ELSEVIER
www.elsevier.com/locate/worlddev

CrossMark

World Development Vol. 66, pp. 614–628, 2015

http://dx.doi.org/10.1016/j.worlddev.2014.09.021

Flood-Induced Displacement and Civil Conflict

RAMESH GHIMIRE, SUSANA FERREIRA and JEFFREY H. DORFMAN*
The University of Georgia, Athens, USA

Summary. — Large, catastrophic floods intensify environmental scarcity and can lead to mass displacement from affected areas. The sudden and mass influx of migrants could increase the risk of social tensions in receiving areas. In this paper, we analyze the impact of the displacement induced by large floods on civil conflict using historical data for 126 countries during 1985–2009. Our results suggest that while the displacement caused by large floods did not ignite new conflicts, it fueled existing conflicts. This effect was larger in developing countries and it receded with time, vanishing five years following the flood.

Key words — climate change, climate/environmentally induced displacements, migration, civil conflict, floods, natural disasters

1. INTRODUCTION

Catastrophic natural disasters are important drivers of displacement. It is estimated that during 2008–11 more than 87 million people were displaced by extreme weather events with almost all of these displacements happening in economically weak and corrupt states (Asian Development Bank, 2012; Centre for Naval Analyses, 2007; D'Andrea, Huang, Fritz, & Anderson, 2011; Internal Displacement Monitoring Centre, 2011). An increase in the frequency and intensity of extreme weather events as a result of climate change is expected to result in more mass migration events in the future (Foresight, 2011; Rowhani, Degomme, Guha-Sapir, & Lambin, 2011; Theisen, Gleditsch, & Buhaug, 2013).

A sudden and mass influx of displaced people, combined with poor socioeconomic characteristics and weak institutions could increase the risk of civil conflict in receiving areas (Gleditsch, Nordas, & Salehyan, 2007; Homer-Dixon, 1994; Salehyan, 2005; Theisen et al., 2013). In this paper we test this premise. We use historical data for a sample of 126 countries during 1985–2009 to estimate the impact of the displacements induced by large, catastrophic flood events on the onset and prevalence of internal civil conflict. A growing literature analyzes the link between natural disasters and civil conflict. However, this literature typically estimates reduced form equations that do not explore the potential channels through which natural disasters may result in an increased probability of conflict. Mass population movements, serving as an adaptation strategy in the face of environmental or climatic shocks (D'Andrea et al., 2011; Petersen, 1958), can be one of these channels. Displacement could result in civil unrest and destabilize many fragile countries, as suggested by the qualitative analyses of e.g., Centre for Naval Analyses, 2007; Gleditsch et al., 2007; Reuveny, 2007; Raleigh, Jordan, & Salehyan, 2008; or Swain, 1996. This paper empirically estimates the importance of this channel.

We gathered data on large floods including the number of people displaced by each event, and on the onset and prevalence of civil conflict for a panel of countries over the last quarter century. In the econometric analysis we explicitly account for the potential endogeneity of flood disasters and migration flows. The impacts of large floods and their very occurrence are a function of floodplain management and emergency management practices, which in turn depend on the same socio-economic and institutional settings that determine the propensity to experience civil conflict in the affected areas (Barnett & Adger, 2007; Cavallo & Noy, 2010; Ferreira & Ghimire, 2012). On the other hand, civil unrest may lead to further economic and institutional weakening and greater migration from the affected area (Gleditsch et al., 2007; Salehyan & Gleditsch, 2006; Suhrke, 1997).

2. THEORETICAL FRAMEWORK: NATURAL DISASTERS, MIGRATION, AND CIVIL CONFLICT

Migration is a multi-causal phenomenon; the decision to migrate is highly complex and depends on economic, social, political, demographic, and environmental factors. While economic and social factors are perceived as having the largest effect on the volume and patterns of migration, climatic factors have been increasingly recognized as an important driver of people's migration decisions and the relationship between extreme climatic events and migration has been studied extensively (see, for example, Massey, Donato, & Liang, 1990; Massey et al., 1993; Stark, 1991; Stark & Bloom, 1985; Waddington & Sabates-Wheeler, 2003).

Apart from the immediate displacement caused by damages to dwellings (e.g., in the case of floods and earthquakes), natural disasters can lead to migration indirectly through economic and political drivers. Increased competition over scarce resources in affected regions can result in conflict which, in turn, leads to greater migration (Black et al., 2011; Gleditsch et al., 2007; Raleigh, 2011; Salehyan, 2005). These displacements can be temporary or permanent depending on the severity of the disaster event and on the socioeconomic and institutional characteristics of both affected and receiving areas, but the displacements are typically constrained by a country's borders (Barnett & Adger, 2007; Barnett & Webber, 2010; Werz & Conley, 2012).[1]

Anecdotal evidence suggests that natural disasters have played a role in altering internal migration patterns in

* We thank Tom Werth, seminar participants at the University of Georgia, the 2012 Heartland Environmental and Resource Economics Workshop, and the ESF-ZiF-Bielefeld University Conference 2012, and two anonymous reviewers for useful comments. Financial support from the Open Society Foundations and the European Science Foundation is gratefully acknowledged. Final revision accepted: September 21, 2014.

Bangladesh, Canada, Philippines, and the United States (Cruz, Meyer, Repetto, & Woodward, 1992; Ezra & Kiros, 2001; Gregory, 1991; Hafiz & Islam, 1993; Lockeretz, 1978; Myers, 1993; Otunnu, 1992; Worster, 1979). However, in many cases, migration is a response to an increase in poverty and limited employment opportunities caused by natural hazards and not directly caused by the hazards themselves (Black et al., 2011; Dun, 2011; Hunter, 2005; Naik, Stigter, & Laczko, 2007; Rahman, 2000; Theisen et al., 2013). For example, Osterling (1979), writing about migration in the aftermath of the 1970 earthquake in Peru, stated that: "most migrants were compelled to seek employment through migration because the natural disaster had intensified traditional poverty in their origin villages." [2]

Several studies analyzing the role of extreme weather events on the risk of violent conflict posit that migration is an important causal variable (Centre for Naval Analyses, 2007; German Advisory Council on Global Change, 2008; Van Ireland, Nierop, & Van Der Wusten, 1996). Although immigrants can add skills and cultural vibrancy to the receiving area, the inflow of migrants can result in social unrest, particularly if the inflow is large and disordered (Gleditsch et al., 2007). The literature on environmental security suggests different complementary mechanisms through which extreme flood events may lead to mass migration and result into violent conflict. Floods are discrete, rapid-onset disasters that can quickly destroy natural resources (such as crops, croplands, forests, pastures, freshwater, and fish), and energy infrastructure (by knocking down power lines or contaminating oil supplies), leading to resource and energy scarcity. Eventually, this situation can lead to a Malthusian conflict, with people competing over a limited supply of resources and force people to migrate from the affected areas (Gleditsch et al., 2007; Homer-Dixon & Blitt, 1998).

According to Reuveny (2007), a sudden influx of climate or environmentally induced migrants can increase the risk of civil conflict in the receiving areas through at least three complementary processes: (i) the economic and resource bases of the receiving area are burdened, promoting native-migrant contest over existing resources, especially if property rights are underdeveloped; (ii) environmental scarcity creates distrust between the area where migration originates and the host area; and (iii) ethnic tensions in the receiving area are exacerbated if the migrants and residents belong to different ethnic groups.

Relative deprivation theories are especially applicable to explain crises following a sudden influx of environmentally displaced people for two reasons. [3] First, deprivation theories stress rapid changes in people's conditions such as those arising from an influx of mass immigrants (e.g., scarcity of freshwater, crowding of infrastructures and public services, such as road, hospitals, or schools). Gradual changes are less likely to result in violent conflict because they may go unnoticed, or societies may adjust to them more easily (Brancati, 2007). Second, the scarcities do not generally affect all groups equally, and individuals commonly blame the government for natural disasters regardless of its responsibility and response, leading to hostility toward their government (Achen & Bartels, 2004).

Anecdotal evidence suggests that the influx of environmental migrants increases the risk of civil conflict in receiving areas. In Bangladesh, over 600,000 people migrated from rural and coastal areas to Chittagong Hill Tracts in response to droughts, floods, storms, erosion, and desertification during 1970–2000. This migration led to ethnic strife between migrants and local residents resulting in a high intensity civil conflict (Hafiz & Islam, 1993; Lee, 2001). In Philippines, the migration of around 4.3 million people from the lowlands to the center and uplands regions during 1970–2000 resulted in landowner-peasant tensions, civil strife, and insurgency, which led to a high-intensity civil conflict in the receiving area (Cruz et al., 1992; Myers, 1993). Likewise, because of droughts, famines, and forest fires, approximately 600,000 Ethiopians migrated from the central and northern areas of the country to the southwest and west during 1984–85. This migration created a conflict over land between nomads and farmers that initiated a medium-level conflict (Ezra & Kiros, 2001; Otunnu, 1992). For a recent review of other environmental migration and conflict episodes, please see Reuveny (2007).

3. DATA

We compiled historical data on civil conflict, large floods, and the displacement associated with these, and, based on the literature on civil conflict, a range of socioeconomic, political, and geophysical country characteristics for a total of 126 countries during 1985–2009. (Table 7 in the appendix shows the list of countries included in the analysis.)

(a) *Internal civil conflict data*

Civil conflict data come from the UCDP/PRIO conflict dataset (Gleditsch, Wallensteen, Eriksson, Sollenberg, & Strand, 2002; Themnér & Wallensteen 2012). The dataset defines civil conflict as "a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which one is the government of the state, results in at least 25 battle-related deaths." The dataset includes only politically motivated conflicts; it excludes conflicts occurring among groups without political motives, such as drug cartels. We use two indicators of civil conflict, considering the threshold of 25 battle-related deaths. The first one, conflict onset, is a dummy variable with a value of one if in a given year a new conflict emerges, there has been a total change in the opposite side or if a conflict that has been inactive for more than two calendar years becomes active again, and zero otherwise. The dataset includes 85 onsets (3% of the 2697 observations) (Table 1), out of which 80 (94%) occurred in developing countries. Like Miguel, Satyanath, and Sergenti (2004), we also measure conflict prevalence with a 'conflict incidence' variable that takes the value of one in a given country and year if there is any type of conflict (new or existing conflict). The dataset contains 464 incidences (17% of the observations) out of which 431 (93%) are from developing countries (Table 1).

(b) *Flood-induced displacement data*

Flood-induced displacement is the number of people internally displaced by large floods. Displacement data come from the Dartmouth Flood Observatory (DFO), a publicly accessible global archive of large flood events (http://floodobservatory.colorado.edu/). For a flood event to be considered 'large' and recorded in the dataset, it has to fulfill at least one of the following criteria: significant damage to structures or agriculture, long reported intervals (decades) since the last similar event, and/or fatalities (Brakenridge, 2011).

DFO records a number of characteristics of each large flood event including its severity, area affected, duration, and magnitude. The DFO uses a wide range of flood detection tools, most of them global in scope covering all the countries in the world including MODIS (Moderate Resolution Imaging Spectroradiometer, http://modis.gsfc.nasa.gov), optical remote sensing