Climate change, migration & security
Best Practice Policy and Operational Options for Mexico

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- The **Climate Change and Security** programme at RUSI explored the complex nexus between climate change and security in Latin America between 2009 and 2012 with our primary focus on the impacts of climate change on migration and security in Mexico. RUSI's future work in this area will be encompassed within the **Food, Energy and Water Security** (FEW) project that is exploring the future of resource security.

- **STUDY COMMISIONED BY**
  - *The UK Foreign and Commonwealth Office (FCO) through the British Embassy in Mexico*

- **PARTNERS**
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CAMBIO CLIMÁTICO, MIGRACIÓN Y SEGURIDAD

Política de buenas prácticas y opciones operacionales para México

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INFORME WHITEHALL 1-13

INTRODUCTION

- The research question and its purpose
- Setting the scene
- Justification of the empirical study
- The importance of Mexico as a CIM case study
- Methodology
- Key findings

ANALYSIS

- Quantitative analysis
- Qualitative analysis
- Benefits Limitations of the research
- Next steps to a deeper understanding of CIM

RECOMMENDATIONS

- Possible practice and operational options for Mexico
- Acknowledgements

There is growing consensus that the emission of greenhouse gases as a result of human activity is causing changes in temperature, precipitation levels, sea levels and the frequency of extreme weather events. It is increasingly accepted that a link may exist between climate change and migration.

How will changes in climate impact migratory patterns within Mexico and what are the consequences for national security?

- Enhance the fundamental understanding and awareness of the climate-security nexus and the impacts on migration

- Bolster the international evidence based and build upon emerging findings in the field

- Provide evidence in support of good governance and best-practice policy decisions and implementation in Mexico

- Foster the development of a 'shared language' to seed collaboration

- **The phenomenon of migration is complex and multi-causal** influenced by demographic, social, political economic and environmental push and pull factors.

- **Conceptualisation of 'security'**
  - Includes threat to security beyond the military sphere
  - Addresses human security, with a focus on individuals and communities building their own resilience

- **We do not advocate the strengthening of borders to limit massive flows of migrants driven by climate change** as they are not coming to the borders in massive numbers nor they will do in the years to come

- (1990) The **IPCC** : "the *greatest single impact of climate change could be on human migration, with millions of people being displaced by natural disasters, shoreline erosion, coastal flooding and disruption of agricultural industries*"

- (2006) The **Stern Review**: "*the effects of climate change could drive millions of people to migrate*"

- (2012) The **IPCC Special Report,** 'Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation': "*disasters associated with climate extremes influence population mobility and relocation, affecting host and origin communities*"

- According to some experts: projected numbers of people worldwide affected by CIM vary over an order of magnitude with numbers ranging from **25 million to 200 million** by 2050

- **Securitisation of CIM:** Climate change poses a threat to national security, with CIM as one of the most worrying problems associated with rising temperatures and sea levels
    - The movement of hundreds of millions of people could trigger major security concerns and spike regional tensions

- Migration is a defining characteristic of modern Mexico and strongly affects its stability, prosperity and political relations with its neighbours

- Environmental changes continue to affect Mexico
    - *Average temperature expected to rise up to 4℃ by the end of the century*
    - *Average precipitation to decrease 11 % over the same period*

- The impact of climate variability in Mexico places pressure on resources such as water, food and energy interconnecting migratory dynamics and the security landscape

- The Mexican government has a keen interest in climate change in general and diverse solutions to address climate change and migration in particular
    - *Pushing forward adaptive measures*
    - *Improving sustainable development strategies to maintain growth*

QUANTITATIVE
- Multinominal logit model (MLM) developed specifically for this study
  - *Demographic data (characteristics of population and household) from the 2010 National Census in Mexico*
  - *Climate data from HadGEM1 (A1B) and MIROC 3.2-HIRES (A1B)*
  - *Soil characteristics at the municipal level (INEGI and FAO)*
  - *MLM incorporates key variables including some climate variables and determines their ability to influence the decision to migrate (internal and international) of Mexicans from a national and regional perspective*

QUALITATIVE
- Literature review, expert and civil society interviews
  - *Literature review on the determinants of migration*
  - *History and discussion of climate change and migration in Mexico*
  - *Analysis of security issues likely to be impacted by CIM*
  - *Discussion of resource stress in Mexico*
  - *Overview of government initiatives concerning climate change, migration, water, agriculture, energy, infrastructure and security*
  - *Policy recommendations based upon key findings*

- Preliminary advances towards a deeper understanding of the climate-migration-security nexus

- The statistical significance and the changes in probabilities from the MLM are non-zero, indicating that internal and international migration in Mexico is linked to changes in temperature and precipitation

  - *Therefore, climate variables should be included in future models aimed at determining the variables that influence the decision to migrate*

- Climate variability is a determinant in the decision to migrate and the security risks will mainly be associated with resource stress, thus the availability and management of key resources both in sending as well as recipient communities

- Resource (water, food, land and energy) stress may arise in places already vulnerable to overcrowding, leading to resource scarcity and potentially heightening existing tensions.

  - *The MLM model indicates migration from northern states should decrease if the annual mean precipitation were to increase (alleviating water stress in the north). The opposite is true for the southern states where there is limited water stress (increasing precipitation would actually lead to an increase in migration)*

- Food security is threatened by increasing irregularities in the rainy season brought about by climate change. Desertification causes land abandonment where the production of primary resources occurs and could cause serious problems of food insecurity.

  - *The MLM model shows that an increase in the mean annual temperature increases the probability of migration*

  - *Those communities which will not migrate as an adaptive response will have to put in place resilient practices to overcome the impact of environmental change and degradation*

The results from the MLM model report the impact of several variables on the decision to migrate in Mexico in terms of internal migration, international migration and total migration (a heterogeneous mix of internal and international migration)

General observations
- Internal and international migrants most likely to be males of working age
- The level of education positively impacts internal migration but negatively impacts international migration with increasing levels of education
- Higher wealth negatively impacts internal migration but positively impacts international migration

Climate induced observations
- Higher average temperatures enhance the probability of both internal and international migration
- Increased average precipitation reduces the probability of internal migration but enhances international migration
- The identified impacts observed for using the HadGEM1 model agrees with the MIROC model

Marginal effects

- Holding all other variables constant, the effects of a marginal increase in the average temperature and precipitation were put through the model
  - *Increasing the temperature by 1 °C increases the probability of internal migration but decreased the probability of international migration*
  - *Increasing the average precipitation by 1 mm/year decreases the probability of internal migration but increases the probability of international migration*

- Surprisingly, the results of our marginal analysis show that an increasing temperature has a greater influence on the decision to migrate internally than gender

- The impact of an additional year of schooling is positive for domestic migration and negative internationally

- The marginal effects observed from the MLM model using the HadGEM1 model agrees with those from the MIROC model

BENEFITS

- Bridging the gap between policy and science
- Quantitative analysis could yield greater detail down to the state and potentially municipal level.
- Demonstration of level of statistical significance and the non-zero probability of each variable in the MLM.
- Aggregation of extensive literature references from science and policy in the fields of environmental changes, migration, security, econometrics and atmospheric science.

LIMITATIONS

- Incapable of predicting absolute numbers of migrants as it only considers changes in probabilities
- First step towards the qualitative and quantitative understanding of the relationship between environmental changes, migration and security.
- It should be noted that people may not formally register their internal movements, and as such this movement may be missed by the census.

1. With further human and computational resource, the MLM model could be expanded at state and municipality level to consider the impact of climate variables on the decision to migrate with unprecedented **municipality** resolution

2. Further studies may also provide a good estimate of the **absolute** number of people affected by climate induced migration
   - *We see this as challenging with the data currently available, but the analysis could form part of a wider initiative to investigate these effects by using a* ***General Equilibrium Model (GEM)***

3. High resolution resource data together with municipality level outputs from the GEM, coupled with absolute figures for the movement of people would enable accurate mapping of resource stress overlaid with migratory flows

POSSIBLE PRACTICE POLICY & OPERATIONAL OPTIONS

Based upon our key findings and a review of Mexico's current strengths and areas for improvement, we have identified the following recommendations:

1. Increase awareness of climate-induced migration in Mexico

2. Further enhance co-ordination and management of CIM initiatives through a collaborative network of institutions

3. Collate high-resolution climate, demographic ecological degradation and resource depletion data, into a national, publicly available database

4. Establish an annual vulnerability assessment using standardised CIM vulnerability indicators, at the national, state and municipal level

5. Promote planned relocation (internal migration) and legal and managed migration opportunities (international migration) as a potential adaptive mechanism

6. Promote information dissemination related to changes in climate, increasing public awareness of local vulnerabilities, improving their ability to respond and adapt.