Title: The Impact of Global Climate Change and Local Environmental Stress on Migration in Nang Rong, Thailand

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Extended Abstract:

        Climate scientists predict that climate change will influence migration patterns of rural residents who rely on agriculture for their livelihoods (IPCC 2007). While there was some initial concern that climate change would lead to mass out-migration from rural areas into urban areas and across borders, attention has turned instead to the role of selective migration from rural to urban areas as an adaptation strategy for communities affected by climate change. In many cases, these moves are predicted to be internal moves, and may take the form of temporary, circular moves or permanent ones (Hugo et al. 2009). This migration might serve as a means of alleviating predicted challenges to traditional agricultural livelihoods, such as declines in harvest yields brought on by increased and prolonged periods of drought (Barnett and Weber 2010; Tacoli 2009; Adger et al. 2009; IPCC 2007). Out-migration as an adaptive strategy is already being employed in many regions of the world, where temporary and permanent migration is used as a way to buffer household exposure to risk, sending members of households to earn additional income that is later remitted back to the family of origin (de Haan 1999; Kniveton, Schmidt-Verkerk, Smith, and Black 2008; Stark and Taylor 1989; Tacoli 2009). It is difficult to highlight climatic change or environmental degradation as the main factor in explaining migration flows, particularly when considering overlapping causes of migration that include economic, social and political factors (Castles 2002; Hugo 2008). Migration and environmental degradation are both complex processes that require multi-level analysis in order to understand how the two interact (Curran 2002). A body of conceptual and empirical work has emerged to help us understand the role of the environment in migration flows and to shape the debate about climate change and migration (Findley 1994; Henry, Schoumaker, and Beauchemin 2004; Gray 2009; Gray and Mueller 2011; Massey, Axinn, and Ghimire 2007, McLeman and Smit 2006). Specifically, subsequent to initial empirical work in the field and mixed results about the impact of climate change on migration, scholars in the field now call for measures of climate change that distinctively observe both slow-onset change and short-term extreme events (Pigeut 2010) Furthermore, as migration scholars have recognized for a decade or more, an array of migration outcomes need to be observed in order to evaluation climate change impacts, including the timing and duration of permanent, temporary, circular or seasonal, and return migration. However, few data are available to allow such observations and to model this complexity. We contribute to this small but growing literature with an analysis of longitudinal data covering over 100 thousand person years, representing thousands of individuals from rural Nang Rong, in NE Thailand, over a 16 year period.   Using geo-referenced residence information we match these demographic data to 26 years of environmental information about vegetation health, landscape elevation and hydrology, and episodic cycles of global climate – namely the El Niño-La Niña effects.

        Nang Rong is a good choice for a study site because of the history of internal migration in the area, a former frontier region that has undergone considerable land use and population

changes during the latter half of the twentieth century (Entwisle, Malanson, Rindfuss, and Walsh 2008). Nang Rong has also been the focus of extensive study and much is known about the motivations and consequences of circular labor migration from the area. Considerable quantitative and qualitative data have also been collected on the environment in Nang Rong (Curran et al. 2005; Garip 2008; Van Wey 2003; Rindfuss et al. 2002). Seasonal migration is not uncommon in Nang Rong, where the rainy, monsoon season is often followed by drought-like conditions that require people to migrate in search of non-agricultural labor.

Our migration data come from the northeast region of Thailand. The Nang Rong Surveys are a longitudinal panel data collection effort conducted by the Carolina Population Center at the University of North Carolina and the Institute for Population and Social Research at Mahidol University in Thailand.[1] We employ the first three waves of data (collected in 1984, 1994, and 2000) for our analyses. The 1984 data collection was a census of all households and individuals residing in 51 villages within Nang Rong. It included information on individual demographic data, household assets and village institutions and agricultural, natural, economic, social, and health resources. Further, village-level data were collected from all of the villages in Nang Rong district. The 1994 survey followed all 1984 respondents still living in the original village, as well as respondents from 22 of the original 51 villages who had moved to one of the four primary destinations outside of the district, plus any new village residents. The 1994 surveys included all questions from the 1984 survey, as well as a 10-year retrospective life history about education, work, and migration, a survey about the age and location of siblings, and a special survey of migrants' migration experiences and histories. The 2000 round of surveys built on the previous data collection efforts by following all of the 1994 respondents and adding to the database any new residents and households in the original villages.

The 1994 and 2000 surveys included a migrant follow-up component. This was conducted among persons who had resided in 22 of the original 1984 villages, and defined a migrant as someone who was a member of a 1984 household and had since left a village for more than two months to one of four destinations: the provincial capital, Buriram; the regional capital, Korat or Nakhon Ratchasima; Bangkok and the Bangkok Metropolitan Area; or Eastern Seaboard provinces. The migrant follow-up in 2000 included migrants identified and interviewed in 1994, and individuals who had lived in the village in either 1984 or 1994 but subsequently migrated to one of the four primary destinations. The retrospective recall items in the survey allow us to measure timing and sequencing of moves (outgoing and returning), migrant destination, occupation in destination, and duration of stay. The data for these analysis focus only upon villagers from the 22 villages where there was a migrant follow-up component. In these villages, the follow-up rate is fairly high (about 78%) because the survey team relied on a multiple search methods (see Rindfuss et al. 2002). This means that migrant selectivity bias is minimized among this group of villagers and villages.

We use two environmental indicators to predict migratory behavior, at the local and global levels: Normalized Difference Vegetation Index (NDVI) and El Nino Southern Oscillation (ENSO) events. NDVI allows us to examine long-term vegetation changes in the area and determine and the role these changes play in migratory decisions. ENSO data allows us to examine to what extent global processes that yield extreme oscillations in climate outcomes then impact migration behavior in an area of the world that is particularly vulnerable to the drier impacts of an El Niño event. Both NDVI and ENSO events offer more robust measures of environmental stress than rainfall measures alone (more typically used in analyses of climate change, drought and migration, e.g. Findley 1994). We use event history analysis with a shared

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[1] The data and information about the surveys are available at http://www.cpc.unc.edu/projects/nangrong/

frailty component to model the effect of the environmental conditions on migration. We expect that a degraded environment will lead to increased out-migration and/or frequency of trips from Nang Rong, while a healthier environment will lead to a decrease in out migration. Preliminary findings indicate that lower health of vegetation in a given year, as measured by NDVI, is associated with higher rates of labor migration and lower rates of return migration. Dry El Nino periods have the same effects on migration as NDVI, whereas wet La Nina periods are associated with lower labor migration and higher return migration.

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