

# **Spatial analysis of civil war violence**

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At the beginning of the twenty-first century, 19 wars continue; they have caused displacement of over 20 million refugees and migrants (Moore and Shellman 2004, SIPRI 2004). Some conflicts are enormous in geographic scope involving numerous countries and many are very destructive. The wars of the Democratic Republic of the Congo between 1999 and 2004 resulted in over 3 million lives lost. Furthermore, the negative effects of conflicts persist long after the end of the fighting. Wars increase the effects of infectious diseases, such as AIDS, through shifting of government expenditures from basic needs to the military and to destruction of healthcare infrastructure and traditional family coping mechanisms. Overall, the World Health Organization estimates that 269,000 deaths and 8.44 million lost DALYs (Disability Adjusted Life Years) were caused in 1999 by all wars, civil and international, and another 8.01 million DALYs were lost in 1999 as an indirect effect of civil wars in the 1991-1997 period (World Health Organization 2000, Ghobarah, Huth and Russett 2003, 2004b, SIPRI 2004). The focus of this chapter is to understand the distribution of these civil wars across the globe and to indicate some significant gaps in the research on the geography of violent domestic conflicts. We also identify what we see as promising avenues of research that link political geographic approaches to the much larger accumulation of research in political science and economics on the causes and frequency of civil wars.

This chapter sits in the spatial analytical tradition of human geography that examines geographically-expressed phenomena for patterns and general trends. It thus stands in sharp contrast to the regional tradition that dominated geography before the 1960s that is now updated to incorporate attention to linkages across scales (local, national and global). Our approach also stands apart from the critical tradition, inspired by Marxist, feminist and post-structuralist theories (see Johnston and Sidaway, 2004). What the spatial analytical tradition shares with the "new regional geography" is a concern with the special importance of context, the milieu in which political, economic, and social processes that shape violence occur. Thus, it is

distinguishable from political science and economics research which typically does not pay a lot of attention to specific places, though comparativists by their very nature insist on such details (Kalyvas, 2006; Herbst, 2000).

We do not claim that wars are the only expression of violence. Indeed, in most years, more people are killed through inter-personal violence than in formal international conflicts or in civil wars. Furthermore, while we focus on wars, we are sympathetic to the argument that “structural violence”, perpetuated by poverty and lack of access to proper nutrition, clean water and health care, causes far more deaths than direct violence. A comparison of the scale of these two types of violence showed that premature deaths (measured by years of life compared to the median values of rich countries) far exceeded war casualties (Johnston, Taylor and O’Loughlin 1987). The examination of war violence is further complicated by definitional issues since gang and other organized violence often has a political objective, while conversely, the violent actions of political groups often have monetary or personal motives. In this chapter, we use the commonly-accepted definition of war as a militarized dispute that results in civilian and/or military deaths; see the discussion in Jones, Bremer and Singer (1996).

Since the end of the Cold War about 1991, the most dramatic development in the nature of conflict is the shift from international to civil wars. During the 1945-1990 period, about 5 civil conflicts occurred per each interstate war (O’Loughlin 2004) but by 2003, the ratio had increased to 8.5 to 1 (SIPRI 2004). An upsurge in civil wars in the early 1990s, especially on the territory of the former Soviet Union, was made possible by the removal of the brake of a strong central state on ethnic-oriented violence. However, the preexisting conditions for violence were already in place and most recent civil conflicts can be traced to pre-1991 origins and mobilizations of political movements. To attribute the apparent rise in civil war violence to the end of the Cold

War dampening of autonomous movements is, thus, too simplistic and forgets the activities of the two superpowers in stirring up oppositional movements in the spheres of the opponent (O'Loughlin 1989).

What role does a geographic perspective on war and organized violence have in the academic division of labor? As we hope to make clear in this chapter, the dominant political and economic perspectives are flawed by their narrow vision of what constitutes the role of geographic factors in war. Further, these approaches consistently are unable to see how the particular context of war affects the propensity of groups to engage in violence, to fund their continued fight, to set the terms of possible agreements to end the fighting, and to accommodate refugees and others forcibly removed from homes and community. In particular, we will argue for a continued focus on disaggregation of the measures of conflict and widening and deepening of the kinds of information typically available to researchers. We stress that geography is not only about "space" (typically measured as some kind of contiguous connection between countries at war and their neighbors) but it is also about "place" (the unique combination of circumstances for each region that produces the cultural-political mosaic across the world's continents) and "relations between scales" (the links between local, regional, national, and global developments). In doing so, we argue for perspectives that are quite alien to most war researchers but comfortable for most geographers (Johnston 1991, O'Loughlin 2001).

In this chapter, we describe how political geographers have recently approached analysis of war and conflict, how geographical factors are currently being considered in conflict studies, and in what ways, a spatial analytical perspective can add to these studies. We stress that our spatial analytical approach is only one of many possible ways of understanding civil wars. Though obviously, we believe that spatial analysis offers the most promising of avenues especially because it connects the discipline of geography to the main strands of social scientific

work on the causes and consequences of domestic conflicts. Major projects have brought together World Bank interdisciplinary teams of economists and political scientists (Collier *et al.*, 2003). Though the aggregate elements are submerged in this World Bank study that examines the economics and politics of wars, it does not take much effort to reconsider the main conclusions in light of the evident relevance of regional and local contexts.

Geographical analysis can be undertaken in a number of ways. We present an example of the simplest geographic method, that of basic cartographic presentation, to illustrate the cross-border nature and geographic transitions in the long-running Ugandan civil wars. We then consider how more sophisticated quantitative spatial analysis can add to established views about the long-effect effects on health and life expectancies.

### **Geographers and the Study of War**

The discipline of geography has a long and checkered legacy in its relationship with war and violence. The discipline's modern origins in the promotion of colonialism and imperialism and the discovery and exploitation of resources in the mid nineteenth-century are well documented (O'Loughlin and Heske 1991, Mamadouh 2004). In the twentieth-century, geographers have moved away from their earlier practice of the art and science of geopolitics to an increasingly critical view of the military and the conduct of war. Careful mapping of the depredations of military actions such as the bombings of the dikes in North Vietnam by the U. S air force (Lacoste 1976) and the allied destruction of German cities in World War II (Hewitt 1983) are dramatic examples of the power of the simplest and most accessible of spatial methods, that of cartographic display. At a larger scale, similar mappings of the locations of contemporary conflicts clearly demonstrate the variable distribution of war violence across the globe (Buhaug and Gates 2002, O'Loughlin 2004) and recall the long-standing distinction between stable zones of

peace and zones of war (Boulding 1978, Gleditsch 2002). The interesting question, of course, is why do some regions remain peaceful for the long haul while others oscillate between episodes of war. The answer is complex and depends in part on the dodgy distinction between civil and international wars. While classifying wars by type is somewhat subjective, it is evident that there has been a significant shift in conflict to poor parts of the globe since 1945 (O'Loughlin and van der Wusten 1993). While the “democratic peace” hypothesis (that democratic states do not fight each other) has received a lot of attention in political science, the empirical data show that democratic states, especially France, the U.K. and the U.S., have been heavily involved in wars of decolonization, democracy-promotion, and (in the 1990s) against tyrannical regimes in Iraq, Afghanistan and former Yugoslavia.

As well as the descriptive accounts of the reasons why wars are geographically concentrated in certain world regions, geographers have turned to specialized methods developed for the analysis of spatially-distributed phenomena to try to understand and model the conflicts. In doing so, geographers are getting closer to the kinds of approaches that are dominant in the ancillary disciplines of political science and economics with their emphasis on large-N studies and regression-type explanations. The spatial analytic approach argues that the location of a country relative to other countries (neighboring, near, distant, remote, connected by transport links, sharing minorities across borders, etc) is an important consideration in understanding the distribution and diffusion of conflict. Political science work, typically, does not pay much attention to these connections, rather seeing countries somewhat like “atoms” floating in space (Agnew, 1994). One of the most important predictors of whether a country will experience a civil war is whether its neighbors have internal strife, the so-called spatial lag effect. Ignoring this factor is to cast aside one of the most obvious explanations of conflict (Diehl 1991). In statistical analyses, this contagion variable is often as important as the usual political and economic predictors, such as the autocratic nature of the government, the ethnic fractionalization

of the population, the level of poverty, income inequality, and years since independence. Further, countries are frequently involved in a complex nexus of conflict as wars ebb and flow across borders due to the sanctuaries offered by neighbors, the placement of rebels in areas occupied by sympathetic minorities, the actions of refugees to undermine the forces that caused their flight, and the access of extra-territorial bases to external supporters and sources of income (Väyrynen 1984, O'Loughlin and Anselin 1991). Recent examples of these formations include the Great Lakes area of Africa (Democratic Republic of Congo, Uganda, Rwanda, Burundi, Tanzania), West Africa (Sierra Leone, Liberia, Guinea, Senegal), the Middle East (Israel, Lebanon, Syria, Egypt, Jordan and Palestine) and parts of former Yugoslavia (Croatia, Serbia, Bosnia-Herzegovina, Kosovo, Macedonia).

Two further aspects of the geography of civil war have occupied the attention of geographers. The military analysis of wars tends to be split between large-scale (strategic) and small-scale battlefield (tactical) considerations. The strategic analyses devolve into geopolitical deliberations while the tactical analyses tend to have a strong physical geographic component (O'Sullivan and Miller 1983, Palka and Corson 2004, Palka and Galgano 2005). As the battlefield technology has become very sophisticated, it has become integrated with geographic databases that contain details and images of physical terrain, urban environments, and even the social characteristics of local inhabitants. Enormous amounts of information, much of it gathered through intelligence satellites for high-resolution imagery, are now available for waging and monitoring war and evaluating its effects, though it is disproportionately available only to rich western countries.

Wars leave a lasting legacy on both the landscapes and the people. When territory changes hands, a kind of landscape erasure often follows. Changing street and placenames, erecting monuments to the victors, destroying religious and other cultural monuments of the defeated, converting establishments to new use, and implementing educational and other

changes to reflect the hegemonic ideas of the victorious side are well-documented by historical and cultural geographers. Samples of this kind of work are Heffernan (1998), Johnson (1999), Charlesworth (2003), Weeks (2006) and Winston (2006). Much of this research has focused on Europe since it is axiomatic among cultural geographers that wars and their legacy are instrumental in making and re-making national identity. Nationalist ideologues memorialize selectively; exclusive claims to certain territories are made based on historical linkages and settlements in those places (Azaryahu, 1996). Winning a war also means winning a landscape that can be remade in the image of the victor (Murphy 2004).

### **Major Themes in Civil War Research**

Because of its frequent occurrence (all but two of current wars are civil conflicts), we chose to focus this chapter on violence caused by domestic circumstances and cross-border linkages that perpetuate conflict. The difference in the geographic and political science approaches can be seen in the typical civil war studies of each field. While civil war is ultimately created by interplay of domestic structures and domestic contexts, geographers contend that the effects (identified by political scientists) of domestic structures (GDP, government type, ethnic makeup, etc) and domestic contexts (population growth, terrain, weak state institutions, and resources, etc) are shaped by the nature of the regional context.

Current *en vogue* explanations point to state strength as determining the propensity for civil war onset. The massive State Failure (now Political Instability) Task Force project at the University of Maryland, funded by the U.S. Central Intelligence Agency (CIA) , has identified weak states as prime factors in civil war causation, durability and re-occurrence (details accessible, at time of writing, at: <http://globalpolicy.gmu.edu/pitf/>). The number of state failures peaked in the early 1990s with about 30% of all countries “in failure”. This peak



coincided with the high point of ethnic wars (over 20 per year) and followed a surge of genocides and politicides (mass killings of political groups) a decade earlier (Goldstone, et al. 2003). Disputed sovereignty and an inability to foster a coherent national identity conspire to keep weak states vulnerable to putsches and loss of territory. The spatial clustering of weak states, and subsequent clustering of conflict in weak states, allows for conflict to penetrate borders, infecting already vulnerable states. Therefore, the geographic position of a state is not simply an attribute, but another potential cause of conflict. High risk countries are subject to increased risk because 1) civil wars exacerbate volatile domestic conditions inside bordering states by forcing a re-evaluation of military spending, and 2) neighboring wars can (and frequently do) spread into nearby states, through the actions of government and opposition fighters, refugees, and cross-border supporters. Weak states cannot effectively mitigate conflict diffusion and escalation from outside state borders (Raleigh, 2004).

The literature on civil war has a long legacy and is characterized by an approach that is best described as piecemeal. For example, there is a considerable literature that separately examines the onset, escalation, and termination of civil wars. (See the extensive and annotated bibliography in Collier *et al.* (2003). Most of the literature has also looked at civil wars as self-contained and homogenous phenomena, ignoring the external connections of civil wars. As a result, almost all the existing data on civil war are collected and organized at the country level. The question of whether there is a larger (regional or global) or smaller (local) scale in which the wars are embedded has, heretofore, largely been ignored. In briefly reviewing these studies, we illustrate some of the shortcomings that result from geographical aggregation of local processes to national attributes in existing cross-national studies. We also suggest how studying the processes across scales can contribute to our understandings of the dynamics and consequences of civil war.

Two key variables, often summarized as “creed” (ethnicity) and “greed” (income

generating resources), dominate the analysis of civil wars. That increasing national income lessens the risk of civil war onset remains undisputed (Collier, et al. 2003, Fearon and Laitin 2003). But how does poverty increase the odds of civil war? Higher rates of per capita income increase a government's ability to retain control of the state apparatus by redistribution of state tax revenues. In countries with lower GDPs, by contrast, securing power and maintaining civil order become government priorities. The ratio of government monies on military spending typically doubles during conflict (Collier, et al. 2003), producing a downward cycle of conflict as social expenditures (education, health, social welfare) is cut, and income further declines. Elbadawi and Sambanis (2002, 2) find that conflict is "disruptive to capital or transaction-intensive activities (such as roads, production of manufactures, or financial services); it can divert expenditure and the society's resources from economic services (growth enhancing activities) to war efforts; and it can divert portfolios from domestic investment into capital flight". Fearon and Laitin (2003, 80) conclude that higher income is associated with a more developed infrastructure, and, therefore, better control of the state apparatus and population. Collier and Hoeffler (2004) note that neighboring war has a considerably larger impact on a bordering country's GDP than on domestic GDP (presumably, domestic GDP is very low to start). In later work, Collier, Hoeffler, and Soderbom (2004) assert that low per capita income, high income inequality, and a moderate degree of ethnic division lengthen conflict, whilst a decline in primary commodity exports shortens it because the state loses critical revenue for its war-making capabilities. Much of the recent work on civil war has emphasized the role of private incentives and rent-seeking activities as predictors of civil war onset. Individuals are more likely to take up arms when they can benefit materially from war through looting, extracting valuable commodities, and extortion (Collier 2000, Le Billon, 2001, Murshed 2002, Mueller 2003, Collier, Hoeffler and Soderbom 2004).

An intersecting paradigm, the effects of ethnic composition and weak state, underpins the role of political factors in civil war. Weak state literature focuses on the legitimacy and

sovereignty of the state as contributing to the outbreak of war (Holsti 1996, Herbst 2000). Governance explanations (about autocracies, democracies, and anocracies) looks for associations between political structure and rebellion (Hegre, *et al.* 2001). If states and governments have a complex of control, either through the validation of the government as the voice of the state in a democracy or a well-instituted infrastructure of fear and domination in an autocracy, the probability of civil war is lowered.

Ethnic diversity as a cause of conflict is based on the assumption that increased fractionalization makes it difficult to create a unified national community, because of alternative competing allegiances. Power relations are not assumed to be equal in fractionalized societies. Ethnicity's relationship to conflict is quite variable, as noted by a number of studies finding diversity linked to conflict (Connor 1973, Horowitz 1985, Fox 2004), diversity not significantly linked to conflict (Collier and Hoeffler 1998, Fearon and Laitin 2003), diversity lessening conflict (Collier, *et al.* 2003), ethnic dominance exacerbating conflict (Gates 2002, Collier, *et al.* 2003), religious affiliation causing conflict (Huntington 1996, Fox 2004) and ethnic elites acting as catalysts for conflict (Lake and Rothschild 1998, Brown 2001). Ethnic fragmentation's relationship to conflict proliferation is thus quite varied (Horowitz 1985, Gurr 1993).

Recent studies with more nuanced analysis of the connection of poverty and ethnic diversity do not simply show increased risk of conflict. Poverty alone cannot provide a reasonable explanation of why groups resort to violent conflict since poverty is ubiquitous, but only some countries see violence. The key might be the relative status of ethnic groups since relative deprivation and economic inequality are common elements in poor societies that experience civil war (Gurr 1970). Ethnic dominance (45-90% of the population) can increase the risk of rebellion. This argument is based on the notion that the effects of ethnic diversity depend on the opportunities for profiting from primary commodity exports and taxing opportunities (Collier and Hoeffler 2004). A dominant group also has a considerable number of potential

recruits and hence, improves the chance of retaining control of the state apparatus. Ethnic ties, strengthened by perceived ethnic grievances, lessen the costs of recruiting and sustaining a fighting force because perceived benefits are shared throughout the ethnic group.

This economic perspective on the nature of ethnic wars has detractors who regard conflict as the outcome of the interplay of ethnic diversity and economic grievance. Grievances (based on the distribution of resources) and ethnic identification as a basis for rebellion are grounded in the impression that modernity does not lead to more democracy (Ellingson 2000, 237). Elbadawi and Sambanis (2002) find similar results to Collier and Hoeffler (2004)--economic and political underdevelopment are the root causes of conflict (specifically in Africa)--but they also find that ethnic fragmentation may lead to poor economic prospects through the implementation of bad economic policies.

Recent studies showed that geographically-disaggregated conflict-specific measures of resources yield much better predictions of civil war duration than national level data (Buhaug and Lujala 2005; Buhaug and Rød, 2006). Many studies of civil war perpetuate the mismatch between the national level at which data are collected and the regional and local elements of the actual conflict. Buhaug and Gates (2002), however, show that the geographic location of a civil war within a particular country is fundamental for understanding conflict dynamics. Civil wars that develop in the periphery of countries tend to last much longer than those occurring close to national capitals, for example. Governmental capabilities are typically not homogenous, but neither are they geographically fungible. Extensive state power may be present in some locales, but virtually absent a few kilometers away, especially in weak or failing states.

## **Geographic Elements and Conflict**

Work that examines the diffusion of conflict and the locational attributes of civil war has

primarily focused on three different themes -- absolute location of wars, relative location of wars, and territory as a “container” of salient factors. Absolute location perspectives contend that civil war prone states disproportionately occupy the periphery of the world economy. Decolonization, superpower proxy wars, and impoverished conditions have created an environment of endemic poverty, poor governance, and a fundamental disjoint of state ideology and nation, which in turn has fostered discontent and violent conflict (O’Loughlin 1989). Strategic geopolitics —fostered by resource and strategic location considerations —has continued to create “Shatterbelt” regions well past the end of the Cold War (Klare 2001, Cohen 2003). Shatterbelt regions, such as the Caucasus, are defined as areas with a globally-significant natural resource, ethnic diversity, external intervention and a history of local conflict.

Relative location work focuses on the position and process of both the state and the internal conflict. Similar work on interstate conflict stresses the relationships of alliances and borders as explanations of conflict diffusion and proliferation (Siverson and Starr 1991; Starr and Thomas, 2002). Countering the atomistic nature of the usual type of study, Ward and Gleditsch (2002), Sambanis (2001) and Salehyan and Gleditsch (2004) show that regional conditions in neighboring communities also influence the initiation of civil violence. Challenges to central rule are assumed to come from distinctive areas that have been ignored in weakened or failed states (Herbst 2000); further, conflict location relative to state capitals, borders, communities, and resources often provide tacit explanations of intent and positionality (Buhaug and Gates 2002, Buhaug and Lujala 2005). The involvement of outside players in a civil war has recently prompted speculations of “aggressive symbiosis” (Le Billon 2001), where the conflict has become beneficial to certain criminal elements of war-torn societies. The creation of spaces and networks of illegal activity is redrawing political boundaries and overtaking governance in failed states, presenting local, national, and possibly global risks (Keen 1998, Ó Tuathail 2000).

The external diffusion of conflict, or the escalation of parallel conflicts, is rooted in the

questionable legitimacy of many state borders and the frequent inability to control territories and the people within them. Diffusion and escalation are important and understudied features of civil war because entire regions can escalate into a series of civil wars feeding off each other (e.g. West Africa in the late 1990s). The salience of borders in civil war study highlights the mismatch of nation and state territories (Englebert, Tarango and Carter 2002).

“Geography as Container” work focuses on salient features of the environment (human or physical) that may be associated with war in a particular territory. Among key variables are measures of minorities at risk, per capita income trends, environmental stress that might be partly due to climatic change, income inequality, urbanization, and population migrations. Incorporating such measures pose additional challenges because of the paucity of data that continues to be a major stumbling block to such analyses. The linkage of the environment and security began in the 1980s, and case studies, focusing particularly on scarcity of resources (water, forests, fish), and violent domestic and international conflict, are able to construct a causal pathway (Homer-Dixon 1999). The environmental perspective is dominated by resource arguments, which contends that features of particular resources, especially the use of resources by easily-lootable resources by rebels as funds for their cause, make conflict more feasible. Research on resource scarcity as conflict encouraging (Homer-Dixon 1999) has been challenged by a growing body of research focusing on the proliferation of conflict in resource abundant areas (de Soysa 2000, Auty 2004).

Natural resource endowment is linked to poor economic growth and governance since “resource rents provide political leaders with a classic means of staying in power by establishing a regime organized through a system of patronage” (Le Billon 2001, 567). Research details the dual role of resources; the revenue of precious materials that support corrupt governments also provide conflict incentives and a much-needed source of income for rebel groups (Collier, 2000). While oil has received most attention as a war-inducing resource (Collier 2000, Fearon and Laitin

2003, Le Billon 2004), other resources including diamonds (West and Central Africa), timber (Cambodia), minerals (Congo), and drugs (Colombia, Afghanistan) have been implicated in civil war proliferation (Auty 2004, Olsson and Fors 2004). The spatial dispersion of resources (diffused throughout the state or in certain point locations) has been incorporated into theories of relative conflict location (Le Billon 2001, Buhaug and Gates 2002, Ross 2004). In general, resources and civil war are related by a variety of mechanisms and we need to separate them by group and regional context before we can conclude that the “resource curse” hypothesis (resources increase the risk of civil war) is supported.

Recently, political scientists have made tentative attempts to consider the influence of physical geographic factors in civil wars. De Rouen and Sobek (2004) conclude that “borders, war type, Africa, UN intervention, forest cover, and mountain cover” all help to determine to civil war outcomes but that the effects are varied and contradictory. Their research indicates that forest cover helps the government cause, whilst mountainous terrain helps rebels. Whereas Fearon and Laitin (2003) find evidence for the influence of terrain in conflict onset, Collier and Hoeffler (2004) and Buhaug and Gates (2002) dismiss this argument preferring an economic explanation as incentive to rebellion. Nevertheless, terrain is considered a contributing factor in conflict proliferation (Collier, *et al.* 2003, Fearon and Laitin 2003). Studies detailing the role of terrain are useful, but inconclusive, partly because of uncertainties in definition and measurement of rough terrain. More careful mapping of insurgencies and rebel movements is a way to understand this correlation.

Regional conflicts are, per definition, a mixture of intra-national, intra-regional, and extra-regional conflicts. Considering that most conflict is currently intra-state and regional conglomerations of weak states are at internal risk because of conflict diffusion, international interests exacerbate tensions and power relationships inside regions resulting in shatterbelt-like scenarios. Of course, the opposite is also true. Systems that experience a great degree of stability

are at a lesser risk of internal conflict because of the stability of the larger region. The European Union is an example of such a region where stable democracy, favorable economic environment and a location in the core of the world-economy allow for change through peaceful measures.

Most analyses of civil war data reviewed above proceed with an implicit assumption that all the data are generated by a random process that results in the data being independently and identically distributed across the globe. Spatial analysts, on the other hand, offer two different strategies to place political actions in their regional contexts (O'Loughlin, 2003). On the one hand, we advocate a SISS (spatially integrated social science) which views space as integrating social processes and sees social science dynamics as processes in place (Griffith and Layne 1999, Goodchild, et al. 2000). This approach uses GIS (Geographic Information Systems) to integrate data by geo-referenced location and applies spatial statistical analysis to integrate multidisciplinary approaches. Reviewing the status of this perspective, Goodchild *et al.* (2000, 139) conclude that “in the mainstream of the social sciences, attention to the spatial (and space-time) dimension of phenomena is much less apparent (compared to geography), although a revival of sorts is occurring.”

The second stream of the spatial analysis approach revisits the decades-old notion of the “ecological triad” (social entity or actor, environment, and entity-environment relationship) from the Sprouts (Sprout and Sprout 1965). Here the emphasis is on the place of politics, the context in which political actions happen. It dovetails well with the traditions of political ecology and pays special attention to local cultural and material traditions (Robbins 2004). Careful consideration of contextual elements can disabuse us of ideas that certain global regions, such as the Middle East, are intrinsically “conflict-prone”. As Sørli *et al.* (2005) show, economic growth and development, ethnic dominance and regime type explain the distribution of conflict in the Middle East, (but not oil or Islam); thus, a general model fits this region as well as the global case and there is no reason to resort to (regional) exceptionalist explanations. Examples of both of these approaches



are now presented.

## **Spatial Analysis of Civil Wars**

In this section, we present two analyses that illustrate the spatial analytical approach to the study of civil wars whilst also making the case for more disaggregated data to answer key remaining questions. By taking the standard political science approach and giving it a spatial analytical twist, we show how the study of civil wars is enriched. The first example is both a demonstration of a case study, that for Uganda, and also an analysis that shows how civil wars become international wars because of the porous nature of borders and the alliances that are built across them by governments and rebels. The other example demonstrates the use of modern spatial analysis at a global scale and illustrates some pertinent features of civil wars that are not evident in the usual studies of economists and political scientists.

In spatial analysis, research usually proceeds from ESDA (exploratory spatial data analysis) techniques and cartographic exploration with attribute and locational data (latitude/longitude) organized in a GIS (Geographic Information System). Within the past decade, there has been a welcome integration of cartographic display and spatial statistical analysis within the same software packages. While cartographic display can offer some possible hypotheses about the geographic association of the variable of interest (the location of civil wars), we must be careful to also consider the other map layers that display the predictors such as income, ethnicity, political development, etc. Until these effects are filtered out, the simple statistic of clustering or randomness from a point pattern analysis cannot be conclusive. In human geography, simple extrapolations cannot be supported because of the complexity of human spatial processes.

## Uganda and its Neighbors: The Evolution of an Extended Conflict: The Ugandan test case

illustrates the application of geographic theory and methods to the mechanisms involved in the reproduction of conflict over time. Uganda is a major player in the African Great Lakes conflict formation over the last four decades, as it has experienced civil strife since its independence in 1962. Its conflicts remain relatively understudied in comparison to its neighbors, Rwanda, the Democratic Republic of Congo (DRC, formerly Zaire), or Sudan. However, the various Ugandan rebellions illustrate a number of salient factors important to understanding civil conflict in the developing context. Firstly, Uganda's colonial history set the stage for the present day North-South divide within the political institutions and the military; secondly, these conflicts demonstrate the shifting relations and intersections between internal rebel organizations and regional ethnic groups; thirdly, Uganda ethnic geography has been a primary factor in development and hence motivations for conflict; and finally, Ugandan foreign relations highlight the role that external actors play in supporting or suppressing conflict across borders, and the resource neighboring failed and weak states are to rebel groups.

The geography of Ugandan conflicts expresses these aforementioned factors. Various provinces of Uganda have been involved in rebel activity fighting during the different rebellions. As wars diffused and ended, and as rebel camps mobilized, regrouped, retreated or were victorious in gaining control of the capital, Kampala, the map of war changed repeatedly (see Raleigh and Hegre, 2005 for an illustration). A brief overview of major Ugandan conflicts demonstrates how the political geography of Uganda has shaped the form and focus on rebellions against the state.

Uganda's colonial and post-colonial situation perpetrated an environment wherein ethnicity determined one's access to power within the state. The northern Uganda regions were kept underdeveloped by the British, who filled military ranks with Northern soldiers; the south was more developed and hence considered a threat to the colonizing powers. At independence,

this divide continued when a rebellion in the powerful southern region of Buganda was suppressed by the northern (Langi) Milton Obete government. In 1971, a *coup d'état* by a northern, ethnically Kakwa, General Idi Amin marked a descent into terror and highlighted a number of complicated ethnic relations inherent in the Uganda power structure. Amin directed considerable repression against Milton Obete-supporting fellow Northern ethnic communities-- specifically the Acholi and Langi people. Amin's foreign policy, including his decision to attack neighboring Tanzania in 1978, encouraged Tanzania to ally with assorted Ugandan rebels to launch the 1979 attack that overthrew the Amin regime. The influence of Amin's sole ethnic power center-- the northwest-- was too small to counteract the influence of the northern areas coupled with outside support.

Despite the overthrow of Amin, the continued North-South divide saw the newly reinstated President, Milton Obete, returning to power to face a civil war with the NRA (National Resistance Army). The NRA took control of the ethnic, southern Bugandan heartland as this area provided a favourable recruiting environment for the growth and success of the rebel group. Obete, as he had done in 1962, overran the area and committed numerous atrocities in Buganda and the centrally located Luwero triangle (Ngoga, 1998). The war between the NRA and northern dominated government continued for over five years. The eventual failure of the Obete government to counteract the southern rebels resulted in the overthrow of Obete by northern, ethnically Acholi, officers. The instability of the coup, coupled with the ever increasing losses of territory to the NRA, culminated in rebel leader, Yoweri Museveni, declaring a rebel victory and seizing Kampala of January, 1986.

The extent of NRA liberated territory was limited. The victorious rebels did not control the north, which proved to be both a favourable area to host rebel organizations and relatively inaccessible to the government (Behrend, 1998). The overthrown Acholi officers returned north, as far as Sudan, to reform the previous regime's military into a rebel force to counterattack the now

official military forces of the NRA. Of number of smaller rebellions also occurred during this time; the most successful of these folded elements of the previous military into the Ugandan People's Democratic Movement (UPDM) and the Holy Spirit Movement (HSM). When the UPDM agreed to a ceasefire in 1989, the remaining active rebels allied with the HSM to continue the civil war. The HSM eventually ceased its activity only to stage resurgence in 1994 as the Lord's Resistance Army -LRA (another group—the "Ugandan Democratic Christian Army" had mobilized before the LRA). The geography of the LRA rebellion reflected what was thought to be a sympathetic public in the north. The northern Acholi community has borne the brunt of LRA actions, presumably because the LRA is not strong enough to gain a foothold in any other region, and so depends of ransacking Acholi villages and towns to sustain itself. The brutal actions of the LRA include numerous kidnapping of children to serve as soldiers. (See Figure 1 for the locations of the LRA actions (Raleigh and Hegre, 2005 ACLED data).

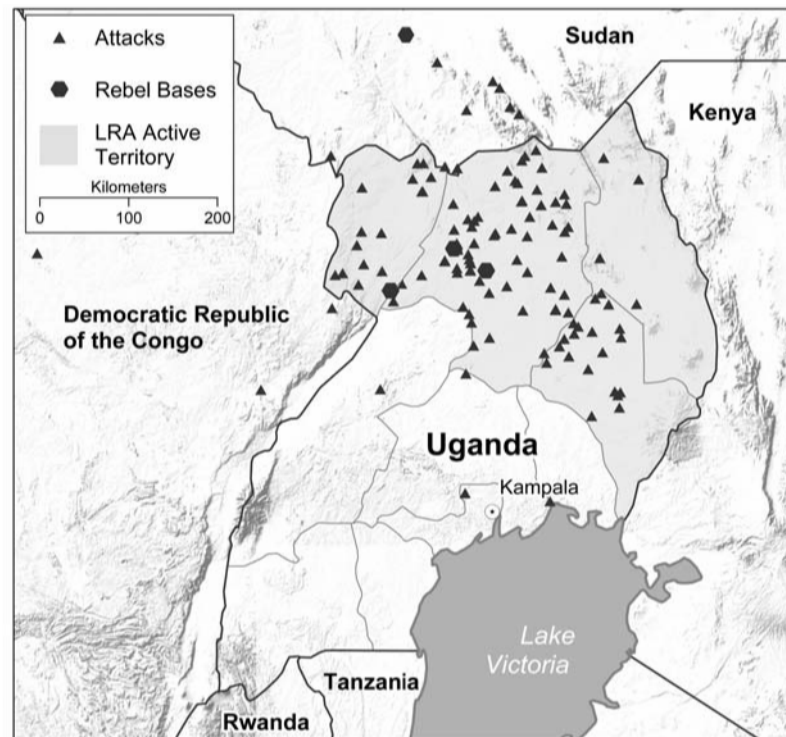


Figure 1: Lords Resistance Army (LRA) active territories 1994-2004

The domestic civil war now widened as it spread across Uganda's borders, giving rise to a

classic regional conflict formation. The LRA established bases in southern Sudan, where they were supported by the Sudanese government. At the same time, the SPLA Sudanese rebels of southern Sudan, while engaged in a long and brutal civil war with the own government, were tacitly supported by the Ugandan government. The LRA managed to attack northern civilians and army posts through hit and run tactics across the border into northern Uganda while maintaining a safe haven in Sudan. The LRA also created ties with a smaller rebel group in the Northwest, the West Bank Nile Front (WBNF). A recent attack by the LRA on peacekeepers in the DRC has confirmed suspicions that the LRA is now firmly established in that failed state, and is still assisted by the Sudanese government.

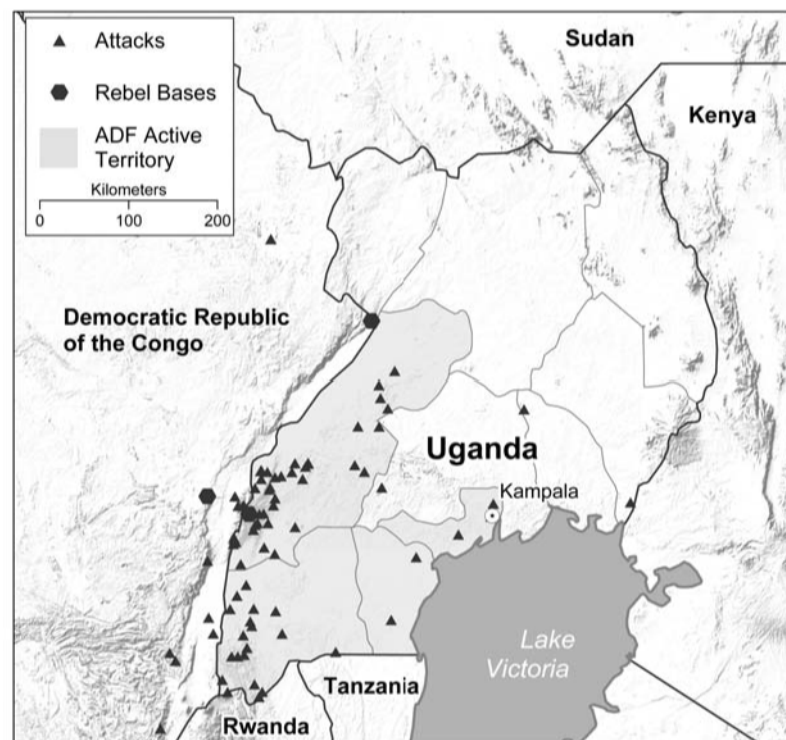


Figure 2: Allied Democratic Forces – ADF – active territories 1996-2002

Another rebel group (the Allied Democratic Forces - ADF) developed in the west of Uganda in the rough terrain of the Ruwenzori Mountains in 1996. The ADF merged member of previous rebel organizations, and derived some support from the ethnic communities in the far western region which were unfriendly to the current regime. Although the goals of the ADF

were unclear, it perpetrated multiple attacks on government military posts in the west, on civilians, and eventually on the capital, Kampala. Eventually, the ADF made strong alliances with DRC rebels and went on to establish bases in that failed state. It is rumored that the Virunga Forest-Park in the remote Northeast corner of the DRC was home to multiple allied rebel organizations in the late 1990s. (See Figure 2 for the geography of the ADF revolt (Raleigh and Hegre, 2005 ACLED data). Thus, Uganda's large neighbors (Sudan and the DRC), both with devastating civil wars of their own, were now part of the struggle for control of the Kampala-centered state regime. Uganda entered the first and second Congo wars (1996 and 1998, respectively), justifying its actions by claiming the Congo was a haven for rebels intent on harming the Museveni regime, and that of Uganda's Rwandan allies (Clark, 2002).

Hence, both internally and externally, the geography of Ugandan conflicts returns to distinct national North-South divisions and regional ethnic affiliations. The politicization of the ethnic communities in Uganda is further exacerbated by the geography of development. The northern President Obete, attempting to redress entrenched under-development as a result of colonialism, faced resentment from southerners. In turn, President Museveni, a southerner, is seen as having cultivated his southern base, whilst leaving northern regions underdeveloped. As noted by Kasfir - "Devastating civil wars have been fought in parts of the east and north. The perception of the north as a southern government, and its wars it has fought against remnants of armies of former enemies, has reinforced regional cleavages (1995:149)". These situations have resulted in an entrenched sense of hostility and ethnically charged insurgencies against ruling regimes. It is northern grievance and hostility, Joseph Kony- the leader of the northern Lord's Resistance Army- claims to represent in current negotiations with the Museveni regime.

Externally, Uganda contributes to and suffers from foreign assistance to rebel groups. The entrenched instability in the African Great Lakes region is fueled by states such as Uganda

assisting the SPLA (Sudan), or AFDL (Kabila-Zaire), or RCD (DRC) rebel organizations, while suffering from Sudanese and DRC support for Ugandan rebel groups. Neighboring instability creates an environment for state failure and increases the risk of civil war within a state (Raleigh, 2006). The post-colonial history of Uganda, generally considered a fairly successful African polity, demonstrates that replacing one leader for another is likely to result in further ethnic resentment. Without the mechanism of a democratic regime to allocate government benefits and participate in non-ethnic politics, poor countries can expect to see further civil strife that involves their neighbors, inadvertently or not.

Uganda, in particular, and the Great Lakes region in general, highlight the complexities of African civil wars. Civil war onset and duration are typically not explained by one cause but by the interplay of underlying ethnic and economic conditions with catalytic political factors. In the case of Uganda, previous rebellions, politicized ethnic communities, and questionable military loyalties created an environment suitable for persistent civil wars. Governments facing rebellion are often repressive and reliant on a military of dubious quality and ethnic, rather than state, attachment (see Clapham, 1986). For that reason, governments shift spending from basic needs to the military (African countries often top the league table of military spending as a proportion of GDP; see SIPRI, 2004) and install members of the ethnic group that provide the government's ministers as the officers in the military (Clapham, 1986 and Midgal, 2001). Outside factors —such as neighboring rebellion and porous borders —allow rebels safe haven. The Great Lakes conflicts highlight how many current civil wars are not state-specific or solely internal phenomena, but related and supported by a host of external conditions (Clark, 2002). And, in relation to theoretical emphases in the human geographic consideration of scale, a variety of scale dependent and scale related effects are clearly visible.

Determining and analyzing the geography of conflicts, along with the root and catalytic factors of conflicts, requires local scale data. A collection of disaggregated data, including geo-

coded information on battles, rebel and government camps, resources, targets, etc., can provide the essential information for such a detailed analysis (See Raleigh and Hegre, 2005 on disaggregated event data for Central and West African Conflicts). Typically, event data are recorded using newspaper reports and other archival data and are elusive and time-consuming to collect. However, they provide insight into the nature of actions, shedding light on the forces which lead to the outbreak of conflict in certain areas of the state. (See Kalyvas, 2006, for an extended argument about the localized and otherwise personalized nature of civil war, supported by dozens of diverse examples that rely on individual event data).

### The Long-Term Effects of Civil Wars – A Lot Depends on *Where* the Conflict Occurs:

Most civil war study has concentrated on the reasons for war outbreaks, the variations in war duration, and the conditions under which wars end. However, a recent initiative in the World Health Organization that re-calculates life expectancy measures to take account of the years of life lost due to disabilities of various kinds (DALE – disability adjusted life expectancy) has led to a consideration of the effects of wars on a country's quality of life, even for those not directly involved in the conflicts. The sum of the research to date is that the indirect effects of conflicts are significantly more important in reducing DALYs (disability-adjusted life years) than the direct effects of the fighting itself. Ghobarah, Huth and Russett (2003, 2004a, b) show that public health consequences of civil wars persist beyond the span of the actual conflict by estimating the additional burden of death and disability. The health outcome in 1999, from the indirect and lingering effects of civil wars in the years 1991–97, was approximately equal to that incurred directly and immediately from all wars in 1999. Further, the public health consequences of civil wars are disproportionately borne by women and children.

The Ghobarah, Huth and Russett regression model that generates the estimates of the effects of civil wars is very straightforward and contains a series of controls such as ethnic



fragmentation, income inequality, health spending, urban growth, location in a tropical country, a governance score on the democracy-autocracy scale, and education. Their key predictors are the number of people killed in civil wars in the previous decade and whether the neighboring states experienced a civil war in the previous decade. The outcome (dependent) variable is DALYs lost per year per 100 people and the analysis is repeated for a large number of demographic groups (men and women separately of various ages). In their studies, civil wars both at home and in contiguous states have independent significant effects on DALYs (Disability Adjusted Life Years), often of a sizeable magnitude. Thus, they estimate that “the impact in 1999 of living in a country that had experienced an intense civil war a few years earlier (such as Bosnia, with 6.8 civil war deaths per 100 people) rather than in a median country with no war at all is a loss of about 28.5 healthy years for only one disease of 23; the misery accumulates with each of the other 22 categories of disease.” (Ghobarah, Huth, and Russett 2003, 197). They report the coefficients and the estimates for the whole world with no disaggregation for region or country, though one of the key controls in the studies is whether a country is located in a tropical zone or not.

What is lacking in the Ghobarah, Huth and Russett studies is any consideration of how these effects of civil wars on life expectancy might vary across the globe. To calculate these effects, we recalibrated their models using GWR (Geographically Weighted Regression). This method differs from OLS (Ordinary Least Squares) because one can disaggregate the usual global parameters (such as those reported in Ghobarah, Huth and Russett papers) into local estimates that can be mapped (Fotheringham, Charlton and Brunsden, 2002). Using the data on the Yale team's website (accessible, at time of writing, at:

<http://pantheon.yale.edu/%Ebrusset/APSRMay03.zip>), we replicated the studies (the global coefficients are the same) and extended them by disaggregating the regression parameters to each of the 180 countries. Our inquiry is designed to see if there are significant variations across the globe and whether these variations are geographically clustered, which, in turn, might

generate further hypotheses on the factors causing the distribution. Some key results are reported in Figures 3-4.

Ghobarah, Huth and Russett (2003) report that the overall annual effect of civil war deaths on DALYs lost to all disease categories for 100 Males aged 15-44 is 0.215, a small but a statistical significant effect. (The biggest effect, by far, on DALYs is due to income inequality). The distribution of the parameter values for the civil wars effects is geographically variable, ranging from -1.28 to + 0.53, as can be seen in Figure 3. The concentration of highest values in South-east Asia and other high values in Africa south of the Sahara, the Arabian peninsula and east Asia is highly visible. In these regions, civil wars cause up to twice the impact on DALYs for males between 15 and 44 than in a country with no such civil conflicts.

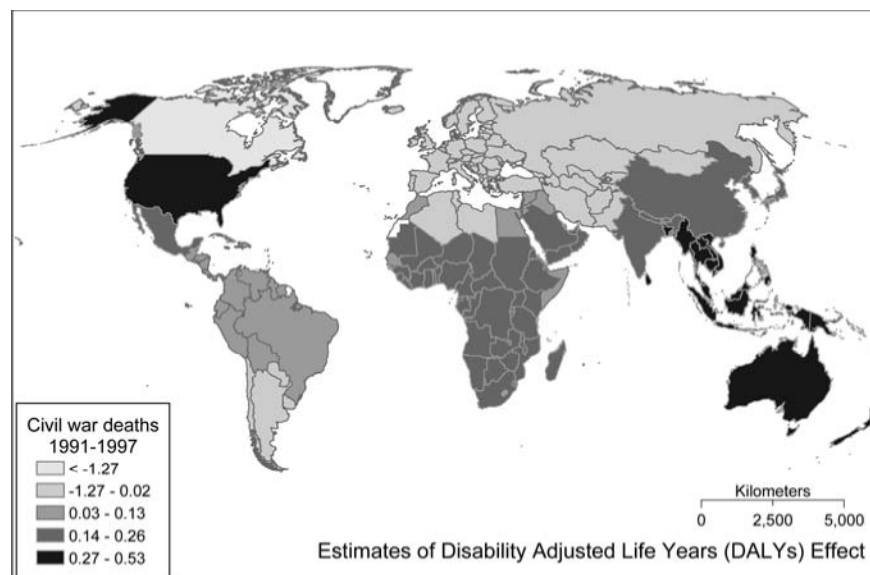


Figure 3: Effects of Civil Wars on DALYs (Disability adjusted life years) for Males aged 15-44

An even more dramatic demonstration of the geographical variation in these estimates of civil war effects is in the values for contiguous civil war variable. The global average is 5.75 AIDS-caused DALYs in women aged 15-44 , but the values range up to 36.12 in southern Africa.

The map (Figure 4) show significant concentration of highest values in Africa where southern African countries (Mozambique, Zimbabwe, South Africa etc) have values eight to ten times higher than the average global effect. In this region, already wracked by declining per capita incomes and an overloaded health care system, local conflicts further exacerbated the devastating effects of AIDS on the female population through transferred government spending from social to military exigencies. In fact, replication of many of the original models using GWR shows that the authors ignored an obvious predictor in their study, location in sub-Saharan Africa, which has independent and significant effects in addition to the controls that they used.

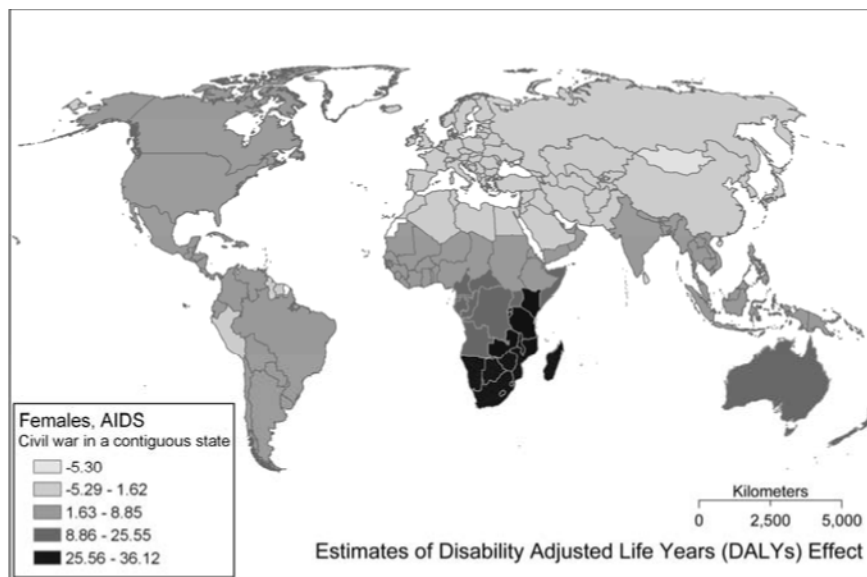


Figure 4: Effects of civil wars in adjoining states on DALYs (disability adjusted life years) lost for females aged 15-44 due to AIDS

Further statistical analysis by O’Loughlin and Witmer (2005) indicates that the African clusters on all the maps of DALYs suggest that the “African factor” in the models of Ghobarah, Huth and Russett is under-specified. The re-analysis of the data that show a significant effect of civil war involvement at home and in neighboring states from Ghobarah, Huth, and Russett (2003) using geographically-weighted regression identified important spatial patterns in the distribution of the localized parameters, especially for Africa. Not all of the original analyses

need to be disaggregated and the choice of spatial weighting is an important consideration in the spatial analysis. However, the appearance of clusters in Africa (especially in southern and eastern Africa) of high parameter values for many of the models suggests that greater attention be paid to the specific African context and consideration of a recalibrated model that would substitute an African location for the 'tropical location' that was present in the original models

These short illustrations of the value of a geographic approach to the study of civil war violence incorporated both an emphasis on place and contextual conditions and scale considerations (Uganda) and the techniques of spatial analysis at the global scale (the study of civil wars' long-term effects). What is common to both approaches is the need to disaggregate the country-level data widely used in civil war study and to question the use of global models that effectively summarize the whole distribution but which hide important and interesting geographic variations. Until more political scientists and economists become convinced of the need for the collection of more precise geographic codings to go along with the temporal and event data that they normally collect, the study of these spatial considerations remains severely hampered.

## **Conclusions and Desiderata for Future Research**

Disaggregated data beyond the level of the nation state have not yet been widely explored in the study of civil war violence. Although such data presently do not yet exist in a manner that easily allows cross-national comparisons and local in-depth analysis, hopefully this review has made the case for a disaggregated, spatial perspective on civil wars will augment our understanding of their causes.

This review has stressed the impossibility of bounding the study of civil wars to the legally-defined territorial limits of the country in question. With the advent of transnational

violence in the form of potentially ubiquitous terrorism, the lines between national, international, transnational, and subnational have blurred irrevocably. Scales, in effect, have become more malleable and their specific meanings changes from region to region. That said, it is also evident that most violence will continue to be found in the world's poorest regions. The peripheral parts of states, particularly ethnic enclaves, can harbor both domestic and transnational oppositions. Thus, the United States 9-11 Commission identified western Pakistan and the Pakistan-Afghanistan border region, southern and western Afghanistan, the Arabian peninsula, the Horn of Africa, West Africa, south-east Asia, and western European cities with sizeable expatriate Muslim communities as possible bases for anti-American terrorist movements and concluded that "in the twentieth-century, strategists focused on the world's great industrial heartlands. In the twentieth-first, the focus is in the opposite direction, toward remote regions and failing states. The United States has had to find ways to extend its reach, straining the limits of its influence" (9/11 Commission 2004, 366). The post-Iraq war national military strategy formalizes this fear and while stating that the US will cooperate with allies, retains a preemptive strategy for future military actions (Myers 2004). Most oppositional movements will not achieve such global attention from the US but the connections between rebellions, state-to-state alliances, US hegemony, and domestic and transnational terrorism are only now being developed.

Study of civil war, both its development and aftermath, has been hindered by a paucity of data and a reliance on secondary published sources, government and non-governmental agency reports, and newspaper accounts. There is relatively little primary data collection, either through questionnaire surveys, remote sensing from satellites, interviews or census taking. A clear need exists to link thematic data for a wide range of important actors and institutions: data for geographic units (counties, census units, etc) derived from government sources, data on individuals whose addresses are geo-referenced and gathered through a survey questionnaire as

well as satellite image data on the physical environment that can be geocoded and matched. In this regard, further development of methodologies that link social science approaches to the physical environment are warranted. To organize data collection and to overlay and integrate the spatial coverages for the three types of data, GIS offers a solution to efficiently display the information collected. An integrated database can thus contain the geo-referenced data from satellite imagery, digital line graphs, GPS data (for household addresses and ground-referencing information), socio-demographic data and infrastructural and environmental information gathered from fieldwork and from international agencies (e.g. UNDP) working in the war zones. This kind of information will allow a different kind of research thrust, one that is avowedly geographic, to supplement the (increasingly) stale stable of existing reports on civil war violence.

For too long, geographers have paid scant attention to the depredations of civil wars and associated violence. Research by political scientists and economists has reached the point of diminishing returns and it will take a paradigmatic shift and/or a flood of data, especially for disaggregated units, to jumpstart this body of work to a new level. The geographic perspective, especially the emphasis on context, scale linkages, diffusion, and spatial analysis, offers a vital and innovative supplement to dominant approaches.

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