Global expert survey on multidimensional drought vulnerability and resilience indicators for small farms

BELMONT FORUM

DR32019 - Management of Disaster Risk and Societal Resilience

Introduction

In creating composite indexes for drought resilience and vulnerability, one of the main issue is:

What indicators should be include in the index?

This work → present the results from a global expert survey that qualify the most commonly used indicators of drought vulnerability and resilience for food system linked to small farms.

The global survey

36 resilience or vulnerability indicators were evaluated in terms of its **relevancy**, easy of **understanding**, data **accessibility**, data **objectively**, data **consistency** over time and space.
Rates: low, medium, high and don't know.

Resilience

Category	Indicators
Agricultural (crop)	Cultivation of drought-resistant crops (%)
Agricultural (crop)	Farmers use different crop varieties (%)
Agricultural (land)	Land rights clearly defined (yes/no)
Government & policy	Existence of drought management policies
Government & policy	Technical assistance from local entities
Government & policy	Farmers with crop, livestock or drought insurance (%)
Government & policy	Water use rights clearly defined
Infrastructure & Technology	Availability of drought prediction and warning systems or climatic predictions
Infrastructure & Technology	Transportation network
Infrastructure & Technology	Access to electricity (Acess to energy)
Socioeconomic	Food source reliability and diversity
Social	Public participation in local policy
Social	Participation in farming cooperatives or associations
Socioeconomic	Access to financing and credit
Water/stream	Integrated land and water management policies
Water/stream	Percentage of retained renewable water
Water/stream	Total dam capacity

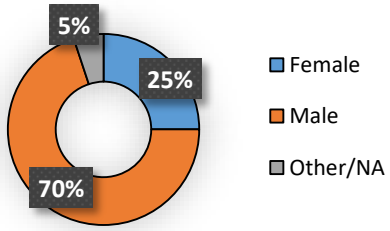
Vulnerability

Category	Indicators
Agricultural (crop)	Percentage of participation of crop and livestock production in the income of smallholder farming
Agricultural (crop)	Crop Damage & Sensitivity (Crop Loss)
Agricultural (general)	Area protected and designated for the conservation of biodiversity (%)
Agricultural (general)	Use of Insecticides and pesticides (Use of agricultural inputs)
Agricultural (general)	Crop water use efficiency (WUE)*
Agricultural (land)	Degree of land degradation and desertification*
Social	Prevalence of conflict/insecurity
Social	Population without access to (improved) sanitation (%)
Social	Gender inequality (categorical)
Social	Rural population (% of total population)
Socioeconomic	Unemployment rate (and/or proportion of formal work)
Social	Population ages 15-64 (% of total population)
Social	Percentage of population displaced internally or transboundary
Social	Presence of drivers of migration and displacement
Socioeconomic	Poverty Rate
Socioeconomic	% of the population employed in small farms
Water/stream	Baseline water stress (ratio of withdrawals to renewable supply)
Water/stream	Water quality
Water/stream	Groundwater level/sources

Data from the responders

Primary information

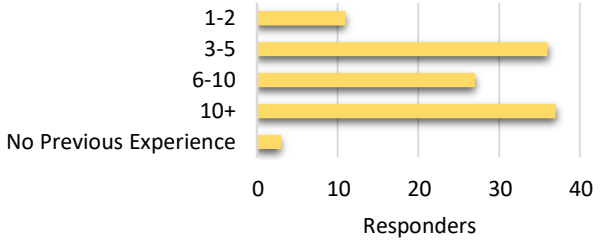
Gender



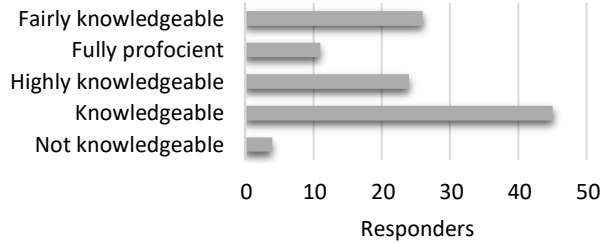
Institution of (primarily) work

Expertise in drought

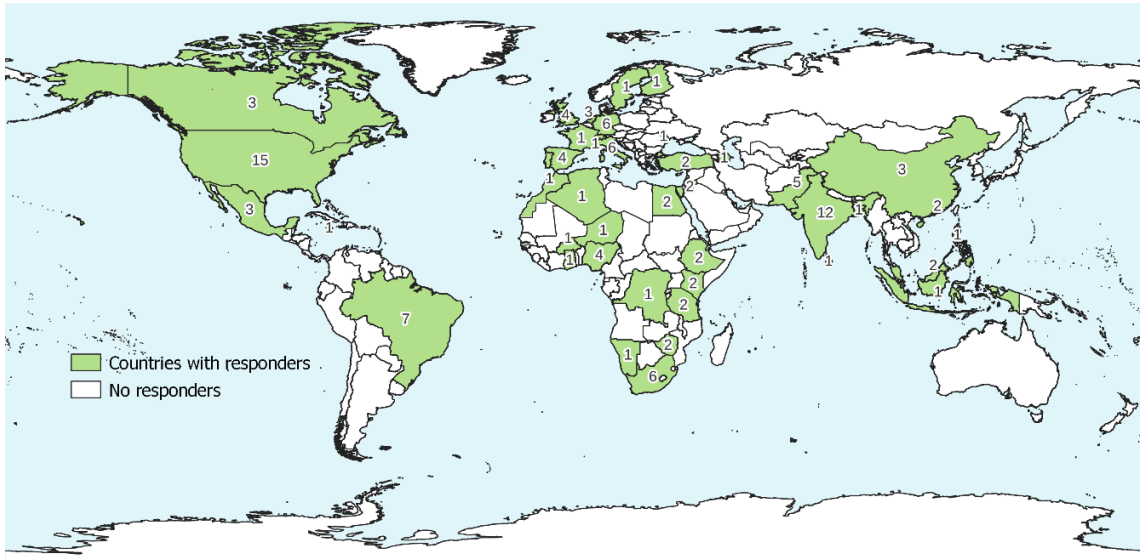
Years of experience working on drought



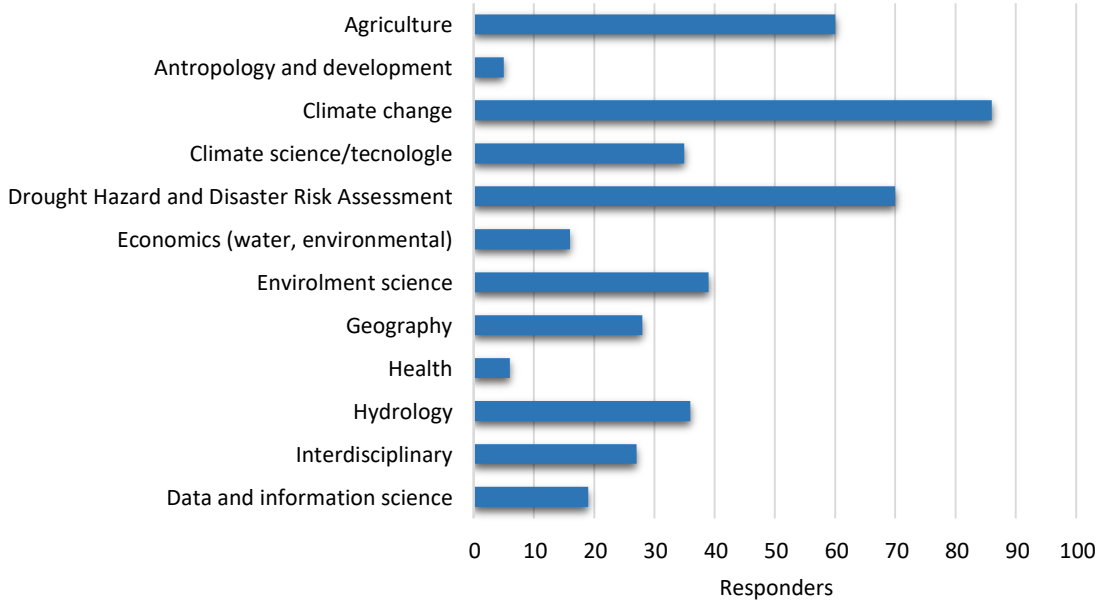
Level of expertise in disaster risk/resilience



Location



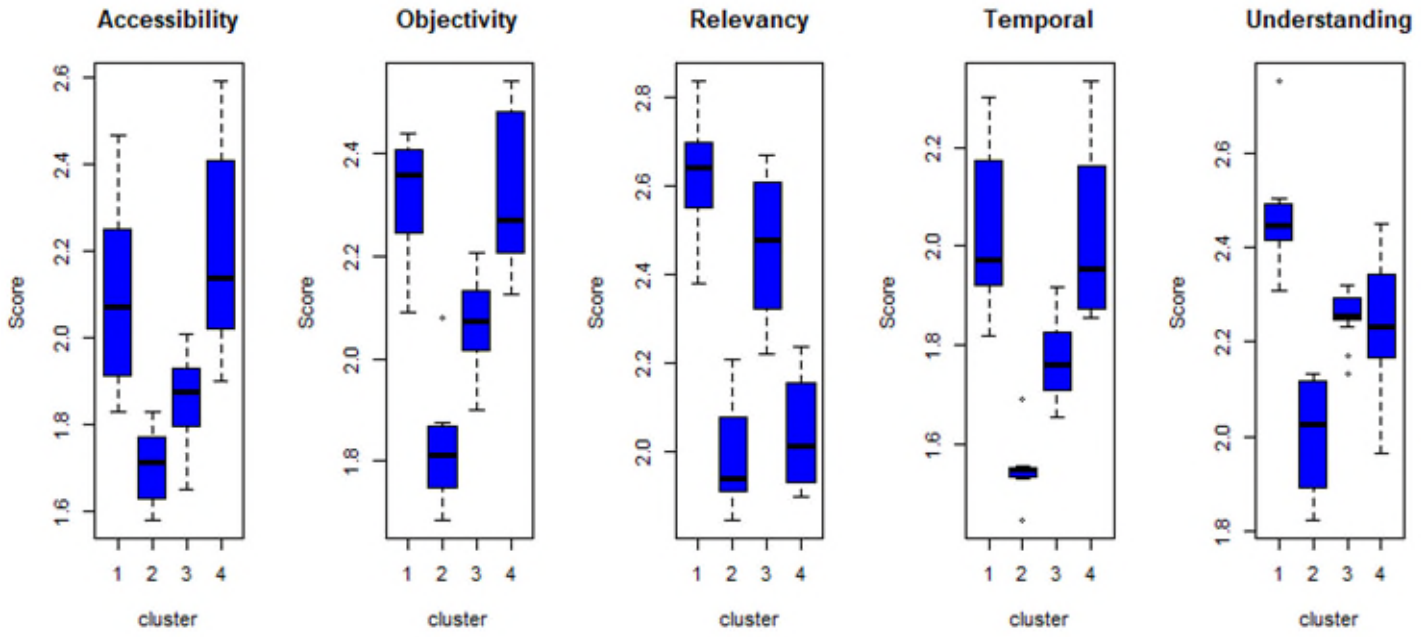
Area of expertise



*120 experts finished the survey.

Cluster analysis

$$Score = 1(\%\ Low) + 2(\%\ Medium) + 3(\%\ High) + 0(\%\ Not\ Know)$$



- **Cluster 1**: Most relevant high-quality indicator. Best indicators
- **Cluster 2**: Least relevant low-quality indicator. Worst indicators
- **Cluster 3**: Most relevant low-quality indicator.
- **Cluster 4**: Least relevant high-quality indicator.

Cluster analysis - Resilience indicators

Best indicators: Relevant and high quality data (Cluster 1)

- Drought management policies
- Drought insurance
- Prediction system
- Dam capacity

Worst indicators: Low relevancy and low quality data (Cluster 2)

- Land rights
- Transportation network
- Participation in local policy

Intermediate indicators: High relevancy, but low quality data (Cluster 3)

- Drought resistance crops
- Crop varieties
- Technical assistance
- Water use rights
- Food source reliability
- Cooperatives or associations
- Financing and credit
- Integrated policies
- Retained renewable water

Intermediate indicators: Low relevancy, but high quality data (Cluster 4)

- Access to electricity

Cluster analysis - Vulnerability indicators

Best indicators: Relevant and high quality data (Cluster 1)

- Crop income dependence
- Crop loss
- Poverty
- Groundwater level

Worst indicators: Low relevancy and low quality data (Cluster 2)

- Conflict
- Gender inequality
- Displaced population
- Drivers of migration

Intermediate indicators: High relevancy, but low quality data (Cluster 3)

- Water use efficiency (WUE)
- Land degradation
- Water stress
- Water quality

Intermediate indicators: Low relevancy, but high quality data (Cluster 4)

- Protected area
- Use of agricultural inputs
- Sanitation condition
- Rural population
- Unemployment
- Working-age population
- Employment in small farms

Preliminary remarks

- Social indicators are among the worst qualified for drought vulnerability
- High relevancy of government & institutional indicators for drought resilience assessment

Next step → to use the results to calculate a composite index