BRIEFING PAPER

GLOBAL CLIMATE RISK INDEX 2017

Who Suffers Most From Extreme Weather Events? Weather-related Loss Events in 2015 and 1996 to 2015

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GERMANWATCH

Brief Summary

The Global Climate Risk Index 2017 analyses to what extent countries have been affected by the impacts of weather-related loss events (storms, floods, heat waves etc.). The most recent data available – from 2015 and 1996–2015 – were taken into account.

The countries affected most in 2015 were Mozambique, Dominica as well as Malawi. For the period from 1996 to 2015 Honduras, Myanmar and Haiti rank highest.

This year's 12th edition of the analysis reconfirms that, according to the Climate Risk Index, less developed countries are generally more affected than industrialised countries. Regarding future climate change, the Climate Risk Index may serve as a red flag for already existing vulnerability that may further increase in regions where extreme events will become more frequent or more severe due to climate change. While some vulnerable developing countries are frequently hit by extreme events, there are also some others where such disasters are a rare occurrence.

The climate summit in Marrakesh is giving the "go-ahead" on developing the "rule-book" for the Paris Agreement, including the global adaptation goal, adaptation communication systems, and finance assessment systems for building resilience. A review on the UNFCCC's work on loss and damage provides the opportunity to better detail the next 5-year's work on loss and damage, in relation to the climate regime, as well as to better understand exactly how loss and damage should be taken up under the Paris Agreement.

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Content

Qualifier: How to Read the Global Climate Risk Index

The Germanwatch Global Climate Risk Index is an analysis based on one of the most reliable data sets available on the impacts of extreme weather events and associated socio-economic data. The Germanwatch Climate Risk Index 2017 is the 12th edition of the annual analysis. Its aim is to contextualize ongoing climate policy debates – especially the international climate discussions – with real-world impacts during the last year and the last 20 years.

However, it must not be mistaken for a comprehensive climate vulnerability scoring. It represents one important piece in the overall puzzle of climate-related impacts and associated vulnerabilities but, for example, does not take into account important aspects such as rising sea-levels, glacier melting or more acidic and warmer seas. It is based on past data and should not be used for a linear projection of future climate impacts. Specifically, not too far reaching conclusions should be drawn for political discussions regarding which country is the most vulnerable to climate change. Also, it is important to note that the occurrence of a single extreme event cannot be attributed to anthropogenic climate change. Nevertheless, climate change is an increasingly important factor for changing the likelihood of occurrence and the intensity of these events. There is an increasing body of research that is looking into the attribution of the risk of extreme events to the influences of climate change.[1]

The Climate Risk Index indicates a level of exposure and vulnerability to extreme events, which countries should understand as warnings in order to be prepared for more frequent and/or more severe events in the future. Not being mentioned in the CRI does not mean there are no impacts. Due to the limitations of the available data, particularly long-term comparative data, including socio-economic data, some very small countries, such as certain small island states, are not included in this analysis. Moreover, the data only reflects the *direct* impacts (direct losses and fatalities) of extreme weather events, whereas, for example, heat waves – which are a frequent occur-

[1] See, for instance, Stott et al. (2015); Hansen et al. (2016); Haustein et al. (2016); and Committee on Extreme Weather Events and Climate Change Attribution et al. (2016).

rence in African countries – often lead to much stronger *indirec*t impacts (e.g. as a result of droughts and food scarcity). Finally, it does not include the total number of affected people (in addition to the fatalities) since the comparability of such data is very limited.

Key messages

- According to the Germanwatch Global Climate Risk Index, Honduras, Myanmar and Haiti were the countries most affected by extreme weather events between 1996 and 2015.
- In 2015, Mozambique, Dominica as well as Malawi were at the top of the list of the most affected countries.
- Altogether, more than 528 000 people died as a direct result of nearly 11 000 extreme weather events; and losses between 1996 and 2015 amounted to around 3.08 trillion US$ (in Purchasing Power Parities).
- The host region of the UN climate summit 2016 – the continent of Africa – is severely affected by climatic events with four countries ranking among the 10 countries worldwide most affected in 2015 – Mozambique (1st), Malawi (3rd), Ghana and Madagascar (joint 8th position).
- Precipitation, floods and landslides were the major causes of damage in 2015. A high incidence of extreme precipitation supports the scientific expectations of accelerated hydrological cycles caused by climate warming.
- Most of the affected countries in the Bottom 10 of the long-term index have a high ranking due to exceptional catastrophes. Over the last few years another category of countries has been gaining relevance: Countries like the Philippines and Pakistan that are recurrently affected by catastrophes continuously rank among the most affected countries both in the long term index and in the index for the respective year for the last six years.
- Of the ten most affected countries (1996–2015), nine were developing countries in the low income or lower-middle income country group, while only one was classified as an upper-middle income country.
- The climate summit in Marrakesh is giving the “go-ahead” on developing the “rulebook” for the Paris Agreement, including the global adaptation goal, adaptation communication systems, and finance assessment systems for building resilience. A review of the UNFCCC’s work on loss and damage provides the opportunity to better detail the next 5-year’s work on loss and damage, in relation to the climate regime, as well as to better understand exactly how loss and damage should be taken up under the Paris Agreement.

1 Key Results of the Global Climate Risk Index 2017

People all over the world have to face the reality of climate variability and in many parts of the world an increasing variability. Between 1996 and 2015, more than 528 000 people died worldwide and losses of US$ 3.08 trillion (in PPP) were incurred as a direct result of almost 11 000 extreme weather events. The UNEP Adaptation Gap Report 2016 warns of increasing impacts and resulting increases in global adaptation costs by 2030 or 2050 that will likely be much higher than currently expected: "two-to-three times higher than current global estimates by 2030, and potentially four-to-five times higher by 2050".[2] On the other hand, the report highlights the importance of enhanced mitigation action towards limiting global temperature increase to below 2°C, which can avoid substantive costs and hardships.[3] The **Global Climate Risk Index (CRI)** developed by Germanwatch analyses the quantified impacts of extreme weather events[4] – both in terms of fatalities as well as economic losses that occurred – based on data from the *Munich RE* NatCatSERVICE, which is worldwide one of the most reliable and complete databases on this matter. The CRI examines both absolute and relative impacts to create an average ranking of countries in four indicating categories, with a stronger emphasis on the relative indicators (see chapter "Methodological Remarks" for further details on the calculation). The countries ranking highest are the ones most impacted and should see the CRI as a warning sign that they are at risk of either frequent events or rare, but extraordinary catastrophes, or a combination of both.

The Climate Risk Index does not provide an all-encompassing analysis of the risks of anthropogenic climate change, but should be seen as just one analysis explaining countries' exposure and vulnerability to climate-related risks along with other analyses,[5] based on the most reliable quantified data. It is based on the current and past climate variability and – to the extent that climate change has already left its footprint on climate variability over the last 20 years – also on climate change.

Countries most affected in the period 1996–2015

Honduras, Myanmar and Haiti have been identified as the most affected countries in this 20-year period.[6] They are followed by **Nicaragua, the Philippines, and Bangladesh.** Table 1 shows the ten most affected countries concerning the last two decades with their average weighted ranking (CRI score) and the specific results relating to the four indicators analysed.

[2] UNEP (2016): Executive Summary. p. xii
[3] Ibid. (2016): p. 42
[4] Meteorological events such as tropical storms, winter storms, severe weather, hail, tornados, local storms; hydrological events such as storm surges, river floods, flash floods, mass movement (landslide); climatological events such as freezing, wildfires, droughts.
[5] See e.g. analyses of Columbia University: http://ciesin.columbia.edu/data/climate/, Maplecroft's Climate Change Vulnerability Index: http://maplecroft.com/themes/cc/
[6] The full rankings can be found in the Annexes.

Table 1: The Long-Term Climate Risk Index (CRI): the 10 countries most affected from 1996 to 2015 (annual averages)

CRI 1996–2015 (1995–2014)	**Country**	**CRI score**	Death toll	Deaths per 100 000 inhabitants	Total losses in million US$ PPP	Losses per unit GDP in %	Number of events (total 1996–2015)
1 (1)	Honduras	11.33	301.90	4.36	568.04	2.100	61
2 (2)	Myanmar	14.17	7 145.85	14.71	1 300.74	0.737	41
3 (3)	Haiti	18.17	253.25	2.71	221.92	1.486	63
4 (4)	Nicaragua	19.17	162.90	2.94	234.79	1.197	44
5 (4)	Philippines	21.33	861.55	1.00	2 761.53	0.628	283
6 (6)	Bangladesh	25.00	679.05	0.48	2 283.38	0.732	185
7 (8)	Pakistan	30.50	504.75	0.32	3 823.17	0.647	133
8 (7)	Vietnam	31.33	339.75	0.41	2 119.37	0.621	206
9 (10)	Guatemala	33.83	97.25	0.75	401.54	0.467	75
10 (9)	Thailand	34.83	140.00	0.22	7 574.62	1.004	136

There have only been slight changes compared to the analyses presented in the CRI 2016, which considered the period from 1995 to 2014.[7] All ten countries that made the Bottom 10[8] list last year appear again in this year's edition. Haiti, the poorest country of the Western Hemisphere, as well as Honduras and Myanmar remain the top three most affected countries over the past two decades. These rankings are attributed to the aftermath of exceptionally devastating events such as Hurricane Sandy in Haiti and Hurricane Mitch in Honduras. Likewise, Myanmar has also been struck hard, most notably by Cyclone Nargis in 2008, responsible for an estimated loss of 140 000 lives as well as the property of approximately 2.4 million people.[9]

Particularly in relative terms, poorer developing countries are hit much harder. These results emphasise the particular vulnerability of poor countries to climatic risks, despite the fact that the absolute monetary losses are much higher in richer countries. Loss of life and personal hardship is also much more widespread especially in low-income countries.

Countries most affected in 2015:

Mozambique, Dominica as well as Malawi were the most affected countries last year followed by **India, Vanuatu and Myanmar**.[10] Table 2 shows the ten most affected countries, with their average weighted ranking (CRI score) and the specific results relating to the four indicators analysed.

[7] See Kreft et al., 2015: Global Climate Risk Index 2016. http://germanwatch.org/de/download/13503.pdf
[8] The term "Bottom 10" refers to the 10 most affected countries in the respective time period
[9] See OCHA, 2012, http://reliefweb.int/sites/reliefweb.int/files/resources/Myanmar-Natural%20Disasters-2002-2012.pdf
[10] The full rankings can be found in the Annexes.

Table 2: The Climate Risk Index for 2015: the 10 most affected countries

Ranking 2015 (2014)	**Country**	**CRI score**	Death toll	Deaths per 100 000 inhabitants	Absolute losses (in million US$ PPP)	Losses per unit GDP in %	Human Development Index 2014[11]
1 (23)	Mozambique	12.17	351	1.25	500.07	1.499	**180**
2 (138)	Dominica	13.00	31	43.66	611.22	77.369	**94**
3 (60)	Malawi	13.83	111	0.61	907.98	4.451	**173**
4 (10)	India	15.33	4317	0.33	40 077.22	0.501	**130**
5 (29)	Vanuatu	20.33	11	4.09	278.86	40.650	**134**
6 (94)	Myanmar	20.83	173	0.33	1 359.65	0.479	**148**
7 (138)	The Bahamas	22.83	33	9.07	80.64	0.904	**55**
8 (118)	Ghana	23.33	267	0.99	306.28	0.265	**140**
8 (34)	Madagascar	23.33	118	0.49	228.04	0.642	**154**
10 (62)	Chile	25.17	39	0.22	2 652.69	0.627	**42**

Heavy rainfalls due to the intensified monsoon in South Eastern Africa which started in December 2014 and continued throughout January and beyond had disastrous consequences for infrastructure, agriculture and food security.[12] **Mozambique** (1st), **Malawi** (3rd) and **Madagascar** (8th) were the countries hardest hit by the floods resulting from the torrential rainfalls. In Mozambique the number of affected people was greater than 325 000, 163 people were killed; in Malawi around 638,000 have been affected with more than 170 000 still displaced months later.[13] The floods also fostered the outbreak of diseases, e.g. cholera in some regions. In Northern Madagascar, the tropical storms Chedza on January 16, 2015 and Fundi on February 6 and 7, 2015 worsened the floods and the already tense situation, while drought persisted in the south.[14] [15]

Tropical storm Erika came upon **Dominica** on August 27, 2015 impacting large parts of the island's infrastructure especially in the transport sector. According to some sources, the economic damages amount to around 90% of the country's GDP.[16]

India faced several types of extreme weather events in 2015. After floods in February and March due to unseasonal rainfall, it suffered from one of the deadliest heatwaves in world history (EM-DAT) killing more than 2,300 people in May, followed by a much weaker monsoon than normal.[17]

[11] UNDP, 2015b: Human Development Report, p. 208-211. The Human Development Report 2015 indicates the Human Development Index for the year 2014.
[12] NOAA. Climate.gov, 2015a: https://www.climate.gov/news-features/event-tracker/southeastern-africa%E2%80%99s-monsoon-goes-dry-deluge
[13] European Commission, 2015: ec.europa.eu/echo/files/funding/decisions/.../madmalmoz_02000_en.pdf. p. 6ff
[14] Ebd.
[15] Irinnews, 2015: http://www.irinnews.org/analysis/2015/03/05/disaster-prone-madagascar-battles-flooding-and-drought
[16] Commonwealth of Dominica, 2015: www.dominica.gov.dm/images/documents/rapid_damage_impact_assessment_dominica.pdf p. 7
[17] Livemint, 2015: http://www.livemint.com/Politics/4SbC4kGC9cYt2oxtrYS6eP/A-year-of-extreme-weather-conditions-for-India.html

Further floods in August and especially in Chennai in December had enormous consequences.[18] Severe monsoon rains resulting in floods and landslides in **Myanmar** since June 2015 left thousands of people displaced and caused extensive agricultural damage with Cyclone Komen bringing additional destruction at the end of July.[19] In total, nearly one million people were affected by the floods.[20]

The small island state **Vanuatu** was hit by the category 5 tropical Cyclone Pam on March 13, 2015 which destroyed the majority of food crops and affected more than two thirds of the state's population.[21] Category 4 Hurricane Joaquin temporarily suspended and/or destroyed large parts of transport, housing and communication infrastructure in some parts of the **Bahamas** for several days starting on September 29, 2015.[22] [23]

Ghana was also affected by heavy floods which led to the destruction of a fuel station and a total number of more than 200 people being killed in the region Greater Accra at the beginning of June 2015.[24] [25] Exceptional rainfalls also occurred in the northern part of the Atacama Region in **Chile** at the end of March 2015. Although comparably low amounts of rain with maximums of around 60mm fell, the desert soil in one of the driest regions on earth could not absorb the water masses, leading to flash floods. At least 31 people died.[26]

Exceptional catastrophes or continuous threats?

The Global Climate Risk Index 1996–2015 is based on average values over a twenty-year period. However, the list of countries featured in the Bottom 10 can be divided into two groups: those that only have a high ranking due to exceptional catastrophes and those that are continuously affected by extreme events.

Countries falling into the former category include Myanmar, where Cyclone Nargis in 2008 caused more than 95% of the damage and fatalities in the past two decades, and Honduras, where more than 80% of the damage in both categories was caused by Hurricane Mitch in 1998. The latest addition to this group is Thailand, where the floods of 2011 accounted for 87% of the total damage. With new superlatives like Hurricane Patricia in October 2015 being the strongest land-falling pacific hurricane on record, it seems to be just a matter of time until the next exceptional catastrophe occurs.[27] Cyclone Pam, that severely hit Vanuatu in March 2015, once again showed the vulnerability of Least Developed Countries (LDC) and Small Island Developing States (SIDS) to climate risks.[28]

The appearance of some European countries among the Bottom 30 countries can to a large extent be attributed to the extraordinary number of fatalities due to the 2003 heat wave, in which more than 70,000 people died across Europe. Although some of these countries are often hit by extreme events, the relative economic losses and the fatalities are usually relatively minor compared to the countries' populations and economic power.

[18] NOAA. Climate.gov, 2015b: https://www.climate.gov/news-features/event-tracker/india-heat-wave-kills-thousands
[19] Reliefweb, 2015b: http://reliefweb.int/disaster/fl-2015-000080-mmr
[20] BBC, 2015b: http://www.bbc.com/news/world-asia-33844076
[21] UNDP, 2015a: http://www.undp.org/content/undp/en/home/ourwork/our-projects-and-initiatives/cyclonepam-response.html
[22] Reliefweb, 2015c: http://reliefweb.int/report/bahamas/pahowho-helps-bahamas-cope-health-impact-hurricane-joaquin
[23] 350.org, 2015: https://350.org/the-bahamas-theres-no-forgetting-the-role-climate-change-played-in-our-des truction/
[24] Reliefweb, 2015a: http://reliefweb.int/disaster/fl-2015-000065-gha
[25] ACT Alliance, 2015: actalliance.org/wp-content/uploads/2015/07/Alert17_2015_Floods_Ghana.pdf
[26] MunichRe, 2015: https://www.munichre.com/en/reinsurance/magazine/topics-online/2016/topicsgeo2015/floods-inthe-atacama-desert/index.html
[27] The Weather Channel, 2015, http://www.weather.com/storms/hurricane/news/hurricane-patricia-mexico-coast
[28] BBC 2015a, http://www.bbc.com/news/world-asia-31866783

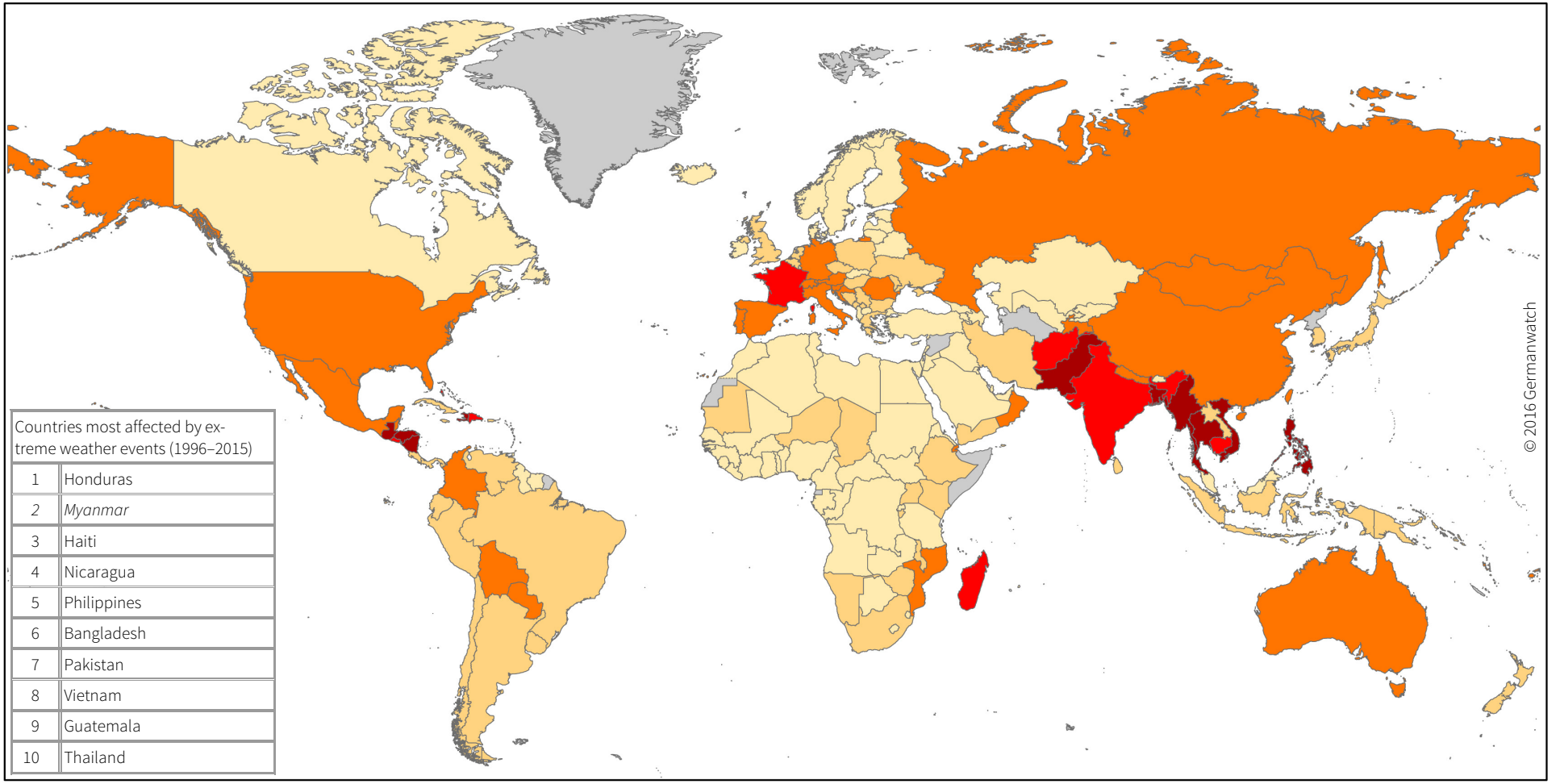
The link between climate change and extreme weather events

Climate change-related risks stemming from extreme events such as heat waves, extreme precipitation, and coastal flooding can already be observed as the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) from 2014 stresses.[29] The frequency of heat waves has increased in large parts of Europe, Asia and Australia. Likewise, the number of heavy precipitation events has increased in most land regions. Especially in North America and Europe the frequency or intensity of heavy precipitation events has increased.[30]

The IPCC has already predicted that risks associated with extreme events will continue to increase as the global mean temperature rises.[31] However, the link between certain weather events and climate change is still a frontier in science. In general, many studies conclude that "the observed frequency, intensity, and duration of some extreme weather events have been changing as the climate system has warmed."[32] However, it is not easy to investigate the impact of climate change on a single weather event as different regional circumstances need to be taken into account and data might be very limited.[33] Nevertheless, more and more research is being done on the attribution of extreme events to climate change, i.e. in how far anthropogenic climate change has contributed to the event's likelihood and strength.[34] Due to methodological improvement "fast track attribution" is now more feasible and can be undertaken within months of the event.[35] Of course, these approaches can only make statements about the change in probability of a certain event happening.

The countries most affected in 2015 show how destructive extreme precipitation can be, namely through the floods and landslides which have hit many regions in Africa, South and Southeast Asia and South America – regions which now feature in the Bottom 10. Extreme precipitation is expected to increase as global warming intensifies the global hydrological cycle. Thereby, single precipitation events are expected to increase at a higher rate than global-mean changes in total precipitation, as outlined by Donat et al. 2016. Furthermore, those increases are expected in wet as well as dry regions.[36] A new study by Lehmann et al. 2015 strengthens the scientific link between record breaking rainfall events since 1980 and rising temperatures. According to the scientists, the likelihood of a new extreme rainfall event being caused by climate change reached 26% in 2010.[37] An example of such an extreme rainfall event in the Russian town Krymsk, in 2012, was studied by Meredith et al. 2015. With simulation models, they showed that the current, warmer surface of the Black Sea changes the local atmospheric characteristics and leads to a 300% increase in simulated precipitation compared to the temperature in 1980.[38] As they found less uniform patterns of precipitation occur at higher temperatures, Wasko and Sharma 2015 suggest that warmer temperatures due to climate change could increase the magnitude and frequency of short-duration floods.[39] Furthermore, there is increasing evidence on the link between extreme El Niño events and global warming, as a simulation by Cai et al. 2014 showed that the occurrence of such events could double in the future due to climate change.[40]

[29] IPCC, 2014, p.12
[30] IPCC, 2013, p.3
[31] IPCC, 2014, p.12
[32] Committee on Extreme Weather Events and Climate Change Attribution et al., 2016: p. 2
[33] Hansen, G. et al., 2016
[34] Stott et al., 2015
[35] Haustein et al., 2016
[36] Donat et.al. 2016
[37] Lehmann et al., 2015
[38] Meredith et al., 2015
[39] Wasko and Sharma, 2015
[40] Cai et al., 2014



Italics: Countries where more than 90% of the losses/deaths occurred in one year/event

Figure 1: World Map of the Global Climate Risk Index 1996–2015

Source: Germanwatch and Munich RE NatCatSERVICE

2 Region of the Climate Summit: Africa – Focus on Africa, Focus on Impacts

This year's climate summit rotates to Africa with Morocco[41] hosting the Conference of Parties (COP) under the United Nations Framework Convention on Climate Change (UNFCCC) in Marrakesh. Awareness of climate change already exists or is currently being increased in many parts of Africa. Responses to climate change impacts need to consider development issues as well. Africa is especially vulnerable to the impacts of climate change, mainly because of its low adaptive capacity due to, amongst other reasons, a low stage of economic development but at the same time high exposure to the effects of global warming. It is widely agreed that climate change – through rising temperatures and changes in precipitation patterns – will severely affect and reduce the agricultural output in terms of crops, whose stability is in most regions highly dependent on specific climatic conditions.[42] Further challenges regarding food security, caused by extreme weather events or flooding, can influence food availability and be reinforced by external factors such as population growth and urbanization. In addition to that, climate change will interact with other pre-existing non-climatic stress factors and development challenges. It is therefore likely that it will exacerbate the already present vulnerabilities concerning access to fresh drinking water resources, health issues such as malnutrition, sanitation and diseases as well as issues of human security.[43] Furthermore, the continent suffers from climate phenomena like the extremely strong 2015–2016 El Niño which also led to extensive droughts.[44]

In the past year, African countries have been heavily struck by weather catastrophes. Mozambique and Malawi, ranking first and third in the annual index for 2015, were hit by severe floods as a result of serious rainfall which started in December 2014 and lasted through to the end of January 2015 and beyond. The southern African monsoon started late after a period of drought and then the rains continued over an unusually long period of time.[45] Nearly one million people have been affected in both countries; more than 200,000 people had to leave their homes.[46] The floods had severe consequences on infrastructure and agriculture. Furthermore, they fostered the outbreak of diseases, e.g. cholera.[47] Other countries in the region such as Zimbabwe and Madagascar had to face similar rains and deal with the impacts as well.

Nevertheless, African countries rank comparatively low in the long-term index featuring the period from 1996 to 2015. Madagascar (19th), Mozambique (22nd) and Djibouti (37th) are the only African states ranked among the 50 most affected countries. Indirect impacts often are much more severe, e.g. food shortages as a result of droughts. These impacts cannot be adequately featured using the data which serves as the basis for the CRI.[48]

[41] Germanwatch is well aware of the disputed situation in the Western Sahara, its history and the different claims among all parties concerned. In treating territories, the CRI does not deviate from the approach taken by Munich RE NatCatSERVICE or IMF. The dashed border in the map on page 10 visualizes that the region is considered a non-self-governing territory under international law by the United Nations. Germanwatch continues to raise awareness on fair solutions that allow Moroccan and Sahrawi people to co-exist in dignity and peace.

[42] IPCC, 2014: p. 1202, 1218, 1221

[43] Ebd. p. 1203, 1221

[44] Thomson Reuters Foundation News, 2016: http://news.trust.org/item/20160726173509-5mkm4/?source=spotlight

[45] NOAA. Climate.gov, 2015a: https://www.climate.gov/news-features/event-tracker/southeastern-africa%E2%80%99s-monsoon-goes-dry-deluge

[46] Humanitarian Country Team Mozambique. United Nations, IOM, Red Cross, and NGOs (2015). p. 4

[47] European Commission (2015): ec.europa.eu/echo/files/funding/decisions/.../madmalmoz_02000_en.pdf. p. 6ff

[48] Harmeling (2011): p. 10

Governments initiate systems and frameworks on various state levels in order to adapt and respond to the impacts of natural disasters and strengthen resilience. However, capacities to elaborate those frameworks often are too low. Financial resources needed depict another obstacle to implementation, therefore projects are frequently financed by external donors.[49]

One approach by the African Union (AU) is the African Risk Capacity Project serving as a pan-African risk pool and mutual insurance which has been set up as a specialized agency of the AU. With the aim of strengthening resilience to extreme weather events, particularly droughts, and to reduce the risk of loss and damage, member states are supported through capacity building "to better plan, prepare and respond to extreme weather events and natural disasters, therefore protecting the food security of their vulnerable populations".[50] A pre-assessment of costs using the Africa RiskView software in case of natural disasters helps in providing quick financial support in the affected countries.[51]

Another initiative led by the Committee of African Heads of State and Government on Climate Change (CAHOSCC) is the African Adaptation Initiative which was launched at COP21 in Paris. Its objective is to enhance adaptation action and address existing gaps in capacity, information and finance, with a special focus on enhancing ambition in the pre-2020 period.[52] The work programme shall amongst others include country support regarding the "mapping of existing and future adaptation programmes" and conduct needs assessments.[53]

Table 3: The 10 African countries most affected in 2015

Ranking CRI	Country	CRI score	Death toll	Deaths per 100 000 inhabitants	Absolute losses (in US$ PPP)	Losses per unit GDP in %
1	Mozambique	12.17	351	1.25	500.07	1.499
3	Malawi	13.83	111	0.61	907.98	4.451
8	Ghana	23.33	267	0.99	306.28	0.265
8	Madagascar	23.33	118	0.49	228.04	0.642
14	Zimbabwe	29.50	29	0.21	253.58	0.904
15	Burundi	33.00	48	0.5.	37.01	0.473
33	South Africa	45.67	19	0.03	3 427.96	0.472
43	Cape Verde	52.00	2	0.38	8.51	0.249
49	Guinea-Bissau	54.83	7	0.39	3.81	0.142
50	Angola	56.00	75	0.28	71.81	0.039

[49] IPCC, 2014: p. 1203
[50] African Risk Capacity Project: http://www.africanriskcapacity.org/about/vision-and-mission
[51] The Guardian, 2015: African countries turn to insurance to safeguard against climate change. Available at https://www.theguardian.com/global-development/2015/oct/07/african-risk-capacity-agency-au-climate-change-adaptation-insurance
[52] Omari-Motsumi, Kulthoum, 2016: http://unfccc.int/files/focus/adaptation/technical_expert_meeting/application/pdf/20160525_omari_aai.pdf
[53] The Adaptation Network, 2016: http://www.adaptationnetwork.org.za/2016/08/overview-african-adaptation-initiative-2/

Table 4: The 10 African countries most affected in 1996–2015 (annual averages)

Ranking CRI	Country	CRI score	Death toll	Deaths per 100 000 inhabitants	Absolute losses (in US$ PPP)	Losses per unit GDP in %
19	Madagascar	42.50	78.80	0.42	160.88	0.634
22	Mozambique	43.33	101.80	0.47	94.40	0.584
38	Djibouti	54.17	3.50	0.47	33.60	1.803
63	Namibia	69.50	11.25	0.57	26.11	0.160
66	Ethiopia	70.33	88.35	0.12	153.93	0.199
74	The Gambia	76.67	4.90	0.32	7.09	0.339
80	Malawi	79.00	11.55	0.08	56.97	0.487
80	Niger	79.00	12.40	0.09	49.09	0.426
80	Zimbabwe	79.00	17.40	0.14	46.21	0.206
83	Mauritania	79.17	4.35	0.14	40.52	0.384

3 One Year after the Big Decisions: What's next for International Resilience Policy?

The year 2015 saw many international processes culminating with decisions taken for the Paris Agreement, the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction. One year on, the opportunity presents itself to take stock of the progress achieved and to identify the next steps for an international resilience policy against climatic events.

Taking stock: Global norm setting for resilience

Paris provided the key-stone to remarkable decisions in Sendai on disaster risk reduction, and in New York on the Sustainable Development Goals. Paris delivered an international agreement that equally addresses climate change mitigation and resilience policy. This is manifested in a specific long-term goal for adaptation (Article 7 on adaptation provisions and obligations of conduct for countries and Article 8 on measures to address climatic loss and damage). Adaptation is part of the core architecture of the Paris Agreement – both in terms of its transparency regime as well as its ambition mechanism that through joint stocktaking of countries' climate outputs shall ramp up countries' climate policies in five year intervals.

The Sustainable Development Goals – the new global development narrative that aims to marry imperatives of the global environment and human well-being – address climatic disasters in a multi-faceted manner. Its goals 1 (end poverty), 2 (end hunger), 9 (sustainable infrastructure), 10 (cities) and 13 (fight climate change) all have resilience building as sub-targets, and if implemented through national and international policies, will help reduce the impacts of climatic catastrophes.

The Sendai Framework for Disaster Risk Reduction 2015–2030 formulates international goals to prevent natural catastrophes. The Sendai Framework encourages countries to support and help each other to implement policies that help to further the understanding of disaster risks, strengthen disaster management governance, invest in risk reduction and resilience building and if disaster strikes, enhance response systems and "build back better" programmes.

In May 2016 world leaders gathered at the World Humanitarian Summit, to discuss the challenges for the humanitarian system in coping with increases in conflict but also climate change. And in October 2016, the last of the big UN summits gathered in Quito, Ecuador, to decide on the framework for the urban agenda. It resulted in an international guidance document for cities that has resilience making as an overriding paradigm.

Next steps: What's lined up for resilience in Marrakesh?

The year 2016 saw unforeseen momentum in countries rushing to ratify the Paris Agreement. This resulted in one of the fastest entry into force of any international agreement in recent history. This is a great political gain, and shows the willingness of countries to implement the vision of the Paris Agreement.

In terms of next steps for the issue of resilience in the climate regime, the UNFCCC will have to: *a)* further the understanding of the global adaptation goal, and how it can be tracked through a global stocktake; *b)* establish responsive communication systems for countries to report adapta-

tion and resilience building activities and receive international acknowledgement; and *c)* build systems that facilitate adaptation finance needs assessments in the country in question to attract both domestic and international resources.

In terms of detailing such elements of the Paris Agreement, it is not the expectation that the Marrakesh climate summit will deliver on all of the mandates of the Paris Agreement. Rather, Marrakesh should establish the timelines and work schedules for the next two years in order to arrive at a detailed "rule-book" for the Paris Agreement in 2018. It should also initiate initial decisions, for instance how adaptation communication systems can properly identify resilience needs, and also target the especially vulnerable and needy sections of the population. Marrakesh should discuss adaptation finance and ways to upscale and rebalance climate finance in this regard, and it should decide how the Adaptation Fund – an institution that supports developing countries with concrete adaptation measures – can run under the Paris Agreement.

Moreover, Marrakesh provides the chance to make substantive progress on the issue of loss and damage – the manifested results of climatic events. At the Marrakesh summit, countries are coming together to review the UNFCCC's work hitherto. This provides the opportunity to better detail the next 5-year's work concerning the climate regime on loss and damage as well as to better understand exactly how loss and damage should be taken up under the Paris Agreement.

4 Methodological Remarks

The presented analyses are based on the worldwide data collection and analysis provided by Munich RE NatCatSERVICE. "The information collated [by Munich RE] can be used to document and perform risk and trend analyses on the extent and intensity of individual natural hazard events in various parts of the world."[54] For the countries of the world, Munich RE collects the number of total losses caused by weather events, the number of deaths, the insured damages and the total economic damages. The last two indicators are stated in million US$ (original values, inflation-adjusted).

In the present analysis, only weather related events – storms, floods, as well as temperature extremes and mass movements (heat and cold waves etc.) – are incorporated. Geological incidents like earthquakes, volcanic eruptions or tsunamis, for which data is also available, are not taken relevant in this context as they do not depend on the weather and therefore are not possibly related to climate change. To enhance the manageability of the large amount of data, the different categories within the weather related events were combined. For single case studies on particularly devastating events, it is stated whether they concern floods, storms or another type of event.

It is important to note that this event-related examination does not allow for an assessment of continuous changes of important climate parameters. For instance, a long-term decline in precipitation that was shown in some African countries as a consequence of climate change cannot be displayed by the CRI. Such parameters nevertheless often substantially influence important development factors like agricultural outputs and the availability of drinking water.

Although certainly an interesting area for analysis, the present data does also not allow for conclusions about the distribution of damages below the national level. The respective data quality would only be sufficient for a limited number of countries.

Analysed indicators

For this examination, the following indicators were analysed:

1. Number of deaths,
2. Number of deaths per 100 000 inhabitants,
3. Sum of losses in US$ in purchasing power parity (PPP) as well as
4. Losses per unit of Gross Domestic Product (GDP).

For the indicators 2–4, economic and population data primarily provided by the International Monetary Fund were taken into account[55]. It must be added, however, that especially for small (e.g. Pacific Small Island Developing States) or politically unstable countries (e.g. Somalia), the required data is not always available in sufficient quality for the whole observed time period. Therefore, these countries have been omitted from the analyses.

The Climate Risk Index 2017 is based on the loss-figures from 2015 and 1996–2015. This ranking represents the most affected countries. In each of the four categories Ranking is used as normalisation technique. Each country's index score has been derived from a country's average ranking in all four indicating categories, according to the following weighting: death toll, 1/6; deaths per 100 000 inhabitants, 1/3; absolute losses in PPP, 1/6; losses per GDP unit, 1/3.

[54] Munich Re, NatCatSERVICE: Downloadcenter for statistics on natural catastrophes. https://www.munichre.com/en/reinsurance/business/non-life/natcatservice/index.html
[55] IMF World Economic Outlook Database, October 2016.

Therefore, an analysis of the already observable changes in climate conditions in different regions sends a sign of warning to those most affected countries to better prepare for the future. Although looking at socio-economic variables in comparison to damages and deaths caused by weather extremes – as was done in the present analysis – does not allow for an exact measurement of the vulnerability, it can be seen as at least an indication or pattern of vulnerability. In most cases, already afflicted countries will probably also be especially endangered by possible future changes in climate conditions. Despite the historic analysis, a deterministic projecting of the past to the future is not appropriate. That is, climate change might change past trends in extreme weather events.

For another, new phenomena can occur in states or regions. In 2004, for example, a hurricane was registered in the South Atlantic, off the Brazilian coast, for the first time ever. The cyclone that hit Oman in 2007 or the one that hit Saudi Arabia in 2009 are of similar significance. So the appearance in the Climate Risk Index is an alarm bell for these countries. But the analyses of the Climate Risk Index should not be regarded as the only evidence for which countries are already afflicted or will be affected by global climate change. After all, people can in principle fall back on different adaptation measures. However, to which extent these can be implemented effectively depends on several factors, which altogether determine the degree of vulnerability.

The relative consequences also depend on economic and population growth

Identifying relative values in this index represents an important complement to the otherwise often dominating absolute values because it allows for analysing country specific data on damages in relation to real conditions and capacities in those countries. It is obvious, for example, that for richer countries like the USA or Japan damages of one billion US$ cause much less economic consequences than for one of the world's poorest countries, where damages in many cases constitute a substantial share of the annual GDP. This is being backed up by the relative analysis.

It should be noted that values, and hence the rankings of countries regarding the respective indicators do not only change due to the absolute impacts of extreme weather events, but also due to economic and population growth or decline. If, for example, population increases, which is the case in most of the countries, the same absolute number of deaths leads to a relatively lower assessment in the following year. The same applies to economic growth. However, this does not affect the significance of the relative approach. Society's ability of coping with damages through precaution, mitigation and disaster preparedness, insurances or the improved availability of means for emergency aid, generally grows along with increasing economic strength. Nevertheless, an improved ability does not necessarily imply enhanced implementation of effective preparation and response measures. While absolute numbers tend to overestimate populous or economically capable countries, relative values give more prominence to smaller and poorer countries. In order to take both effects into consideration, the analysis of the Climate Risk Index is based on absolute (indicators 1 and 3) as well as on relative (indicators 2 and 4) scores. Being double weighted in the average ranking of all indicators generating the CRI Score, more emphasis and therefore higher importance is given to the relative losses.

The indicator "losses in purchasing power parity" allows for a more comprehensive estimation of how different societies are actually affected

The indicator "absolute losses in US$" is identified by purchasing power parity (PPP), because using this figure expresses more appropriately how people are actually affected by the loss of one US$ than by using nominal exchange rates. Purchasing power parity is a currency exchange rate, which permits a comparison of, for instance, national GDPs, by incorporating price differences

between countries. Basically this means that a farmer in India can buy more crops with US$ 1 than a farmer in the USA with the same amount of money. Thus, the real consequences of the same nominal damage are much higher in India. For most of the countries, US$ values according to exchange rates must therefore be multiplied by a factor bigger than one.

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Annexes

CRI = Climate Risk Index; GDP = gross domestic product; PPP = purchasing power parity

Table 6: Climate Risk Index for 1996–2015

(Avg. = average figure for the 20-year period. E.g., 28 people died in Albania due to extreme weather events between 1996 and 2015; hence the average death toll per year was 1.40)

CRI Rank	Country	CRI Score	Fatalities (annual average)		Fatalities per 100 000 inhabitants (annual average)		Losses in million US$ (PPP)		Losses per unit GDP in %	
			Avg.	Rank	Avg.	Rank	Avg.	Rank	Avg.	Rank
140	**Albania**	125.50	1.40	141	0.05	133	19.682	126	0.0853	110
101	**Algeria**	93.00	65.65	37	0.20	71	104.574	79	0.0246	150
119	**Angola**	106.67	31.35	59	0.15	78	28.171	115	0.0191	155
72	**Antigua and Barbuda**	74.50	0.25	163	0.31	53	15.553	132	0.9833	23
92	**Argentina**	84.67	26.75	63	0.07	114	772.608	29	0.1140	94
152	**Armenia**	139.50	0.20	166	0.01	172	18.295	127	0.1050	100
34	**Australia**	52.00	48.15	48	0.23	65	2 203.885	12	0.2553	61
50	**Austria**	60.83	24.40	66	0.30	56	527.842	33	0.1667	77
149	**Azerbaijan**	134.83	2.40	126	0.03	156	57.403	93	0.0464	139
139	**Bahrain**	125.00	2.90	122	0.31	54	0.584	174	0.0014	173
6	**Bangladesh**	25.00	679.05	9	0.48	34	2 283.378	11	0.7324	31
158	**Barbados**	144.00	0.05	175	0.02	162	3.697	155	0.0996	105
150	**Belarus**	135.67	4.95	102	0.05	128	13.997	134	0.0117	161
61	**Belgium**	68.67	106.35	27	1.00	17	145.029	69	0.0376	141
26	**Belize**	47.17	2.35	127	0.80	22	56.838	96	2.8727	8
151	**Benin**	136.17	4.00	114	0.05	132	5.312	153	0.0365	143
109	**Bhutan**	98.17	1.45	139	0.22	68	5.032	154	0.1583	80
36	**Bolivia**	52.17	41.60	52	0.45	37	143.391	71	0.2946	58
70	**Bosnia and Herzegovina**	72.50	2.35	127	0.06	119	397.971	40	1.3076	15
155	**Botswana**	141.50	0.60	153	0.03	152	12.793	138	0.0591	127
89	**Brazil**	83.33	155.75	21	0.08	109	1 738.306	17	0.0659	122
176	**Brunei Darussalam**	168.33	0.10	172	0.03	157	0.349	176	0.0011	174
62	**Bulgaria**	69.17	9.30	84	0.12	89	361.903	43	0.3211	55
110	**Burkina Faso**	98.83	7.00	94	0.05	130	40.071	105	0.2179	67
87	**Burundi**	82.50	8.10	91	0.11	96	24.260	122	0.4453	45
13	**Cambodia**	36.50	57.45	40	0.43	39	241.939	51	0.8795	25
146	**Cameroon**	133.83	7.70	92	0.04	139	11.741	139	0.0255	147
107	**Canada**	97.00	11.45	78	0.04	149	1 490.151	20	0.1201	93
147	**Cape Verde**	134.50	0.25	163	0.05	126	1.833	164	0.0810	114
165	**Central African Republic**	153.67	1.10	145	0.03	159	1.000	169	0.0311	145
99	**Chad**	89.33	4.60	107	0.05	129	89.833	83	0.4595	44
100	**Chile**	91.00	9.15	85	0.06	124	396.542	41	0.1372	86
34	**China**	52.00	1 354.90	4	0.10	97	32 847.144	2	0.3123	56
38	**Chinese Taipei**	54.17	76.40	36	0.34	48	966.762	25	0.1415	84
47	**Colombia**	59.17	106.85	26	0.25	62	604.475	31	0.1359	87
132	**Comoros**	118.17	1.00	149	0.16	76	0.686	172	0.0727	118
78	**Costa Rica**	78.00	8.20	90	0.19	72	82.959	84	0.1699	75
156	**Cote d'Ivoire**	142.00	7.15	93	0.04	146	6.696	149	0.0129	159

CRI Rank	Country	CRI Score	Fatalities (annual average)		Fatalities per 100 000 inhabitants (annual average)		Losses in million US$ (PPP)		Losses per unit GDP in %	
			Avg.	Rank	Avg.	Rank	Avg.	Rank	Avg.	Rank
32	**Croatia**	50.17	35.35	54	0.81	21	160.431	65	0.2040	70
68	**Cuba**	71.50	4.30	113	0.04	144	3 015.455	8	2.0307	10
105	**Cyprus**	95.50	3.35	120	0.44	38	15.729	131	0.0659	123
69	**Czech Republic**	72.33	10.30	80	0.10	100	675.029	30	0.2529	62
145	**Democratic Republic of Congo**	132.67	28.95	62	0.05	134	5.335	152	0.0146	157
181	**Democratic Republic of Timor-Leste**	175.33	0.10	172	0.01	171	0.020	180	0.0003	179
131	**Denmark**	117.00	0.75	151	0.01	167	297.261	47	0.1389	85
38	**Djibouti**	54.17	3.50	118	0.47	36	33.599	111	1.8028	12
17	**Dominica**	42.00	1.80	135	2.54	6	46.023	101	7.8932	2
11	**Dominican Republic**	36.00	209.95	19	2.34	7	214.847	57	0.2516	63
55	**Ecuador**	64.83	41.55	53	0.30	55	185.652	60	0.1439	83
157	**Egypt**	142.67	15.60	71	0.02	160	23.327	123	0.0033	171
15	**El Salvador**	39.17	33.55	56	0.57	32	282.162	49	0.7288	33
129	**Eritrea**	114.50	0.15	169	0.00	174	49.998	98	0.6339	36
162	**Estonia**	149.83	0.45	157	0.03	150	7.652	146	0.0254	148
66	**Ethiopia**	70.33	88.35	31	0.12	91	153.929	67	0.1991	71
27	**Fiji**	47.33	5.70	98	0.68	26	57.356	94	1.0083	20
169	**Finland**	158.00	0.20	166	0.00	173	25.803	120	0.0141	158
137	**Former Yugoslav Republic of Macedonia**	122.67	1.45	139	0.07	113	14.453	133	0.0708	119
18	**France**	42.33	1 121.60	5	1.84	10	1 943.581	15	0.0922	107
175	**Gabon**	167.67	0.45	157	0.03	153	0.012	181	0.0000	181
106	**Georgia**	96.50	3.65	116	0.09	107	42.090	103	0.1804	73
23	**Germany**	43.50	476.60	11	0.58	30	3 597.266	6	0.1209	92
113	**Ghana**	103.17	29.05	61	0.14	86	31.816	112	0.0500	137
93	**Greece**	85.67	12.60	74	0.12	92	283.261	48	0.1001	104
16	**Grenada**	40.33	2.00	132	1.94	9	78.734	86	7.8670	3
9	**Guatemala**	33.83	97.25	30	0.75	24	401.539	39	0.4667	43
170	**Guinea**	158.17	1.70	137	0.02	163	1.325	166	0.0121	160
142	**Guinea-Bissau**	129.67	0.45	157	0.03	154	3.081	157	0.1623	78
111	**Guyana**	101.00	0.30	162	0.04	141	33.684	110	0.8728	26
3	**Haiti**	18.17	253.25	16	2.71	5	221.925	55	1.4865	14
1	**Honduras**	11.33	301.90	14	4.36	2	568.036	32	2.0997	9
59	**Hungary**	67.83	34.30	55	0.34	47	217.472	56	0.1040	101
179	**Iceland**	173.17	0.00	176	0.00	176	0.490	175	0.0046	168
14	**India**	37.50	3 589.75	2	0.32	50	11 335.170	3	0.2756	60
67	**Indonesia**	70.83	252.30	17	0.11	93	1 902.918	16	0.1007	103
159	**Iraq**	144.50	4.90	103	0.02	165	38.593	106	0.0091	164
123	**Ireland**	111.33	2.00	132	0.05	131	174.416	62	0.0961	106
12	**Islamic Republic of Afghanistan**	36.17	278.65	15	1.02	16	150.898	68	0.3538	51
76	**Islamic Republic of Iran**	77.17	56.60	42	0.08	111	1 310.289	21	0.1284	89
133	**Israel**	118.67	4.60	107	0.07	115	67.863	91	0.0371	142
25	**Italy**	46.00	1 007.60	6	1.73	11	1544.333	18	0.0800	115
53	**Jamaica**	63.50	4.35	111	0.16	75	155.505	66	0.7579	27
96	**Japan**	87.50	81.25	33	0.06	116	2 441.103	10	0.0628	125
135	**Jordan**	120.17	2.55	125	0.04	136	45.582	102	0.0828	111

CRI Rank	Country	CRI Score	Fatalities (annual average)		Fatalities per 100 000 inhabitants (annual average)		Losses in million US$ (PPP)		Losses per unit GDP in %	
			Avg.	Rank	Avg.	Rank	Avg.	Rank	Avg.	Rank
160	**Kazakhstan**	146.67	5.20	101	0.03	151	12.998	137	0.0035	170
85	**Kenya**	81.17	53.80	47	0.16	77	92.910	82	0.1016	102
126	**Kiribati**	112.83	0.00	176	0.00	176	10.865	141	6.8742	4
75	**Korea, Republic of**	76.83	57.40	41	0.12	90	1 060.194	24	0.0899	108
177	**Kuwait**	170.17	0.50	156	0.02	164	0.133	177	0.0001	180
121	**Kyrgyz Republic**	109.83	12.80	73	0.24	64	3.380	156	0.0235	151
87	**Lao People's Democratic Republic**	82.50	5.70	98	0.10	101	75.793	89	0.3389	53
112	**Latvia**	102.17	4.55	110	0.20	70	25.735	121	0.0668	121
141	**Lebanon**	126.83	2.25	129	0.06	122	27.624	116	0.0521	136
134	**Lesotho**	118.83	0.25	163	0.01	169	17.700	128	0.4751	42
170	**Liberia**	158.17	0.35	161	0.01	170	1.141	168	0.0422	140
173	**Libya**	159.67	1.05	148	0.02	161	5.611	150	0.0045	169
138	**Lithuania**	122.83	2.60	124	0.08	112	30.691	113	0.0494	138
113	**Luxembourg**	103.17	6.50	95	1.37	14	2.528	162	0.0064	167
19	**Madagascar**	42.50	78.80	35	0.42	41	160.877	64	0.6338	37
80	**Malawi**	79.00	11.55	77	0.08	110	56.973	95	0.4872	41
103	**Malaysia**	94.00	29.55	60	0.11	94	271.755	50	0.0551	133
128	**Mali**	114.17	5.45	100	0.04	137	25.865	119	0.1097	96
164	**Malta**	152.17	0.15	169	0.04	147	2.904	158	0.0266	146
127	**Marshall Islands**	113.50	0.00	176	0.00	176	8.912	143	6.7384	5
83	**Mauritania**	79.17	4.35	111	0.14	81	40.525	104	0.3843	49
117	**Mauritius**	103.67	1.10	145	0.09	104	26.302	117	0.1692	76
44	**Mexico**	58.00	143.85	23	0.13	87	3 051.643	7	0.1927	72
42	**Micronesia**	55.50	3.50	118	3.33	3	2.607	161	0.9737	24
73	**Moldova**	75.00	3.25	121	0.09	106	135.121	73	0.9971	22
48	**Mongolia**	60.17	10.00	82	0.39	45	82.091	85	0.3471	52
102	**Morocco**	93.33	19.20	69	0.06	117	176.663	61	0.1058	98
22	**Mozambique**	43.33	101.80	29	0.47	35	94.401	81	0.5845	40
2	**Myanmar**	14.17	7 145.85	1	14.71	1	1 300.743	22	0.7368	30
63	**Namibia**	69.50	11.25	79	0.57	31	26.114	118	0.1599	79
24	**Nepal**	44.33	235.40	18	0.92	19	107.814	78	0.2314	66
84	**Netherlands**	80.00	84.65	32	0.52	33	133.659	74	0.0201	154
91	**New Zealand**	83.50	3.70	115	0.09	105	301.123	46	0.2399	65
4	**Nicaragua**	19.17	162.90	20	2.94	4	234.794	53	1.1967	17
80	**Niger**	79.00	12.40	75	0.09	103	49.087	99	0.4263	47
125	**Nigeria**	112.00	79.30	34	0.06	123	101.519	80	0.0151	156
154	**Norway**	141.00	1.30	142	0.03	158	72.428	90	0.0247	149
30	**Oman**	47.83	8.75	87	0.31	52	817.523	28	0.6524	34
7	**Pakistan**	30.50	504.75	10	0.32	49	3 823.175	5	0.6469	35
97	**Panama**	88.33	9.50	83	0.28	58	37.863	107	0.0824	112
55	**Papua New Guinea**	64.83	25.25	64	0.42	40	35.991	109	0.2077	68
46	**Paraguay**	58.50	8.60	88	0.15	80	309.479	45	0.7445	29
64	**Peru**	69.83	106.20	28	0.39	44	165.327	63	0.0701	120
5	**Philippines**	21.33	861.55	7	1.00	18	2 761.533	9	0.6279	38
60	**Poland**	68.50	54.90	45	0.14	82	916.890	26	0.1340	88
21	**Portugal**	42.67	143.65	24	1.38	13	363.859	42	0.1439	82
93	**Puerto Rico**	85.67	1.95	134	0.05	127	504.961	34	0.4408	46
180	**Qatar**	174.83	0.00	176	0.00	176	1.180	167	0.0006	177

CRI Rank	Country	CRI Score	Fatalities (annual average)		Fatalities per 100 000 inhabitants (annual average)		Losses in million US$ (PPP)		Losses per unit GDP in %	
			Avg.	Rank	Avg.	Rank	Avg.	Rank	Avg.	Rank
163	**Republic of Congo**	150.83	2.05	131	0.06	120	0.123	178	0.0006	178
65	**Republic of Yemen**	70.17	55.25	43	0.26	60	119.170	76	0.1267	91
28	**Romania**	47.50	55.15	44	0.26	59	1 283.413	23	0.3588	50
31	**Russia**	48.17	2 945.50	3	2.04	8	2 065.513	14	0.0590	128
124	**Rwanda**	111.67	8.35	89	0.10	102	8.042	145	0.0762	116
77	**Samoa**	77.50	0.45	157	0.25	63	8.583	144	1.0535	19
113	**Saudi Arabia**	103.17	24.75	65	0.10	98	241.573	52	0.0202	153
144	**Senegal**	130.67	4.80	106	0.04	140	13.069	136	0.0559	131
79	**Serbia & Montenegro & Kosovo**	78.67	5.75	97	0.06	121	433.104	37	0.4036	48
172	**Seychelles**	159.33	0.00	176	0.00	176	0.854	170	0.0566	129
136	**Sierra Leone**	121.83	9.05	86	0.18	74	0.620	173	0.0106	162
178	**Singapore**	171.83	0.10	172	0.00	175	2.822	159	0.0010	175
108	**Slovak Republic**	97.50	4.60	107	0.09	108	137.944	72	0.1113	95
43	**Slovenia**	56.17	12.05	76	0.60	29	124.388	75	0.2502	64
71	**Solomon Islands**	73.67	1.80	135	0.38	46	5.457	151	0.7302	32
89	**South Africa**	83.33	48.05	49	0.10	99	459.542	35	0.0875	109
118	**South Sudan**	105.83	15.05	72	0.14	84	13.943	135	0.0562	130
33	**Spain**	51.17	701.45	8	1.61	12	845.958	27	0.0638	124
54	**Sri Lanka**	64.33	44.50	50	0.23	67	234.341	54	0.1743	74
51	**St. Kitts and Nevis**	62.00	0.20	166	0.41	43	36.208	108	3.7644	6
49	**St. Lucia**	60.67	1.10	145	0.68	27	16.740	129	1.0622	18
52	**St. Vincent and the Grenadines**	63.33	0.70	152	0.65	28	11.168	140	1.2340	16
104	**Sudan**	94.33	44.00	51	0.13	88	77.344	87	0.0602	126
174	**Suriname**	167.00	0.15	169	0.03	155	0.116	179	0.0018	172
120	**Swaziland**	107.83	0.55	154	0.05	125	22.085	125	0.2864	59
148	**Sweden**	134.67	1.25	143	0.01	168	185.780	59	0.0540	135
40	**Switzerland**	54.67	53.90	46	0.72	25	402.163	38	0.1093	97
37	**Tajikistan**	52.50	20.60	68	0.29	57	111.931	77	0.7459	28
116	**Tanzania**	103.50	23.80	67	0.06	118	64.591	92	0.0817	113
10	**Thailand**	34.83	140.00	25	0.22	69	7 574.620	4	1.0040	21
19	**The Bahamas**	42.50	2.80	123	0.86	20	144.151	70	1.9933	11
74	**The Gambia**	76.67	4.90	103	0.32	51	7.088	147	0.3388	54
161	**Togo**	147.00	2.25	129	0.04	142	1.508	165	0.0209	152
44	**Tonga**	58.00	1.20	144	1.19	15	6.729	148	1.5934	13
166	**Trinidad and Tobago**	153.83	0.55	154	0.04	138	2.304	163	0.0070	165
168	**Tunisia**	155.83	3.65	116	0.04	148	0.747	171	0.0009	176
122	**Turkey**	110.00	31.85	58	0.05	135	347.997	44	0.0330	144
130	**Tuvalu**	115.00	0.00	176	0.00	176	2.668	160	8.6836	1
95	**Uganda**	87.33	33.30	57	0.11	95	56.835	97	0.1272	90
97	**Ukraine**	88.33	63.90	38	0.14	85	197.849	58	0.0556	132
167	**United Arab Emirates**	154.67	0.90	150	0.02	166	29.733	114	0.0066	166
57	**United Kingdom**	66.17	154.25	22	0.25	61	1 522.434	19	0.0761	117
28	**United States**	47.50	444.80	12	0.15	79	39 107.131	1	0.3003	57
86	**Uruguay**	82.00	6.00	96	0.18	73	75.879	88	0.1505	81
153	**Uzbekistan**	139.67	10.30	80	0.04	145	9.247	142	0.0091	163
40	**Vanuatu**	54.67	1.65	138	0.76	23	16.049	130	3.1385	7
58	**Venezuela**	67.50	60.80	39	0.23	66	456.354	36	0.1051	99

CRI Rank	Country	CRI Score	Fatalities (annual average)		Fatalities per 100 000 inhabitants (annual average)		Losses in million US$ (PPP)		Losses per unit GDP in %	
			Avg.	Rank	Avg.	Rank	Avg.	Rank	Avg.	Rank
8	**Vietnam**	31.33	339.75	13	0.41	42	2 119.368	13	0.6213	39
143	**Zambia**	130.17	4.90	103	0.04	143	22.395	124	0.0543	134
80	**Zimbabwe**	79.00	17.40	70	0.14	83	46.214	100	0.2059	69

Table 7: Climate Risk Index for 2015

CRI Rank	Country	CRI score	Fatalities in 2015		Fatalities per 100 000 inhabitants		Losses in million US$ (PPP)		Losses per unit GDP in %	
			Total	Rank	Total	Rank	Total	Rank	Total	Rank
55	**Albania**	58.00	3	85	0.10	54	73.622	73	0.2254	41
91	**Algeria**	77.50	23	46	0.06	72	83.645	71	0.0144	102
50	**Angola**	56.00	75	28	0.28	30	71.805	74	0.0388	87
135	**Antigua and Barbuda**	124.50	0	114	0.00	114	0.000	135	0.0000	135
63	**Argentina**	63.67	28	44	0.06	69	371.670	36	0.0420	82
113	**Armenia**	98.33	0	114	0.00	114	13.266	100	0.0522	74
20	**Australia**	35.50	26	45	0.11	51	3 812.502	6	0.3342	30
53	**Austria**	57.00	4	81	0.05	76	829.069	25	0.2047	42
135	**Azerbaijan**	124.50	0	114	0.00	114	0.000	135	0.0000	135
135	**Bahrain**	124.50	0	114	0.00	114	0.000	135	0.0000	135
35	**Bangladesh**	46.17	168	16	0.11	53	556.442	33	0.0959	61
135	**Barbados**	124.50	0	114	0.00	114	0.000	135	0.0000	135
135	**Belarus**	124.50	0	114	0.00	114	0.000	135	0.0000	135
46	**Belgium**	52.83	410	5	3.66	6	43.583	84	0.0088	108
135	**Belize**	124.50	0	114	0.00	114	0.000	135	0.0000	135
135	**Benin**	124.50	0	114	0.00	114	0.000	135	0.0000	135
87	**Bhutan**	76.17	5	78	0.64	13	0.297	125	0.0050	114
37	**Bolivia**	47.00	43	35	0.40	19	62.734	77	0.0841	66
56	**Bosnia and Herzegovina**	58.17	1	102	0.03	90	308.306	39	0.7565	14
75	**Botswana**	70.17	0	114	0.00	114	242.431	49	0.6938	15
87	**Brazil**	76.17	36	38	0.02	99	671.916	29	0.0210	96
135	**Brunei Darussalam**	124.50	0	114	0.00	114	0.000	135	0.0000	135
27	**Bulgaria**	42.50	7	74	0.10	57	756.356	27	0.5515	20
60	**Burkina Faso**	61.00	8	72	0.04	78	84.319	70	0.2725	34
15	**Burundi**	33.00	48	33	0.51	16	37.006	87	0.4726	23
48	**Cambodia**	54.17	14	55	0.09	58	95.701	66	0.1760	44
116	**Cameroon**	102.83	4	81	0.02	101	5.098	110	0.0070	112
77	**Canada**	71.00	3	85	0.01	110	2 179.454	13	0.1334	54
43	**Cape Verde**	52.00	2	90	0.38	22	8.511	104	0.2494	37
135	**Central African Republic**	124.50	0	114	0.00	114	0.000	135	0.0000	135
135	**Chad**	124.50	0	114	0.00	114	0.000	135	0.0000	135
10	**Chile**	25.17	39	37	0.22	32	2 652.691	12	0.6267	19
23	**China**	38.00	916	4	0.07	68	36 272.535	2	0.1842	43
51	**Chinese Taipei**	56.17	11	65	0.05	75	1 472.523	16	0.1338	53
33	**Colombia**	45.67	108	22	0.22	31	331.137	38	0.0496	76
135	**Comoros**	124.50	0	114	0.00	114	0.000	135	0.0000	135

CRI Rank	Country	CRI score	Fatalities in 2015		Fatalities per 100 000 inhabitants		Losses in million US$ (PPP)		Losses per unit GDP in %	
			Total	Rank	Total	Rank	Total	Rank	Total	Rank
91	**Costa Rica**	77.50	2	90	0.04	81	56.885	79	0.0758	67
108	**Cote d'Ivoire**	95.00	16	53	0.07	67	0.253	127	0.0003	128
95	**Croatia**	82.67	0	114	0.00	114	149.488	60	0.1638	47
135	**Cyprus**	124.50	0	114	0.00	114	0.000	135	0.0000	135
115	**Czech Republic**	98.67	0	114	0.00	114	91.282	68	0.0270	91
68	**Democratic Republic of Congo**	65.67	60	32	0.07	66	36.516	88	0.0583	71
135	**Democratic Republic of Timor-Leste**	124.50	0	114	0.00	114	0.000	135	0.0000	135
120	**Denmark**	104.17	0	114	0.00	114	40.340	85	0.0156	99
135	**Djibouti**	124.50	0	114	0.00	114	0.000	135	0.0000	135
2	**Dominica**	13.00	31	42	43.66	1	611.219	32	77.3694	1
80	**Dominican Republic**	74.83	2	90	0.02	95	167.341	57	0.1116	56
73	**Ecuador**	69.17	33	39	0.20	34	18.318	96	0.0099	106
58	**Egypt**	59.67	145	17	0.16	41	160.896	59	0.0153	100
47	**El Salvador**	53.00	5	78	0.08	63	184.311	56	0.3490	29
135	**Eritrea**	124.50	0	114	0.00	114	0.000	135	0.0000	135
135	**Estonia**	124.50	0	114	0.00	114	0.000	135	0.0000	135
65	**Ethiopia**	64.33	0	114	0.00	114	1 314.016	18	0.8113	13
41	**Fiji**	51.00	3	85	0.34	23	18.557	95	0.2301	40
135	**Finland**	124.50	0	114	0.00	114	0.000	135	0.0000	135
18	**Former Yugoslav Republic of Macedonia**	33.83	6	76	0.29	28	259.554	47	0.8921	12
16	**France**	33.33	3 336	2	5.19	4	1 069.897	20	0.0401	85
135	**Gabon**	124.50	0	114	0.00	114	0.000	135	0.0000	135
30	**Georgia**	44.00	20	50	0.54	15	51.219	82	0.1435	51
64	**Germany**	63.83	18	52	0.02	93	2 869.197	9	0.0743	68
8	**Ghana**	23.33	267	10	0.99	10	306.280	40	0.2655	35
67	**Greece**	65.33	2	90	0.02	98	675.020	28	0.2356	39
135	**Grenada**	124.50	0	114	0.00	114	0.000	135	0.0000	135
31	**Guatemala**	45.00	288	9	1.77	7	52.921	81	0.0419	83
100	**Guinea**	86.33	13	57	0.11	52	0.446	123	0.0029	117
49	**Guinea-Bissau**	54.83	7	74	0.39	20	3.814	111	0.1420	52
135	**Guyana**	124.50	0	114	0.00	114	0.000	135	0.0000	135
40	**Haiti**	50.33	12	60	0.11	49	56.280	80	0.2990	32
44	**Honduras**	52.17	12	60	0.15	43	68.647	75	0.1668	46
109	**Hungary**	96.67	1	102	0.01	108	64.401	76	0.0249	93
117	**Iceland**	103.17	0	114	0.00	114	6.358	109	0.0419	84
4	**India**	15.33	4 317	1	0.33	24	40 077.222	1	0.5011	21
39	**Indonesia**	48.67	104	24	0.04	82	4 186.230	4	0.1470	50
93	**Iraq**	78.00	65	30	0.18	37	3.233	114	0.0006	125
74	**Ireland**	69.67	2	90	0.04	80	281.689	42	0.0923	63
28	**Islamic Republic of Afghanistan**	43.33	364	6	1.14	9	33.450	90	0.0539	73
44	**Islamic Republic of Iran**	52.17	65	30	0.08	62	976.328	21	0.0708	69
105	**Israel**	93.17	1	102	0.01	105	90.509	69	0.0317	89
19	**Italy**	34.83	174	13	0.29	29	2 084.897	14	0.0958	62
135	**Jamaica**	124.50	0	114	0.00	114	0.000	135	0.0000	135
36	**Japan**	46.33	106	23	0.08	61	4 174.851	5	0.0862	64

CRI Rank	Country	CRI score	Fatalities in 2015		Fatalities per 100 000 inhabitants		Losses in million US$ (PPP)		Losses per unit GDP in %	
			Total	Rank	Total	Rank	Total	Rank	Total	Rank
118	**Jordan**	103.50	2	90	0.03	89	2.314	117	0.0028	118
105	**Kazakhstan**	93.17	2	90	0.01	107	99.411	65	0.0217	95
62	**Kenya**	62.17	171	15	0.39	21	12.564	102	0.0088	107
83	**Kiribati**	75.50	0	114	0.00	114	12.625	101	6.2500	5
135	**Korea, Republic of**	124.50	0	114	0.00	114	0.000	135	0.0000	135
135	**Kosovo**	124.50	0	114	0.00	114	0.000	135	0.0000	135
135	**Kuwait**	124.50	0	114	0.00	114	0.000	135	0.0000	135
101	**Kyrgyz Republic**	88.00	8	72	0.13	45	0.397	124	0.0020	121
94	**Lao People's Democratic Republic**	81.17	2	90	0.03	88	32.194	91	0.0856	65
135	**Latvia**	124.50	0	114	0.00	114	0.000	135	0.0000	135
78	**Lebanon**	72.33	15	54	0.33	26	6.651	108	0.0080	110
135	**Lesotho**	124.50	0	114	0.00	114	0.000	135	0.0000	135
98	**Liberia**	86.00	1	102	0.02	92	3.694	112	0.0983	59
135	**Libya**	124.50	0	114	0.00	114	0.000	135	0.0000	135
135	**Lithuania**	124.50	0	114	0.00	114	0.000	135	0.0000	135
135	**Luxembourg**	124.50	0	114	0.00	114	0.000	135	0.0000	135
8	**Madagascar**	23.33	118	19	0.49	17	228.038	53	0.6417	17
3	**Malawi**	13.83	111	20	0.61	14	907.985	23	4.4507	6
132	**Malaysia**	117.00	2	90	0.01	111	0.276	126	0.0000	132
124	**Mali**	105.83	5	78	0.03	87	0.136	129	0.0004	127
135	**Malta**	124.50	0	114	0.00	114	0.000	135	0.0000	135
135	**Marshall Islands**	124.50	0	114	0.00	114	0.000	135	0.0000	135
135	**Mauritania**	124.50	0	114	0.00	114	0.000	135	0.0000	135
135	**Mauritius**	124.50	0	114	0.00	114	0.000	135	0.0000	135
52	**Mexico**	56.33	67	29	0.06	73	1 246.623	19	0.0559	72
12	**Micronesia**	28.50	9	71	8.74	3	38.491	86	12.5786	4
70	**Moldova**	66.67	0	114	0.00	114	277.066	44	1.5444	7
59	**Mongolia**	59.83	1	102	0.03	85	231.767	51	0.6409	18
135	**Montenegro**	124.50	0	114	0.00	114	0.000	135	0.0000	135
134	**Morocco**	121.50	1	102	0.00	113	0.027	133	0.0000	134
1	**Mozambique**	12.17	351	7	1.25	8	500.073	34	1.4993	8
6	**Myanmar**	20.83	173	14	0.33	25	1 359.654	17	0.4786	22
97	**Namibia**	85.83	0	114	0.00	114	44.533	83	0.1740	45
42	**Nepal**	51.33	198	11	0.69	12	20.981	93	0.0299	90
107	**Netherlands**	94.50	2	90	0.01	106	126.514	63	0.0151	101
85	**New Zealand**	75.83	1	102	0.02	94	201.805	55	0.1202	55
24	**Nicaragua**	40.83	12	60	0.19	36	134.805	61	0.4262	26
90	**Niger**	77.17	21	49	0.12	46	2.649	116	0.0139	103
86	**Nigeria**	76.00	79	26	0.04	79	128.768	62	0.0118	105
76	**Norway**	70.83	4	81	0.08	64	161.838	58	0.0453	79
16	**Oman**	33.33	12	60	0.31	27	654.718	30	0.3901	28
11	**Pakistan**	28.17	1 663	3	0.88	11	907.122	24	0.0974	60
122	**Panama**	104.83	1	102	0.02	91	3.436	113	0.0039	116
25	**Papua New Guinea**	41.50	14	55	0.18	38	112.043	64	0.4154	27
38	**Paraguay**	47.50	6	76	0.09	59	284.588	41	0.4655	25
32	**Peru**	45.50	45	34	0.14	44	385.632	35	0.0989	58
13	**Philippines**	28.83	196	12	0.19	35	1 797.737	15	0.2417	38
71	**Poland**	67.00	22	47	0.06	71	333.205	37	0.0331	88

CRI Rank	Country	CRI score	Fatalities in 2015		Fatalities per 100 000 inhabitants		Losses in million US$ (PPP)		Losses per unit GDP in %	
			Total	Rank	Total	Rank	Total	Rank	Total	Rank
121	**Portugal**	104.50	2	90	0.02	96	7.322	107	0.0025	119
110	**Puerto Rico**	97.00	0	114	0.00	114	57.565	78	0.0437	81
129	**Qatar**	110.33	0	114	0.00	114	19.273	94	0.0060	113
119	**Republic of Congo**	104.00	2	90	0.05	77	0.166	128	0.0006	126
26	**Republic of Yemen**	41.83	32	41	0.11	48	230.670	52	0.3048	31
61	**Romania**	61.50	1	102	0.01	112	2 797.884	11	0.6746	16
57	**Russia**	59.50	110	21	0.08	65	937.386	22	0.0252	92
110	**Rwanda**	97.00	10	68	0.09	60	0.025	134	0.0001	130
135	**Samoa**	124.50	0	114	0.00	114	0.000	135	0.0000	135
79	**Saudi Arabia**	72.50	140	18	0.45	18	1.229	119	0.0001	131
124	**Senegal**	105.83	0	114	0.00	114	8.071	105	0.0220	94
83	**Serbia**	75.50	0	114	0.00	114	272.927	45	0.2794	33
135	**Seychelles**	124.50	0	114	0.00	114	0.000	135	0.0000	135
102	**Sierra Leone**	88.50	10	68	0.16	42	0.114	131	0.0011	124
135	**Singapore**	124.50	0	114	0.00	114	0.000	135	0.0000	135
123	**Slovak Republic**	105.33	1	102	0.02	97	7.468	106	0.0046	115
135	**Slovenia**	124.50	0	114	0.00	114	0.000	135	0.0000	135
89	**Solomon Islands**	76.83	1	102	0.17	39	0.511	121	0.0445	80
33	**South Africa**	45.67	19	51	0.03	84	3 427.958	7	0.4722	24
133	**South Sudan**	117.33	0	114	0.00	114	0.508	122	0.0021	120
69	**Spain**	66.33	22	47	0.05	74	637.070	31	0.0394	86
98	**Sri Lanka**	86.00	13	57	0.06	70	17.608	97	0.0079	111
135	**St. Kitts and Nevis**	124.50	0	114	0.00	114	0.000	135	0.0000	135
135	**St. Lucia**	124.50	0	114	0.00	114	0.000	135	0.0000	135
135	**St. Vincent and the Grenadines**	124.50	0	114	0.00	114	0.000	135	0.0000	135
82	**Sudan**	75.33	43	35	0.11	50	13.519	99	0.0080	109
135	**Suriname**	124.50	0	114	0.00	114	0.000	135	0.0000	135
128	**Swaziland**	109.33	0	114	0.00	114	1.890	118	0.0174	98
104	**Sweden**	90.33	0	114	0.00	114	235.938	50	0.0497	75
96	**Switzerland**	85.33	3	85	0.04	83	94.589	67	0.0196	97
22	**Tajikistan**	37.67	10	68	0.12	47	263.053	46	1.0945	9
72	**Tanzania**	68.67	79	26	0.17	40	17.055	98	0.0123	104
53	**Thailand**	57.00	12	60	0.02	100	2 838.711	10	0.2557	36
7	**The Bahamas**	22.83	33	39	9.07	2	80.642	72	0.9035	11
135	**The Gambia**	124.50	0	114	0.00	114	0.000	135	0.0000	135
131	**Togo**	114.33	1	102	0.01	104	0.130	130	0.0012	123
135	**Tonga**	124.50	0	114	0.00	114	0.000	135	0.0000	135
135	**Trinidad and Tobago**	124.50	0	114	0.00	114	0.000	135	0.0000	135
135	**Tunisia**	124.50	0	114	0.00	114	0.000	135	0.0000	135
126	**Turkey**	106.00	13	57	0.02	103	3.223	115	0.0002	129
81	**Tuvalu**	75.17	0	114	0.00	114	12.333	103	33.3333	3
130	**Uganda**	110.50	4	81	0.01	109	0.986	120	0.0012	122
103	**Ukraine**	89.33	0	114	0.00	114	206.680	54	0.0608	70
127	**United Arab Emirates**	109.17	3	85	0.03	86	0.087	132	0.0000	133
66	**United Kingdom**	65.17	11	65	0.02	102	2 894.407	8	0.1071	57
21	**United States**	36.17	325	8	0.10	55	27 122.700	3	0.1504	48
112	**Uruguay**	97.50	0	114	0.00	114	34.317	89	0.0471	77
135	**Uzbekistan**	124.50	0	114	0.00	114	0.000	135	0.0000	135

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			Total	Rank	Total	Rank	Total	Rank	Total	Rank
5	**Vanuatu**	20.33	11	65	4.09	5	278.862	43	40.6504	2
135	**Venezuela**	124.50	0	114	0.00	114	0.000	135	0.0000	135
29	**Vietnam**	43.50	91	25	0.10	56	822.584	26	0.1486	49
113	**Zambia**	98.33	0	114	0.00	114	28.500	92	0.0456	78
14	**Zimbabwe**	29.50	29	43	0.21	33	253.578	48	0.9044	10

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