

When Fragile States Face Climate Stress: Addressing Compound Climate-Fragility Risks

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Conference on Climate-Security Nexus: Implications for the Military

October 24, 2019



Our research tracks compound climate-fragility risks:

- Exposure to *multiple* climate hazards: floods, droughts, chronic aridity, wildfires, cyclones, sea-level rise
- Fragility in state *effectiveness* and *legitimacy* in security, political, economic, and social spheres



Top 15 Countries or Territories with Largest Share of Population in Very High Exposure Areas

Country or Territory	Pop. Share	Country or Territory	Pop. Share	Country or Territory	Pop. Share
1. Cayman Islands	88%	6. Maldives	45%	11. Kiribati	41%
2. Suriname	71%	7. Netherlands	45%	12. Vietnam	41%
3. Cocos Islands	70%	8. Turks and Caicos Isl.	44%	13. U.S. Minor Outlying Isl.	40%
4. Guyana	69%	9. Bahrain	44%	14. Bangladesh	33%
5. United Arab Emirates	47%	10. Marshall Islands	41%	15. Northern Mariana Isl.	32%

Note: “Very high exposure” areas are four standard deviations or more above the global mean exposure.

Data source: Smith, Krishnan, and Busby 2016.

Top 15 Countries or Territories with Largest Population in Very High Exposure Areas

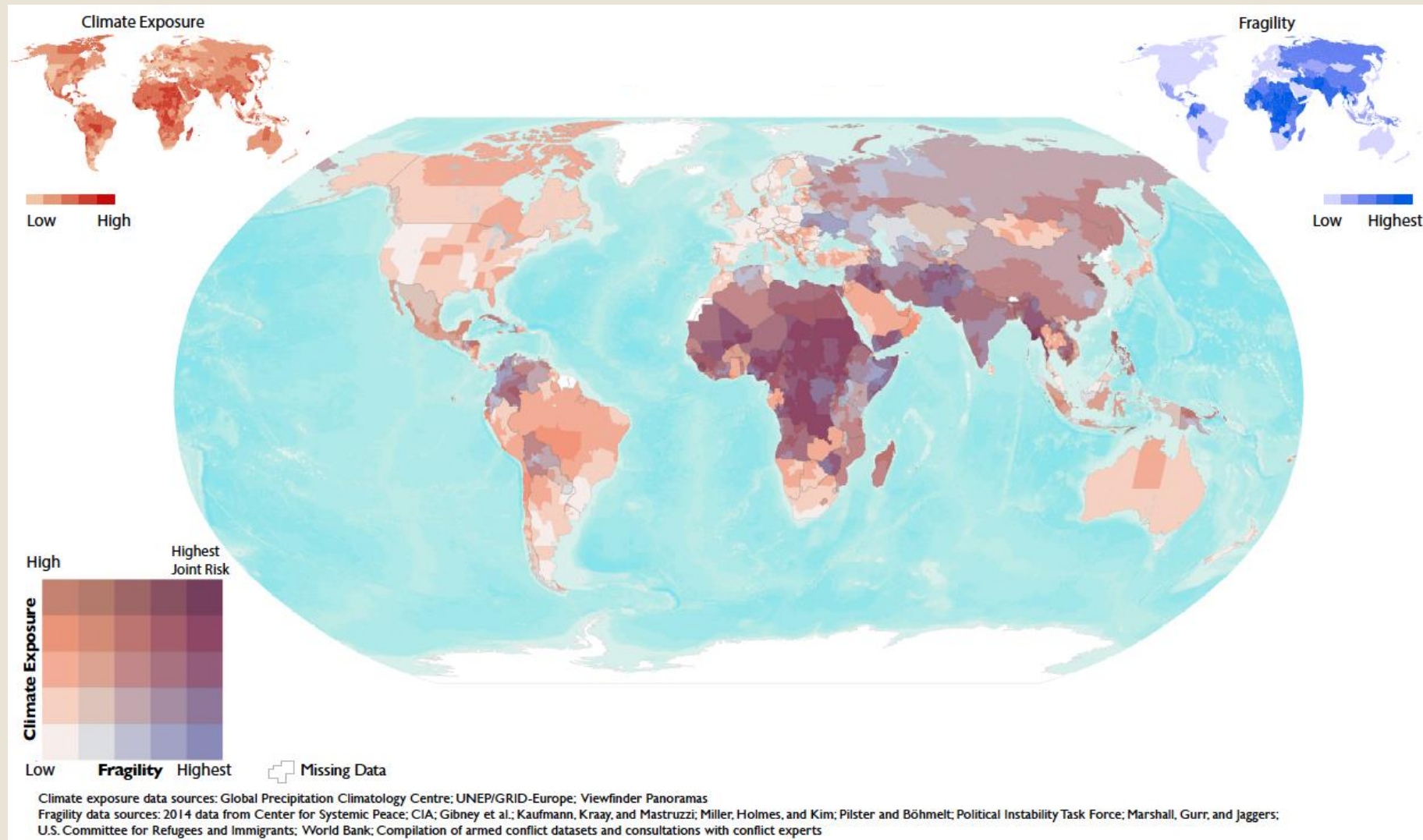
Country or Territory	Population	Country or Territory	Population	Country or Territory	Population
1. China	107,048,429	6. United States	24,176,175	11. Burma	8,003,903
2. Bangladesh	53,385,535	7. Japan	20,173,835	12. Netherlands	7,473,996
3. India	44,113,082	8. Philippines	19,134,979	13. Brazil	5,593,270
4. Vietnam	37,823,127	9. Egypt	13,730,433	14. Nigeria	4,502,705
5. Indonesia	26,376,281	10. Thailand	11,105,864	15. Cambodia	3,111,643

Note: "Very high exposure" areas are four standard deviations or more above the global mean exposure.

Data source: Smith, Krishnan, and Busby 2016.

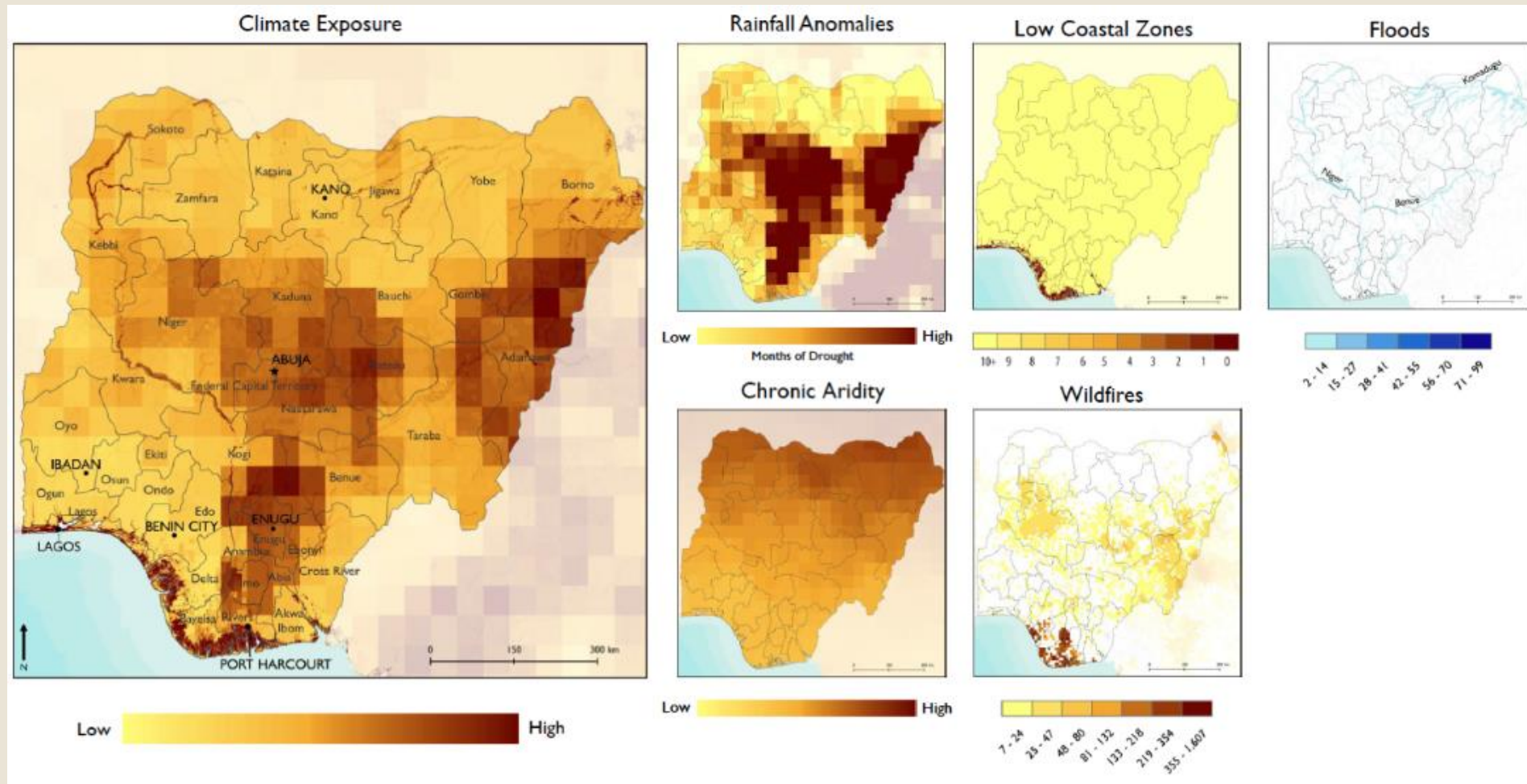
Compound Risks

The highest combined climate-fragility risks are in sub-Saharan Africa, followed by MENA and South and Southeast Asia.



Compound Risks

Most highly fragile states – 26 of the 39 states with the highest or high fragility – face multiple, overlapping climate hazards.



Climate exposure measure: Busby et al. 2016. Data sources: Global Precipitation Climatology Centre, UNEP/GRID-Europe, Viewfinders Panoramas.

Compound Risks

All 26 states with high climate and fragility risks have more than 1 million people or more that 10 percent of the population living in high-exposure areas.

Number of People in in <i>High Climate Exposure Areas</i>		Proportion of Population in <i>High Climate Exposure Areas</i>	
India	118,625,684	Sierra Leone	100%
Nigeria	41,390,300	Guinea	64%
Egypt	33,208,361	Cambodia	45%
DRC	19,398,276	Cameroon	39%
Burma	15,925,053	Egypt	39%
Cameroon	8,105,362	Burma	29%
Guinea	7,201,019	Mauritania	28%
Cambodia	6,775,592	DRC	26%

Data sources: Kishi and Linke 2016; Smith, Krishnan, and Busby 2016.

Compound Risks

State legitimacy is poor in nearly all states with high compound climate-fragility risks.



Compound Risks

Fragility is key in exploring indirect pathways between climate risks and potential conflict outcomes.



Varied conflict patterns in similar climate stress



Protests and riots



Multiple ongoing long-term conflicts

Compound climate-fragility risk assessment can:

- Identify **focal points for intervention**
- Support **early action** to prevent *new* compound risks
- Support **policy coordination**
- Develop **broadened strategies** for reducing fragility
- Identify the best **channels for climate actions** in fragile states

Research Team

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For study reports, data, and maps, see www.strausscenter.org/strauss-articles/state-fragility.html.

EXTRA SLIDES

Indicators Used to Assess Exposure to Climate Hazards

Hazard (weight)	Indicator	Scale	Data Years
Cyclones (20%)	Tropical cyclones average sum of winds (km per year)	2 km x 2 km resolution	1970-2009
Flood events (20%)	Number of flood events for inland surface waters per 100 years	1 km x 1 km resolution	1999-2007
Wildfire events (20%)	Number of wildfire events per year	1 km x 1 km resolution	1995-2011
Rainfall anomalies (10%)	Number of months between 1980-2013 in which the 6-month accumulated rainfall was two standard deviations or more below average for that calendar month over the previous 20 years	0.5 degree	1980-2013
Chronic aridity (10%)	Coefficient of variation based on monthly rainfall	0.5 degree	1980-2013
Low-elevation coastal zones (20%)	Low-lying coastal areas within 0 to 10 km above sea level	90 m x 90 m resolution	2014

Climate exposure measure: Busby et al. 2016. Data sources: Global Precipitation Climatology Centre, UNEP/GRID-Europe, Viewfinders Panoramas.

Indicators Used to Assess State Fragility

Type	Effectiveness	Legitimacy
Political	Quality of public service No. of successful coups d'état in last five years Government tax revenue as percent of GDP	Competitiveness of political participation Citizen participation in selecting government Asylum requests as percent of population
Security	Intensity of ongoing armed conflict Size of displaced population Proportion of country affected by conflict	State use of political terror Presence of militant groups against the state Number of rivaling military organizations
Economic	GDP per capita Poverty headcount ratio Primary commodity exports as percent of total	Control of corruption Rule of law and property rights protection Number of days to start a business
Social	Infant mortality rate Child immunization rates Percent of population with access to improved water source	Military expenditures as percent of GDP Percent of parliamentary seats held by women Life expectancy at birth

Fragility measure: Kishi and Linke 2016. Data sources: Center for Systemic Peace; CIA; Gibney et al.; Kaufmann, Kraay, and Mastruzzi; Miller, Holmes, and Kim; Pilster and Bohmelt; PITF; Marshall, Gurr, and Jagers; U.S. Committee for Refugees and Immigrants; World Bank; Compilation of armed conflict datasets and consultations with conflict experts.