Climate variability, political crises, and historical population displacements in Ethiopia

Joshua Comenetz*, César Caviedes

Department of Geography, University of Florida, P.O. Box 117315, Gainesville, FL 32611, USA

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Abstract

El Niño events from the 1970s through the 1990s caused extended droughts in Ethiopia. These droughts were followed by famine and political turmoil that resulted in radical changes of government, secession, and a massive program of population redistribution. Cartographic analysis of Ethiopian census data from 1984 and 1994 shows changes in demographic patterns. The consequences of government-imposed migration policies, whose catalyst was the climate variability caused by repeated El Niño events, were changes in the ethnic composition of certain Ethiopian regions and changes in the geographic pattern of population growth.

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1. Introduction

Climate variability over the last three decades of the 20th century resulted in droughts, famines, and locust outbreaks in several countries of Africa—all of them being catalysts of decisive changes in the political development of such countries and causes of dramatic population displacements. Climatic oscillations commonly have been given only a subordinate role as the triggers of historical events and political changes, perhaps to avoid conveying an air of determinism to the assumed free acts of humans. Nevertheless, the persistence and dimensions of recent environmental crises have swayed some researchers away from this traditional interpretation of recent history. It is now more easily accepted that in vulnerable traditional societies, climate or environmental crises have a compelling influence over social structures and political stability (McNeill, 2000). When describing the after-effects of the widespread El Niño of 1972–73, Caviedes (1982) observed that the fall of Ethiopia’s emperor Haile Selassie and his replacement by a Marxist military regime had been prompted by the social unrest resulting from the droughts in sub-Saharan Africa (Sahel) and eastern Africa that had been induced by that climate anomaly. The political and social developments unleashed in Ethiopia by drought and famine did not end in the subsequent years, but were, on the contrary, exacerbated by further El Niño events in 1976–77, 1982–83, and 1991–93. When the effects of El Niño 1991–93 raged over the drought- and famine-stricken country, the communist rulers, in order to subdue unruly populations, introduced draconian measures such as ousting the people, including the forced migration of emancipationist ethnic groups. After the 1991–93 El Niño, dissent and uprisings in Ethiopia were enormously magnified by the lack of rain, consequent food shortages, and the severe resettlement policies taken by the Marxist government during the previous two decades (Pankhurst, 1991).

This paper assesses the spread and intensity of the droughts and famines caused by El Niños from the 1970s to the 1990s, which served as the context for the relocation of populations undertaken by the regime of General Mengistu Haile Mariam. It also analyzes the effects of these climate crises and the forcible relocations of inhabitants on the demographic structure of contemporary Ethiopia. The arguments made in this paper rest on historical data that reveal the deep impacts that past droughts had on nature and Ethiopian populations.
Using cartographic analysis of recent census data, this research also examines the consequences that political repression had on the distribution of population across the country.

This is a case study of the consequences a climatic crisis can have when coinciding with social unrest and political caprice. Not many African countries are suited for this type of study due to the lack of appropriate statistical data, scarce documentation of the impact of climatic crises, and the unpredictability of political developments. Ethiopia has the advantage of having a relatively straightforward history of events, central policies that are applicable country-wide, and a statistical base that—with careful consideration of its pitfalls—can offer a fair picture of the consequences that political and natural events have had on the demographic makeup of the country (Rubenson, 1991). This study enriches the underdeveloped field of demographic studies in African nations that have been repeatedly affected by El Niño. Studies that quantify the influence of El Niño on population change in Africa do not exist: these countries have neither the infrastructure nor the human or monetary resources to document with hard data the demographic impact of such catastrophes. Ethiopia is the only country in semi-arid Africa with the basic statistical resources (census data) necessary to assess the impact of droughts and political events on demographic trends. In this sense, the country and this study are unique. Cartographic analysis of population change is also rare or absent in these countries. Though existing literature on population movements is abundant, it mostly reports on qualitative changes. Thus, our attempt to quantify population movements related to natural catastrophes through cartography breaks new ground.

2. Persistent droughts and famines in the Horn of Africa

Located at a climatic crossroad in northeast Africa, where interannual variations of precipitation depend on the seasonal displacements of the Inter-Tropical Convergence Zone (ITCZ), the dominance of the drying harmattan during the winter months, and the time of inception and intensity of the summer monsoons (Sirocko, 1996), Ethiopia accurately reflects whatever variation takes place when one of these three major climatic controls fluctuates (Nicholson, 1997). Since the main contributor to Ethiopian rainfall is the summer monsoon (74 percent of annual rain), its weakness or failure to occur has disastrous consequences for eastern Africa and the Sahel. Early studies from the 1960s tied the decrease of precipitation in sub-Saharan Africa to the occurrence of the warm phases of the El Niño/Southern Oscillation (ENSO)—in other words, to the development of sea surface warming in the equatorial Pacific.

Contemporary warm ENSO events, those that can be documented with instrumental meteorological data, have revealed the remarkable simultaneity that droughts in Ethiopia and the Sahel have with droughts in India, Indonesia, Australia, and southeast Asia (Hastenrath, 1990). The association between monsoon failures in the Indian Ocean and droughts in the Horn of Africa can be understood through examination of the interannual variation of rainfall at Addis Ababa (Fig. 1). Prior to the

![Fig. 1. Interannual rainfall variability at Addis Ababa (1940–94): annual deviation from mean in standard deviation units. Darkened bars indicate coincidence with warm ENSO events (El Niño) in the tropical Pacific. Inset: averaged monthly rainfall for the stations Addis Ababa, Gondar, and Awassa in the highlands of central Ethiopia. Source: Global Historic Climate Data, NOAA National Climatic Data Center (NCDC). Asheville, NC, 2003.](image-url)
existence of instrumental data (before the second half of
the 19th century) historical sources and anecdotal
references to times of dryness and famine are very
frequent in historical accounts of Ethiopia and allow a
fair identification of the effects of past El Niños in the
context of worldwide historical variability (Whetton
and Rutherford, 1994). A useful list of famines and
epidemics, reaching back to the 1400s, was compiled
by Pankhurst (1990). Using these materials, Caviedes
(2001) was able to relate the occurrence of the most
devastating drought/famine events in Ethiopia to the
occurrence of past El Niños in the Pacific realm. These
events also coincided with droughts in Asia and the rest
of Africa, such as those that occurred in the wake of the
warm ENSO episodes of 1540, 1567–68, 1618–19, 1633–
35, 1747, 1772–73, 1812, 1828, 1888–92, 1916–18, and
1927–28. After the El Niño of 1957–58, the coincidence
of warm ENSO episodes and droughts in Ethiopia in
became quite evident, indicating that these phenomena
were becoming more frequent and intense, probably due
to contemporary global warming.

Detailed documentation offered by Wolde-Mariam
(1986) presents irrefutable evidence that the occurrence
of recent El Niños had deleterious consequences for
agricultural and pastoral communities in Ethiopia.
Agricultural activities, whether for subsistence or for
cash crops such as coffee, sorghum, maize, and cereal
are concentrated in the central highlands of the country.
Due to good rainfall and the relatively low prevalence of
diseases such as malaria (Kloos and Adugna, 1989a), the
central highlands are where the highest concentration
of population is found. The agricultural calendar reflects
the annual distribution of rain (inset in Fig. 1). The early
rains (belg) are used to grow basic staples and to prepare
the ground for the main planting season that depends on
the June-to-September (kiremt) rains. Whenever the
summer monsoon is weak or late to arrive—typical
occurrences during El Niño events in the tropical
Pacific-crops planted in the early summer are stunted
in their growth or fail altogether. With most of the
cultivating activities being conducted with oxen, the
failure of rains also causes critical shortages of fodder
that lead to cattle mortality (Wolde-Georgis et al.,
2001).

The most extensive cultivated area is the core region
of the country, Shewa (where Addis Ababa is located),
and the northern mountain regions of eastern Gondar
and Gojjam (Fig. 2; Ethiopian Mapping Authority
(EMA), 1988). In the uplands bordering this central
core, stretch the drought-prone regions of Wello,
western Gojjam, Keffa, and Sidamo, where subsistence
agriculture mixes with mountain pastoralism and the
density of population diminishes remarkably. The
northern region that comprises Tigray and the now
independent, former Ethiopian province of Eritrea is
less densely populated than the core (Fig. 2) and
increasingly more drought-stricken. So too is the eastern
region of Hararge and Bale (Somali area in Fig. 2) that
borders Djibouti and Somalia. Desert conditions pre-
dominate and pastoral activities are restricted to a few
watercourses descending from the Harar Mountains.

The Western Uplands, including Wellega, Keffa,
western Gojjam, and Illubabor, gradually descend onto
the plains of Sudan and are drained by the Blue Nile
and its tributaries. Increased humidity, caused by the

![Fig. 2. Population density by wereda, 1984, with old provincial boundaries.](image-url)
northern shift of the ITCZ in summer, permits the spread of more arboreal vegetation in this region than in the rest of the country, although the recent wars, human occupation, and progressive dryness during the last decades of the 20th century are converting this large sector of Ethiopia into a hardwood-savanna environment. Here pastoral activities are mixed with subsistence agriculture.

Surveys of the famine-proneness of Ethiopia by Wolde-Mariam (1986) and Wolde-Georgis et al. (2001) reveal that the most affected regions are those of the northeast, the eastern plains bordering Somalia, and the south adjacent to Kenya. Struck by less severe droughts and ensuing famines are the regions located in the central highlands and in the uplands descending to Sudan. On the basis of drought occurrences from 1958 to 1977, Wolde-Mariam (1986) recognized a pattern of progression: in general, droughts and famines begin to be felt in the arid mountains of Eritrea and Tigray before they propagate southward along the Awash Valley into the southern regions of Hararge and Bale. As the seriousness of a drought mounts, the central highland regions of Wello, Shewa, Arssi, Keffa, and Wellega become involved. The last regions to fall under the influence of dryness, livestock mortality, and increased lack of staples are the western regions of Gojjam, Gondar, Wellega, and Illubabor. The stress produced by this internally spiraling progression of drought and famine first affects the peripheral regions of the central core, forcing people fleeing disaster to seek refuge in regional centers before moving into the more populated heartland. This helps to explain why both Emperor Haile Selassie and General Mengistu were reluctant to admit that an impending drought (and social unrest) was brewing in the northeast section of the country, and why, when they reacted, it was too late to defuse the militance of secessionist forces (Keller, 1992).

3. The human and environmental impact of the 1970s droughts

It was not until the occurrence of the 1972–73 warm ENSO episode that the negative consequences of these anomalies in certain regions of the tropics became clear (Caviedes, 1982). Globally, the 1972–73 El Niño was not extremely severe when compared with subsequent episodes, but regionally, the consequences in Africa were the most calamitous of recent decades. This event deeply upset the hydro-meteorological regimes of eastern and sub-Saharan Africa, initiating the infamous drought and subsequent famines of the Sahel (Kates, 1981). In Ethiopia, the precipitation of the kiremt (planting season rains) were so scant or absent in some districts that the subsequent harvest season of the autumn of 1972 was seriously reduced, particularly in northern Wello. As 1973 arrived and the ENSO episode became more acute, the failure of the kiremt to materialize extended the drought further into the northern highlands. Agricultural dryness also expanded into the eastern and southern regions of the country to encompass 55 percent of all the 102 awrajas (regions), into which the country was divided before the administrative restructuring of the 1980s. By mid-1974, the continued drought and failed summer harvests grew to comprise 60 percent of the awrajas as the specter of famine covered most of the country, with the exception of the western regions (Wolde-Mariam, 1986). Though he was alerted to the threats that the expanding famine posed in terms of social unrest and flows of refugees into urban places, Emperor Haile Selassie was poorly advised as to the seriousness of famine in different regions. State food was therefore not distributed to all hungry populations in all needy regions. His delays were used by a group of Addis Ababa army officers known as the Derge (Committee) to stage a coup that deposed the emperor in September 1974 and forced him into exile (Hancock, 1985).

The Marxist roots of the officers who removed the emperor were evident in the name Derge, the authoritarian policies implemented to deal with the emergency, and with popular unrest. Food was distributed mostly to rural dwellers sympathetic to the new regime (Kebbede, 1988) and drastic measures were adopted by the military to restrict the mobility of those who were abandoning scorched fields and trying to escape famine-stricken areas (Keller, 1992). In 1975 the Derge regime, now firmly in the hands of General Mengistu Haile Mariam, proceeded to decree the nationalization of all agricultural lands in the country with the purpose of creating rural communes in the Soviet style (Clay and Holcomb, 1986). Creating rural communes in the middle of a disastrous food shortage caused by the drought set the conditions for disaster, but then the military ruler enacted a forced agricultural program to stimulate productivity. At this point agricultural productivity was severely impaired by climatic limitations and military conscription or joining of agricultural teams further exacerbated an already volatile situation. Finally, all measures originated from the ethnic-Amharic military power in Addis Ababa, so that provincial resistance was not long in coming. When the next El Niño (1982–83) provoked a drought of even larger magnitude and more prolonged effects than that of 1972–73, the ethnic rebellion flared up again (Tareke, 2002).

To understand the roots and dynamics of the opposition to the Derge during the 1980s that resulted in the collapse of the regime in 1991 and the secession of Eritrea in 1993, it is necessary to outline the ethnic and cultural complexity of Ethiopia (Henze, 1995). Through the decades of imperial rule by Haile Selassie, Ethiopia
was a conglomerate of ethnic groups united by an iron rule exerted by Amharic elites from the central highlands, where Addis Ababa is located. The central mountain region is the spine of historical Abyssinia and the heartland of the country, populated by the Amhara peoples, a group of Semitic language and Christian Orthodox belief, that has traditionally dominated the upper ranks of the political, military and cultural elites of Ethiopia (Fig. 3). The northern extreme of the country is inhabited by peoples of Tigre ethnic roots, who differ historically as well as religiously (Muslim), from the Amhara of the central mountains; they make up the ethnic core of modern Eritrea. On the high plateau south of the Eritrea border live the Tigrayan peoples, of Semitic language like the Amhara, Orthodox Christians (Kaplan et al., 1971), and subsistence cultivators. Their traditional independent leanings often have placed them at odds with the centralizing and authoritarian Amhara elites (Tareke, 1991). In the arid lands to the east of Tigray and into the shores of the Red Sea live the Affar, members of the Cushite linguistic family, a group consisting of Muslim herders having much in common with the Affar tribes located in coastal Eritrea. Populating most of eastern Wello, eastern Shewa, and northern Hararge, the Affar have long struggled against Amharic centralism. During the Derge regime, and even more so when Eritrea broke from Ethiopia, they fought to achieve autonomy. The dry uplands and plains of the southeast, comprising the territories of Hararge and Bale, are in lifestyle, language, culture, and Muslim religion, very similar to their southern neighbors in Somalia. The Oromo, established mostly in the provinces of Sidamo and Gamo Goffa, south of the region inhabited by the Amharic population, are closely related by language (Cushite) and religion (Muslim) to their Kenyan neighbors, and are estimated to make up 40 percent or more of the total population of Ethiopia (Clay and Holcomb, 1986; Keller, 1995). The western fringe of the country, adjacent to Sudan, is inhabited by semi-nomadic tribesmen of Nilotic language and customs, predominantly Muslim. It is against this ethnic backdrop that the sweeping changes following the dethronement of Haile Selassie, and the repressive policies of General Mengistu are reviewed.


As early as May 1982, anomalous ocean and atmospheric conditions typical of El Niño began to develop in the tropical Pacific. By September and October, these anomalies had propagated into the eastern hemisphere as shown by a delayed onset of the southeast Asian monsoons. This earlier-than-usual development of the warm ENSO event meant that in Ethiopia the rain needed for planting failed to occur after the commonly rainless winter months (Mattsson and Rapp, 1991). As had happened in previous drought-famine occurrences, the areas struck first were the northern provinces. However, as dryness persisted during the rest of the year and continued into 1983, in phase with the prolonged El Niño episode in the Pacific, the drought gradually expanded into the central highlands, and from there progressed into the western semi-arid belt (Kiros, 1991; World Meteorological Organization (WMO),
The first reaction of the Derge government was denial, followed by hasty and unorganized distribution of stored grain, and then by suppression of information and repressive measures against desperate peasants and villagers who were fleeing the scorched countryside (Adhana, 1991). With the arrival of a third year of dryness in 1984 and another summer harvest failure, the government finally acknowledged that catastrophe had hit rural Ethiopia and that the external world had to come to relieve the disaster (Webb and von Braun, 1994). It was only in the autumn of 1984 that the western world came to know the misery that ineffective political measures, bad administration of meager resources, and extreme climatic conditions had brought into the country (Clay et al., 1988). By then the excesses of repression and outright war triggered by the drought calamity became evident.

As is usual in emergency situations in Ethiopia, lack of food and the failure to obtain assistance from the central government erupted in popular restlessness in the provinces traditionally discontented with the central government (Tareke, 2002). After an initial government reaction based on the use of armed force to quell discontent, the spread of regional resistance against the military was countered through administrative quick-fixes, of which the most long-lasting and destructive was the reorganization of administrative boundaries. New districts were artificially created in order to divide cohesive and well-functioning ethnic communities. In other cases, new units—particularly in border regions—were instituted to grant an apparent autonomy to discontented peasants from Wello and Tigray who were placed in distant regions (Clay and Holcomb, 1986). The government intended to tackle two problems at once (famine and ethnic tension). It was not long before famine encroached upon local populations as well as resettled peasants, and they began to flee into neighboring Sudan, this time as drought-famine refugees. Similar developments also occurred in the villages of Bale and Hararge, where it was ethnic-Somali Ethiopians who were escaping deprivation and hunger (Khalif and Doornbos, 2002).

As dryness and hunger gradually spread in the wake of the 1982–83 ENSO event, forcible resettlement—different from villagization in that peasant families from the highlands were simply transported to remote areas of Metekel (western Gojjam), Wellega, Illubabor, and Keffa—was imposed by the Mengistu regime. This policy had the negative result that native populations from these regions were displaced by the newcomers, and violent encounters occurred between natives and resettled families. This was to be expected, because most “resettlements were located in areas troubled by insurgent activities” (Gebre, 2002, p. 268) and thus the government intended to tackle two problems at once (famine and ethnic tension). It was not long before famine encroached upon local populations as well as resettled peasants, and they began to flee into neighboring Sudan, this time as drought-famine refugees. Similar developments also occurred in the villages of Bale and Hararge, where it was ethnic-Somali Ethiopians who were escaping deprivation and hunger (Khalif and Doornbos, 2002).

The climatic component of the Ethiopian tragedy is obvious when considering the impact that the droughts and famines (associated with the two El Niños: 1972–73 and 1982–83) had in influencing political developments and altering population flows in the country. However, this was not the end of the duress and deprivation. During the prolonged warm ENSO event ensued from 1991 to 1993, even though precipitation was not critically low, the distress caused by more than 12 years of dryness and food scarcity—added to the excesses of...
the Mengistu regime and the fatigue caused by constant warfare—caused a famine that affected 6.7 million people (Wolde-Georgis et al., 2001).

The political faction that deposed General Mengistu, the Ethiopian People’s Revolutionary Democratic Front (EPRDF), was not to be exempted from the vagaries of climate. Consecutive droughts in 1991–92 and 1993–94 caused as much distress as during the 1980s. Moreover, in 1997–98, a drought induced by yet another El Niño cost nearly $28 million in damages. This drought was followed by catastrophic flooding in 1998 that compounded the shortage of food (Wolde-Georgis et al., 2001). As usual, there was rural exodus and city immigration, both exacerbated by the displacement of nearly 350,000 Ethiopians who fled from the border region with Eritrea when boundary disputes led to armed hostilities between the two countries (Wolde-Georgis et al., 2001). Once again, a climatic crisis had worsened a political conflict to bring more distress to the Ethiopian population.

5. Changes in population distribution: data and caveats

To determine whether the spatial patterns of Ethiopian population change reflect the geographical variation of the drying effects of El Niño or are the consequence of forced migration policies, it was necessary to create a map with sufficient geographical resolution to display regional variations. Ethiopia conducted a census in 1984, just at the wake of the major 1982–83 El Niño and before the moderate event of 1986. There was a second census in 1994, which probably captures the effects of a less pronounced event in 1991–93 and the results of nearly 17 years of forced population displacements.

Though the 1994 census was partially incomplete, due to political problems in the eastern part of the country, the final enumeration was completed in 1996–97. This information was used to extrapolate values for certain administrative units in 1994. The census also omitted parts of the regions enumerated in 1994, with the information deficit made up by estimation, whose accuracy it is impossible to determine. For example, in Gambella region, “a certain rate of growth of population was utilized” to project data from the 1984 census forward (Central Statistical Authority (CSA), 1995, p. 6). However, these are the only two “full, modern” national censuses for Ethiopia according to the US Census Bureau’s listing of international census dates (previous Ethiopian demographic reports were based on sample surveys only) (Central Statistical Office (CSO), 1971; US Census Bureau, 2001). The simplest way to look at demographic change over time is to map change by province between 1984 and 1994 assuming no changes to the geography of the enumeration unit. However, the administrative boundary reorganization precluded this. Therefore, the following discussion is partly dependent on the authors’ processing of census data into a usable format.
6. Data and cartographic methods: reconciling historical demography

Though Ethiopia conducted censuses in 1984 and 1994, tracking demographic change through this period proves very difficult because the Ethiopian government restructured its administrative boundaries twice in the intervening decade. For the sake of simplicity, all geographic references in this paper are to the 13 familiar older provinces (Fig. 5). Conversion of data between different sets of administrative boundaries is a common problem in demographic mapping, and can only be accurately accomplished when either (a) one knows the location of every person or (b) all administrative units in one data set can be exactly amalgamated or translated into units in the other data set. Otherwise, one must either aggregate old units to new unit boundaries by a weighting method (Simpson, 2002) or create a third set of units that subsumes both original sets. Because the Ethiopian reorganization affected not only the highest-level administrative unit (provinces), but also the next level (awrajas or regions), the third level (weredas), and possibly even the fourth level (kebeles, or peasant associations), re-aggregation of data from one census into the provinces existing at the time of the other census proved impractical. Even if it were possible, the number of provinces has always been too small for detailed analysis: omitting now-independent Eritrea, there were 13 in 1984 and 11 in 1994.

The standard alternative, assigning weights to parts of administrative units, also introduces error because weighting methods depend upon assumptions about population distribution within enumeration units, e.g. that population is concentrated in cities. In order to minimize this error, two gridded world population data sets have been created: the Gridded Population of the World (GPW) version 2 (Center for International Earth Science Information Network (CIESIN), International Food Policy Research Institute, and World Resources Institute, 2000) and Landscan version 3 (Oak Ridge National Laboratory (ORNL), 2001). Instead of manipulating administrative units, these divide the world into regular grid squares, and assign populations to each square based on weighting methods. Unfortunately, available gridded data are not suited to the present analysis due to problems of accuracy and consistency. The GPW for Ethiopia is based on 1984 census data, projected to subsequent years based on estimated annual growth rates. The Landscan program uses the latest available projections provided by the US Census Bureau. Thus, neither data set is derived from unedited census data, but rather on census-based projections that introduce additional error (data quality issues are acknowledged for Ethiopia on the GPW website).

Equally important, in order to detect change over the desired time period, one would need to combine GPW and Landscan because the former is based on the 1984 census while the latter is based on newer data. This is impossible because (1) grid cell sizes differ, and (2) GPW and Landscan use different methods for assigning population to grid cells: GPW assumes that population density is constant within weredas, while Landscan uses a weighting method based on road proximity, urban area location, land cover, and other variables. Thus, use of gridded data would neither improve accuracy nor encompass the desired inter-censal period (1984–94).

![Fig. 5. Old provincial boundaries (pre-1987).](image-url)
The method chosen to address the problems caused by administrative boundary restructuring was to design a set of new geographic units, approximating real political boundaries as much as possible but deviating where necessary due to changes in the boundaries of lower-level administrative units. For the construction of the new map, the following data sources were used:

- Base maps of 1984 provinces, regions, and weredas in paper (Ethiopian Mapping Authority (EMA), 1988; Tareke, 1991) and GIS formats (US Agency for International Development Famine Early Warning System Network (USAID FEWS NET), 2002);
- Base maps of 1994 provinces and weredas, in paper and graphic file format (Graham, 1997; United Nations Development Program (UNDP), 1999);

The ultimate purpose was to aggregate weredas from both 1984 and 1994 into a set of new regions whose boundaries could be held constant for the analysis of data from both censuses, thus permitting the sketching of an accurate map of population change. The task was difficult because, with the rearrangement of administrative boundaries, some weredas were split or combined, others were partly annexed to neighboring weredas, and a few changed name. As some new weredas spanned the old provincial boundaries, and vice versa, it was impossible to simply re-aggregate weredas to the other set of provincial boundaries. Use of provincial units is further complicated by the inconsistency of different sources in their delineation of Ethiopian administrative boundaries for any single time period (Grepperud, 1996).

Fortunately, the boundaries of many weredas remained constant between 1984 and 1994. These served as a starting point for amalgamation of 1984 weredas into a new set of 30 regions called “Merged Zones”, accomplished through geographic analysis using base maps and GIS. As no digital map of 1994 boundaries was available, weredas in the 1984 map were combined to create larger units that also encompassed groups of 1994 weredas. This was eased by the fact that many weredas did not change between 1984 and 1994, according to inspection of all available digital and paper map sources. Weredas that did change were combined with their neighbors until the border of the combined region (Merged Zone) could be held constant between 1984 and 1994. The Merged Zones (MZs) have the advantage of encompassing certain populations, because they are all composed of entire weredas. No old or new wereda is split between two MZs. Every old or new wereda that crosses a new or old provincial boundary is included within a single MZ, thus eliminating the problems inherent in weighting. Creation of the MZs is illustrated in Fig. 6, where dotted lines indicate wereda boundaries, solid lines show region/awraja boundaries, and heavy black lines represent 1984 provincial boundaries. Five sample MZs are numbered and shaded in gray (for all MZs, see Fig. 7). Whenever possible, MZs were designed to be equivalent to a region/awraja (MZ 1), a province (MZ 2, equivalent to Arssi province), or combinations of awrajas (MZ 3). For
example, MZ 1 is equivalent to an awraja within Hararge province, while MZ 3 is equivalent to a group of four awrajas within Bale province. MZs 4 and 5 are more complex. MZ 4 lies entirely within Gondar province, but does not consist of entire awrajas. One awraja is split between MZ 4 and another MZ. The split portion of the awraja is indicated by cross-hatching. This was necessary when weredas, boundaries were altered so that they crossed pre-existing awraja boundaries. In the case of MZ 5, new weredas crossed old provincial boundaries resulting in an MZ spanning parts of three old provinces. MZs 4 and 5 do, however, lie entirely within new provinces, and are approximately equivalent to new second-level administrative units. Finally, the largest MZs (Fig. 7) represent areas where weredas could not be amalgamated within any configuration of either old or new provincial or regional boundaries and it was necessary to create more extended zones to avoid splitting weredas. Thus, all MZ borders represent constant boundary lines—lines that served as wereda borders in both 1984 and 1994 and that were not affected by wereda splits or mergers. Where possible, these lines also coincide with existing regional or provincial boundaries, and MZs are therefore not arbitrary divisions of territory. Beyond the unavoidable problems inherent in census statistics, e.g. miscounting, it is likely that the populations of the 30 MZs are as good approximations of truth as one can achieve using available data.

7. Interpretation of mapped changes

Ethiopian population can be divided into three geographic regions: the central uplands that contain the majority of the country’s population; the relatively unpopulated and arid south; and the northern and central areas with moderate population density. Between 1984 and 1994, the areas of fastest growth (Fig. 7) were mostly located in the far west and east, in Hararge and Illubabor provinces. These were zones of very low population density, so this rapid change involved a relatively small number of people, but it is still indicative of actual growth relative to neighboring areas. Regions in the eastern half of the country grew faster than the national average of 34%, while the western half experienced slower growth. Increased growth also occurred around the capital and in Gamo Goffa and western Gojjam. Demographic decline or stagnation took place primarily in several southwestern regions, along with western Wello and the eastern part of Hararge adjacent to Somalia.

To test the hypothesis that the enumerated demographic change between 1984 and 1994 reflects the distant effects of ENSO-induced droughts and decisions made in the period, a geographic comparison of population change is appropriate. The regions affected by droughts and famines have not been consistently portrayed, as one observes by comparing the maps in Ethiopian Mapping Authority (EMA) (1988), Wolde-Mariam (1986), and Webb and von Braun (1994). This means that the demographic changes shown on Fig. 7 are not likely to be the product of continued, long-term trends prompted by previous drought episodes. This is confirmed by the analysis of Kloos and Adugna (1989a), who found that population growth in the years before 1984 was highest in central and western Ethiopia. Fig. 7 shows high growth in the east and lower growth in all western areas, with the notable exception of those areas.
affected by government resettlement programs. This shift occurred, at least in part, as consequence of the ENSO episodes of 1982–83 and 1986, and was aggravated by subsequent political actions and resettlement policies. The latter include forced migration or population relocation and villagization of formerly nomadic or scattered rural inhabitants.

According to Wolde-Mariam (1986), the most “famine-prone” regions of Ethiopia are the northeast, much of the south, and some central areas, with the largest regions corresponding roughly to Tigray and Wello and southern and eastern Hararge, Bale, and Sidamo. Webb and von Braun’s map of areas “most affected by famine and drought” in the 1980s roughly corresponds to this, with the addition of Illubabor and portions of the central part of the country. However, these areas also include most of the regions of fastest population growth detected by our mapping, suggesting that drought alone did not have a significant effect on net demographic change. Studies by Dejene (1990) and Grepperud (1996) show that population pressure (the result of an annual growth rate approaching 3% for the past several decades) has negatively affected soil quality, thus reducing agricultural productivity. More striking, Ezra (2001) found that land has become so scarce in Wello and Tigray (the origin regions of most settlers in 1984–86) that not only were some people willing to migrate, but there has been a decline in the fertility rate relative to other parts of the country. In this situation, drought only exacerbated the pre-existing long-term problem of over-intensive land use, without necessarily having a major effect on population change within the 1984–1994 period.

It is more likely that the mapped changes reveal a link between population change and the resettlement/villagization that occurred primarily between 1984 and 1986, a period that corresponded with generalized rainfall anomalies in eastern Africa, and when the movement of “drought-affected population” in Ethiopia reached its peak (Webb and Habtu, 1994). According to Clay and Holcomb (1986), the Ethiopian government moved people from the northern part of the country to the west, mostly toward the provinces of Keffa, Illubabor, and Wellega. A second flow took place between the north and northwest, primarily toward Gondar and western Gojjam. Some resettled people returned to their northern homes, often through Sudan, landing in or passing through the same northwestern area. Pankhurst (1991) estimates that up to a quarter of settlers left their new villages, but does not offer an estimate as to how many of them returned to their original homes. Thus, a large majority of settlers remained outside their regions of origin and it is no surprise that areas of governmental resettlement (Fig. 4) and population growth (Fig. 7) show some correlation. As noted above, most relocated migrants originated from Tigray or Wello (Ethiopian Mapping Authority (EMA), 1988; Dejene, 1990), and our map shows either decline or below-average population growth in these regions.

Existing sources do not coincide in determining exactly how many people were resettled. An official government survey (Central Statistical Authority (CSA), 1991) gives a figure of 425,000, while independent sources place the number at 500,000 (Adugna, 1989) or nearly 600,000 (Pankhurst, 1992; Gebre, 2001), though, according to Woldemeskel (1989) and Adugna (1989), the original plan was to resettle as many as 1,500,000, or about 20% of the total number of famine victims. This uncertainty reflects the fact that there has always been seasonal and inter-regional migration in Ethiopia (Kloos and Adugna, 1989a; Berhanu and White, 2000) largely on a voluntary and non-governmentally sponsored basis and government resettlement programs began only after the earlier famine in 1973–74 (Dejene, 1990; Ethiopian Mapping Authority (EMA), 1988). In some cases, resettlement meant only local moves, but for most migrants, the journey involved crossing several provincial boundaries, often into regions with significantly different climatic and agricultural conditions (Pankhurst, 1992; Colchester and Luling, 1986). Though the settlement program has been described as coerced, many settlers moved quasi-voluntarily, deceived by government propaganda promising a “land of milk and honey” with new housing and tractors (Pankhurst, 1991). Aside from intra-country movement, Ethiopia has been “one of the most important refugee-generating countries of the world for the past 20 years” (Bariagaber, 1997, p. 30). A further large, but uncounted number of people crossed into Sudan as a result of resettlement and other government policies in the 1980s (Kibreab, 1996), but once again, the number of individuals involved remains unknown.

The geographic distribution of the destinations of migrants according to the government statistical office survey (Central Statistical Authority (CSA), 1991) is shown in Fig. 4. Though these data are certainly incomplete, the geographic patterns agree with those depicted in Kloos and Adugna (1989b), whose data came from a different Ethiopian government agency (the former Relief and Rehabilitation Commission, now the Disaster Prevention and Preparedness Commission). Most migrants were sent to west-central areas, including several low-density regions reporting above-average population change between 1984 and 1994 (Fig. 7). In the context of general internal migration, small and/or sparsely populated regions are more likely to display higher rates of population change because they have lower base populations. Thus, it is not surprising that Illubabor and western Gojjam registered more rapid growth than other areas receiving large numbers of migrants. Though settlement areas were ostensibly selected for their good, unoccupied agricultural land,
these areas were, in fact, already inhabited by indigenous groups, and did not have sufficient resources to support greatly expanded populations, not to mention the presence of diseases unfamiliar to settlers from highland areas (Woldemeskel, 1989). In Metekel (western Gojjam), for example, the settler population reached about 82,000 by 1988, but then declined sharply, as food shortages led to high mortality and out-migration, falling below 30,000 by the 1994 census (Gebre, 2001). The effect of migration on receiving weredas (based on government data only) is shown in Fig. 8 as a percent of 1984 census population. Migration had the most effect on sparsely populated areas near the Sudanese border, reflecting, in part, the return of the peoples who fled to that country as refugees. Similarly, since Wello is cited by Pankhurst (1992) as the largest source region of migrants, it is not surprising to see a demographic decline in western Wello (Fig. 7).

The second type of migration involved a transfer of sparse population from rural to non-rural settlements. Villagization of formerly non-urban population in 1984–87 mostly occurred in the central, relatively densely populated regions around Addis Ababa (Clay et al., 1988), away from the sparsely inhabited border areas that served as resettlement destinations. For this reason, population change was mostly near the national average in this region, with above average growth near the capital and areas of decline in the north (Wello) and south (Fig. 7). Population growth in the Somali region reflects the inflow of escapees from the areas of villagization. Another reason for the population increases in certain troubled spots is cityward migration, which in most developing countries has swollen urban centers in the past few decades. In the case of Ethiopia, this trend was reinforced by the migration of former rural-dwellers escaping government coercion. For example, one way to escape villagization and other forms of resettlement was by migrating directly to towns or cities (Berhanu and White, 2000). In addition, one has to take into consideration that famine claimed the lives of one-half to one million people (Dejene, 1990; Ezra, 2001). The famine led to not only a great increase in mortality but also to a substantial decline in fertility (Kidane, 1989), so that the net effect on population change was greater than if only one component was affected.

8. Migrants and ethnic change

The main ethnic/linguistic groups in Ethiopia as of the mid-1980s, along with the old provincial boundaries, are shown in Fig. 3. Ethiopians are much more diverse in ethnicity, language, and religious affiliation than can be indicated by any single map. No region of the country is culturally homogeneous, though comparisons with Fig. 9, demonstrates that the most recent redrawing of provincial boundaries was intended to create regions with more cohesive ethnic identities (compare to map in Keller, 1995). Data from the 1994 census do not show...
dramatic changes in the national ethnic pattern, but resettlement caused very significant changes at the local level, even if some migrants subsequently fled into Sudan or returned to their original homes. Figs. 2 and 3, show the destination regions of most resettlement are dominated either by smaller minority ethnic groups (of the Nilotic or Omotic language groups), or by the Oromo, or do not have any single dominant ethnic group. Since the primary sources of settlers were northern regions with large Amharic or Tigrayan majorities (compare Figs. 2 and 3), it is clear that one effect of the large southwesterly migration was to increase the presence of Amharic and Tigrayan people in areas where they were previously absent (or nearly so), while diluting the demographic dominance of minorities or the Oromo. The effect of such change was magnified by the fact that before 1984, government data on internal migration indicate that long-distance migration was relatively rare in Ethiopia (Central Statistical Authority (CSA), 1992). As the 1984 census report for Illubabor states, for example, “streams of migration into the region seems to be reflections [sic] of the generally low level of inter-regional mobility” (Central Statistical Authority (CSA), 1989, p. 219), and the statistics on in-migrants show that most migrants to the area originated from the two neighboring provinces of Wellega and Keffa. Illubabor then experienced very fast population growth between 1984 and 1994, and was the destination of many thousands of migrants from much farther away. The same is true for Gojjam, which received relatively little migration from the northern provinces of Wello and Tigray before 1984 (Central Statistical Authority (CSA), 1990) but whose Metekel region became a major resettlement area. Because the settlers’ destination regions had lower population density than their source regions (compare Figs. 1 and 3), resettlement had a much larger effect on the composition of the population in the receiving regions compared to the regions of departure (Fig. 8).

9. Conclusion

Of the many countries in Africa affected by ENSO events, Ethiopia is unique in that documented population movements can be explained partially as the result of environmental crises (droughts/famines) caused by climatic variations. In contrast to other African countries affected by climatic crises related to El Niño, Ethiopia has established a regular demographic enumeration schedule, and conducted censuses before and after the 1982–83 and 1991–93 El Niño events. Yet the country is not wealthy enough to respond to or mitigate such crises through government aid intervention alone. In Ethiopia, a climatic crisis accentuated a political crisis, and one of the ways in which the government responded to both problems was through imposed migration policies. Because migration (forced and voluntary) was mostly directed toward more sparsely populated areas and led to changes in the ethnic
balance, the demographic effect of El Niño can be observed in Ethiopian demographic records and through the type of cartographic analysis presented in this paper. Though there are many catalysts promoting population variability due to displacements in any country, Ethiopia appears to be a good example of climatic and political agents interacting to elicit significant changes in population distribution.

References


