

Linking Disaster Risk and Environmental Sustainability

JONNEL S. ACOBA, THE MAXWELL SCHOOL OF CITIZENSHIP AND PUBLIC AFFAIRS

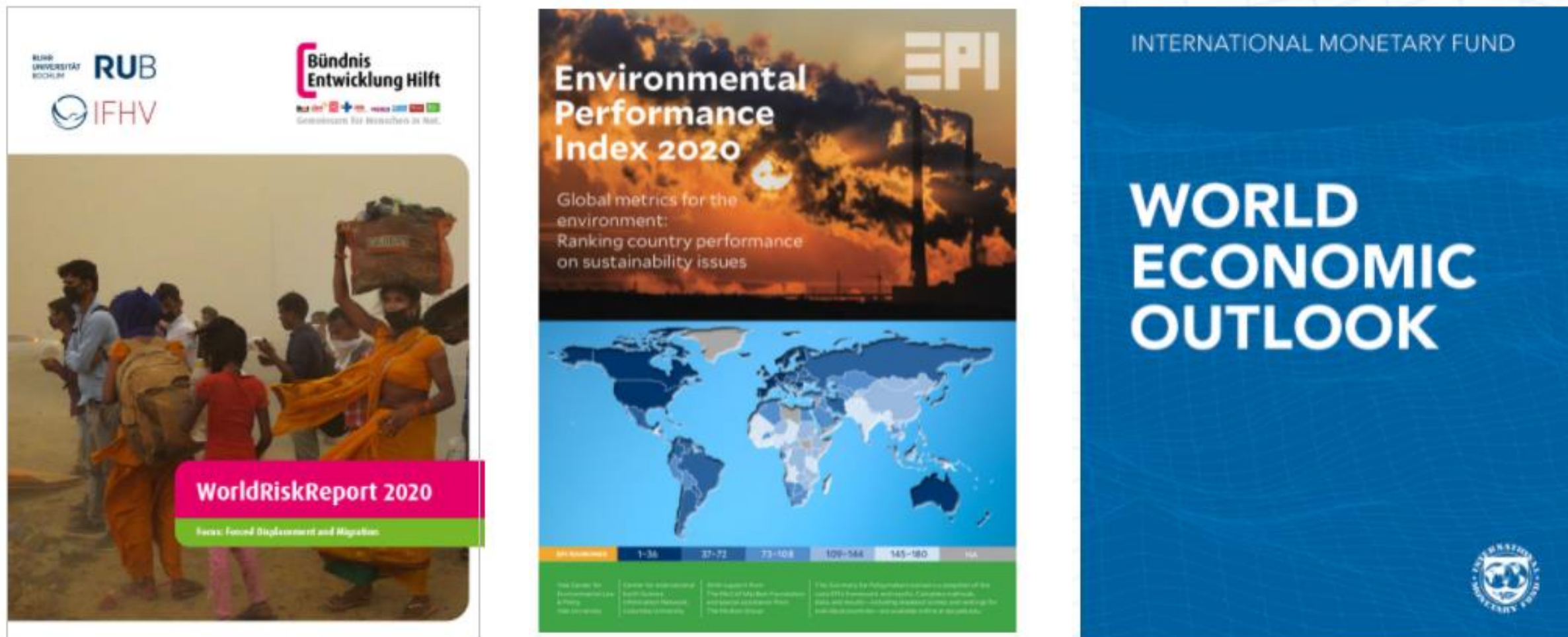
MOTIVATION

Over the years, destructive natural disasters have adversely impacted economies, claimed lives, and damaged properties. Various literatures posit that aside from inherent [exposure] risk of countries, the increase in more destructive natural disasters is predicated by the worsening state of the environment (climate change).

Research Questions:

- Is there a relationship between EPI and WRI?
- What does EPI tell about the exposure and vulnerability of countries to natural disasters?
- What does the location and economic development status of a country tell about its WRI and EPI?

DATA



- The **World Risk Index (WRI) Report from 2016 to 2020** ranked 181 countries around the world according to their risk of becoming a victim of extreme natural event. WRI is a function of Exposure and Vulnerability. Exposure refers to inherent risk of a country and Vulnerability pertains to the mean of Susceptibility, Lack of Coping Capacities, and Lack of Adaptive Capacities.
- The **2020 Environmental Performance Index (EPI) Report** ranked 180 countries according to their performance in addressing environmental sustainability issues. The EPI assessment uses 32 metrics or indicators summed up in two components: Environmental Health and Ecosystem Vitality.
- Utilized economic and socio-demographic data from the **2020 World Economic Outlook Report** downloaded from the International Monetary Fund (IMF) website.

ANALYSIS

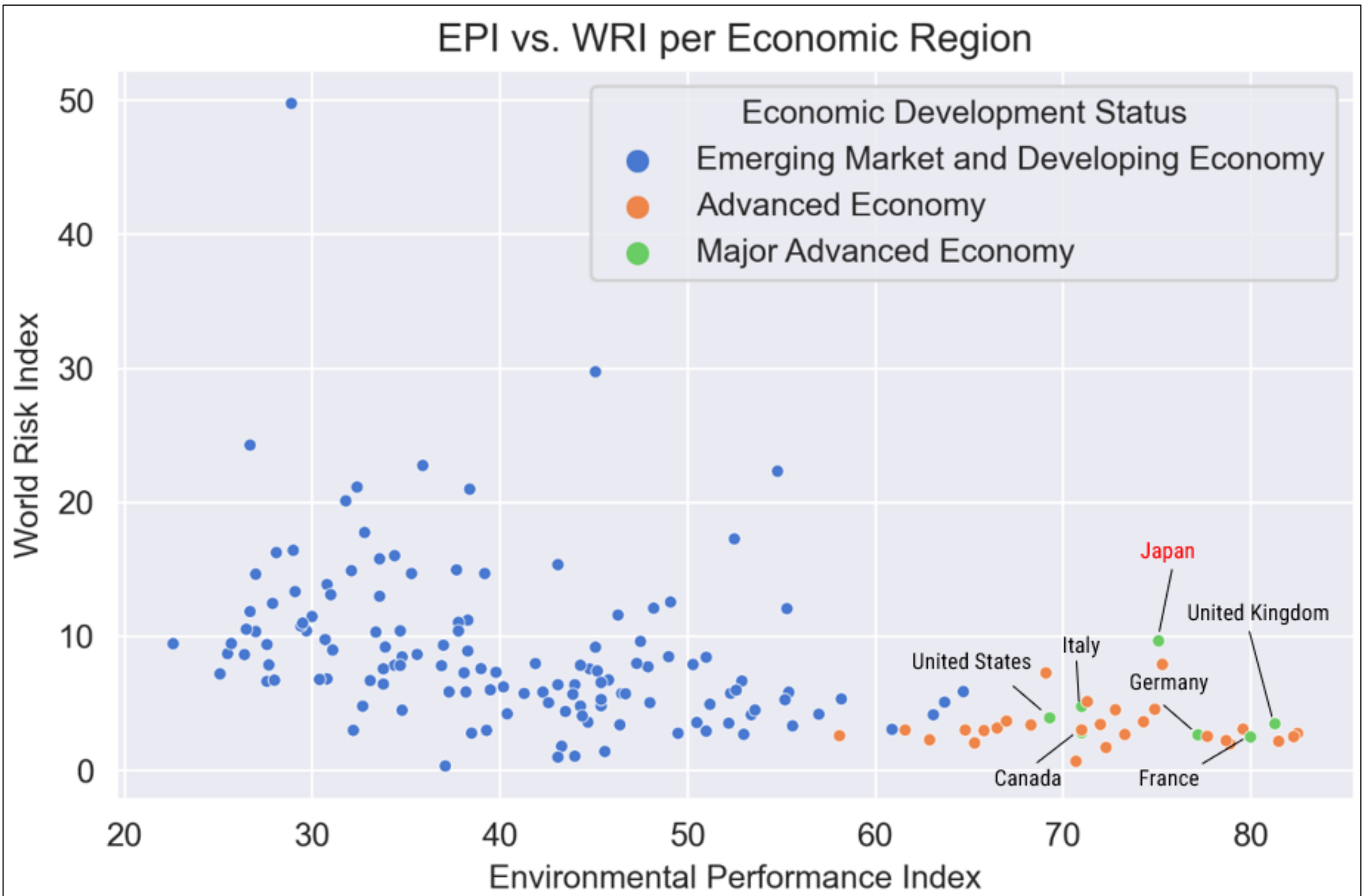
- Performance in environmental sustainability management (EPI) is negatively correlated with the risk of natural disaster (WRI).

	Correlation, r	R-squared	Constant	Estimate
World Risk Index	-0.477	0.228	16.411	-0.1826
Exposure	-0.188	0.035	22.4667	-0.1306
Vulnerability	-0.892	0.796	83.7742	-0.7941

- EPI has a stronger correlation with a country's risk vulnerability than its exposure.

ISO3	Country	Economic Region	Risk Level	WRI	Exposure	Vulnerability	Susceptibility	Lack of Coping Capacities	Lack of Adaptive Capacities	EPI
JAM	Jamaica	Latin America & Caribbean	Very High	12.08	26.05	46.39	25.14	39.50	74.52	48.20
KIR	Kiribati	Asia-Pacific	Very High	14.94	26.05	57.36	39.27	50.04	82.77	37.70
DZA	Algeria	Greater Middle East	Medium	7.55	16.51	45.75	20.97	39.30	76.97	44.80
SEN	Senegal	Sub-Saharan Africa	High	9.74	16.51	58.97	44.37	54.45	78.09	30.70
ROU	Romania	Eastern Europe	Medium	5.86	15.41	38.03	19.49	30.00	64.60	64.70
SUR	Suriname	Latin America & Caribbean	Medium	7.40	15.41	48.04	28.66	42.50	72.96	45.20
AFG	Afghanistan	Southern Asia	High	8.69	12.99	66.93	49.10	59.61	92.09	25.50
USA	United States of America	Global West	Low	3.90	12.99	30.06	15.97	21.67	52.54	69.30
ESP	Spain	Global West	Low	3.61	11.74	30.77	16.07	18.82	57.42	74.30
PAK	Pakistan	Southern Asia	Medium	6.68	11.74	56.89	33.13	52.73	84.81	33.10
MDA	Republic of Moldova	Former Soviet States	Low	4.04	9.59	42.10	22.96	34.36	68.98	44.40
RUS	Russian Federation	Former Soviet States	Low	3.55	9.59	37.04	18.43	27.80	64.88	50.50
BOL	Plurinational State of Bolivia	Latin America & Caribbean	Low	4.78	9.56	50.01	32.36	37.71	79.97	44.30
LUX	Luxembourg	Global West	Very Low	2.50	9.56	26.18	12.40	20.03	46.10	82.30
BWA	Botswana	Sub-Saharan Africa	Low	4.20	8.82	47.59	31.46	39.35	71.97	40.40
SWE	Sweden	Global West	Very Low	2.20	8.82	24.96	15.60	18.08	41.19	78.70

ISO3	Country	Economic Region	Economic Development Status	GDP	Risk Level	EPI	WRI	Exposure	Vulnerability	Susceptibility	Lack of Coping Capacities	Lack of Adaptive Capacities
JPN	Japan	Asia-Pacific	Major Advanced Economy	39,391.14	High	75.10	9.64	38.67	24.93	17.76	17.83	39.20
ITA	Italy	Global West	Major Advanced Economy	37,904.74	Low	71.00	4.75	15.17	31.29	17.25	17.41	59.22
USA	United States of America	Global West	Major Advanced Economy	59,651.00	Low	69.30	3.90	12.99	30.06	15.97	21.67	52.54
GBR	United Kingdom	Global West	Major Advanced Economy	41,899.45	Low	81.30	3.46	12.58	27.53	16.42	19.09	47.07
CAN	Canada	Global West	Major Advanced Economy	45,003.36	Very Low	71.00	2.79	10.36	26.89	15.17	18.77	46.73
DEU	Germany	Global West	Major Advanced Economy	50,682.06	Very Low	77.20	2.63	11.52	22.81	14.98	16.08	37.36
FRA	France	Global West	Major Advanced Economy	43,002.82	Very Low	80.00	2.47	9.62	25.66	16.61	16.22	44.14



ANALYSIS

- Advanced economies perform better in addressing environmental sustainability issues, hence with lower risk of natural disaster*.

ISO3	Country	Risk Level	Economic Development Status	GDP	EPI	WRI	Exposure	Vulnerability	Susceptibility	Lack of Coping Capacities	Lack of Adaptive Capacities
LUX	Luxembourg	Very Low	Advanced Economy	106,787.70	82.30	2.50	9.56	26.18	12.40	20.03	46.10
SGP	Singapore	Very Low	Advanced Economy	90,447.36	58.10	2.57	8.87	28.97	11.29	21.60	54.03
QAT	Qatar	Very Low	Emerging Market and Developing Economy	86,941.04	37.10	0.31	0.91	34.33	8.32	30.08	64.58
IRL	Ireland	Low	Advanced Economy	84,562.32	72.80	4.50	16.68	26.96	15.74	17.64	47.49
CHE	Switzerland	Very Low	Advanced Economy	64,654.10	81.50	2.15	9.01	23.90	13.91	19.32	38.46
NOR	Norway	Very Low	Advanced Economy	61,358.71	77.70	2.52	10.83	23.25	13.92	17.34	38.49
USA	United States of America	Low	Major Advanced Economy	59,651.00	69.30	3.90	12.99	30.06	15.97	21.67	52.54
BRN	Brunei Darussalam	Very High	Emerging Market and Developing Economy	58,482.21	54.80	22.30	57.61	38.70	14.75	33.35	67.99
ARE	United Arab Emirates	Low	Emerging Market and Developing Economy	55,312.90	55.60	3.30	10.99	30.01	9.55	25.86	54.61
DNK	Denmark	Very Low	Advanced Economy	54,665.18	82.50	2.74	11.85	23.12	14.91	15.31	39.13
SLE	Sierra Leone	High	Emerging Market and Developing Economy	1,618.58	25.70	9.44	13.69	68.99	55.80	65.60	85.57
MDG	Madagascar	High	Emerging Market and Developing Economy	1,558.32	26.50	10.51	15.12	69.48	65.68	56.21	86.55
TGO	Togo	Very High	Emerging Market and Developing Economy	1,551.15	29.50	10.97	16.59	66.11	55.74	56.25	86.34
TCD	Chad	Very High	Emerging Market and Developing Economy	1,530.53	26.70	11.83	15.71	75.32	64.54	68.94	92.49
LBR	Liberia	High	Emerging Market and Developing Economy	1,452.90	22.60	9.43	13.56	69.52	56.27	65.02	87.26
MOZ	Mozambique	High	Emerging Market and Developing Economy	1,210.15	33.90	9.18	13.31	68.97	62.61	56.44	87.85
NER	Niger	Very High	Emerging Market and Developing Economy	1,185.08	30.80	13.85	19.26	71.90	60.64	67.19	87.87
MWI	Malawi	High	Emerging Market and Developing Economy	941.60	38.30	8.89	13.22	67.24	59.28	57.80	84.65
CAF	Central African Republic	High	Emerging Market and Developing Economy	919.67	36.90	7.79	10.20	76.34	70.83	67.32	90.88
BDI	Burundi	High	Emerging Market and Developing Economy	740.32	27.00	10.34	14.74	70.14	62.20	57.53	90.68

POLICY SIGNIFICANCE

- Potential study focus [new dimension of public sector performance audits] in reevaluating environmental sustainability management efforts, especially for inherently risky countries (many developing countries).
- Benchmarking for best practices around the world but limited to initiatives addressing susceptibility, coping and adaptation (institutions and management).
- May guide policy decisions on reallocation of humanitarian and other development aids from regional development partners and other agencies.

REFERENCES

World Risk Report 2020. Bündnis Entwicklung Hilft, Ruhr University Bochum – Institute for International Law of Peace and Conflict 2020.

Welle, Torsten & Birkmann, Joern. (2015). The World Risk Index – An Approach to Assess Risk and Vulnerability on a Global Scale. Journal of Extreme Events. Volume 2. 10.1142/S2345737615500025.

Wendling, Z. A., Emerson, J. W., de Sherbinin, A., Esty, D. C., et al. (2020). 2020 Environmental Performance Index. New Haven, CT: Yale Center for Environmental Law & Policy. epi.yale.edu