

Disaster Risk in the Context of Climate Change:
A National-Level Assessment

*******DRAFT*******

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Introduction

In the context of anthropogenic climate change, climate risk is composed of baseline vulnerability to climate hazards combined with additional risks from climate change, mediated by the capacity to adapt to them. Furthermore, climate hazards are heterogeneous, differing in type, physical intensity and degree of impact on human systems. This analysis builds on existing research on climate risk, adaptive capacity, and climate change projections to develop a national-scale assessment of relative disaster risk in the context of climate change. It is intended to serve as a tool to help guide strategic decision making and prioritization of the UNDP climate change adaptation portfolio.

Data and Methods

Data on baseline disaster-related climate risks, adaptive capacity and climate change projections were analyzed separately, and presented in tabular format, beginning on page 5. Datasets used and procedures followed are described below:

Baseline Risks

Data on baseline climate risks were taken from *Natural Disaster Hotspots: A Global Risk Analysis* (Dilley et al 2005). GIS datasets describing the spatial extent and relative intensity of mortality and economic risks from cyclone, drought and flood were downloaded from the Columbia University Center for Hazards and Risk Research’s Hotspots website (<http://www.ldeo.columbia.edu/chrr/research/hotspots/>).

Spatial data were presented in a 2.5' x 2.5' global grid describing relative risks for various hazards in terms of "risk deciles," incorporating physical hazard intensity, historical loss rates, and population/GDP density. For a full description of the datasets, see the *Natural Disaster Hotspots* synthesis report¹.

In order to give greater weight to the regions with the most severe risks and de-emphasize areas with milder risks, the value of each grid cell was cubed and divided by 100, transforming a linear 1-10 scale into an exponential 1-10 scale. The resulting data were then aggregated nationally using zonal statistics, and the sum of the cell values for each country was calculated, giving national-scale values of absolute disaster risk. These in turn were divided by national population and GDP figures to scale mortality and economic risks by the size of the population and size of the economy, respectively. The resulting maps of relative national-scale disaster risk are presented in Annex 1.

Lastly, countries were assigned to equal-interval quintiles based on the results of the above steps, with those with the highest ratios of risk to population/GDP forming the top quintile.

Adaptive capacity

Data on adaptive capacity to climate change were taken from *Vulnerability, Sensitivity and Coping/Adaptive Capacity Worldwide* (Malone & Brenkert 2007)². Using an indicator model combining proxies for economic, human and environmental capacity, Malone and Brenkert developed an index of capacity to adapt to climate change. Individual country adaptive capacity index values were classified from 1-10 values into four categories (Higher, > 5; Moderate, 4 – 4.9, Low, 3 – 3.9, Very Low, < 3). These classifications are presented in a map in Annex 2.

Climate Change Projections

Data on climate change projections were based on the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Working Group 1, Chapter 11: *Regional Climate Projections* (Christensen et al 2007). Climate change risks were assessed by hazard, in terms of their likely impact (increasing or decreasing stress) on existing hazards.

Cyclones/Storms:

According to the IPCC, storms are likely to grow in intensity around the world, though there is much uncertainty about potentially increasing spatial range of tropical storm hazards. Therefore, for the purpose of this analysis, every country that currently experiences hazards from tropical storms can expect these hazards to increase in the future, though this analysis is unable to make predictions about increasing spatial range of storm risks.

¹ Available for download at <http://sedac.ciesin.columbia.edu/hazards/hotspots/synthesisreport.pdf>

² This has not yet been published, and should not be cited publicly.

Drought

Drought risks were assessed in terms of likely impacts on rainfall and temperature. For all land regions of the Earth, temperature is forecast to increase. Precipitation changes will be more varied. For the purpose of this analysis, regions were classified as one of the following, depending on the number of models in agreement over the direction of change, as well as considerations of model accuracy as discussed in the text of Christensen et al (2007).

- Decreasing
- Unclear/Potentially Decreasing
- Unclear
- Unclear/Potentially Increasing
- Increasing

These designations represent long-term mean changes, and thus mask patterns of variability and changes therein (eg: ENSO) – often the most important drivers of drought risk. Furthermore, given that they only account for precipitation, they cannot measure transboundary streamflow changes as a potential driver of drought.

Flood

Climate change is expected to increase rainfall in many areas, while increasing the intensity of storms more generally. For the purpose of this analysis, flood risk is considered to be “increasing” where 20% or more of years are predicted by the IPCC AR4 to be “extreme” wet seasons by the 2080-2099 period for a given region. Flood risk is considered to be “potentially increasing” where the majority of models predict a strong trend toward more extremely wet seasons, but under the 20% threshold. Note that this only covers precipitation, and cannot be applied to flood events rising from changing snowmelt dynamics, runoff characteristics, or similar factors. Further note that baseline mortality risk data from Dilley et al (2005) is taken from EM-DAT, which inconsistently measures factors such as flood-related disease mortality, and caution is especially due in interpreting these results.

Results and Discussion

While there are many limitations and simplifications in the methodology followed here, some strong results are apparent, which can both serve as a guide for both climate change adaptation funding prioritization and disaster risk management activities.

- Climate related disaster risk and capacity to adapt to climate change are highly – though imperfectly – correlated. This emphasizes that climate impacts are both a cause and effect of poverty. However, several exceptions to this generalization are apparent, both in the form of countries blessed with fewer climate hazards, and in the form of lower-income countries whose economies and people have taken measures to reduce exposure to disasters that might cause much greater dislocations elsewhere. While it is possible to make broad generalizations regarding climate impacts and development, these generalizations often fail at the national and sub-national scale.
- Climate change will add further stresses to many already-vulnerable regions, while examples of climate change ameliorating existing risks are few. Among the most vulnerable regions for drought, Southern Africa is likely to become increasingly dry with increasing global temperatures. Central Asia, the Middle East, Central America and the Caribbean face similar prospects. While Eastern Africa, potentially the Sahel, and many Pacific SIDS are likely to experience increasing rainfall, it is likely that much of this will fall in the form of increasingly intense, less agriculturally useful events – contributing to flood rather than ameliorating drought.

While these results provide a useful sketch comparing baseline climate risks to adaptive capacity and climate change trends, there is a clear need for more detailed data at the national and subnational level, using more rigorous geospatial representations of climate change variables, and capturing long-term trends as well as discreet disaster events, incorporating more types of hazards.

Results

Cyclones/Storms – Economic Risk

Country	Baseline Risk	AC Category	CC Signal
Niue	Highest		Increasing
Madagascar	Highest	Low	Increasing
Belize	Highest	Moderate	Increasing
Nicaragua	Highest	Low	Increasing
Laos	Highest	Moderate	Increasing
Haiti	Highest	Very Low	Increasing
Solomon Islands	Highest		Increasing
Dem. Peoples Republic of Korea	Highest	Moderate	Increasing
Honduras	Highest	Low	Increasing
Palau	Highest		Increasing
Dominican Republic	High	Low	Increasing
Bangladesh	High	Very Low	Increasing
Vietnam	High	Moderate	Increasing
Dominica	High		Increasing
Mozambique	High	Low	Increasing
Jamaica	High	Moderate	Increasing
Philippines	High	Moderate	Increasing
Cuba	High	Moderate	Increasing
Guatemala	High	Low	Increasing
Myanmar	High	Higher	Increasing
Swaziland	Moderate	Very Low	Increasing
Malawi	Moderate	Low	Increasing
St. Vincent and the Grenadines	Moderate		Increasing
Cape Verde	Moderate	Low	Increasing
Vanuatu	Moderate		Increasing
Mauritius	Moderate	Moderate	Increasing
Costa Rica	Moderate	Moderate	Increasing
Antigua and Barbuda	Moderate		Increasing
India	Moderate	Low	Increasing
St. Kitts and Nevis	Low		Increasing
St. Lucia	Low		Increasing
Mexico	Low	Moderate	Increasing
Tonga	Low		Increasing
Pakistan	Low	Low	Increasing
China	Low	Moderate	Increasing
Barbados	Low	Moderate	Increasing
Cambodia	Low	Moderate	Increasing
Samoa	Low		Increasing
El Salvador	Low	Low	Increasing
Federated States of Micronesia	Lowest		Increasing
Indonesia	Lowest	Higher	Increasing
Papua New Guinea	Lowest	Moderate	Increasing

Thailand	Lowest	Higher	Increasing
Colombia	Lowest	Low	Increasing
Trinidad and Tobago	Lowest	Higher	Increasing
South Africa	Lowest	Low	Increasing
Zimbabwe	Lowest	Low	Increasing
Panama	Lowest	Moderate	Increasing
Venezuela	Lowest	Higher	Increasing
Cook Islands	Lowest		Increasing

Cyclones/Storms – Mortality Risk

Country	Baseline Risk	AC Category	CC Signal
Belize	Highest	Moderate	Increasing
Nicaragua	Highest	Low	Increasing
Pacific Islands (Palau)	Highest		Increasing
Vanuatu	Highest		Increasing
Laos	Highest	Moderate	Increasing
Cuba	Highest	Moderate	Increasing
Honduras	Highest	Low	Increasing
Madagascar	Highest	Low	Increasing
Dominica	Highest		Increasing
Solomon Islands	Highest		Increasing
Fiji	High		Increasing
Dominican Republic	High	Low	Increasing
Jamaica	High	Moderate	Increasing
Dem. Peoples Republic of Korea	High	Moderate	Increasing
Guatemala	High	Low	Increasing
Mozambique	High	Low	Increasing
Haiti	High	Very Low	Increasing
Antigua and Barbuda	High		Increasing
Costa Rica	High	Moderate	Increasing
St. Vincent and the Grenadines	High		Increasing
Philippines	Moderate	Moderate	Increasing
St. Lucia	Moderate		Increasing
Vietnam	Moderate	Moderate	Increasing
Swaziland	Moderate	Very Low	Increasing
Mexico	Moderate	Moderate	Increasing
Tonga	Moderate		Increasing
Federated States of Micronesia	Moderate		Increasing
St. Kitts and Nevis	Moderate		Increasing
Samoa	Low		Increasing
Comoros	Low		Increasing
Cape Verde	Low	Low	Increasing
Bangladesh	Low	Very Low	Increasing
Barbados	Low	Moderate	Increasing
Mauritius	Low	Moderate	Increasing
China	Low	Moderate	Increasing
Myanmar (Burma)	Low	Higher	Increasing
El Salvador	Low	Low	Increasing
India	Low	Low	Increasing
Pakistan	Lowest	Low	Increasing
Thailand	Lowest	Higher	Increasing
Malawi	Lowest	Low	Increasing
Trinidad and Tobago	Lowest	Higher	Increasing
Cambodia	Lowest	Moderate	Increasing
Niue	Lowest		Increasing
Colombia	Lowest	Low	Increasing

Indonesia	Lowest	Higher	Increasing
Papua New Guinea	Lowest	Moderate	Increasing
Panama	Lowest	Moderate	Increasing
Sri Lanka	Lowest	Moderate	Increasing
South Africa	Lowest	Low	Increasing
Venezuela	Lowest	Higher	Increasing
Zimbabwe	Lowest	Low	Increasing

Drought – Economic Risk

Country	Baseline Risk	AC Category	CC Precip Signal	CC Temp Signal
Zimbabwe	Highest	Low	Decreasing	Increasing
Eritrea	Highest	Low	Unclear/Potentially Increasing	Increasing
Ethiopia	Highest	Low	Increasing	Increasing
Malawi	Highest	Low	Decreasing	Increasing
Kyrgyzstan	Highest	Moderate	Decreasing	Increasing
Niger	Highest	Very Low	Unclear/Potentially Increasing	Increasing
Guinea-Bissau	Highest	Low	Unclear	Increasing
Burundi	Highest	Very Low	Increasing	Increasing
Lesotho	Highest	Very Low	Decreasing	Increasing
Niue	Highest		Increasing	Increasing
Mozambique	Highest	Low	Decreasing	Increasing
Guinea	Highest	Low	Unclear	Increasing
Somalia	Highest	Low	Increasing	Increasing
Tajikistan	Highest	Low	Decreasing	Increasing
Sierra Leone	Highest	Low	Unclear	Increasing
Botswana	Highest	Moderate	Decreasing	Increasing
Gambia, The	Highest	Very Low	Unclear/Potentially Decreasing	Increasing
Burkina Faso	Highest	Very Low	Unclear	Increasing
Central African Republic	Highest	Moderate	Unclear/Potentially Increasing	Increasing
Chad	Highest	Very Low	Unclear/Potentially Increasing	Increasing
Sudan	Highest	Very Low	Unclear/Potentially Increasing	Increasing
Tanzania, United Republic of	Highest	Moderate	Unclear/Potentially Increasing	Increasing
Mali	Highest	Very Low	Unclear/Potentially Decreasing	Increasing
DR Congo	Highest		Unclear/Potentially Increasing	Increasing
Togo	Highest	Low	Unclear	Increasing
Myanmar (Burma)	High	Higher	Increasing	Increasing
Madagascar	High	Low	Unclear	Increasing
Djibouti	High	Low	Unclear/Potentially Increasing	Increasing
Nicaragua	High	Low	Decreasing	Increasing
Liberia	High	Low	Unclear	Increasing
Zambia	High	Low	Decreasing	Increasing
Senegal	High	Low	Unclear/Potentially Decreasing	Increasing
Guyana	High	Moderate	Decreasing	Increasing
Angola	High	Moderate	Unclear/Potentially Decreasing	Increasing
Uzbekistan	High	Moderate	Decreasing	Increasing
Ghana	High	Low	Unclear	Increasing
Moldova	High	Moderate	Decreasing	Increasing
Iran	High		Unclear/Potentially Decreasing	Increasing
Mauritania	High	Low	Unclear/Potentially Decreasing	Increasing
Bolivia	High	Low	Unclear	Increasing
Kenya	High	Moderate	Increasing	Increasing
Benin	High	Low	Unclear	Increasing
Syria	High	Low	Decreasing	Increasing
Nigeria	High	Low	Unclear	Increasing

Azerbaijan	High	Moderate	Decreasing	Increasing
Uganda	High	Low	Increasing	Increasing
Morocco	High	Low	Decreasing	Increasing
Cameroon	High	Low	Unclear	Increasing
Laos	High	Moderate	Increasing	Increasing
Paraguay	High	Low	Unclear	Increasing
Ivory Coast	Moderate	Low	Unclear	Increasing
Iraq	Moderate	Low	Decreasing	Increasing
Cambodia	Moderate	Moderate	Increasing	Increasing
Haiti	Moderate	Very Low	Decreasing	Increasing
Ecuador	Moderate	Moderate	Increasing	Increasing
Colombia	Moderate	Low	Mixed	Increasing
Jordan	Moderate	Moderate	Decreasing	Increasing
Tunisia	Moderate	Low	Decreasing	Increasing
Honduras	Moderate	Low	Decreasing	Increasing
Dominica	Moderate		Decreasing	Increasing
Armenia	Moderate	Moderate	Decreasing	Increasing
Guatemala	Moderate	Low	Decreasing	Increasing
Gabon	Moderate	Moderate	Unclear/Potentially Increasing	Increasing
Congo	Moderate	Moderate	Unclear/Potentially Increasing	Increasing
Peru	Moderate	Moderate	Increasing	Increasing
Argentina	Moderate	Higher	Increasing	Increasing
Nepal	Moderate	Low	Increasing	Increasing
Turkmenistan	Moderate	Moderate	Decreasing	Increasing
Algeria	Moderate	Moderate	Decreasing	Increasing
Costa Rica	Moderate	Moderate	Decreasing	Increasing
Thailand	Moderate	Higher	Increasing	Increasing
Kazakhstan	Moderate	Moderate	Decreasing	Increasing
India	Moderate	Low	Increasing	Increasing
Cuba	Moderate	Moderate	Decreasing	Increasing
Bangladesh	Low	Very Low	Increasing	Increasing
Bhutan	Low	Low	Increasing	Increasing
Philippines	Low	Moderate	Increasing	Increasing
Georgia	Low	Moderate	Decreasing	Increasing
Pakistan	Low	Low	Unclear	Increasing
Mexico	Low	Moderate	Decreasing	Increasing
Rwanda	Low	Low	Increasing	Increasing
Dominican Republic	Low	Low	Decreasing	Increasing
Indonesia	Low	Higher	Mixed	Increasing
Vietnam	Low	Moderate	Increasing	Increasing
Papua New Guinea	Low	Moderate	Increasing	Increasing
Brunei	Low	Moderate	Increasing	Increasing
Dem. Peoples Republic of Korea	Low	Moderate	Increasing	Increasing
Brazil	Low	Moderate	Decreasing	Increasing
Chile	Low	Moderate	Decreasing	Increasing
Uruguay	Low	Moderate	Increasing	Increasing
Afghanistan	Low	Very Low	Decreasing	Increasing
China	Low	Moderate	Increasing	Increasing

Bulgaria	Low	Moderate	Decreasing	Increasing
Vanuatu	Low		Increasing	Increasing
Venezuela	Low	Higher	Decreasing	Increasing
Federated States of Micronesia	Low		Increasing	Increasing
Bosnia and Herzegovina	Low	Higher	Decreasing	Increasing
Samoa	Low		Increasing	Increasing
Croatia	Lowest	Higher	Decreasing	Increasing
Macedonia	Lowest	Moderate	Decreasing	Increasing
Solomon Islands	Lowest		Increasing	Increasing
Antigua and Barbuda	Lowest		Decreasing	Increasing
Panama	Lowest	Moderate	Decreasing	Increasing
St. Kitts and Nevis	Lowest		Decreasing	Increasing
Jamaica	Lowest	Moderate	Decreasing	Increasing
Namibia	Lowest	Low	Decreasing	Increasing
Tonga	Lowest		Increasing	Increasing
Mongolia	Lowest	Low	Increasing	Increasing
Equatorial Guinea	Lowest	Higher	Unclear/Potentially Increasing	Increasing
Barbados	Lowest	Moderate	Decreasing	Increasing
Albania	Lowest	Higher	Decreasing	Increasing
Serbia	Lowest	Moderate	Decreasing	Increasing
United Arab Emirates	Lowest	Higher	Unclear	Increasing
Estonia	Lowest	Higher	Increasing	Increasing
Lebanon	Lowest	Moderate	Decreasing	Increasing
South Africa	Lowest	Low	Decreasing	Increasing
Latvia	Lowest	Higher	Increasing	Increasing
Swaziland	Lowest	Very Low	Decreasing	Increasing
El Salvador	Lowest	Low	Decreasing	Increasing
Oman	Lowest	Higher	Unclear	Increasing
Cape Verde	Lowest	Low	Unclear	Increasing
Suriname	Lowest	Moderate	Decreasing	Increasing
Kuwait	Lowest	Higher	Unclear	Increasing
Malaysia	Lowest	Moderate	Increasing	Increasing

Drought – Mortality Risk

Country	Baseline risk	AC Category	CC Precip Signal	CC Temp Signal
Somalia	Highest	Low	Increasing	Increasing
Zambia	Highest	Low	Decreasing	Increasing
Angola	Highest	Moderate	Unclear/Potentially Decreasing	Increasing
Central African Republic	Highest	Moderate	Unclear/Potentially Increasing	Increasing
Chad	Highest	Very Low	Unclear/Potentially Increasing	Increasing
Zimbabwe	Highest	Low	Decreasing	Increasing
Mozambique	Highest	Low	Decreasing	Increasing
Mali	Highest	Very Low	Unclear/Potentially Decreasing	Increasing
Sudan	Highest	Very Low	Unclear/Potentially Increasing	Increasing
Eritrea	Highest	Low	Unclear/Potentially Increasing	Increasing
Lesotho	Highest	Very Low	Decreasing	Increasing
Tanzania, United Republic of	Highest	Moderate	Unclear/Potentially Increasing	Increasing
Niger	Highest	Very Low	Unclear/Potentially Increasing	Increasing
Guinea	Highest	Low	Unclear	Increasing
Burkina Faso	Highest	Very Low	Unclear	Increasing
Guinea-Bissau	Highest	Low	Unclear	Increasing
Congo	Highest	Moderate	Unclear/Potentially Increasing	Increasing
Madagascar	Highest	Low	Unclear	Increasing
Sierra Leone	High	Low	Unclear	Increasing
Senegal	High	Low	Unclear/Potentially Decreasing	Increasing
Ethiopia	High	Low	Increasing	Increasing
Benin	High	Low	Unclear	Increasing
Cameroon	High	Low	Unclear	Increasing
Mauritania	High	Low	Unclear/Potentially Decreasing	Increasing
DR Congo	High		Unclear/Potentially Increasing	Increasing
Namibia	High	Low	Decreasing	Increasing
Malawi	High	Low	Decreasing	Increasing
Equatorial Guinea	High	Higher	Unclear/Potentially Increasing	Increasing
Gambia, The	High	Very Low	Unclear/Potentially Decreasing	Increasing
Togo	High	Low	Unclear	Increasing
Kenya	High	Moderate	Increasing	Increasing
Ivory Coast	High	Low	Unclear	Increasing
Nigeria	High	Low	Unclear	Increasing
Swaziland	High	Very Low	Decreasing	Increasing
Ghana	High	Low	Unclear	Increasing
Liberia	High	Low	Unclear	Increasing
Laos	Moderate	Moderate	Increasing	Increasing
Burundi	Moderate	Very Low	Increasing	Increasing
Bhutan	Moderate	Low	Increasing	Increasing
Comoros	Moderate		Increasing	Increasing
Myanmar (Burma)	Moderate	Higher	Increasing	Increasing
Uganda	Moderate	Low	Increasing	Increasing
South Africa	Moderate	Low	Decreasing	Increasing
Mongolia	Moderate	Low	Increasing	Increasing

Cape Verde	Moderate	Low	Unclear	Increasing
Papua New Guinea	Moderate	Moderate	Increasing	Increasing
Vanuatu	Moderate		Increasing	Increasing
Thailand	Moderate	Higher	Increasing	Increasing
Dem. Peoples Republic of Korea	Moderate	Moderate	Increasing	Increasing
Cambodia	Moderate	Moderate	Increasing	Increasing
Fiji	Moderate		Increasing	Increasing
Indonesia	Moderate	Higher	Mixed	Increasing
Vietnam	Moderate	Moderate	Increasing	Increasing
Tonga	Moderate		Increasing	Increasing
Solomon Islands	Low		Increasing	Increasing
China	Low	Moderate	Increasing	Increasing
Philippines	Low	Moderate	Increasing	Increasing
Afghanistan	Low	Very Low	Decreasing	Increasing
Federated States of Micronesia	Low		Increasing	Increasing
Pakistan	Low	Low	Unclear	Increasing
Nepal	Low	Low	Increasing	Increasing
Samoa	Low		Increasing	Increasing
India	Low	Low	Increasing	Increasing
Rwanda	Low	Low	Increasing	Increasing
Bangladesh	Low	Very Low	Increasing	Increasing
Chile	Low	Moderate	Decreasing	Increasing
Mexico	Low	Moderate	Decreasing	Increasing
Djibouti	Low	Low	Unclear/Potentially Increasing	Increasing
Botswana	Low	Moderate	Decreasing	Increasing
Dominica	Low		Decreasing	Increasing
Venezuela	Low	Higher	Decreasing	Increasing
Antigua and Barbuda	Low		Decreasing	Increasing
Barbados	Lowest	Moderate	Decreasing	Increasing
St. Kitts and Nevis	Lowest		Decreasing	Increasing
Argentina	Lowest	Higher	Increasing	Increasing
Costa Rica	Lowest	Moderate	Decreasing	Increasing
Brazil	Lowest	Moderate	Decreasing	Increasing
Gabon	Lowest	Moderate	Unclear/Potentially Increasing	Increasing
Uruguay	Lowest	Moderate	Increasing	Increasing
Panama	Lowest	Moderate	Decreasing	Increasing
Turkmenistan	Lowest	Moderate	Decreasing	Increasing
Tajikistan	Lowest	Low	Decreasing	Increasing
Kyrgyzstan	Lowest	Moderate	Decreasing	Increasing
Guatemala	Lowest	Low	Decreasing	Increasing
Paraguay	Lowest	Low	Unclear	Increasing
Uzbekistan	Lowest	Moderate	Decreasing	Increasing
Kazakhstan	Lowest	Moderate	Decreasing	Increasing
Bolivia	Lowest	Low	Unclear	Increasing
Peru	Lowest	Moderate	Increasing	Increasing
Malaysia	Lowest	Moderate	Increasing	Increasing
Iran	Lowest		Unclear/Potentially Decreasing	Increasing
Colombia	Lowest	Low	Mixed	Increasing

Flood – Economic Risk

Country	Baseline Risk	AC Category	CC Extreme Wet Signal
Niger	Highest	Very Low	Increasing
Burundi	Highest	Very Low	Increasing
Malawi	Highest	Low	Unclear
Tajikistan	Highest	Low	Unclear/Potentially Increasing
DR Congo	Highest		Increasing
Ethiopia	Highest	Low	Increasing
Tanzania, United Republic of	Highest	Moderate	Increasing
Mozambique	Highest	Low	Unclear
Afghanistan	Highest	Very Low	Unclear
Somalia	Highest	Low	Increasing
Bhutan	Highest	Low	Increasing
Nepal	Highest	Low	Increasing
Zimbabwe	Highest	Low	Unclear
Laos	Highest	Moderate	Increasing
Madagascar	Highest	Low	Unclear
Central African Republic	Highest	Moderate	Increasing
Burkina Faso	Highest	Very Low	Increasing
Uganda	Highest	Low	Increasing
Bolivia	Highest	Low	Unclear
Cambodia	Highest	Moderate	Increasing
Rwanda	Highest	Low	Increasing
Togo	Highest	Low	Increasing
Mali	Highest	Very Low	Increasing
Benin	Highest	Low	Increasing
Chad	Highest	Very Low	Increasing
Kenya	Highest	Moderate	Increasing
Lesotho	High	Very Low	Unclear
Kyrgyzstan	High	Moderate	Unclear/Potentially Increasing
Sierra Leone	High	Low	Increasing
Nicaragua	High	Low	Unclear
Djibouti	High	Low	Increasing
Moldova	High	Moderate	Unclear
Uzbekistan	High	Moderate	Unclear/Potentially Increasing
Honduras	High	Low	Unclear
Myanmar (Burma)	High	Higher	Increasing
Yemen	High	Very Low	Unclear
Paraguay	High	Low	Unclear
Haiti	High	Very Low	Unclear
Georgia	High	Moderate	Unclear
Uruguay	High	Moderate	Unclear
Vietnam	High	Moderate	Increasing
Dem. Peoples Republic of Korea	High	Moderate	Increasing
Sudan	High	Very Low	Increasing
Swaziland	High	Very Low	Unclear
Nigeria	High	Low	Increasing

Pakistan	High	Low	Increasing
Belize	High	Moderate	Unclear
Ghana	High	Low	Increasing
Guinea	High	Low	Increasing
Cameroon	High	Low	Increasing
Bangladesh	High	Very Low	Increasing
Eritrea	High	Low	Increasing
Argentina	Moderate	Higher	Unclear
Colombia	Moderate	Low	Unclear
Peru	Moderate	Moderate	Unclear
India	Moderate	Low	Increasing
Ecuador	Moderate	Moderate	Unclear
Senegal	Moderate	Low	Increasing
Morocco	Moderate	Low	Unclear
Sri Lanka	Moderate	Moderate	Increasing
Solomon Islands	Moderate		Increasing
Tunisia	Moderate	Low	Unclear
Guatemala	Moderate	Low	Unclear
Panama	Moderate	Moderate	Unclear
Macedonia	Moderate	Moderate	Unclear
Costa Rica	Moderate	Moderate	Unclear
Algeria	Moderate	Moderate	Unclear
Dominica	Moderate		Unclear
Comoros	Moderate		Increasing
Philippines	Moderate	Moderate	Increasing
Thailand	Moderate	Higher	Increasing
Cuba	Moderate	Moderate	Unclear
Brazil	Moderate	Moderate	Increasing
Jordan	Moderate	Moderate	Unclear
Serbia	Moderate	Moderate	Unclear
Venezuela	Moderate	Higher	Unclear
Dominican Republic	Moderate	Low	Unclear
Botswana	Moderate	Moderate	Unclear
China	Low	Moderate	Increasing
Iran	Low		Unclear
Congo	Low	Moderate	Increasing
Fiji	Low		Increasing
El Salvador	Low	Low	Unclear
Jamaica	Low	Moderate	Unclear
Armenia	Low	Moderate	Unclear
Albania	Low	Higher	Unclear
Syria	Low	Low	Unclear
Vanuatu	Low		Increasing
Indonesia	Low	Higher	Increasing
Mauritania	Low	Low	Increasing
Chile	Low	Moderate	Unclear
Azerbaijan	Low	Moderate	Unclear
Guyana	Low	Moderate	Unclear

Bosnia and Herzegovina	Low	Higher	Unclear
Zambia	Low	Low	Unclear
Mexico	Low	Moderate	Unclear
Montenegro	Low	Moderate	Unclear
Papua New Guinea	Low	Moderate	Increasing
South Africa	Low	Low	Unclear
Ivory Coast	Low	Low	Increasing
Gabon	Low	Moderate	Increasing
Samoa	Low		Increasing
Turkmenistan	Low	Moderate	Unclear/Potentially Increasing
Bulgaria	Lowest	Moderate	Unclear
Angola	Lowest	Moderate	Unclear
Byelarus	Lowest	Higher	Increasing
Iraq	Lowest	Low	Unclear
Antigua and Barbuda	Lowest		Unclear
Lebanon	Lowest	Moderate	Unclear
Malaysia	Lowest	Moderate	Increasing
Trinidad and Tobago	Lowest	Higher	Unclear
Egypt	Lowest	Low	Unclear
Barbados	Lowest	Moderate	Unclear
St. Lucia	Lowest		Unclear
Liberia	Lowest	Low	Increasing
Kazakhstan	Lowest	Moderate	Unclear/Potentially Increasing
Croatia	Lowest	Higher	Unclear
Mongolia	Lowest	Low	Increasing
Oman	Lowest	Higher	Unclear
Saudi Arabia	Lowest	Low	Unclear
Lithuania	Lowest	Higher	Increasing
Kuwait	Lowest	Higher	Unclear
Brunei	Lowest	Moderate	Increasing
Bahrain	Lowest	Higher	Unclear
Suriname	Lowest	Moderate	Unclear
Namibia	Lowest	Low	Unclear
United Arab Emirates	Lowest	Higher	Unclear
Libya	Lowest	Higher	Unclear

Flood – Mortality Risk

Country	Baseline Risk	AC Category	CC Extreme Wet Signal
Uruguay	Highest	Moderate	Unclear
Bhutan	Highest	Low	Increasing
Argentina	Highest	Higher	Unclear
Belize	Highest	Moderate	Unclear
Bolivia	Highest	Low	Unclear
Panama	Highest	Moderate	Unclear
Costa Rica	Highest	Moderate	Unclear
Somalia	Highest	Low	Increasing
Tajikistan	Highest	Low	Unclear/Potentially Increasing
Venezuela	Highest	Higher	Unclear
Brazil	Highest	Moderate	Increasing
Paraguay	Highest	Low	Unclear
Chile	Highest	Moderate	Unclear
Georgia	Highest	Moderate	Unclear
Honduras	Highest	Low	Unclear
Dominica	Highest		Unclear
Swaziland	Highest	Very Low	Unclear
Peru	Highest	Moderate	Unclear
Niger	Highest	Very Low	Increasing
Colombia	Highest	Low	Unclear
Botswana	Highest	Moderate	Unclear
Laos	Highest	Moderate	Increasing
Ecuador	Highest	Moderate	Unclear
Mexico	Highest	Moderate	Unclear
Nicaragua	Highest	Low	Unclear
Cuba	Highest	Moderate	Unclear
Tunisia	High	Low	Unclear
Macedonia	High	Moderate	Unclear
Algeria	High	Moderate	Unclear
Djibouti	High	Low	Increasing
Mozambique	High	Low	Unclear
Moldova	High	Moderate	Unclear
Tanzania, United Republic of	High	Moderate	Increasing
Guatemala	High	Low	Unclear
Lesotho	High	Very Low	Unclear
Thailand	High	Higher	Increasing
Afghanistan	High	Very Low	Unclear
Burkina Faso	High	Very Low	Increasing
Yemen	High	Very Low	Unclear
Chad	High	Very Low	Increasing
Cambodia	High	Moderate	Increasing
Zimbabwe	High	Low	Unclear
Serbia	High	Moderate	Unclear
Gabon	High	Moderate	Increasing
Jamaica	High	Moderate	Unclear

Benin	High	Low	Increasing
Nepal	High	Low	Increasing
Dominican Republic	High	Low	Unclear
Montenegro	High	Moderate	Unclear
Kenya	High	Moderate	Increasing
Central African Republic	High	Moderate	Increasing
Fiji	High		Increasing
Morocco	Moderate	Low	Unclear
Mali	Moderate	Very Low	Increasing
Uzbekistan	Moderate	Moderate	Unclear/Potentially Increasing
Iran	Moderate		Unclear
Madagascar	Moderate	Low	Unclear
Kyrgyzstan	Moderate	Moderate	Unclear/Potentially Increasing
South Africa	Moderate	Low	Unclear
Malawi	Moderate	Low	Unclear
Jordan	Moderate	Moderate	Unclear
Uganda	Moderate	Low	Increasing
Sudan	Moderate	Very Low	Increasing
Dem. Peoples Republic of Korea	Moderate	Moderate	Increasing
Trinidad and Tobago	Moderate	Higher	Unclear
Antigua and Barbuda	Moderate		Unclear
Ethiopia	Moderate	Low	Increasing
Albania	Moderate	Higher	Unclear
El Salvador	Moderate	Low	Unclear
Sri Lanka	Moderate	Moderate	Increasing
Vietnam	Moderate	Moderate	Increasing
Togo	Moderate	Low	Increasing
Haiti	Moderate	Very Low	Unclear
Burundi	Moderate	Very Low	Increasing
Cameroon	Moderate	Low	Increasing
China	Moderate	Moderate	Increasing
DR Congo	Moderate		Increasing
Bosnia and Herzegovina	Moderate	Higher	Unclear
Rwanda	Low	Low	Increasing
Congo	Low	Moderate	Increasing
Armenia	Low	Moderate	Unclear
Pakistan	Low	Low	Increasing
Nigeria	Low	Low	Increasing
Philippines	Low	Moderate	Increasing
Azerbaijan	Low	Moderate	Unclear
Bulgaria	Low	Moderate	Unclear
Syria	Low	Low	Unclear
Vanuatu	Low		Increasing
Byelarus	Low	Higher	Increasing
India	Low	Low	Increasing
Sierra Leone	Low	Low	Increasing
Indonesia	Low	Higher	Increasing
Senegal	Low	Low	Increasing

Myanmar (Burma)	Low	Higher	Increasing
Ghana	Low	Low	Increasing
Lebanon	Low	Moderate	Unclear
Solomon Islands	Low		Increasing
Barbados	Low	Moderate	Unclear
Malaysia	Low	Moderate	Increasing
Samoa	Low		Increasing
Angola	Low	Moderate	Unclear
Guyana	Low	Moderate	Unclear
Turkmenistan	Lowest	Moderate	Unclear/Potentially Increasing
Comoros	Lowest		Increasing
Bangladesh	Lowest	Very Low	Increasing
Guinea	Lowest	Low	Increasing
Iraq	Lowest	Low	Unclear
Mauritania	Lowest	Low	Increasing
Zambia	Lowest	Low	Unclear
St. Lucia	Lowest		Unclear
Papua New Guinea	Lowest	Moderate	Increasing
Ivory Coast	Lowest	Low	Increasing
Eritrea	Lowest	Low	Increasing
Croatia	Lowest	Higher	Unclear
Kazakhstan	Lowest	Moderate	Unclear/Potentially Increasing
Saudi Arabia	Lowest	Low	Unclear
Egypt	Lowest	Low	Unclear
Oman	Lowest	Higher	Unclear
Kuwait	Lowest	Higher	Unclear
Lithuania	Lowest	Higher	Increasing
Brunei	Lowest	Moderate	Increasing
Bahrain	Lowest	Higher	Unclear
Mongolia	Lowest	Low	Increasing
Liberia	Lowest	Low	Increasing
Suriname	Lowest	Moderate	Unclear
United Arab Emirates	Lowest	Higher	Unclear
Namibia	Lowest	Low	Unclear
Libya	Lowest	Higher	Unclear

Annex 1: Baseline Risk Maps