

Is environmental change a primary cause of migration?

Empirical evidence from flood-prone communities
in Ghana and Indonesia

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- Increases in global temperatures will lead to sea-level rise and greater weather variability
 - ⇒ implications for human migration
- Myers (2002): 200 million “environmental refugees” until the year 2060; 162 million of them due to coastal changes in Asia and Africa

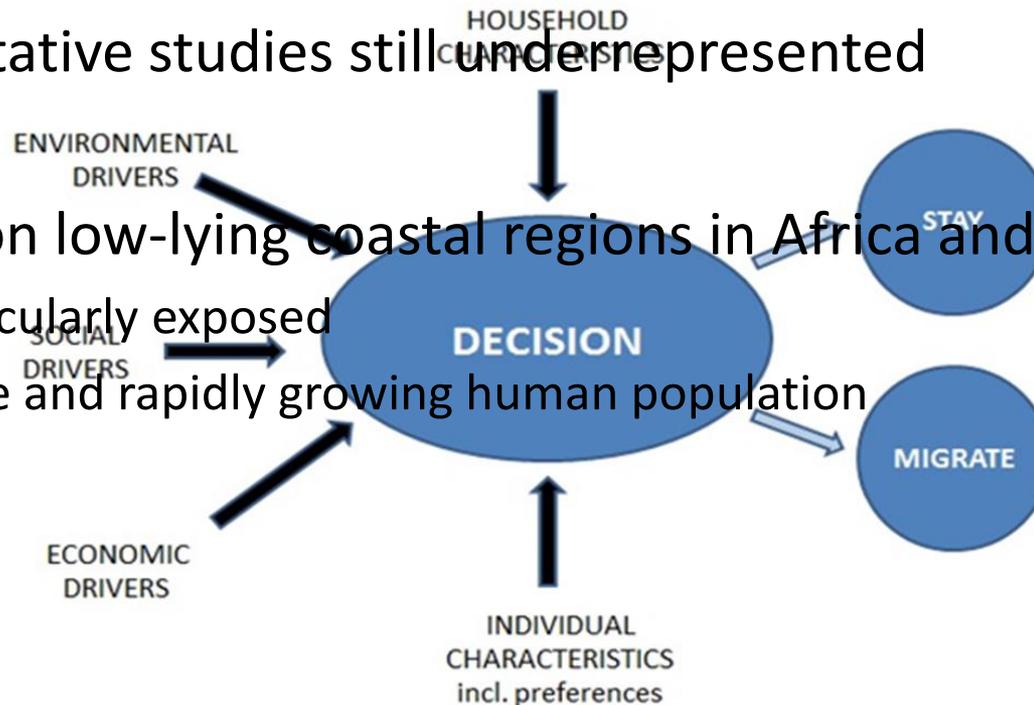
However: Highly contested measure since

- people at risk might adapt instead of migrate
- populations might get trapped
- not every migrant from affected areas leaves due to that environment

- Migration the result of a multi-causal relationship

- Quantitative studies still underrepresented

- Focus on low-lying coastal regions in Africa and Asia
 - Particularly exposed
 - Large and rapidly growing human population



STUDY AREAS

Keta, Ghana



STUDY AREAS



Keta, Ghana

- Erosion rates from 2 to 8m/year
- By the early 1980s, two-thirds of Keta had been swallowed up by the sea
- On top of erosion: tidal waves causing floods



Erosion of Fort Prinsensten, Keta.
Photo source: B.K. Nettle, 1985 Google image

STUDY AREAS

Semarang, Indonesia



STUDY AREAS

Semarang, Indonesia



- Coastal erosion, tidal floods, and severe land subsidence due to groundwater extraction and construction works



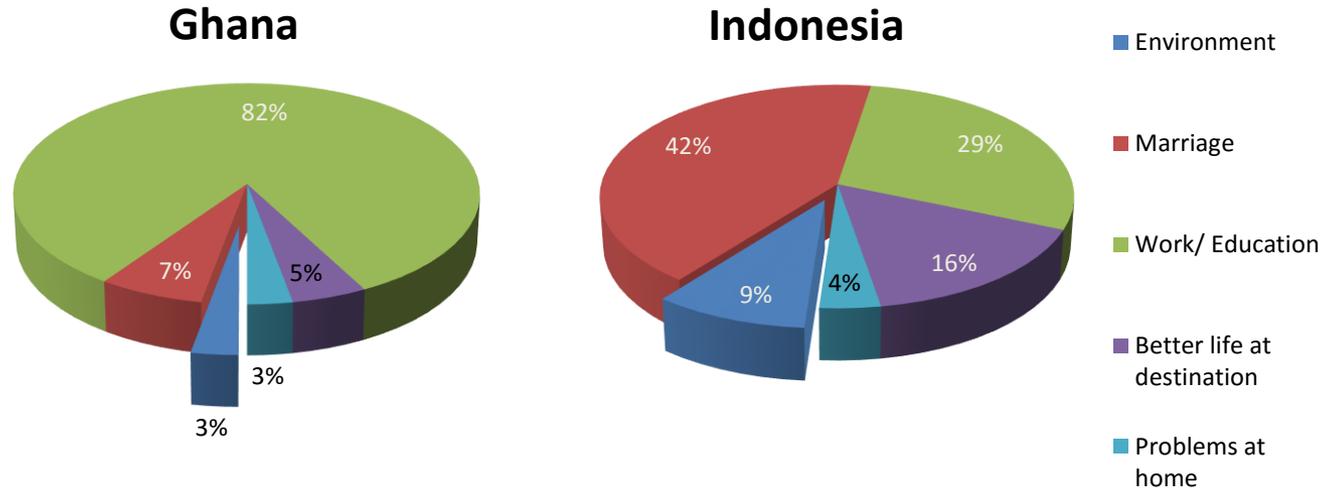
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<http://semarang.go.id/cms>

- Communities were purposefully selected
- Once each community was chosen, households and respondents got randomly selected
- Focus on actual migration
- Interviews with migrants and non-migrants



- Perceptions (*individual level*)
 - Flood
 - Erosion
 - Land subsidence (Indonesia)/ storms (Ghana)
- Distance to coast (*household level*)
- Hazard index (*community level*)



- Van der Geest (2009) : “the underlying causes of migration [...] will not be mentioned by respondents who are asked about their personal motivation to migrate”
- Rather standardized answers (Johnson, 2010)

- Multi-level model where contextual factors are simultaneously considered to isolate the net effects:
- $migration_i = \alpha + \beta environment_i + \gamma_j (community\ characteristics)_{ij} + \delta_j (household\ characteristics)_{ij} + \epsilon_j (individual\ characteristics)_{ij} + u_i$
- Binary logistic regression (binary dependent variable: 1 = Migrant, 0 = Non-Migrant)

ECONOMETRIC ANALYSIS

Ghana



	(1) Migrant Status	(2) Migrant Status	(3) Migrant Status	(4) Migrant Status	(5) Migrant Status
Female headed HH (=1)	0.263 (0.33)	0.320 (0.31)	0.231 (0.33)	0.311 (0.32)	0.770* (0.41)
No of children in HH	-0.210* (0.12)	-0.212* (0.12)	-0.177 (0.12)	-0.212* (0.12)	-0.329* (0.19)
Household size	0.314*** (0.09)	0.317*** (0.09)	0.276*** (0.08)	0.314*** (0.09)	0.364*** (0.12)
Ownership	-1.429 (0.96)	-1.282 (0.97)	-1.385 (0.89)	-1.353 (0.97)	(dropped) ¹⁷
Relative HH income	-0.329* (0.18)	-0.347** (0.18)	-0.339* (0.17)	-0.339* (0.17)	-0.118* (0.06)
Network	0.137 (0.20)	0.116 (0.20)	0.155 (0.21)	0.119 (0.20)	0.496* (0.28)
Unemployed(=1)	0.984*** (0.36)	0.964*** (0.36)	0.985*** (0.37)	0.983*** (0.36)	1.342*** (0.47)
Sex (Female=1)	-0.583 (0.35)	-0.648* (0.35)	-0.475 (0.37)	-0.615* (0.35)	-1.196*** (0.46)
Age	-0.056*** (0.02)	-0.058*** (0.02)	-0.055*** (0.02)	-0.057*** (0.02)	-0.022 (0.02)
Married (=1)	-0.236 (0.21)	-0.235 (0.21)	-0.267 (0.21)	-0.232 (0.20)	-0.373 (0.23)
Education	0.399*** (0.15)	0.391*** (0.15)	0.405*** (0.15)	0.393*** (0.14)	0.341** (0.17)
Migration Experience (=1)	0.934** (0.41)	0.931** (0.41)	0.920** (0.41)	0.935*** (0.41)	0.923* (0.50)
Risk aversion	-0.439*** (0.16)	-0.434*** (0.16)	-0.468*** (0.17)	-0.437*** (0.16)	-0.570*** (0.20)
Impatience	-0.318* (0.17)	-0.318* (0.17)	-0.289** (0.17)	-0.323* (0.17)	-0.535** (0.21)
Flood	0.027 (0.05)				
Erosion		-0.027 (0.06)			
Storm			0.130** (0.06)		
Distance to coast				-0.007 (0.48)	
Hazard					-0.037 (0.25)
Constant	-0.840 (1.64)	-0.437 (1.63)	-1.139 (1.64)	-0.531 (3.25)	-1.215 (1.86)
<i>BIC</i>	646.543	646.619	639.499	647.136	399.020
<i>AIC</i>	566.815	566.891	559.770	567.407	346.956
<i>Pseudo R²</i>	0.362	0.362	0.371	0.361	0.339
<i>Percent correctly classified¹⁸</i>	82.31%	81.59%	83.05%	81.59%	78.48%
<i>Percent reduction in error</i>	43.75%	41.46%	46.10%	41.46%	37.28%
<i>N</i>	277	277	277	277	174 ¹⁹

Note: The dependent variable is migrant status. Robust standard errors in parenthesis.

Community dummies included but not shown

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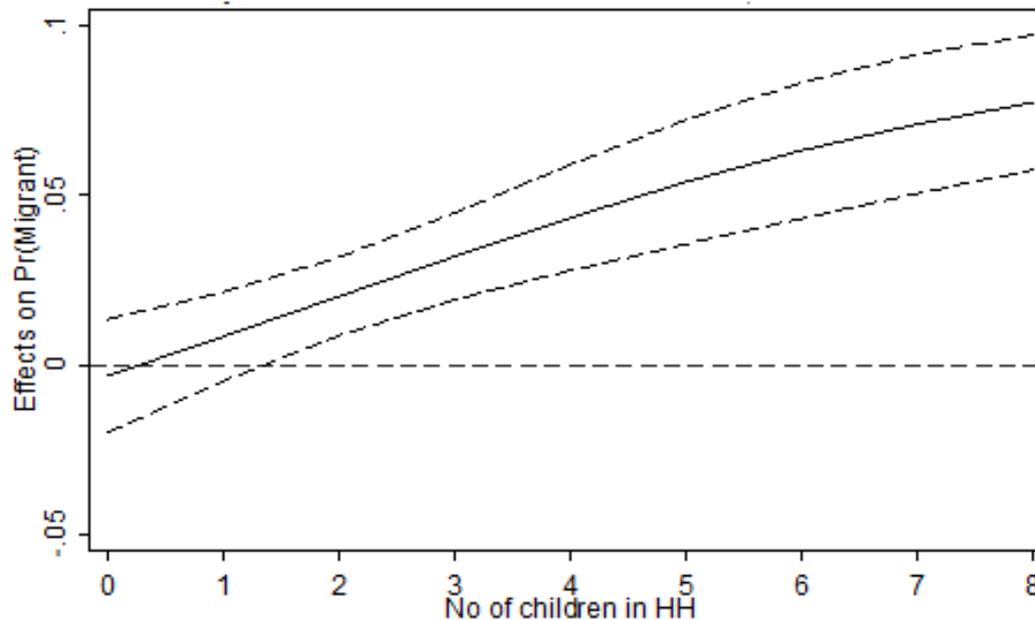
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Community dummies included but not shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

- No significant environmental effect in Indonesian subsample

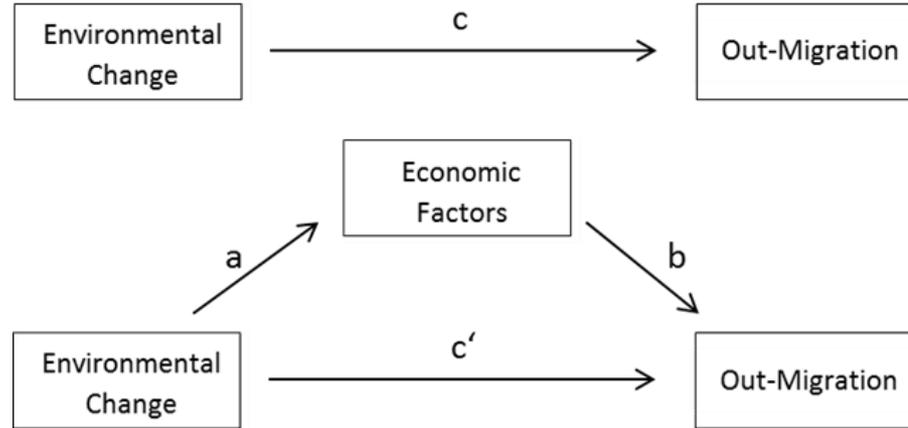
- Only effect in certain contexts?

Figure 2. Marginal effect of storm perception on probability of migrating by number of children, Ghana



Note: All other variables held at their observed values in the dataset.

- Indirect effect of the environment?



⇒ No evidence in our data

- No generalizable direct or indirect effect of environmental change on migration in coastal regions
- However: strong direct impact of storms in Ghana
 - Sudden-onset vs. slow-onset changes?
 - Very context-specific
- Promote adaptation to environmental change and increase the resilience of coastal populations

Thanks for your attention!

