

# Breaking Down Breakdown: Localizing State Failure using GIS<sup>1</sup>

Daniel Lambach  
German Institute of Global and Area Studies, Hamburg<sup>2</sup>

Tim Dertwinkel  
International Conflict Research, ETH Zurich<sup>3</sup>

February 2007, version 0.5

**Abstract** State failure, as a social science concept, takes a whole country as its level of analysis. In this paper, we argue that such an aggregated macro-perspective on state failure is, at best, reductionist, at worst, misleading. We base our argument on the emergent literature of ‘states-within-states’ and ‘non-state governance’ which points to the existence of multiple locations of authority within the state at the same time. We present several examples of states divided into a relatively well-functioning part and areas where the state only shows the most superficial presence. By linking the overly theoretical and policy-laden discussion of state failure back to recent empirical, quantitative work on the geography of civil war and state capacity, we show that a single expression of state strength does not adequately represent empirical reality. This lays the groundwork for a first attempt to map local governance and to visualize structures of authority by using geographic information systems (GIS). We illustrate our main argument by a series of maps for the overall situation in the Democratic Republic of Congo.

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<sup>1</sup> Paper prepared for the *48th ISA Annual Convention, Chicago, 28 Feb-3 Mar 2007*. We would like to thank Jan Ketil Rød, NTNU/Trondheim and PRIO/Oslo for his permission to use figures 1-3 which were taken from his presentation “GIS and armed conflicts”, presented at ETH Zurich 2005.

<sup>2</sup> Senior Researcher, German Institute of Global and Area Studies (GIGA), Institute of African Affairs, Neuer Jungfernstieg 21, D-20354 Hamburg, Germany, Phone: +49 40 42825 523, Email: [lambach@giga-hamburg.de](mailto:lambach@giga-hamburg.de)

<sup>3</sup> Ph.D. Student, Center for Comparative and International Studies (CIS), Swiss Federal Institute of Technology, Seilergraben 49, 8032 Zurich, Switzerland, Phone: +41 1 632 6760, Fax: +41 1 632 1289, Email: [dertwinkel@icr.gess.ethz.ch](mailto:dertwinkel@icr.gess.ethz.ch)

## Introduction

The concept of “state failure” has experienced a rapid rise to fame within the last few years. It has been discussed in an abundance of scholarly monographs and articles (Rotberg 2003a and 2004a; Milliken 2003; Zartman 1995a; Dorff 2005; Fund for Peace 2005 and 2006; Fukuyama 2004; critically Bilgin and Morton 2002), NGO policy papers (Commission on Weak States and National Security 2004; Debiel et al. 2005; International Crisis Group 2004) and official documents (National Security Strategy 2002 and 2006; European Security Strategy 2003; USAID 2005).<sup>4</sup> It has entered the vocabulary of development policy and is discussed in security and defense ministries around the world.

From its inception, the concept has been criticized for a variety of things. The strongest critique was that the notion of “failure” was construed in relation to a Weberian ideal-type of the state that was manifestly unfair to postcolonial countries which could hardly be said to adhere to such a concept (Migdal and Schlichte 2005). In spite of the general validity of said critique, we believe that it is unnecessary to discard the concept of state failure, or, as it is now frequently called, state fragility, altogether. Instead, we propose to use it as a springboard for further inquiry. By getting rid of normative subtexts commonly (though incorrectly, see Lambach 2007: 34-35) associated with the Weberian ideal-type, we aim to preserve its applicability to the problem at hand, not least because alternative research strategies are – as yet – underdeveloped.

A central problem of the “state failure” concept less frequently noted is its reductionism. “State failure” (whether measured on a metric, ordinal or nominal scale) describes a condition at the level of the state. However, it is quite clear that this aggregation leads to a loss of information as the failure of a state does not occur evenly throughout a country’s territory. Several scholarly works (e.g., Migdal 1988; Ferguson and Mansbach 1996) point to the existence of multiple locations of authority within the state. Accordingly, this paper argues that theories of state failure need to consider the spatiality of the state. To talk about state failure affecting the whole of the country is, at best, reductionist, at worst, misleading. Two “failing” states will exhibit starkly different local dynamics. Colombia, for example, is divided into a relatively well-functioning part and an area where the state only shows the most superficial presence. To collapse this complex state of affairs into a single label (such as “weak”, “failing” or “collapsed”) does not adequately represent the empirical record.

We introduce the concept of the “local state” which is made up of the agents, offices and institutions of the state that are present in a given locality. The local “empirical statehood” of the state is determined by the presence, as well the degree of functioning of these aspects and agents. This lays the conceptual groundwork for a project of “mapping stateness” that aims to represent structures of authority (state as well as non-state) geographically by using geographic information systems (GIS).

The paper is structured as follows. In the first part, we will present an overview of theoretically driven state failure research, pointing out how territory and geographic space are incorporated or neglected in conceptualizations of state capacity. Section two discusses the spatiality of the state in greater detail and gives several examples of local statehood. This is followed by preliminary suggestions how to empirically deal with and measure local state capacity, inspired by recent progress in quantitative work on the geography of civil war. In

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<sup>4</sup> For an overview of recent developments see Lambach (2004).

part four, we then discuss the principles and possibilities of a GIS driven research agenda that opens up for further analysis regarding local state capacity. This is illustrated by a series of maps for the Democratic Republic of Congo alongside key dimensions of local governance, and an outline how to proceed with GIS analysis. Section five concludes.

## 1. The State of State Failure Research

The literature about state failure has expanded substantially since September 11th, 2001, in the wake of which a number of research projects were initiated (Dorff 2005). Among the significant conceptual innovations of this recent wave of literature is the notion of a continuum of stateness, ranging from the Weberian ideal-type state to the collapsed state.<sup>5</sup> At the same time, there is a debate about whether we ought to speak of “failed” or “fragile” states (for the latter, see, e.g., Chauvet and Collier 2004; Francois and Sud 2006; USAID 2005; Debiel et al. 2005). Whatever the terminological preference, the substantive arguments are pretty much the same. For this reason, we will continue to speak of “state failure” and consider the two terms as synonymous.

In the literature, there has emerged a certain consensus of what state failure substantially means, even if the definitions vary in some details. An ‘min-max strategy of definition’ (Gerring and Barresi 2003) of state failure would cull the following minimal attributes of state failure from the literature:

- Disruption of political order,
- Loss of physical control over the state’s territory as a whole, and
- Destruction or dysfunctionality of central state institutions.

Among the ideal-type “maximum” attributes would be the following:

- Delegitimization of the government and/or the state,
- Transfer of authority to non-state actors,
- Loss of state capacity to deliver public goods,
- Avenues for aggregation of popular interests are disrupted,
- Increasing external intervention/interference,
- Loss of state ability to extract revenue,
- Informalization of the economy,
- State loss of control over parts of the territory
- “Privatization” of state institutions, and
- Violent intrastate conflict.

However, we believe that it remains rather unclear which attributes of state failure or capacity count most here. In addition, with each additional attribute added, it becomes almost impossible to figure out if these are necessary or sufficient conditions for collapse, or some combination of both.

Furthermore, data relating to these attributes is usually aggregated to the national level, in order to allow an assessment whether a state can be considered “failed” (or “fragile”, “failing”, “weak”, or “collapsed”). A typical example is Rotberg (2004b) who offers a series of regional maps indicating the current status of various countries. However, it is intuitively clear that most of these attributes contain an element of spatial variation. For example, a

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<sup>5</sup> The notion itself is not entirely new and has been employed by Nettl (1968) and Holsti (1995), among others. In state failure research, however, it has enjoyed widespread use only in recent years (see, e.g., Rotberg 2004b).

government never loses physical control over all of its territory simultaneously. In some provinces, government forces might be driven back by rebels, while the state's authority will be uncontested in others. The capacity to deliver public goods will vary immensely throughout a state's territory due to differing social, economic, political, and topographical conditions.

Therefore, we ask whether such sub-state variation in the failure of a state is adequately represented in the literature. The works of William Zartman (1995b) and Robert Rotberg (2003b, 2004b) are among the most influential contributions.<sup>6</sup> We will consider these in turn to see whether and how they consider the spatial dimension of state failure and then compare them to the contribution of Gero Erdmann (2003).

Zartman lays out a scenario that he considers typical of state failure (which he terms "state collapse"). Therein, collapse begins with an ageing regime that is lacking legitimacy and resources. Power devolves to the periphery as state institutions hemorrhage capacity to implement policy and lose control over their agents. Alienation of significant sectors of society leads to a takeover by military actors (such as in coups or rebellions). The new junta, however, is no more capable of governing than the previous one and thus resorts to coercion. Eventually, with its support base ever shrinking, the government is toppled. Civil society, fragmented from the years of repression, is unable to rebuild the political order quickly and a protracted state of political disorder ensues. However, the military takeover might not come about: 'Often the rebellion becomes bogged down on the way to the capital, falling prey to the same divisions as those that have splintered the society. Full takeover is averted and a weak government hangs on, its authority gone and its de facto power limited to the capital.' (Zartman 1995b: 9) Zartman seems to consider this case one of "incomplete collapse". However, since he did not operate with a concept of a continuum of stateness but with a dichotomous understanding of collapse/non-collapse, he does not discuss this point in detail.<sup>7</sup>

In contrast to Zartman, Rotberg does employ a continuum concept, distinguishing between strong, weak, failed, and collapsed states. He states that 'strong states unquestionably control their territories and deliver a full range and a high quality of political goods to their citizens' (2003b: 4). Weak states show a diminished capacity to provide political goods and guarantee security, but are not subject to sub-state variation. Space only enters the picture when a state fails or collapses: 'In contrast to strong states, failed states cannot control their borders. They lose authority over sections of territory. Often, the expression of official power is limited to a capital city and one or more ethnically specific zones' (2003b: 5). A collapsed state is completely devoid of central authority, presenting a level playing field for local actors to assert themselves.

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<sup>6</sup> Other publications either do not consider spatial aspects at all (Baker and Weller 1998 and the related Fund for Peace 2005 and 2006) or do so along similar lines to Zartman and Rotberg.

<sup>7</sup> He also makes an interesting statement about the effects of state collapse on the spatial distribution of power: 'State collapse is marked by the loss of control over political and economic space. The two effects work in opposite directions. Neighboring states encroach on the collapsing state's sovereignty by involving themselves in its politics directly and by hosting dissident movements who play politics from neighboring sanctuaries. As a result, the political space – the territory where politics is played – of the collapsing state is broader than its boundaries. On the other hand, its economic space retracts, in two ways. The informal economy tends to take over, overshadowing the formal economy in its transactions and escaping the control of the state. At the same time, parts of the national territory become lost to neighboring economies. Such areas often use the neighbor's currency and tie in to the neighboring region's trade. [...] Reconstructing the state means, among others, constricting national politics to the national territory and restoring national economic flows throughout the territory.' (Zartman 1995b: 9) An example of territories integrating with neighboring economies would be long-standing ties connecting the diamond-rich Kono area in eastern Sierra Leone with Liberia.

Thus, according to Rotberg, the uniform expression of state power throughout its territory dissolves during progressive stages of failure. Rotberg even offers a hypothesis to that effect: ‘Plausibly, the extent of a state’s failure can be measured by how much of its geographical expanse is genuinely controlled (especially after dark) by the official government. How nominal or contested is the central government’s sway over peripheral towns and rural roads and waterways? Who really expresses power up-country, or in districts distant from the capital?’ (Rotberg 2003b: 5-6, similar 2004b: 6)

Unfortunately, Rotberg immediately violates his clear criteria and disconfirms his own hypothesis when he introduces the chapter on Colombia in his edited volume. At this point, he states that although the Colombian state has no control over one third of its territory (‘a clear hint of failure’ [2003b: 15], he adds), it should be considered a weak state because it is functioning reasonably well in the remaining two thirds of the country.<sup>8</sup> However, this kind of classification by average runs counter to his typological definition of the continuum of stateness.

Erdmann (2003), who starts out with a threefold typology of state failure, goes one step further than Zartman and Rotberg. He differentiates state failure (*Staatsversagen*), state decline (*Staatsverfall*) and state collapse (*Staatszerfall*).<sup>9</sup> Failure includes structural deficits of the state which still retains a functioning monopoly of violence overall. State decline encompasses a ‘territorial constriction of the monopoly of violence and of other activities of the state’ (2003: 271) without the challengers to the state monopoly intending to secede, i.e., without questioning the political community. Erdmann also discusses two different types of state collapse which he characterizes as the breakdown of state authority: The first one is the “partial collapse” which entails the loss of the monopoly of violence and a challenge to the integrity of the state. (‘Here the government still controls substantial parts of the territory and holds a nominal monopoly of violence [...] and is still capable of contesting control over the remaining parts of the country.’ [2003: 272]) The second one is the complete collapse of the state which has only been observed in very few, extreme cases like Somalia or Liberia.

Erdmann’s conceptualization of the spatial variation of state failure is a great improvement over previous efforts. In contrast to Zartman, he explicitly includes a category of “partial collapse” to cover those cases where the government is still able to hang on to some part of the state’s territory. Erdmann would also be able to classify cases like Colombia as examples of state decay, as the territorial aspect of failure plays an important part of his definition of this category. In these respects, Erdmann’s typology represents a significant improvement over previous efforts. Nonetheless, the difference between the categories of state decay and partial collapse is exceedingly thin, resting on whether insurgents have secessionist aims or not. While such a distinction might be theoretically sound, it is almost impossible to verify in practice whether secessionist rhetoric is genuine or not (Englebert 2005).

In the end, Erdmann’s typology might even serve as a reasonable metric to classify countries based on their performance as failed, decaying, or (partially) collapsed. But to what end? We argue that such a categorization might be of use when constructing global datasets or rankings to enable comparative research on the state (Lambach 2007: 34). However, classifying a state this way provides us with little understanding of the micro-dynamics of state failure or of the particulars of a case. Even Erdmann’s typology is only able to tell us that during state decay a ‘territorial constriction of the monopoly of violence’ (2003: 271) occurs. Such a blanket

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<sup>8</sup> In a subsequent classification, Rotberg characterizes Colombia as a ‘failing state’, i.e., as a weak state exhibiting a trend towards failure (2004b: 11, 46).

<sup>9</sup> Citations by Erdmann were translated from the original German by Daniel Lambach.

category can encompass a great variety of cases, from Zaire in late 1996, when the AFDL began its advance on Kinshasa, sweeping away the hollowed-out remains of the state and the military before it, to Angola throughout most of the late 1970s and 1980s, which was in effect a country divided into a government- and a rebel-held area.

In other words, talking about state failure can give us an idea about what is *not* there, but it tells us very little about what is actually taking place. However, for most research questions, an understanding of these processes is essential. Therefore, an identification of a state as “weak”, “failed” or “collapsed” should alert us that the territoriality of that state is in flux, and that the “stateness” of the state will show geographic variation. Next, we give several examples of this variation.

## 2. The Spatiality of the State

It is a central tenet of political geography that the state and most other forms of political organization have a spatial dimension (Cox 2002; Blacksell 2006). This position is echoed by classical sociologists like Max Weber (1979) who have highlighted the territorial base of the state long time ago.

Some definitions are in order at this point to avoid confusion. Space, on the one hand, is understood here merely as geographic space or location. Territory, on the other hand, is an attribute of states and other forms of political organizations (what Yale Ferguson and Richard Mansbach [1996] term ‘polities’), that is, an area over which these polities try to exercise control. Territoriality is the activity of controlling and defending said territory (Cox 2002: 1). Generally put, territoriality is a spatial expression or representation of social power: ‘It is a way to control people and resources by staking out a marked claim and by defending it against rivaling claims.’ (Albert and Brock 2001: 34).<sup>10</sup> Blacksell (2006: 21-27) notes that territoriality is expressed and exercised through three different pillars: symbols, systems and agency. All of these pillars, agency in particular, are useful for this discussion since they exhibit geographical variation, at least in part.

Political space is not exclusive, as Ferguson points out: ‘Polities regularly share some or all of the same political space. The domain of each polity consists of those persons who identify with it, the resources it can command, the “reach” it has with respect to adherents located in “space” in the broadest sense [...], and issues. All polities are “authorities” and “govern” within their respective domain.’ (Ferguson et al. 2000: 29-30; similarly Sidaway 2003; Clapham 1998).

Given this overlap of alternative centers of authority, what is the “local state”? There is a strand of research connecting administrative science, urban sociology and various subdisciplines of geography that deals with such a construct. However, recent research has been largely concerned with relations between state officials and civil society groups in urban settings in industrialized or industrializing countries. As a result, most articles focus on the question of the autonomy of the local state apparatus vis-à-vis the state as a whole, the

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<sup>10</sup> There is an ongoing debate about a possible change in modes of territoriality in the international system brought about by globalization. Some analysts argue that a “de-territorialization” of politics is taking place (Ohmae 1995; Ferguson and Jones 2002; Rosecrance 1999) while others describe it as a reconfiguration of political space that can even lead to a “re-territorialization” or a localization of politics (McMichael 1996; Albert and Brock 2001; Newman 2001). While we are sympathetic to the second argument, we are not going to enter into this debate here.

capitalist elite, or local pressure groups (Kirby 1989; DiGaetano 2002; James 1998). In his review of the literature, Philip Ethington remarks that ‘instrumental, behavioristic, and formalistic studies of the local state have been displaced by studies that seek to integrate the market, semiautonomous political action, and multiple levels of constituted authority and bureaucracies.’ (2001: 687) Accordingly, the local state is not analyzed from an institutionalist point of view, but rather as an actor in a political economy framework of urban governance.

While such a perspective frames the issue in an appropriate manner for First World countries, its applicability to weak and failing states is questionable. In these countries, the question is not so much whether the local state is autonomous from the central state, but *whether it is present and effective at all*. Therefore, we need to construct an alternative understanding of the local state which enables us to understand the causes and effects of weak local statehood. Differences notwithstanding, this understanding needs to heed Ethington’s reminder that ‘[local states] wield the most important kind of power: that which affects everyday life.’ (2001: 686)

There have been contributions on the political geography of weak states that are relevant here. The first one is the concept of ‘states-within-states’ developed by Kingston and Spears (2004; similarly Pegg 1998). They start from the premise that the failure of a state does not lead to “wars of all against all”, but rather ‘that the crumbling of one form of political order can reveal [...] new or incipient kinds of political order’ (Kingston 2004: 1). These they dub states-within-states, i.e., forms of political organization that control a territory within a larger state, impose order and develop institutional structures to collect taxes and implement policy. The emergence of such statelets illuminates the fragile territoriality of a failing state: ‘Indeed, the fact of states-within-states is an acknowledgement that there is a disjuncture between the territory that is ostensibly under a state’s *jurisdiction* and that which is effectively *controlled* by the state’ (Spears 2004: 19, emphasis in the original).

One example of such a state-within-a-state is *Greater Liberia* (or “Taylorland”), the space controlled by National Patriotic Front of Liberia (NPFL) of Charles Taylor during the Liberian civil war between 1990 and 1996 (Ellis 1999). With its military campaign brought to a halt in the outskirts of Monrovia, the Liberian capital, by a Nigerian-led intervention, the NPFL controlled over 90% of the country’s territory. Taylor then publicly proclaimed the state of *Greater Liberia*, with Gbarnga, his military headquarters, as its capital. The borders of *Greater Liberia* fluctuated somewhat as anti-NPFL militias entered the civil war – the NPFL even briefly lost control over Gbarnga in 1994, but managed to retake the city a few months later. It can even be argued that at one time, *Greater Liberia* encompassed parts of Sierra Leone that were then controlled by Taylor’s allies (some would say “proxies”), the Revolutionary United Front of Sierra Leone (RUF), although Taylor disputed these allegations.

The NPFL used *Greater Liberia* as a profit-making machine, netting an estimated annual \$300 million with the sale of diamonds alone and a further \$120 million through timber, iron ore and rubber exports between 1990 and 1994, with 15-20% going directly into Taylor’s private coffers (Ellis 1999: 90-91).<sup>11</sup> *Greater Liberia* only came to an end after Taylor entered national politics as part of one of many peace agreements. In 1996, he became a member of the Council of State, although his hold on Liberia was only finalized by his victory in the presidential election of 1997.

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<sup>11</sup> For comparison: The government of Liberia at the time had an annual budget of some \$20 million, with up to \$3 billion in external debts.

*Greater Liberia* is a case in point that states-within-states need not respect international borders. It also shows that such entities arise out of contested territoriality – it is not at all unusual for competing would-be state-makers to be active in the same areas (Ferguson and Mansbach 1996: 394). Mapping the activities of these groups would help identify overlapping territorial claims and contested spaces.

States-within-states, such as *Greater Liberia*, FARClândia (Colombia), the Hezbollah-controlled areas in Southern Lebanon and other, geographically smaller forms of political order generally do not emerge spontaneously upon the collapse of a state. Rather, the majority of them will have deep historical roots in the local culture. More recent structures, such as warlord domains, tend to receive more attention and can become quite large, but the majority of local authorities will be a product of local society (Migdal 1988).

This is consistent with the work of Catherine Boone (2003) who, in laying out a topography of the African state, focuses on center-periphery relations. She views the postcolonial state as locked in a struggle for authority with rural elites. In her typology, the economic autonomy of rural elites determines their bargaining power vis-à-vis the center (normally the capital city). At the same time, the stronger the social hierarchy in the periphery, the more likely elites will act as rivals to the center. This fits well with Boulding's (1962) pioneering study about the geographic aspects of war and peace. He developed the classical "loss-of-strength-gradient" model of conflict. According to Boulding, two elements are important for projecting national force: a nation's power at the point of origin (the capital) and the rate at which the power diminishes over distance because of transportation costs.

Herbst's (2000) study of the projection of domestic power in Africa builds on Boulding's work and links the abilities of governments and the idea of a state as a function of geographic control. In sum, Herbst shows how weak infrastructure can limit governmental control over state territory. He sees low population density and weak transport and communication infrastructures as obstacles that have hindered state-building in Africa since pre-colonial times. Herbst lays out the hypothesis that smaller countries with a highly concentrated population are easier to govern (and thus less likely to fail) than large countries with extensive hinterlands and multiple population centers. While he concedes that this will probably not be true in all cases, the empirical record is mixed at best. Out of twelve cases of postcolonial state failure in sub-Saharan Africa<sup>12</sup>, only four took place in countries that he identified as having a difficult political geography, while another four happened in countries with a favorable political geography. Herbst is therefore correct to caution that 'geography is not destiny' (2000: 159). Instead, it should be thought of as an intervening variable that structures social, economic and political relations within the country. Seen this way, his otherwise convincing explanation of the difficulties of postcolonial state-building can be reconciled with Boone's theory, in that the "lay of the land" is an important factor influencing the social hierarchy and economic autonomy of rural groups.

Recently, Buhaug, Cederman and Rød (2006) have introduced a novel way to link arguments of the qualitative literature on ethno-nationalist conflicts with the quantitative literature on civil war. Assuming that a state consists of a number of different ethnic groups and their relationships, a basic center-periphery logic is introduced, in line with a prominent insurgency model used by Fearon and Laitin (2003). The basic idea of a spatial center-periphery configuration to analyze such phenomena is taken from Rokkan and Urwin (1983), who have

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<sup>12</sup> D.R. Congo/Zaire (twice), Somalia, Angola, Burundi, Liberia, Rwanda, Sierra Leone, Chad, Côte d'Ivoire, Ghana, Uganda (see Lambach 2007).

proposed a detailed model of how peripheries interact with central states including geographic, logistical, economic and cultural factors.

While Boone and Herbst offer important contributions to the political geography of weak statehood, they focus on the factors *explaining* local variation. Kingston and Spears, on the other hand, investigate a particular *consequence* of local variation. In order to integrate these separate strands with state failure research, we need to develop a concept of local statehood that captures the local dynamic of state failure and state-building. The next part of the paper will be devoted to such an endeavor.

### **3. Operationalizing the Local State**

#### **3.1 Subnational level of analysis**

Throughout this paper, we argue to theoretically break down and empirically analyze state failure on a subnational level of analysis. By doing so, we adopt a perspective most clearly expressed by Snyder (2001) to “scale down” research in comparative politics and international relations. Snyder (2001) introduces what he calls the “subnational comparative method”, because subnational units such as provinces or counties offer several advantages: first, such a focus helps to overcome problems of selection bias by increasing the number of observations and shifts the level of attention to controlled, within-country comparisons with constant background conditions. In short, it makes it easier to construct controlled comparisons, which is often a difficult task in cross-country designs. Thus, it helps mitigating some of the characteristic methodological pitfalls small-N research design suffer from. Second, a focus on subnational units of analysis strengthens the capacity of researchers to accurately code cases and to make valid causal inferences, even across countries. This is so because cross-national research, especially quantitative one, often relies on national-level mean values to code cases, which can lead to serious miscoding and flawed conclusions.<sup>13</sup> Third, the subnational comparative perspective is able to handle the spatially uneven nature of major processes of political and economic change such as uneven democratization, decentralization, economic liberalization or civil war and ethnic conflict. We will make use of the first-level administrative subunits (in this case: provinces) for our example of the Democratic Republic of Congo in part four.

#### **3.2 Dimensions and indicators of local state capacity**

As a starting point, we define the local state as all those expressions of the state that exist in a given locality (Duncan et al. 1988). In line with Blacksell’s three pillars of territoriality, such expressions are most visible in form of agents of the state (such as military and police personnel). In this sense, the local state is the central state writ small. This definition is very broad, but this cannot be avoided to account for the wide variety that forms of local statehood can take (Banning 2006).

Debiel (2005) has made theoretical progress by theoretically disaggregating state capacity into various dimensions, an attempt that is guided by the literature on good governance indicators. He distinguishes at least four dimensions of basic governance functions, dividing basic security, economic, administrative and judicial functions that a strong state should effectively fulfill. We are following his example here, by applying these four dimensions of state capacity to the subnational level.

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<sup>13</sup> Snyder (2001) provides several convincing examples from comparative politics work.

We now turn to the question how to empirically deal with local state capacity in the dimensions we have identified above. We do so by summarizing how state strength or decay is usually operationalized at the national level first. For that task, we heavily borrow from the burgeoning quantitative literature of civil war onset, duration and termination that has emerged over the last decade. This quantitative body of literature is, of course, closely related to the more policy and case study orientated work of state failure or good governance. To give an example, Brzoska (2004) points out that the topic of state failure takes secondary place in current Anglo-Saxon academic writing, while the focus clearly lies on the motivations and causes for rebellion.<sup>14</sup> We are inspired here by writings connecting weak governments, natural resource abundance and geographic characteristics of a country to an increased risk of civil war onset in the form of insurgencies or rebellions, e.g. that of Fearon and Laitin (2003) or Collier and Hoeffler (2004).

Much of the theorizing about insurgency movements by Fearon and Laitin (2003) is influenced by thoughts of “classical” guerilla warfare, stressing the importance of peripheral locations and rural areas for fighting and hiding of rebels against weak state authorities. According to their technology of insurgency reasoning, distance to the capital plays a crucial role, in particular when it comes to questions of logistics and communication. Conflicts in populous countries last longer because larger countries contain larger peripheral areas harder to control. To further investigate the theoretical relationship between rough terrain and domestic conflict, both Fearon and Laitin (2003) and Collier and Hoeffler (2004) use the average national share of mountainous or forested terrain in a country as predictors for conflict onset.

Lootable resources such as alluvial diamonds and valuable minerals as well as the share of primary commodity exports of a country have played prominent roles in “greed” explanations of civil war onset (e.g., Collier and Hoeffler 2004). Most prominently, Fearon and Laitin (2003) find oil abundance to be positively correlated with civil war onset, and explain their findings with a weak-states effect. Fearon and Laitin measure that weakness by national GDP per capita. Per capita income signals the available tax rate for a state to buy off and repress opposition. Thus, richer states are good at counter-insurgencies, mainly because of better infrastructure. Fearon and Laitin (2003) find no support for the argument by Collier and Hoeffler (2004) that primary commodity exports provide the motive and finance for rebellion, but rather that it is oil abundance that matters. Oil weakens states because it dampens state capacity since oil provides easy money for governments, which in turn fail to develop effective institutions for taxation. In addition, large populations make counter insurgency difficult, weakening state capacity.

To sum up, Fearon and Laitin point out that ‘most important for the prospects of a nascent insurgency, however, are *the government’s police and military capabilities and the reach of government institutions into rural areas*’ (Fearon and Laitin 2003, p. 80, emphasis in the original). Nevertheless, their statistical analysis is carried out at the country level. This practice seems misleading because key variables used are not evenly distributed throughout a country and are used in a crude and overly aggregated way (Collier and Sambanis 2005; Sambanis 2004).

Another approach how to measure national state capacity is put forward by DeRouen and Sobek (2004) who focus on the role of the state in civil war duration and outcome. State capacity is measured here in a more direct way, criticizing the overemphasis on rebel

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<sup>14</sup> In his essay, which deals with the discussion of „new“ civil wars and state failure in Germany, he asks why this order of importance seems the opposite in the German academic discourse.

motivations and opportunities in the works discussed above. State capacity is rejected as single concept, very much in line with our argumentation here of several dimensions of governance, and seen as a series of characteristics of a government. These are democracy level (taken from the Polity III data set), bureaucratic quality, which captures a government's effective penetration into all of its territory (taken from the State Failure Task Force Data), and a large government army (measured by dividing the size of the army by the total population).

### **3.3 Security dimension**

Security governance can arguably be seen as the most important dimension of governance (Rotberg 2004b). To capture such a dimension on a micro-level, we rely on local indicators that capture military activities and infrastructure throughout a country. The best data available for such a task is the ACLED data set introduced by Raleigh and Hegre (2005). The data is a spatial refinement of the established Uppsala/PRIO conflict dataset (Gleditsch et al. 2002) and pinpoints the exact location and dates of smaller civil war events. These events include rebel activity, the location of rebel group bases, headquarters, strongholds and presence. Territorial transfer of military control from governments to rebel groups and vice versa is also documented, as well as one-sided violence on civilians by both government or rebel actors, and conflicts between rebel groups.

The ACLED data is already provided in GIS format and is able to code changes over time in the location and expansion of civil war, allowing to test hypotheses about geographic spread and diffusion dynamics. In the current version, it covers 8 conflict countries in West and Central Africa from 1960 through 2004. A further enlargement to the countries of the Balkans and others affected by civil war or widespread domestic violence is under way. Furthermore, the number and location of military HQs or bases, both rebel or government, can easily be extracted from ACLED, as well as the percentage of territory controlled by the fighting groups.

### **3.4 Economic dimension**

Regarding an economic dimension of local governance, Nordhaus (2006) has developed a geophysically based data set on economic activity. This is called the G-Econ project which stands for geographically based economic data. G-Econ provides gross output at a 1-degree longitude by 1-degree latitude resolution at a global scale for all terrestrial cells. The resolution is approximately 100 km by 100 km which roughly equals the size of most third-level administrative units (e.g. counties in the U.S.), producing "gridded" output data or gross cell product, GCP on value added for 1990. The basic measure of output is gross value added in a specific geographical region. This is conceptually equal to gross domestic product on a national level (Nordhaus 2006). For some countries, such as the U.S., data is also available on a decade level, starting the 1950s. In our example of the Democratic Republic of Congo in section 4, we use the local GDP figures of 1990 for the first-administrative units (in this case: provinces), on which the calculations of the cell values (GCP) are based on and which are also provided.

As already mentioned above, other studies have applied economic proxies by relying on measures such as the presence or density of road or transport networks (Buhaug and Rød 2006) and population size or density (Hegre and Raleigh 2006). Work is under way to supplement and conjoin datasets regarding the geographic location of natural resources such as diamonds, gemstones, gold, tantalite, oil, natural gas, timber, drugs and oil pipelines (Gilmore et al. 2005; Lujala et al. 2006).

### 3.5 Administrative and judicial dimensions

Due to a lack of data, we will not deal with these two dimensions explicitly in the paper. Nevertheless, we plan to integrate into our overall concept of local state capacity later on. Administrative governance could be proxied by the distance of a geographic unit to the capital. This is very much in line with the ideas of Boulding's loss of strength gradient and the work done by Herbst. Furthermore, one could try to collect data on local tax revenue per capita relative to local economic output (if such data exists for a given country). For the judicial dimension, the number and location of police headquarters or personnel per capita could be used, similar to the size of military or rebel forces. Local crime rates or rates of violence that do not reach the level of civil war events could be applied as well. Again, we currently lack that data.

To sum up, Table 1 below provides an overview of our four dimensions of local state capacity, possible local indicators, and the links to established literature and data sets. We would like to stress that this overview is preliminary and very much work in progress, but should already give a good idea about what we are aiming at.

<b>Dimension of state capacity</b>	<b>Possible local indicator</b>	<b>Links to existing literature and data sets</b>
Security Governance	<ul style="list-style-type: none"> <li>- location of conflict events</li> <li>- number of military HQs or bases by governance or rebels</li> <li>- % of territory controlled by government or rebels</li> <li>- military personnel per administrative unit</li> </ul>	<ul style="list-style-type: none"> <li>- ACLED data (Raleigh and Hegre 2005)</li> <li>- deRouen and Sobek (2004)</li> </ul>
Economic Governance	<ul style="list-style-type: none"> <li>- local GDP per capita</li> <li>- location and control of natural resources</li> <li>- population size or density</li> <li>- density of infrastructure (roads, transport)</li> </ul>	<ul style="list-style-type: none"> <li>- Fearon and Laitin (2003)</li> <li>- G-Econ data (Nordhaus 2006)</li> <li>- Hegre and Raleigh (2006)</li> <li>- Buhaug and Rød (2006)</li> <li>- Gilmore et al. (2005)</li> <li>- Lujala et al. (2006)</li> </ul>
Administrative Governance	<ul style="list-style-type: none"> <li>- geographic distance of administrative unit from capital</li> <li>- tax revenue per capita relative to local economic output</li> </ul>	<ul style="list-style-type: none"> <li>- Boulding (1962)</li> <li>- Herbst (2000)</li> </ul>
Judicial Governance	<ul style="list-style-type: none"> <li>- local crime rate</li> <li>- police headquarters or personnel per capita</li> </ul>	<ul style="list-style-type: none"> <li>- needs further research</li> </ul>

**Table 1:** Dimensions of state capacity, local indicators and link to existing work and data sets

## 4. Mapping Local State Capacity using GIS

### 4.1 Basic principles of geographic information systems

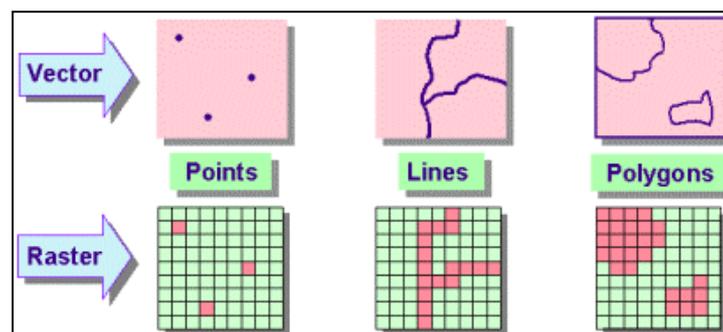
The use of geographic information systems (GIS) as a research tool shows a solid academic record in disciplines close to the natural sciences and engineering such as cartography, geographic engineering, urban planning, land use or environmental sciences, among others. However, only recently the potential of GIS-supported research has been discovered for the

social sciences as well. This development was fostered by scholars aware of studying the role of place and spatial context explicitly, e.g. in research dealing with questions of electoral geography, criminology, innovation diffusion, development economics, public health or conflict studies.<sup>15</sup> Social scientists nowadays are increasingly aware of the capabilities a GIS supported data analysis offers in advance to standard statistical tools. But why is this the case, and what is special about such an approach?

In its simplest form, GIS is a coherent software system that can be used to manage, represent, transform and analyze qualitative as well as quantitative data. The important difference is that this data is geo-referenced: it normally includes inherently spatial or positional information, such as, e.g., longitude or latitude coordinates. GIS offers the researcher the possibility to manipulate and easily visualize certain or all aspects of that geo-referenced data - most commonly in the form of a geographic map as visual output. In addition, statistical output, which may take on the form of numbers, graphs or formal models, can be analyzed inside the GIS or exported to other standard statistical software packages.

#### 4.2 Data types and map layers

Such geographic data is represented in GIS according to either raster or vector data models. Raster (or cells, pixels) are a sequence of identical discrete entities, imposed on a regular grid. Raster data are often used to represent continuous spatial data like altitude, population density, or percentage of rough terrain. While raster cells are always square, they can be any size defined. Deciding which cell size to use depends on which size is most appropriate for the analysis. The vector data format is often used to represent discrete spatial data and is constructed from points (such as single conflict events in civil wars or capital cities), lines (such as roads or rivers), and polygons (such as country or administrative boundaries). Raster and vector datasets may represent the same geographic features and may look similar, depending on raster cell size and resolution, but the storage structure, usefulness, and analysis of the data layers are different. Figure 1 gives an overview of these data principles, showing the differences between raster and vector data according to point, line or polygon features.

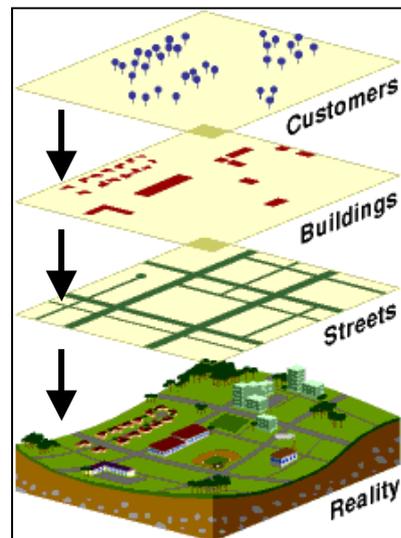


**Figure 1:** Raster vs. vector data models in GIS

In general, GIS analysis can be carried out in line with a more exploratory research strategy in mind, where the purpose of the study could be to map the number or the geographic distribution of a variable of interest. An example for such a descriptive spatial data analysis could be the local population density of a country or the spatial distribution of police stations in a neighborhood. When explanation of relationships between variables is the goal – such as in correlation or regression analysis – GIS can be used to check for such spatial relationships by overlaying and analyzing different data layers or thematic maps. Internally, each map layer

<sup>15</sup> For an introduction of the value of GIS for the social sciences, see e.g. Steinberg and Steinberg (2006).

in GIS contains information about a particular subject and is stored as a separate file. Geographical information is created by queries of individual datasets and through overlaying a number of different layers of geographical data. This is conceptualized by Figure 2, where the final “reality” layer is created by a combination of three other map layers, customers (as points), buildings (as polygons), and streets (as lines).



**Figure 2:** Principle of map overlay in GIS

To come back to our initial example, by adding a geo-referenced data layer of crime events, one could easily visualize and further analyze if higher crime rates are more frequent in neighborhoods with a lower number of police stations. GIS comes with a variety of spatial data analysis tools to do so, such as density, proximity or distance measures, and a basic functionality to carry out spatial statistical analysis for more advanced queries.<sup>16</sup> In sum, GIS offers a variety for both visual and numeric output information that could be returned to the GIS as new geographical data set for future research.

### **4.3 Recent use of GIS in quantitative conflict research**

In studies of international conflict research, especially in those dealing with onset, duration and termination of civil war, spatial analyses are still quite rare, and GIS is largely an undiscovered tool. In the following, we briefly summarize the few studies that have been carried out to date. These exceptional studies share a common concern: while highly influential on an academic as well as on a policy level, recent standard statistical work bases its results on highly aggregated, national macro-indicators, which is seen as problematic for a variety of reasons discussed above (e.g., Hegre and Sambanis 2006). Furthermore, the interpretation of exactly the same explanatory proxies used, e.g., the exact meaning of GDP per capita, varies substantially across studies, most likely due to a mismatch between macro-indicators and proposed micro-mechanisms (Collier and Sambanis 2006; Sambanis 2004).

Robust empirical findings across different model specifications and across different data sources are also rare (Hegre and Sambanis 2006). These non-findings cast serious doubts about the validity of inferences drawn from conventional econometric studies of civil war. The empirical results of these studies are not concise. Hegre and Sambanis (2006) report that

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<sup>16</sup> For the use and future of spatial statistics in the social sciences, see e.g. Anselin (1988; 1999). Note that spatial statistics could also be carried out outside a GIS by using more specialized software such as GeoDa or R. The strength of GIS lies in its ability to visualize and map relationships, which it was originally created for.

only the variables population (larger populations increase the risk of conflict) and average income per capita (lower levels increase the risk) are robust to model specifications.

Using data for the geographic location of conflict centers and their radius, Buhaug and Gates (2002) and Buhaug and Lujala (2005) show that civil wars tend to be longer the further away they are located from the capital. Buhaug and Gates (2002) construct a relative location indicator by using GIS to measure that distance. Hegre and Raleigh (2005) have focused on the links between population size, location, concentration and civil war onset, covering 14 countries in Central Africa using ACLED. The conflict event data are correlated with geographically disaggregated data on populations, distance to capitals, borders, and road networks. The authors conclude that their study should be enriched by future research regarding the location of lootable resources and the spatial distribution of ethnic groups.

Such geographically disaggregated data sets are provided by Cederman, Weidmann and Rød (2006) for the location and settlement patterns of ethnic groups worldwide. Sub-national dataset in a GIS friendly format on diamond locations are presented by Gilmore et al. (2005), and on petroleum fields by Lujala et al. (2006).

Buhaug and Rød (2005) have constructed a civil conflict data set in GIS format, consisting of conflict polygons. This dataset is a geo-referenced extension of the established Uppsala/PRIO Armed Conflicts Dataset (Gleditsch et al. 2002). The information added consists of precise information of conflict zones. The geographic scope of a conflict is operationalized as the smallest possible circle that encompasses all reported locations of battle events and all known rebel-held areas. This is represented by latitude and longitude coordinates, denoting the mid-point of the conflict circle, and a radius variable rounded upwards to the nearest 50 km. Countries are disaggregated into smaller grid cells via GIS. For each grid cell, GIS is used to identify whether or not the cell represents a location affected by conflict. A grid structure of three different resolutions is proposed. For a study on African civil war between 1970 and 2001, Buhaug and Rød (2005) found no support for the rough terrain proposition using local measures. Dealing with conflicts between states, Starr (2002) uses GIS to re-conceptualize and generate indicators of borders and border zones.

#### **4.4 Mapping security and economic governance: the example of the Democratic Republic of Congo**

In this section, we present a preliminary series of maps dealing with the situation of the Democratic Republic of Congo (DRC) over the years 1960-2004. The selection of DRC as an illustration for our main argument is due to two main reasons: first, the DRC typically ranks first or second on overall state failure indices such as the Failed States Index (Fund for Peace 2005 and 2006). Second, our current data, especially the ACLED data set, is limited to certain conflict-ridden countries in “bad neighborhoods” which mostly covers countries located in Central and Western Africa.

Thus, we follow a rather pragmatic approach here which we would characterize as a first feasibility test of our main argument. Our intention is not to deliver a detailed background discussion of the particularities of the DRC and its complicated conflict history, but to present and visualize our main argument with the data at hand so far. So, the following maps (and the case selection as a whole) should be treated as “work in progress” and with due care. All maps were generated using ArcGIS 9.1. Again, we should mention that we only have time-series data for ACLED covering the period 1960-2004. The local GDP and population data is based on figures from 1990.

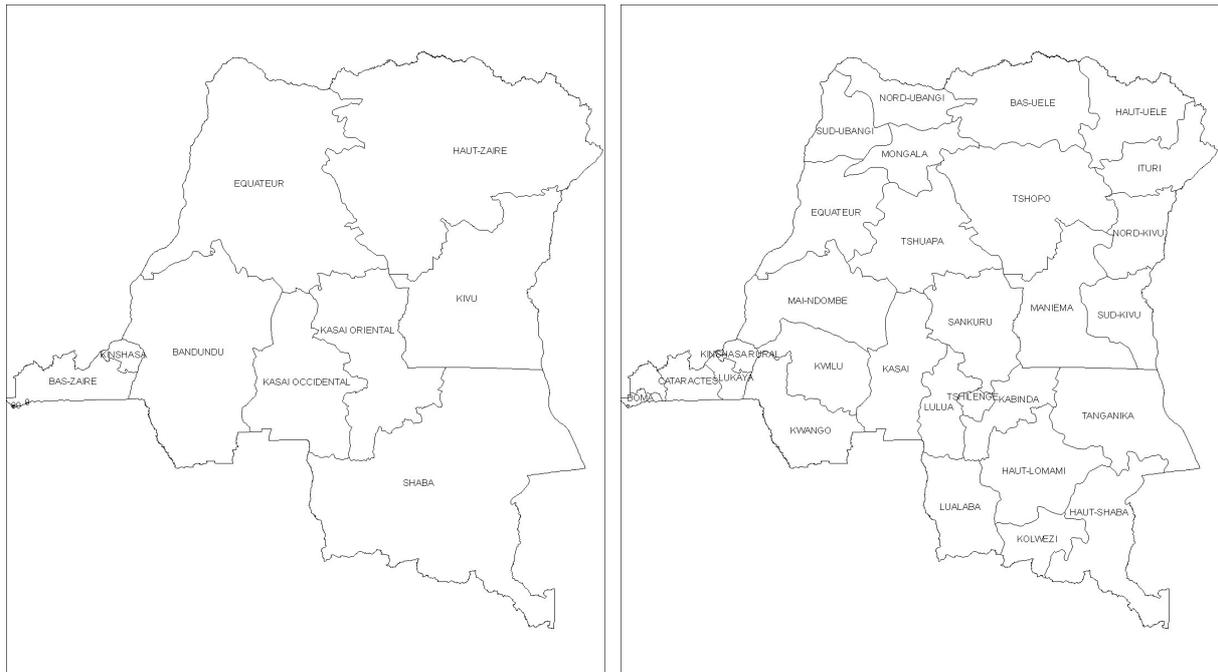
Map 1 gives a general overview of the geographic location of the DRC in Central Africa. Note that the map refers to its name between 1971 and 1997, Zaire.



**Map 1:** Democratic Republic of Congo / Zaire

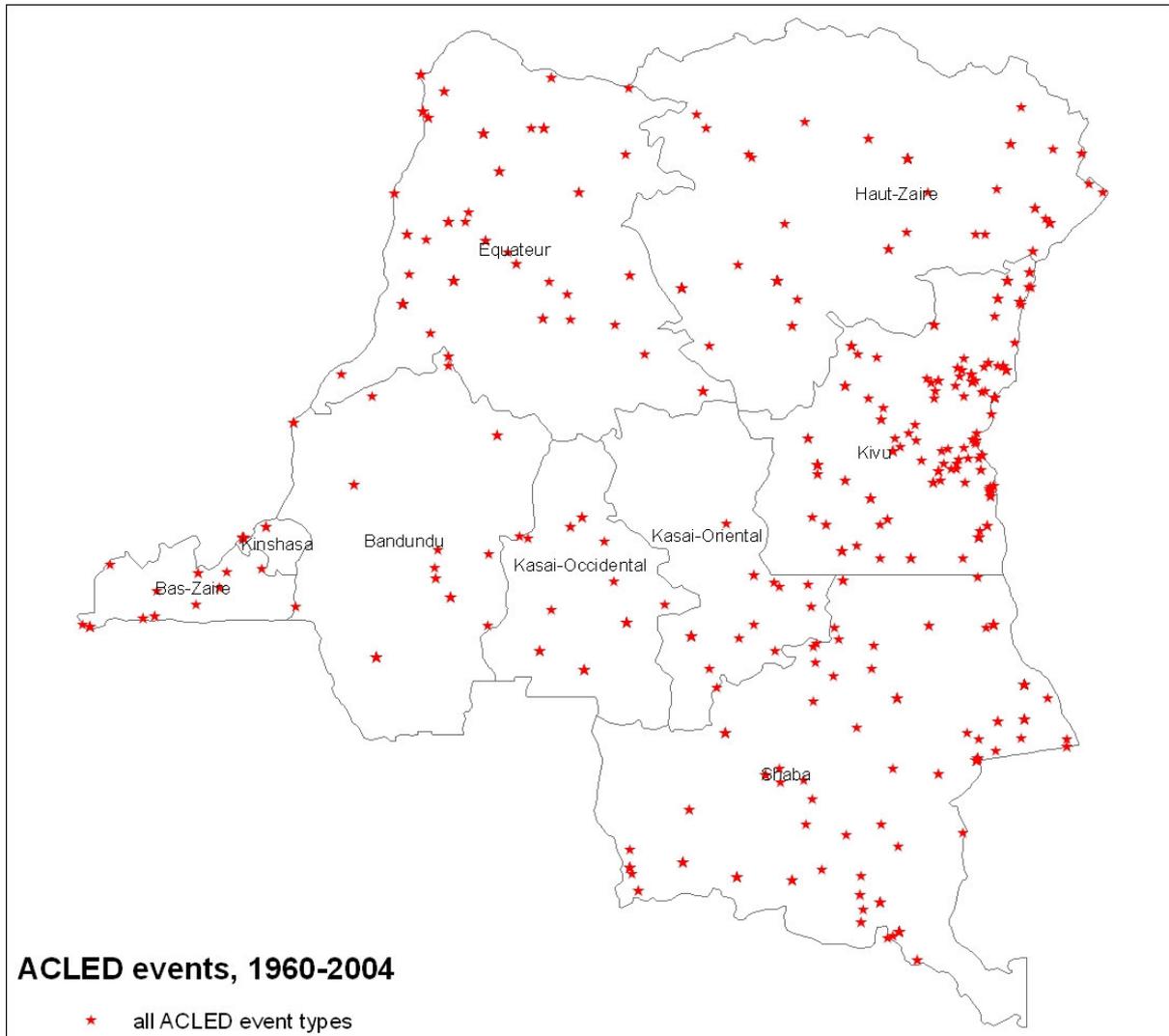
Because our analysis aims to look inside the “black box” of the state, we have to disaggregate down to a meaningful scale. Theoretically, this could have been achieved by using artificial grid cells of equal size generated by GIS as unit of analysis, as used by Buhaug and Rød (2006) and Hegre and Raleigh (2006). Nevertheless, while grid cells have several advantages (such as increasing the number of observations), their interpretation could be quite meaningless. First-level administrative units, as chosen here, are intuitively more theoretically appropriate than grids – such units have historical roots and shape peoples’ identities, especially in conflicts over separation, self-determination or autonomy rights (of which the DRC has experienced quite a few). For the question of local state capacity, grid cells would not make much sense. Of course, it would be advantageous if we had data on even the second- or third-level administrative units, but such data is not available.

Prior to 2006, DRC was divided into 9 first-level administrative units (named provinces). These are shown on the left in map 2 below. Note that DRC now consists of 25 provinces plus the capital city/province of Kinshasa. This new territorial organization is to take effect within 36 months of the new constitution's promulgation, i.e. in 2009. The provinces are divided into 129 territories (not shown here), for which we lack the adequate local GDP data.



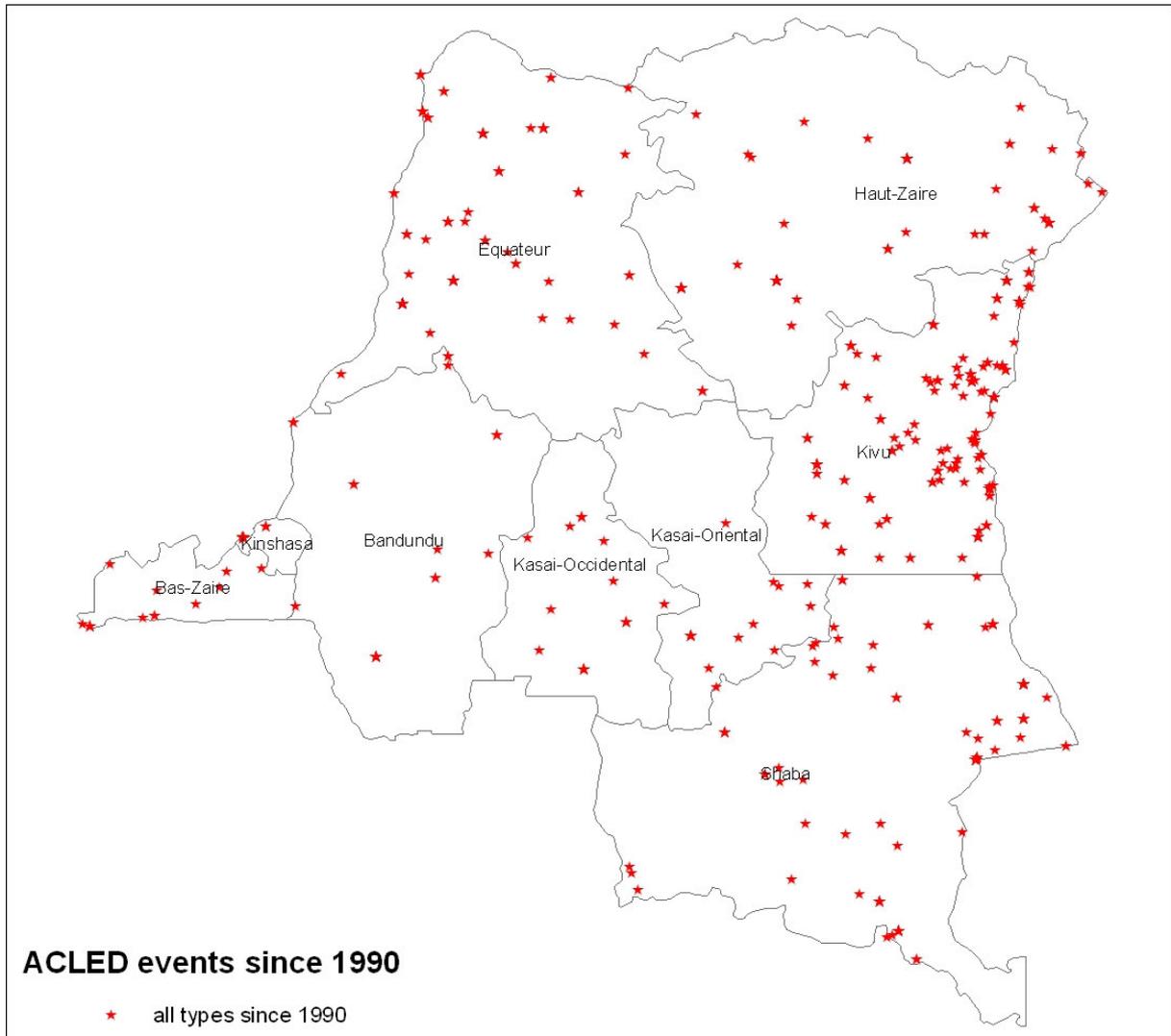
**Map 2:** Provinces of DRC prior to 2006 (left); current (right)

Starting to map our dimension of security governance, Map 3 visualizes the ACLED event data set for the DRC, which gives a first hint of the spatial variation in those events over the time period 1960-2004. Note that this map can be quite misleading, because several events are coded for the same locations, which can not be adequately shown in this map type.



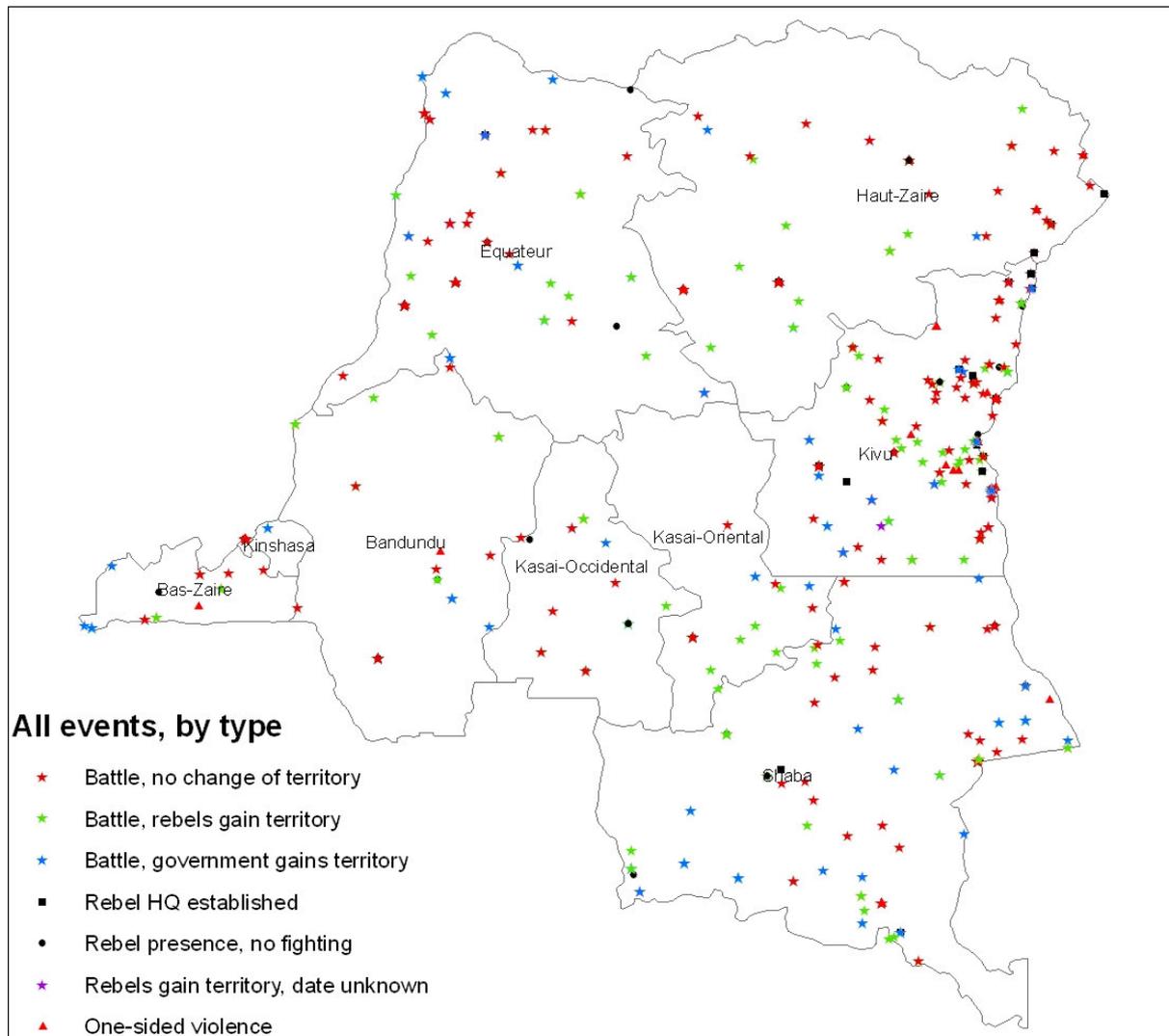
**Map 3:** DRC, all ACLED events from 1960-2004

If we compare the spatial distribution of all ACLED event since 1960 to a shorter time period, say, to all events that took place after the end of the Cold War, the picture won't change much, as displayed in Map 4 below. However, to trace the development of the conflict over time, for example to pinpoint the AFDL movement from the eastern provinces towards Kinshasa in the West in late 1996-1997, much shorter time periods could easily be selected. Because we are more interested in the overall picture here and in the capabilities of a GIS supported analysis, this is not done here.



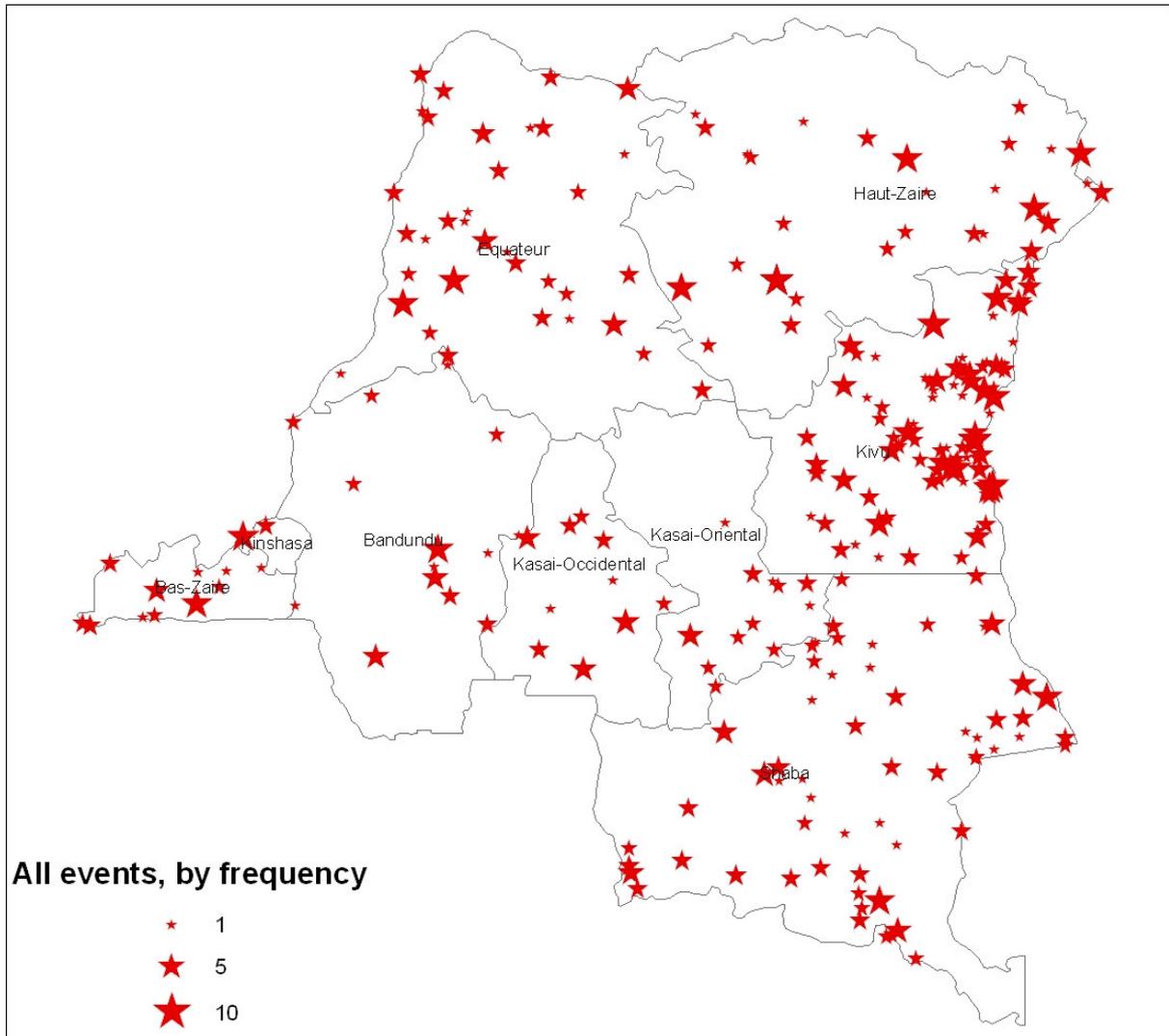
**Map 4:** DRC, all ACLED events since 1990

If we further disaggregate the events by type (Map 5), we see that rebel HQs have been established in the provinces of Kivu and Shaba in the east, as well as in Haut-Zaire in the north east. From such a map, one could e.g. calculate the relative percent of territory occupied or controlled by the government troops or by the rebels at different time periods.



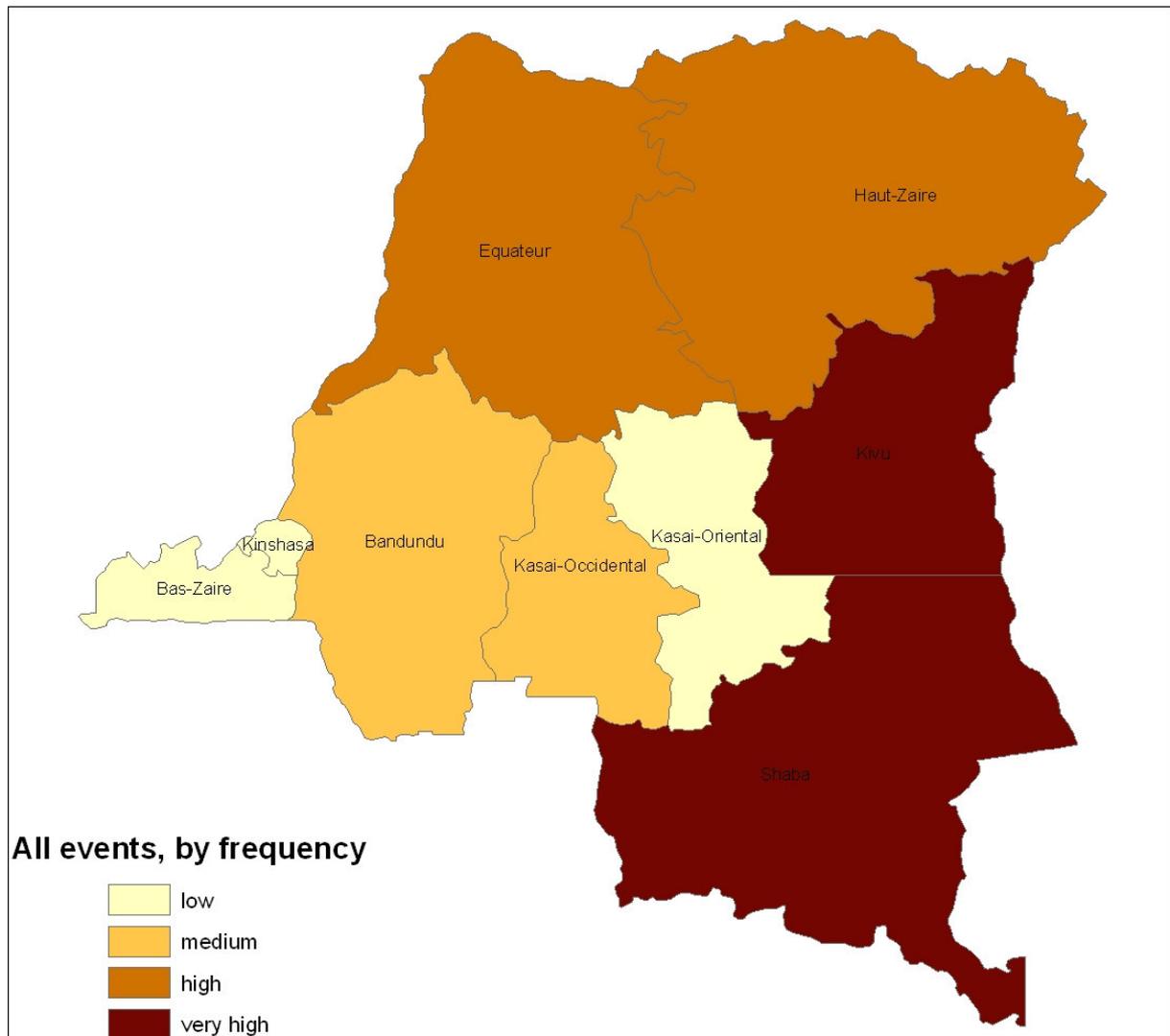
**Map 5:** DRC, all ACLED events by type

Map 6 was created to display not only the absolute number, but also the frequency of events. Now it becomes clear that most of the action on the ground happens in the provinces of Kivu and Shaba in the east and southeast and in close distance to international borders throughout the whole country, while the area around the capital city of Kinshasa seems less affected. Please note that the frequency of events does not tell anything about its intensity in terms of casualties.



**Map 6:** DRC, all ACLED events by frequency

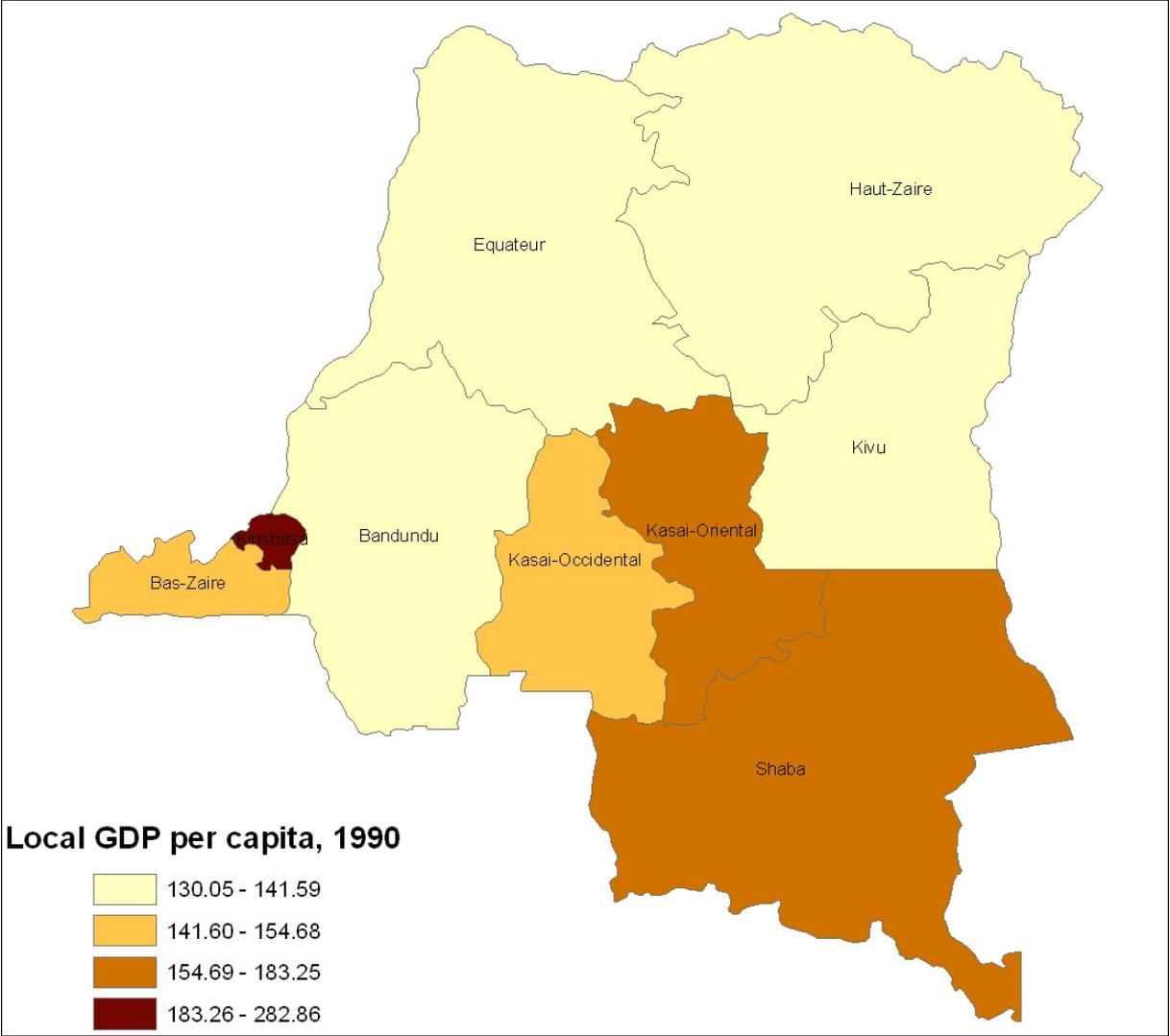
GIS offers the researcher the possibility to create a so-called choropleth map of a frequency distribution of a certain variable, in this case frequencies of ACLD events by first-level administrative unit, which is a standard and powerful way to display spatial data. Such a choropleth map is finally shown as Map 7.



**Map 7:** DRC, all ACLED events by frequency

Up to now, we have only considered the security dimension of local governance or state capacity. Similar to Maps 1-7, based on the ACLED data, a choropleth map of local GDP per capita in 1990 based on the G-Econ data by Nordhaus (2006) was constructed and is shown here as Map 8. It is interesting to note that Shaba does not seem to be among the worst performing provinces in local GDP figures, indicating that the state should be strong there according to Fearon and Laitin's (2003) interpretation of GDP, but has experienced quite a lot of conflict according to the ACLED data.<sup>17</sup>

<sup>17</sup> However, this might also be due to the fact that Shaba is a province with large mineral resources.

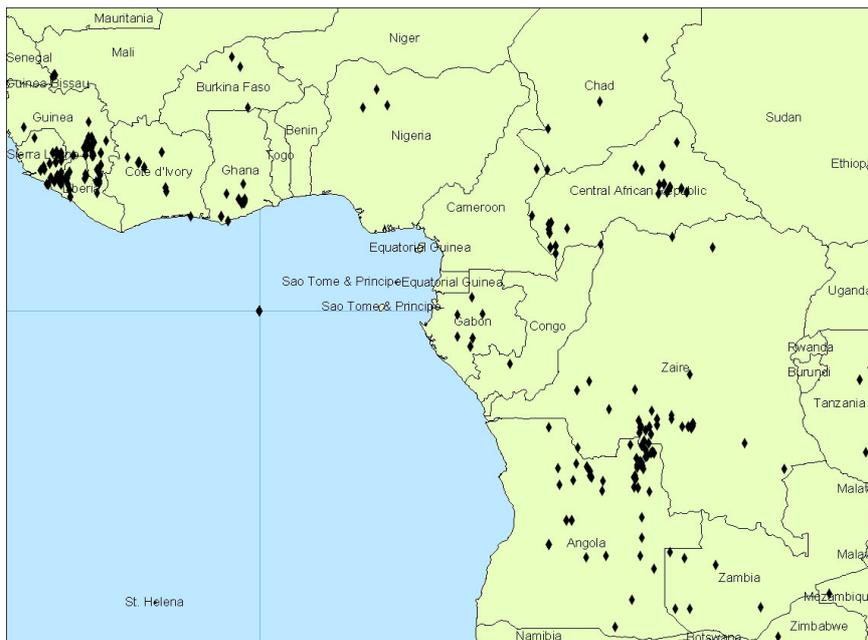


**Map 8:** DRC, local GDP per capita, 1990

In addition, and as we have argued in section 3.4, other proxies for local economic capacity have been used. Map 9 provides a road and transport layer. Note that according to Fearon and Laitin’s (2003) prominent theory of the technology of insurgency and logistics, a denser infrastructural network should be associated with a stronger government and thus with less civil conflict. Map 10 gives an example of a diamond deposit layer for the whole region of Central and West Africa.

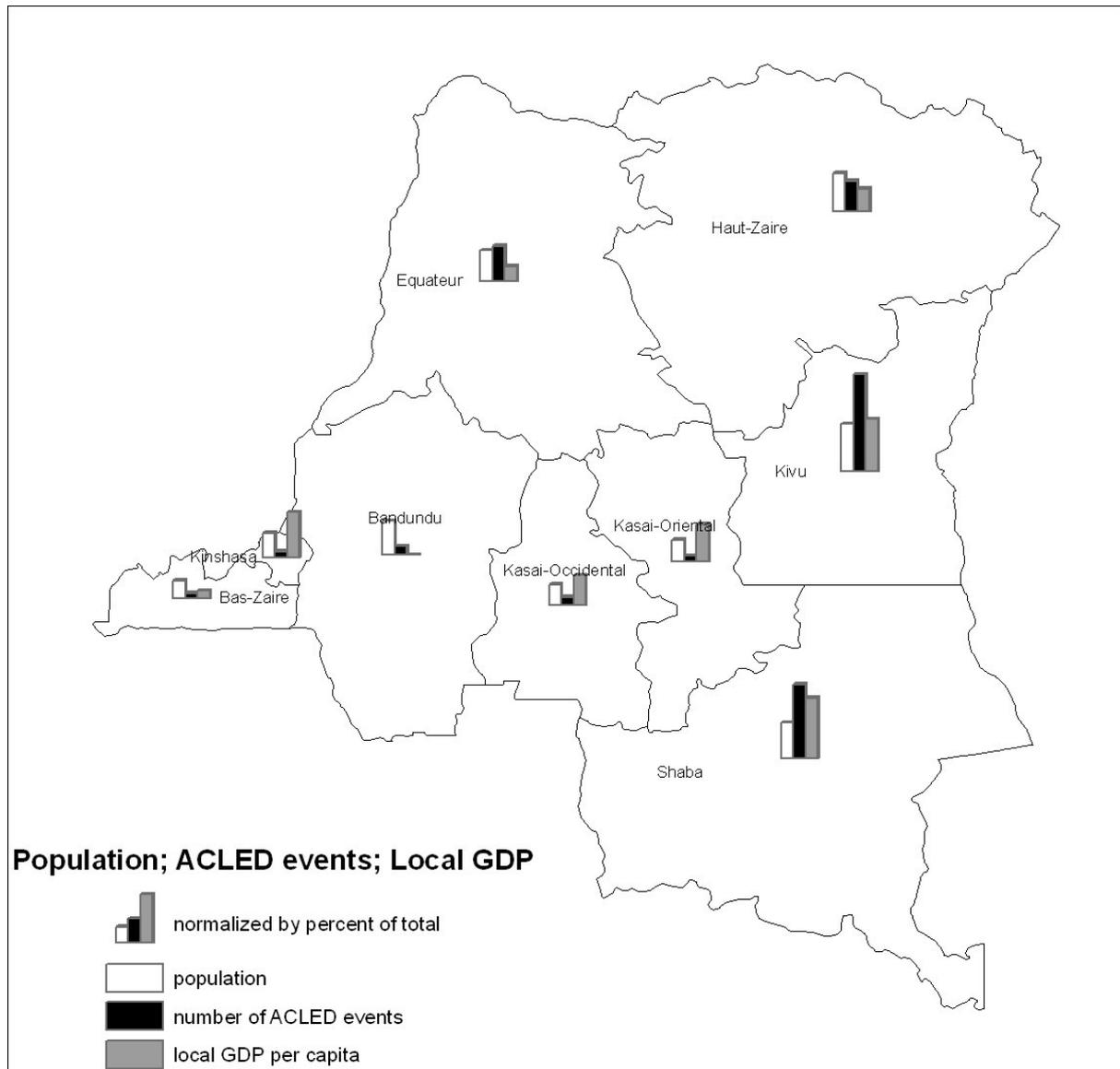


**Map 9: DRC, road and transport network**



**Map 10: Diamond occurrence in Central and West Africa, all types**

Finally, Map 11 shows a combination of three variables per first-level administrative subunit. These are the local population size, the number of ACLED events and local GDP. These variables were normalized by percent of their total values.

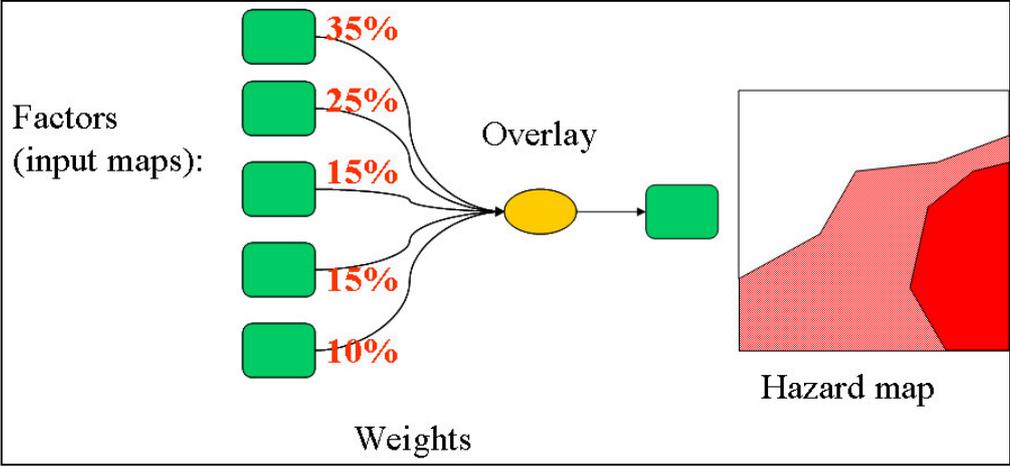


**Map 11:** DRC: population size, ACLED events and local GDP per capita

#### 4.5 Next steps: weighted overlay and hazard mapping in GIS

The different maps of the DRC shown in this paper are presented in a map after map style, depending on the governance dimension or variable of interest. Yet, one of the most important feature of any GIS is the ability to combine several spatial data sets of the same area under study, to produce new maps that incorporate information from a diversity of sources (O’Sullivan and Unwin 2003). As already mentioned above, this process is referred to as map overlay or cartographic modeling. It involves constructing models to predict spatial outcomes or to investigate certain scenarios, e.g. to predict flows of people or optimize the location of waste dumps. Land-use planners and geotechnical engineers use these technique to identify areas suitable or not for some activity. Quite often, maps of a certain area are generated based on input factors contributing to the risk of landslide (such as slope steepness, soil type, and

distance to rivers), a process that generates “hazard maps” of an area. What makes hazard mapping especially interesting is the fact that the input maps can be weighted due to their relative importance. Figure 3 below illustrates this process of creating such a hazard map through a weighted map overlay.



**Figure 3:** Principle of hazard mapping in GIS

In a similar manner, such a map could be created for the DRC or other countries, using the data for the different governance dimensions and applying weights to them to identify areas most at risk of state failure. The ultimate question, of course, would be how to determine the input weights. O’Sullivan and Unwin (2003) mention two basic approaches: knowledge driven and data driven map overlay. In a knowledge-driven approach, experts are asked what criteria count most. For example, one could argue that the most fundamental function of the state is to provide security for its people, so a security input map should receive the highest weight – at least a higher weight than economic or other input factors. Of course, such a kind of hazard mapping would be highly subjective. An empirically reliable and parsimonious theory of the factors leading to state failure would help a lot here, but such theories are unfortunately rare in the social sciences. Accordingly, in a data-driven approach, one possibility is to calibrate the hazard model by using empirical evidence from other studies of the same topic. The most obvious strategy then would be to use as input weights regression coefficients from large-N, multivariate statistical studies dealing with state failure, such as the work carried out by the State Failure Task Force.

**5. Conclusion**

We have started this article by arguing that state failure or state capacity is a concept that suffers from overaggregation, both theoretically and empirically. After summarizing the main trends and developments in the current state failure literature, we have identified several weaknesses of that research strand. Especially when the spatial dimension of the state is neglected, as in most country-level research, a sense of caution is needed. By linking the state failure discussion back to recent methodological and empirical improvement made by scholars of civil war, we tried to build a bridge between the two research agendas. This was illustrated with the help of several maps created by using GIS, a promising tool for further spatial investigations.

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