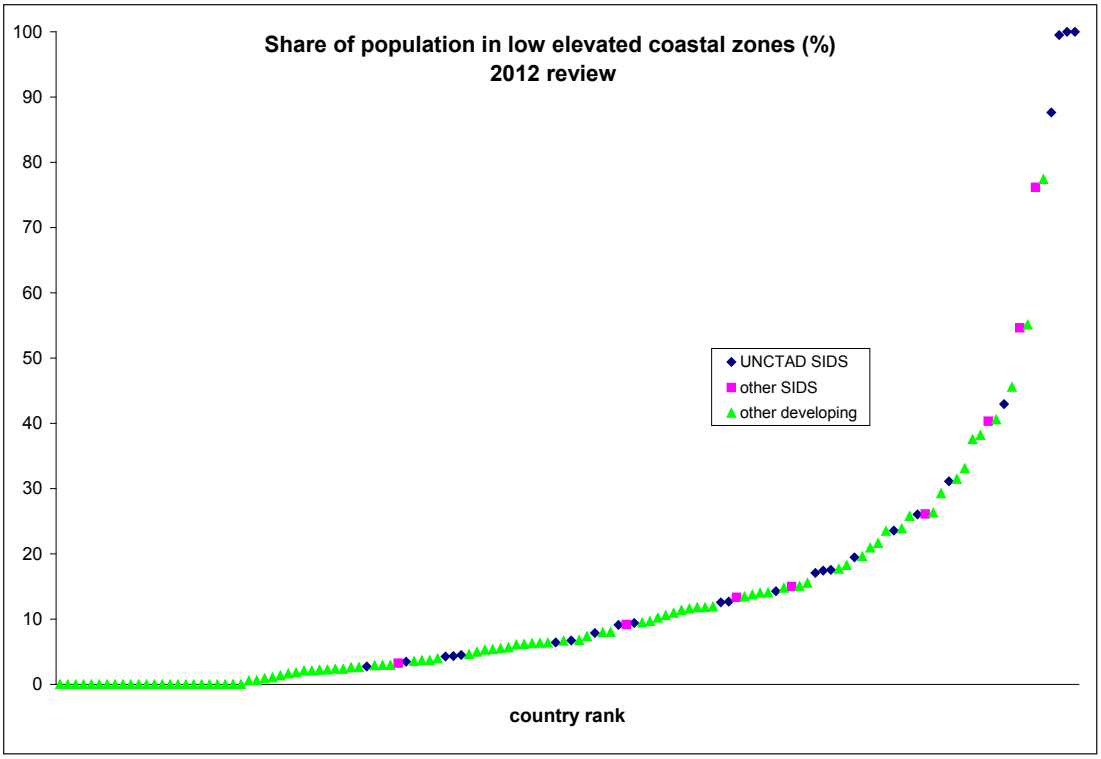
Annex 3: Economic Vulnerability Index scores

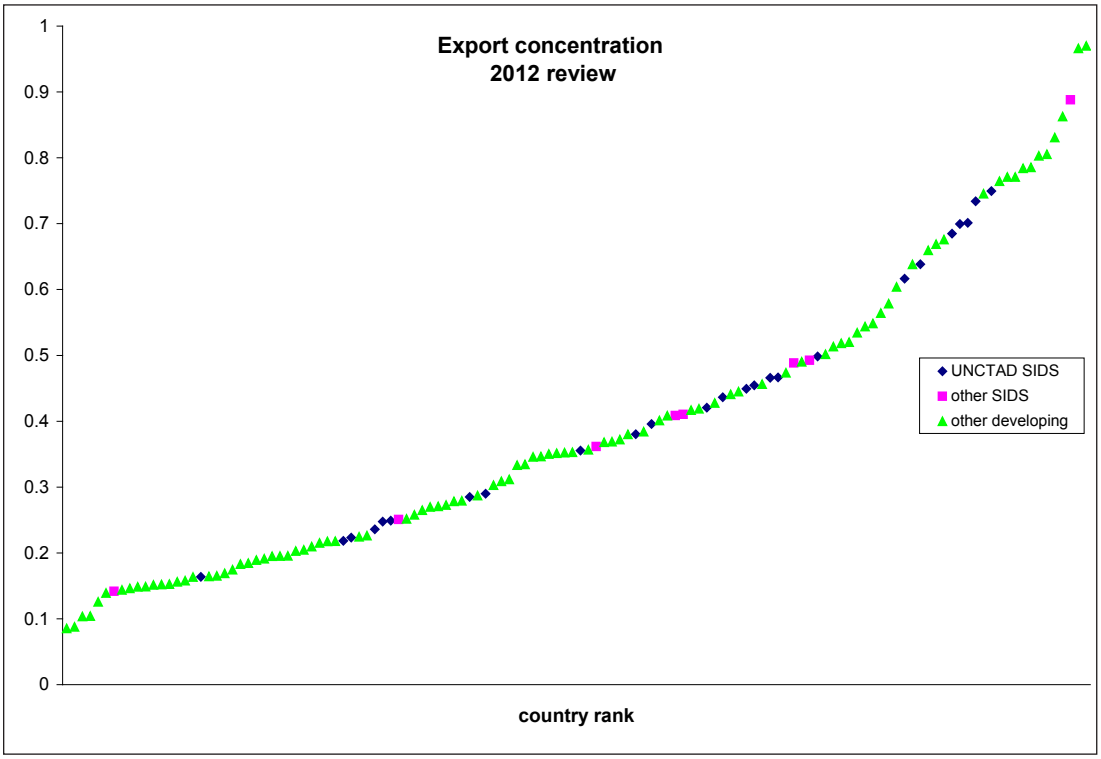


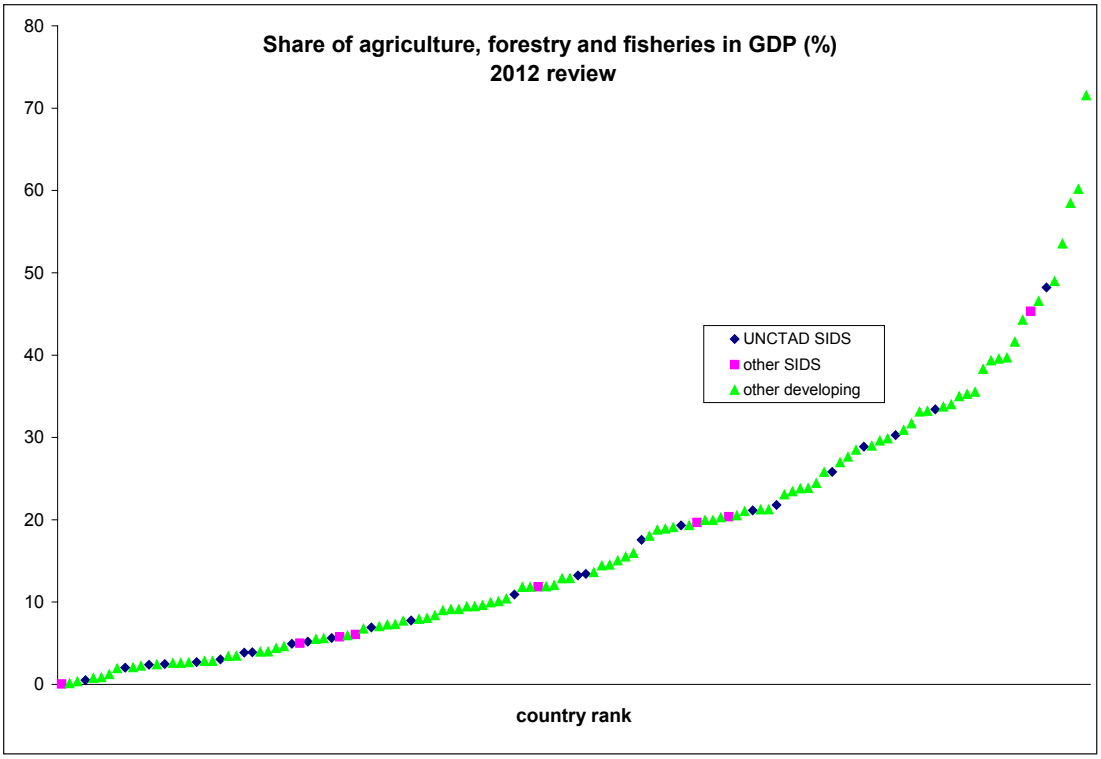


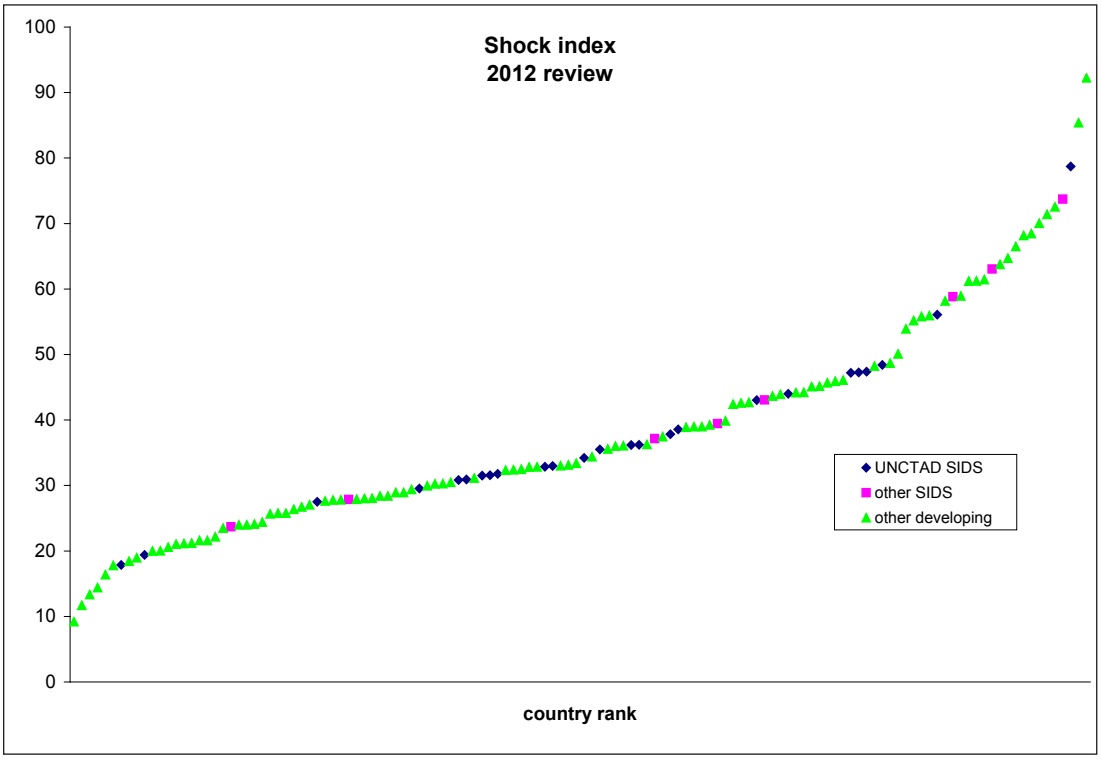

Population maxmins
2012 review
100
90
80
70
60
50
40
30
20
10
0
UNCTAD SIDS
other SIDS
other developing
country rank

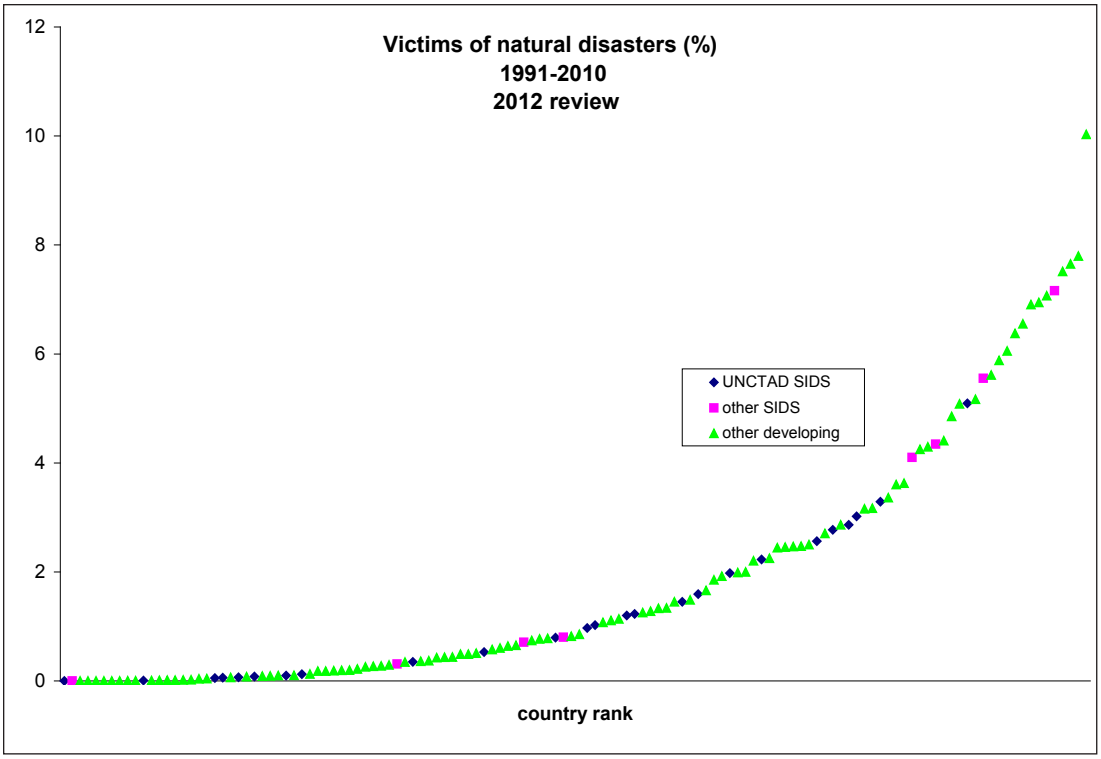

Remoteness index
2012 review
100
90
80
70
60
50
40
30
20
10
0
UNCTAD SIDS
other SIDS
other developing
country rank

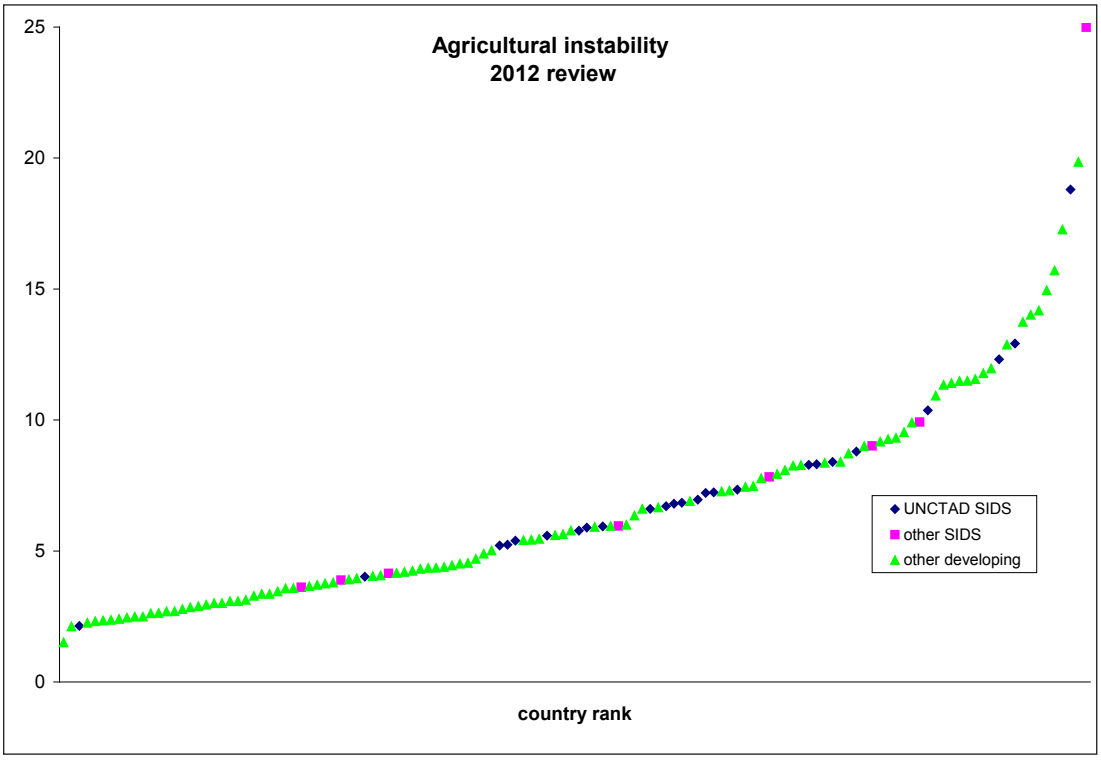

Share of population in low elevated coastal zones (%)
2012 review
100
90
80
70
60
50
40
30
20
10
0
UNCTAD SIDS
other SIDS
other developing
country rank

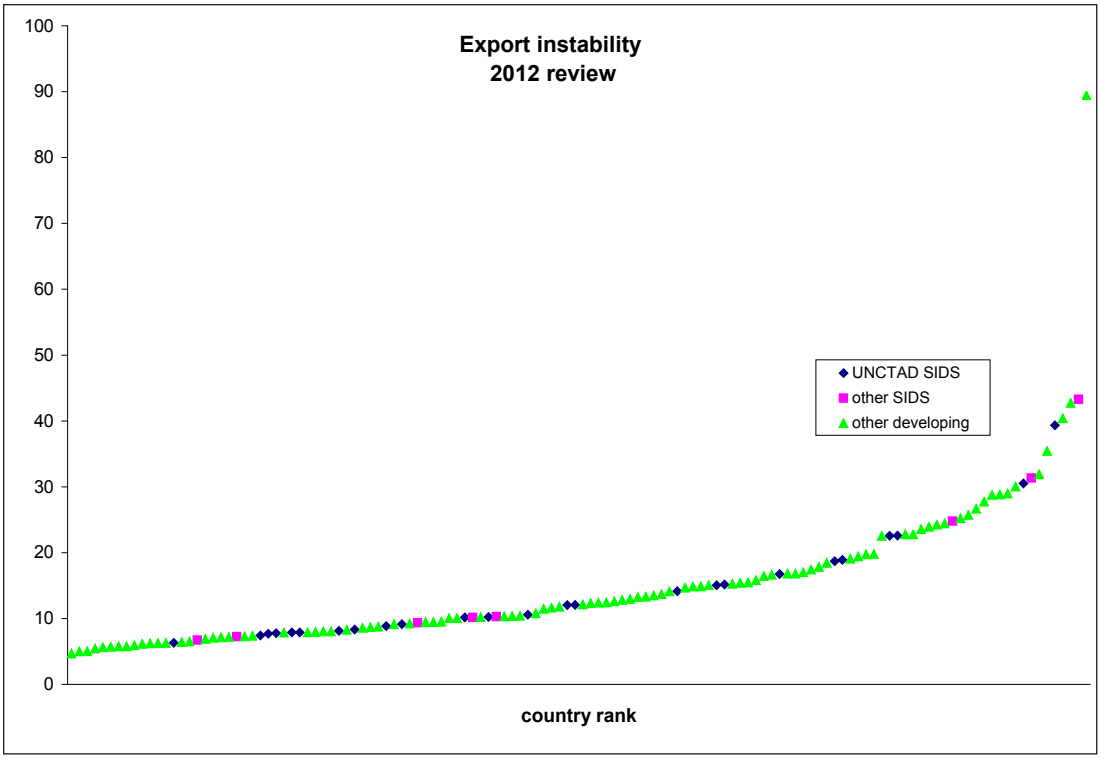

Export concentration
2012 review
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
UNCTAD SIDS
other SIDS
other developing
country rank


Share of agriculture, forestry and fisheries in GDP (%)
2012 review
80
70
60
50
40
30
20
10
0
UNCTAD SIDS
other SIDS
other developing
country rank


Shock index
2012 review
100
90
80
70
60
50
40
30
20
10
0
UNCTAD SIDS
other SIDS
other developing
country rank


Victims of natural disasters (%)
1991-2010
2012 review
12
10
8
6
4
2
0
UNCTAD SIDS
other SIDS
other developing
country rank


Agricultural instability
2012 review
25
20
15
10
5
0
UNCTAD SIDS
other SIDS
other developing
country rank


Export instability
2012 review
100
90
80
70
60
50
40
30
20
10
0
UNCTAD SIDS
other SIDS
other developing
country rank

Annex 4: SIDS clustering

Table 4: SIDS cluster

Cluster	Number of members	Composition
1	16	Antigua and Barbuda, Bahamas, Barbados, Dominica, Grenada, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, Cuba, Dominican Republic, Cape Verde, Mauritius, Seychelles, Singapore
2	11	Fiji, Kiribati, Samoa, Tonga, Tuvalu, Vanuatu, Maldives, Sao Tome and Principe, Belize, Guyana, Suriname
3	6	Comoros, Guinea-Bissau, Haiti, Solomon Islands, Timor-Leste, Papua New Guinea

Source: CDP Secretariat calculations (k-means clustering), based on data of 2012 LDC review, available at: http://www.un.org/en/development/desa/policy/cdp/ldc/ldc_data.shtml. Data are converted into indices; population and GNI per capita indices are based on logarithms. The choice of three over four clusters is supported by the Calinski criterion (13.6 for k=3, 10.5 for k=4).

Countries that are included in DESA's SIDS list, but not in the UNCTAD list are italicized.

Table 5: Simple average and range of vulnerability related indicators for 3 SIDS cluster

	Cluster 1	Cluster 2	Cluster 3
Population (thousands)	2,100 (53-11,300)	330 (10-870)	3,500 (550-10,000)
Remoteness (km)	5,700 (4,200-7,700)	8,000 (5,400-10,400)	7,100 (4,900-9,300)
Share of population in LECZ (%)	16 (3-88)	53 (5-100)	13 (3-26)
Export concentration	.33 (.14-.47)	.52 (.22-.75)	.59 (.36-.89)
Share of agriculture, forestry and fisheries in GDP	4 (0-13)	16 (5-26)	34 (20-48)
Victims of natural disaster (%)	1.2 (0-5.6)	2.5 (0-7.2)	1.7 (0.1-4.4)
Agricultural instability	9.6 (3.9-25)	7.3 (5.9-9)	4.1 (2.1-5.4)
Export instability	9.5 (6.3-18.7)	18.5 (7.9-43.3)	22.8 (14.2-31.3)
Prevalence of undernourishment	10.1 (5-24)	7.1 (5-15)	30 (11-57)
Under 5 mortality rate	18.0 (2.4-33.5)	35.9 (14.6-76.3)	98.9 (54.4-197.7)
Adult literacy	93.3 (84.8 – 99.8)	92.4 (75.1-99.3)	60.4 (48.7-76.6)
Gross secondary enrolment	97 (76-115)	80 (55-101)	41 (26-56)
GNI per capita	10,900 (3,110-36,677)	3,460 (1,110-5,620)	1,060 (550-2,230)
Import dependency	68 (21-191)	67 (50-99)	67 (35-131)
Environmental Vulnerability Index	354 (282-428)	311 (207-395)	285 (251-343)
Protein from fish and seafood (%)	10.3 (2.8-21.4)	16.5 (3.9-43.7)	7.9 (.2-20.2)
Population density	705 (25-7,447)	187 (3-1,060)	151 (15-395)
Cereal import dependency	107 (75-188)	78 (30-128)	62 (18-97)
Remittances (Share in GDP)	5.2 (0.4-14.1)	7.5 (.1-21.4)	6.5 (.1-21.1)

Source: CDP Secretariat calculations, based on data of 2012 LDC review available at http://www.un.org/en/development/desa/policy/cdp/ldc/ldc_data.shtml (for rows 2-14), UNCTAD (import dependency, 2008-2010 average), SOPAC (Env. Vulnerability Index), United Nations Population Division (population density, 2010), FAO (Protein from fish, 2009, cereal import dependency, 2007-2009 average), World Bank (remittances, 2011).

Principal Component Analysis

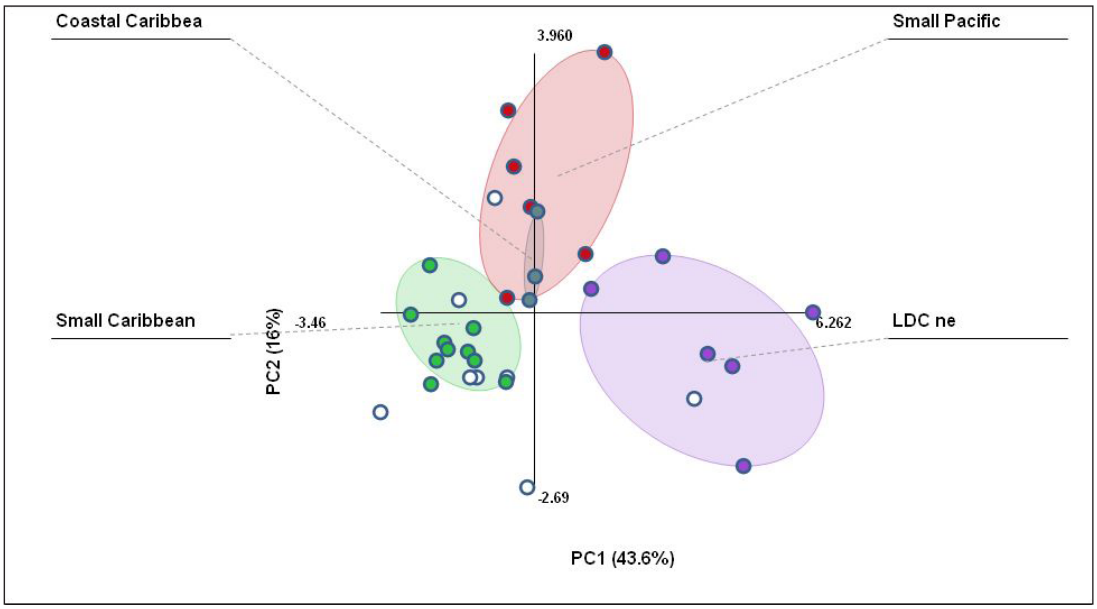
The figure below presents the results of a principal component analysis using the data of the 2012 LDC triennial review for 33 SIDS. In order to visualize key aspects of the geographical/socio-economic nature of the cluster analysis above, the figures distinguishes four groups through different colors: Small Caribbean States (green), Coastal Caribbean States (blue), Small Pacific States (red) and LDCs not eligible for graduation (purple). Solomon Islands is grouped under LDCs, though it is also a small Pacific State. The composition of the groups is follows:

Table 6: Group composition for Principal Component Analysis

Group	Color	Countries
Small Caribbean	Green	Antigua and Barbuda, Bahamas, Barbados, Dominica, Grenada, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago
Coastal Caribbean	Blue	Belize, Guyana, Suriname
Small Pacific	Red	Fiji, Kiribati, Samoa, Tonga, Tuvalu, Vanuatu
LDCs ne	Purple	Comoros, Guinea-Bissau, Haiti, Sao Tome and Principe, Solomon Islands, Timor-Leste
	White	Cuba, Dominican Republic, Cape Verde, Maldives, Mauritius, Seychelles, Singapore, Papua New Guinea

Source: Author calculations

Figure 1: Representation of SIDS along principal components 1 and 2

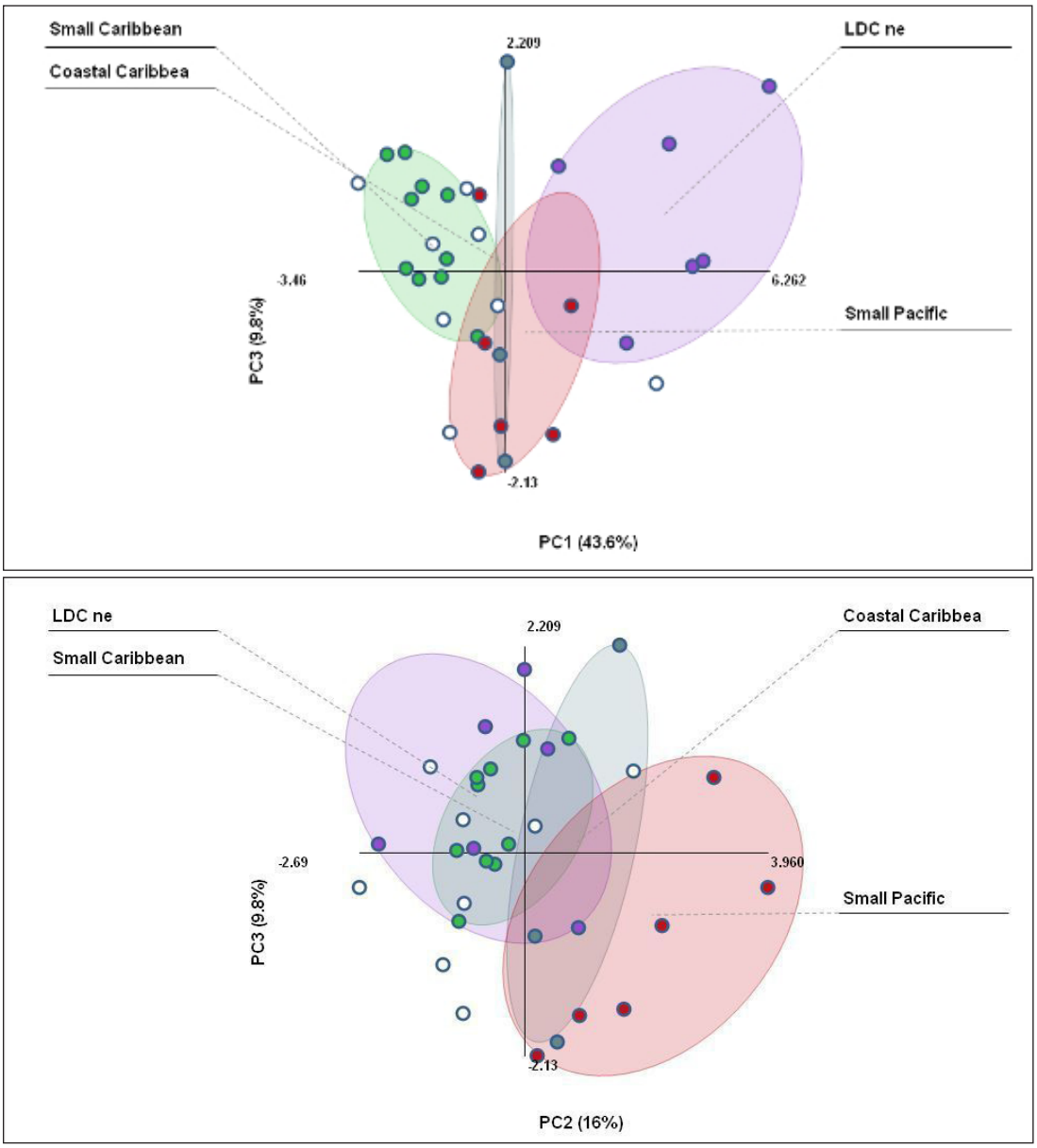


Source: CDP Secretariat, based on principal component analysis performed with the 13 indicators of the LDC review (transformed into indices) and the 33 SIDS listed in table 6. The numbers in parenthesis are the contribution of the principal components to explaining the overall variance in the data.

Figure 1 reveals that Sao Tome and Principe (the left most purple dot) is close to the small Pacific countries, demonstrating why the cluster analysis places it in the cluster with Pacific and coastal Caribbean countries. It also shows that Singapore (the left most white dot) and Dominican Republic (the lowest white dot) have some features quite distinct from the smaller Caribbean Islands, even though they belong to their cluster. Interestingly, though, Cuba is very similar to the smaller Caribbean, as are Cape Verde, Seychelles and Mauritius. Figure 2 below presents the representation along components 1 and 3, and 2 and 3. It shows the significant overlap of SIDS across groups and clusters once the information contain in the lower principal components is considered.

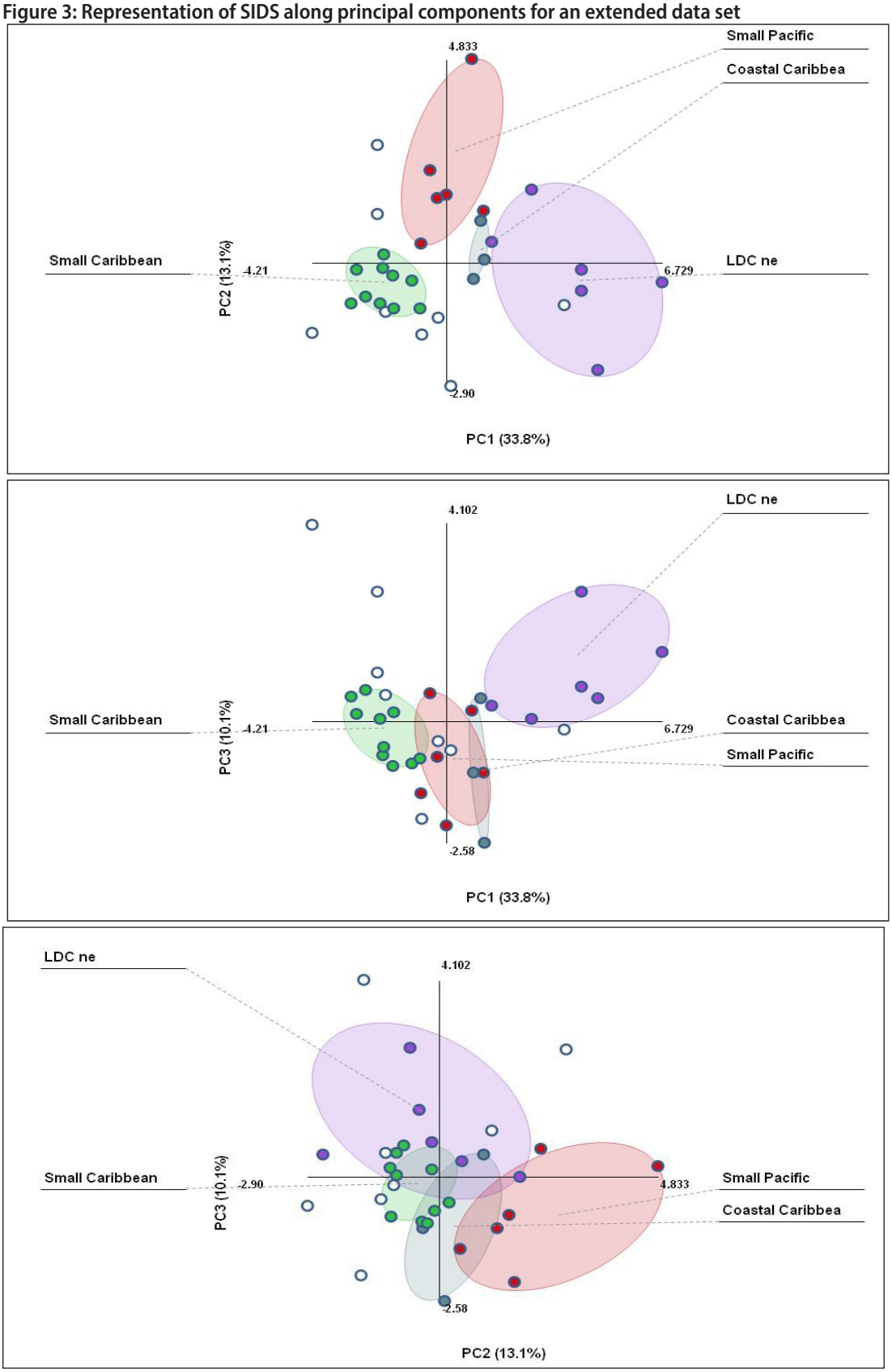
Figure 3 below shows the result of a principal component analysis when in addition to the 13 LDC indicators, six more indicators are utilized, namely import dependency, the environmental vulnerability index, protein intake from fish, population density, cereal import dependency and remittances, see table 5 above for the data sources. It shows that once the additional information is considered, coastal Caribbean countries become more distinct from the Pacific countries. Moreover, with the exception of Mauritius, the close similarities between SIDS in the AIMS region and smaller Caribbean countries vanish.

Figure 2: Representation of SIDS along principal components 1 and 3, and 2 and 3



Source: CDP Secretariat, based on principal component analysis performed with the 13 indicators of the LDC review (transformed into indices) and the 33 SIDS listed in table 6. The numbers in parenthesis are the contribution of the principal components to explaining the overall variance in the data.

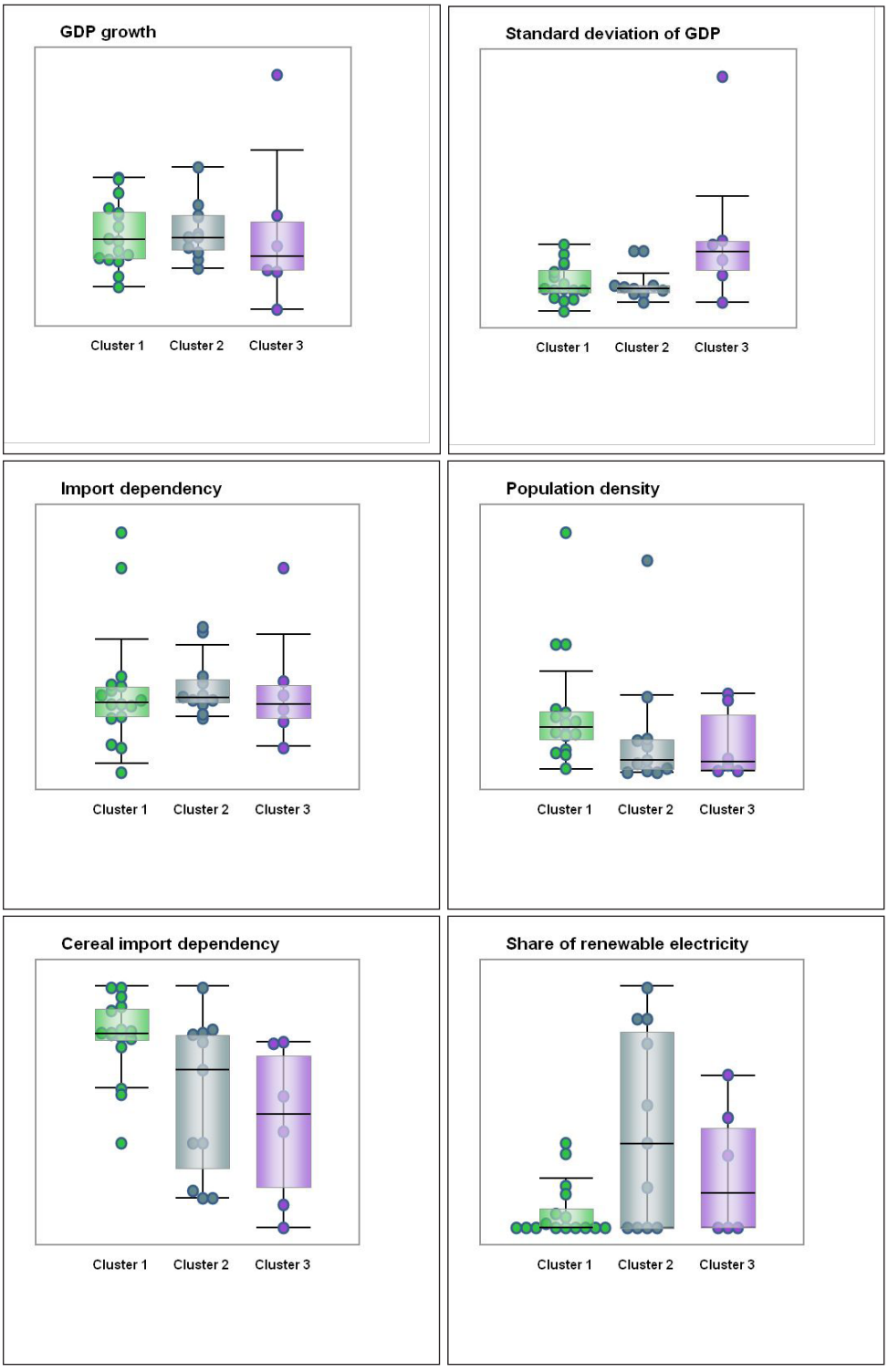
Figure 3: Representation of SIDS along principal components for an extended data set



Source: CDP Secretariat, based on principal component analysis performed with the 13 indicators of the LDC review plus six indicators mentioned in the text (all transformed into indices) and the 33 SIDS listed in table 6. The numbers in parenthesis are the contribution of the principal components to explaining the overall variance in the data.

SIDS cluster and development indicators

Figure 4: Whisker box plots for the three SIDS clusters listed in table 4 and various indicators



Sources: GDP growth (real) and standard deviation (1990-2011): United Nations National Accounts Main Aggregate Database; Import dependency (2008-2010): UNCTADSTAT; Population density (2010): United Nations Population Division World Population Prospects 2010; Cereal import dependency (2008-2010): FAO Food Security Indicators; Share of renewable electricity in installed capacity of electricity power plants (2009): United Nations Statistics Division Energy Statistics Database.