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At Risk: Conflict Resources and the Right to Water in Sub-Saharan Africa

A Capstone Project Submitted in Partial Fulfillment of the  
Requirements of the Renée Crown University Honors Program at  
Syracuse University

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and Renée Crown University Honors  
May 2016

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## **Abstract**

This paper examines the relationship between water and natural resource extraction to expand the understanding of conflict resources to include water stress as a human rights violation. My research question asks how the human right to water can further our conceptualization of conflict resources and conflict risk. If we understand conflict resources broadly as those whose exploitation leads to human rights violations, then any resource extraction resulting in water stress should be considered a conflict resource, as it violates the human right to water and could lead to increased conflict risk. I examine diamonds and coltan as “widely accepted” conflict resources with varying levels of international regulation. I also examine uranium as a natural resource not conventionally considered a conflict resource, and argue water stress caused by uranium mining is both a human rights violation and increases the risk of conflict in areas predisposed to high risk of violence. How we think about water affects how it is treated, both by communities and by corporations. In the case of natural resource extraction, water is not only part of the process, but also an externality of the process itself, which can negatively affect the surrounding population. If we view water as a human right, this can help identify the larger impacts of natural resource mining. The human right to water can help shift the power dynamics at play in the extraction of resources like uranium, where foreign corporations currently hold much of the power in decision-making and regulation.

## Executive Summary

In July 2010, the United Nations passed Resolution 64/292, declaring “the right to safe and clean drinking water and sanitation as a human right that is essential for the full enjoyment of life and all human rights” (United Nations General Assembly- Human Rights Council 2010). For the first time, the world agreed to a legally binding recognition of water as a human right, and the implications of this right have only just begun to arise in the six years since this monumental declaration. This new conceptualization of water as a human right allows for a broader understanding of the impact of water on the lives of people, and helps us to see how people may be affected by conflict and other natural resources. In Africa, the water, conflict, and natural resources are inexplicably linked. The continent is rich in natural resources, many of which have become increasingly valuable with the rise of consumerism and globalization. As these resources become more valuable, they either increase a country’s risk of conflict or fuel an ongoing conflict as resource revenues are used to commit human rights violations.

This link between conflict and natural resources gave rise to the term “conflict resource,” defined as resources whose exploitation and trade results in human rights violations. Diamonds and coltan are both examples of conventionally understood conflict resources, because they were mined and sold in order to generate funds to fuel ongoing conflict in countries across Africa. However, there are other natural resources extracted from Africa that do not fall under the same conceptualization of a conflict resource. Uranium, for example, is not sold to fuel conflict, but the mining process causes water contamination and depletion. As of 2010, this can be viewed as a human rights violation. My research question asks how the human right to water can further our understanding of conflict resources and conflict risk.

Conflict in sub-Saharan Africa has been common since countries gained independence from European colonial powers after World War II. Not all conflicts are alike, however, and there are many types and sources of conflict that can be seen across the continent. Most of Africa’s wars are “unconventional” in the sense that they do not involve two formal military powers or sophisticated weaponry. Instead, many conflicts have involved factional warfare with violence based on opportunity and formal versus informal actors, genocide, and the exploitation of natural resources. The causes of conflict are mostly linked to social, political, and economic equality, but the conflicts can also be related to many other issues, particularly the extraction of natural resources. Literature on conflict and natural resources argues that economic growth can decrease

a country's dependence on natural resources, and therefore decrease the likelihood of conflict.

Other academics argue that how "lootable" a resource is, as well as the ability to sell the resource legally on the international market, impacts its relationship with conflict. A resource that can be easily extracted and sold is more likely to increase conflict risk and fuel ongoing conflict through the exploitation of its revenue. Regulation of resources linked to conflict becomes essential in preventing the sale of conflict resources, because if it is illegal to trade resources from countries with a known connection between conflict and resource extraction, these resources are less likely to fuel the commission of human rights violations during conflict. Diamonds are the best example of the role of regulation, because they are the only traditional conflict resource regulated by a comprehensive framework. The regulatory framework for diamonds is known as the Kimberley Process; it requires participating countries to ensure all trade in diamonds is conflict-free. Diamonds were able to garner this level of successful regulation mainly due to the amount of international pressure put on the diamond industry following damning reports by non-governmental organizations and the United Nations that could directly link the positive symbolism associated with diamonds to mass atrocities and human rights violations in sub-Saharan African countries. The amount of public outcry generated by these reports motivated the diamond industry and countries across the world to come together and create a regulatory framework preventing trade in conflict diamonds.

Not all conflict resources, however, have been fortunate enough to receive such a large amount of public outcry. Coltan is an incredibly valuable natural resource, as it is a crucial part of the production of many electronic devices, including cell phones. It has been extracted and sold by rebel groups in the Democratic Republic of the Congo (DRC) to fuel ongoing conflict, and yet there is no comprehensive international agreement regulating trade in conflict coltan. I argue this is mainly due to a lack of political effort associated with its complex supply chain and level of public knowledge and attention. Unlike diamonds, which are easily viewed as both a natural resource and consumer good, coltan is a natural resource that is smelted and becomes part of a larger electronic good. This makes it more difficult for the public to see the connection between their electronic devices and conflict in central Africa, and as was seen through the production of the Kimberley Process, public outcry is instrumental in getting countries to agree on an international regulatory framework.

But what about resources not considered "conventional" conflict resources? There are resources extracted in sub-Saharan Africa whose trade may not directly fuel ongoing conflict, but

they are linked to conflict in broader ways that go unseen within a more traditional view of conflict resources. This project studies uranium as an example of an unconventional conflict resource. Trade in uranium is regulated by international agreements related to trade in nuclear-related resources, but the mining process has impacts on a country's conflict risk through water contamination and depletion. I conduct a comparative case study of four African countries with varying combinations of conflict and uranium mining. Niger has both a history of conflict and uranium mining; Sudan does not mine uranium but has been in and out of a state of conflict for many years. Namibia and Ghana have both been relatively stable since independence, but Namibia mines uranium and Ghana does not. By examining countries with and without uranium mining and with or without conflict, I can more precisely pinpoint the connection between conflict and uranium. I find that in Niger, although uranium mining represents a significant portion of the world's uranium supply, the local population does not benefit from mining activities, and in fact suffers as a result of water contamination and depletion caused by mining activities. Sudan does not produce uranium, but water stress has served as both a cause of conflict and as an obstruction to conflict resolution. Like Niger, Namibia also produces a significant supply of the world's uranium, but higher levels of development as a result of political and economic stability prevent water stress as a result of uranium mining from increasing Namibia's risk of conflict. Similar circumstances, along with an absence of uranium mining, help to explain lower levels of conflict risk in Ghana.

How we think about water affects how we manage it. Water can be connected to conflict, natural resources, and human rights, and being able to see the linkages between these perspectives of water can broaden our understanding of water and conflict resources. As water has shifted from being seen as an economic good to being considered a human right, we need to evaluate how this might affect water access and management. In the case of Niger, water contamination and depletion are externalities of the production of uranium. This can be considered a human rights violation following the 2010 United Nations Resolution, and yet existing power dynamics favor wealthy Western corporations responsible for uranium mining and allow these human rights violations to occur without accountability. The human right to water provides a mechanism for local communities to fight back against the power of corporations, because they can demand accountability for the protection of their basic human right to water. Additionally, it can expand the world's understanding of conflict resources to

include those that cause water stress and other externalities linked to human rights violations. Conflict resources can be related to issues of trade and exploitation, as seen in the case of diamonds and coltan. However, natural resources like uranium could also be defined as conflict resources when the extraction process results in increased conflict risk and violations of human rights, such as water contamination and depletion.

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## Chapter One: Introduction

Countries across the African continent have been plagued with conflict in the decades following World War II and the end of colonial rule. Simultaneously, the rise of technology and globalization has led to an increasing demand for natural resources involved in the production of consumer goods and energy. This demand has widened the gap between primarily consumption states, such as the United States, and raw material production economies like those of many African countries. Some of these resource-rich countries, however, are the same states that experience prolonged conflict and human rights violations. The connection between demand for natural resources and conflict has led to coining of the term “conflict resources” in which conflict and natural resource extraction are linked as armed groups use profit from trade in natural resources to prolong conflict and to commit further human rights violations. However, this narrow, predominantly economic view of conflict and natural resource extraction ignores the complexities and externalities of resource mining, such as water stress.

This paper examines the relationship between water and natural resource extraction to expand the understanding of conflict resources to include water contamination as a human rights violation. My research question asks how the human right to water can further our conceptualization of conflict resources and conflict risk. The non-governmental organization (NGO) Global Witness offers a comprehensive definition of conflict resources:

“Natural resources whose systematic exploitation and trade in a context of conflict contribute to, benefit from or result in the commission of serious violations of human rights, violations of international humanitarian law or violations amounting to crimes under international law” (Global Witness 2006:1).

This definition, used in literature by Philippe Le Billon reviewed later in this paper, includes conventionally understood resources that fuel conflict but does not incorporate resources that may not directly fund conflict, but still result in human rights violations. If we understand conflict resources broadly as those whose exploitation leads to human rights violations, then any resource extraction resulting in water stress should be considered a conflict resource, as it violates the human right to water and could lead to increased conflict risk.

This research applies a constructivist framework, arguing that people construct their understanding of the world through lived and shared experiences (Creswell 2014). Much of the existing literature tends to apply a narrow, economic definition of conflict resources that does not account for larger contexts. The definition of conflict resources quoted above highlights market value as an integral part of a conflict resource; when the revenue of a resource funds conflict and violence that results in human rights violations, it is considered a conflict resource. However, this conceptualization of conflict resources does not account for the lived experiences of the people affected by the process of resource extraction, because some of these effects cannot be translated into economic costs. For example, the primary goal of resource extraction is not to contaminate water supplies; the pollution of water occurring as a result of mining is an externality that needs to be considered to understand fully the relationship between resources, conflict, and human rights violations. A constructivist worldview can help expand our understanding of conflict resources, because experiences with conflict resource extraction “are varied and multiple, leading the researcher to look for the complexity of views rather than narrowing meanings into a few categories or ideas” (Creswell 2014:8). Diamonds, coltan, and uranium interact differently with the idea of a conflict resource. I argue we must understand the

complexity of the meaning of a conflict resource to account for all human rights violations occurring as a result of resource extraction.

I begin by defining the types and sources of conflict in Africa to frame the links between conflict and resources discussed in the literature. The British Department for International Development (DFID) released a report in 2001 identifying four different types of conflict in Africa: conventional warfare, factional warfare, genocide and ethnic-based conflict, and regional conflict. This report provides comprehensive explanations for the types and causes of conflict found specifically on the African continent. The first type, conventional warfare, is fought by troops on both sides of the conflict along defined fronts. The objectives of the conflict are “military and strategic,” but these wars are often very expensive, and are not the primary form of conflict in Africa. The only conventional war in Africa the decade prior to this report was the war between Ethiopia and Eritrea (DFID 2001:8). The second type of conflict is factional warfare, with undefined front lines and more opportunistic fighting as opposed to formal, strategic warfare. These types of wars are less expensive than conventional wars, requiring less personnel and less advanced weaponry. DFID reports that this type of conflict moves “rapidly from the original cause to revolve around the exploitation of commercial, mineral and natural resources” and is seen in places like Somalia (2001:8). Genocide and ethnic-based conflict have become increasingly common in Africa, and are seen across the continent from Sudan to Nigeria. This kind of conflict is highly organized, carried out as rapid attacks, using extensive amounts of propaganda, mass killings, low technology weaponry, and resulting in major internal displacement of people (DFID 2001). The final, and newest, type is regional conflict, essentially a combination of elements from the previous three types of warfare. As seen in the Democratic

Republic of the Congo, regional conflicts often involve state actors, factional proxies, exploitation of natural resources, and ethnic cleansing (DFID 2001:9).

In the same report, DFID lists a number of causes of conflict, classified into three different levels: root causes of conflict, secondary causes that sustain and prolong conflict, and tertiary causes that prevent the resolution of conflict. Any combination of these causes puts a country at risk of violence. DFID finds the main root cause of conflict is social, political, and/or economic inequality. In a country with two distinct groups with disproportionate circumstances, conflict is likely to result over unequal access to power, resources, and education (DFID 2001). Other root causes of conflict include state collapse, economic decline and shock, history, and natural resources. State collapse, although seldom a sudden event, creates effects including failure of infrastructure and the inability of the state to provide the people with basic needs and services. These effects are dangerous alone, but when coupled with ethnic conflict (which they often are) they can create conflict with no easy solution or foreseeable end (DFID 2001).

The 2001 report notes that economic decline or shock is often paired with state collapse, and can result in drastic effects such as famine or hyperinflation that are often fraught with violence. DFID concludes that a history of conflict is often one of the best ways to predict future conflict. Finally, natural resources play an important role in conflict, from either a lack or abundance of a valuable resource. Conflict related to water rights is one of the most common sources of violence as a result of resource scarcity, as it impacts agriculture, grazing rights, and survival in water-stressed areas. An abundance of a natural resource can cause conflict as well, particularly valuable resources such as oil and minerals, and groups will fight for control of a natural resource and its revenue. These resources often involve private foreign companies and are therefore likely to attract global attention (DFID 2001).

According to DFID, secondary and tertiary causes of conflict are often not instigators for violence, but can lead to entrenched and intractable conflict once violence has begun. Unemployment and lack of education, arms availability, and ethnicity all play a role in determining the length of a conflict, identified as secondary causes of conflict (DFID 2001). Unemployment and lack of education, for example, can increase the prevalence of factional conflict if there is a large population of poor and uneducated young males susceptible to the violent preachings of radical groups. Ethnicity and arms availability both affect the type of conflict likely to result from root causes. A highly ethnically dichotomous country may see elevated levels of tension that could lead to ethnic conflict, and a high prevalence of low technology weapons is likely to result in prolonged factional or regional conflict. Tertiary causes range from conflict spillover and a cycle of conflict to lack of mediation and misplaced humanitarian aid. Conflict spillover is perhaps one of the most common tertiary causes, as many of the conflicts across Africa are interlocking and spill across state borders. Cycles of conflict are often relevant to countries with a history of conflict, because these states may find themselves constantly at low levels of violence, with occasional shifts to all-out war before returning to low-level conflict. A lack of response from the international community, either in the form of aid or mediation, also reduces the likelihood of parties reaching a resolution (DFID 2001). My research on diamonds, coltan, and uranium shows the most notable cause of conflict is abundance or scarcity of natural resources. This has a clear link to conflict resources; however, many if not all of these types and causes are interconnected, and identifying only one cause in cases of violence and conflict in sub-Saharan Africa can be difficult. By categorizing different kinds and sources of conflict, we miss connections among them, such as water in the case of natural resource extraction and conflict risk, as this project demonstrates.

## Chapter Two: Review of the Literature

To contextualize my research on natural resources and conflict in sub-Saharan Africa, I examine the existing academic literature on natural resources as a source of conflict, conflict risk, conflict resources, and water and human rights to show how these concepts are intertwined. My research pulls from a variety of conceptual frameworks, identifying a lack of literature regarding the role of natural resource exploitation in the violation the human right to water. An abundant literature exists on conflict and conflict risk, natural resources and conflict, and water rights. Here, I analyze nine recent studies that highlight the connections between conflict and natural resources, human rights and conflict risk, the role of water in natural resource extraction, and the implications of the human right to water framing my research.

Bannon and Collier (2003) examine the link between natural resources and conflict, focusing mainly on the role of abundant resources as the study takes an economic approach. Bannon and Collier utilize the findings of the Collier-Hoeffler (2001) model that link natural resources and conflict through three factors: “the level of income per capita, rate of economic growth, and structure of the economy, namely, dependence on primary commodity exports” (2003:2). This model finds that higher levels of income per capita and higher economic growth are likely to reduce the risk of conflict, and as primary exports as percent of GDP decrease, so does the risk of conflict (Bannon and Collier 2003). However, Bannon and Collier account for other root causes of conflict, such as ethnic tensions and a history of conflict, explaining that the presence of such factors in addition to the three included in the model is likely to compound the risk of conflict in a natural resource rich country. Linking natural resource abundance and conflict has become more important since the end of the Cold War, as foreign governments fighting proxy wars may have previously financed conflict. Post-Cold War, governments and

rebel groups have needed to turn to alternate forms of revenue, and easily extracted natural resources are an obvious solution. Many rebel groups and natural resources in sub-Saharan Africa are both based in rural areas. Many of these natural resources are produced for export. Taking control of the extraction of a resource in rural remote areas is relatively easy since the resource is located far from centers of power and government and isn't likely to be purchased locally.

Diamonds are a common example of this kind of connection between resources and conflict, as they are a valuable commodity with a simple, low technology extraction process and are easy to smuggle out of conflict zones (Bannon and Collier 2003). The authors also note that more tightly regulated resources can also serve as targets during conflict, as "kidnapping for ransom targeted at foreign extractive companies also can be a profitable business" (Bannon and Collier 2003:6). Bannon and Collier conclude with recommendations to reduce the risk of conflict related to natural resources that could be part of a "global development agenda" (2003:8). They suggest increased economic growth, decreasing a country's economic dependence on a natural resource, and improved resource governance and tracking of natural resources on the international market to prevent the purchase of conflict resources. These steps could significantly decrease the risk of conflict over natural resources and their revenue.

Bhavnani (2009) examines the connections between resource abundance and scarcity, seeking to discover whether one can breed the other. He considers connections between resource abundance and conflict as well as scarcity and conflict, arguing that in the case of abundant "lucrative, easy-to-procure resources" such as diamonds and coltan, resources are more likely to affect the duration of a conflict, and not necessarily serve as a trigger for conflict (Bhavnani 2009:67). Abundant resources may be easier to access if they do not require complex extraction



processes like those involved in the uranium mining process. They are easy to grab and sell for profit to perpetuate conflict, natural resources may, in cases of abundance, serve more as secondary causes of conflict and not necessarily as root causes.

As an extension of this argument, Bhavnani points out the importance of disaggregating conflict resources to determine the smaller, categorical differences that may affect a resource's relationship with conflict. For example, categories such as "lootable and nonlootable resources, artisanal and industrial extraction, physically diffuse and point-source resources and those proximate to and distant to a national capital" need to be taken into account in order to determine what type of conflict is likely to arise and its expected duration (2009:67). Bhavnani also unpacks the relationship between resource scarcity and conflict, arguing that as rural and urban population densities increase, resources become scarce and may result in conflict. This is particularly true for a resource such as arable land, which is connected to varying levels of soil quality, water access, rainfall levels, and deforestation, all of which can serve as triggers for conflict when scarce (Bhavnani 2009).

Finally, Bhavnani examines whether or not resource abundance can breed scarcity, and vice versa. He argues that resource abundance does often lead to scarcity, both economically and of the resource itself. An abundance of a particular resource like timber can lead to rapid deforestation and an eventual scarcity of timber if trees are not replanted regularly to keep up with high levels of clearing. Additionally, an abundance of a resource is unlikely to benefit the local population, instead enriching political leaders and elites. In fact, communities with an abundance of natural resources can sometimes be worse off economically than neighboring communities that are resource scarce (Bhavnani 2009:71). Conversely, resource scarcity can lead to innovation that could eventually produce an abundance of a resource such as food; as the

amount of arable land becomes scarce, for example, technological innovation could provide solutions for future food security. However, Bhavnani notes the importance of disaggregating what he distinguishes as commodities and amenities; although technology may be able turn scarcity into an abundance of commodities, “the same cannot be said for amenities” such as clean water, a necessity for human life (2009:72).

Le Billon (2009) analyzes the role of “lootability” of a natural resource, which measures “the ease with which a rebel group could access revenue from this resource” (17). Le Billon identifies six components affecting the revenue access of a resource, including “the materiality of the resources, its mode of exploration and production, its spatial spread and accessibility to its revenues...its livelihood impact...legal and illicit character...[and] identity and divisibility” (2009:17-18). All six components play a role in determining the conflict risk associated with diamonds, coltan, uranium, and water. This study examines how each factor affects the risk of conflict related to a natural resource. “Materiality” of a resource influences how easy the resource is to extract and transport. If the resource is valuable and easy to transport, then it is more “lootable” (Le Billon 2009:17). The second component is related, in that it addresses the human and financial capital involved in production, and takes into account the role of the global commodity chain (Le Billon 2009). Resources exported to be used in the production of valuable commodities- such as the coltan used in cell phone production, diamonds that become part of expensive consumer goods, and uranium that is a necessary element of nuclear energy- influence the accessibility and attractiveness of a natural resource and make it more lootable.

According to Le Billon, the geography of a natural resource matters, because resources that are more spread out and/or located far from centers of power are much easier to control. The impact of livelihoods takes into account the resource’s “importance for the survival of

individuals or groups” (Le Billon 2009:18). Le Billon uses the specific example of a “vital” resource “such as water, not only in terms of access but also of quality (e.g. mining related pollution)” (2009:18). In this example, water can be seen either as the lootable resource itself, or a side effect of grabbing a natural resource that contaminates water during production. In both cases, water sources are likely to suffer and therefore the livelihoods of those in surrounding areas are likely to suffer as well. Related to livelihood impact, the “identity and divisibility” of a natural resource refers to how society may determine the rights and ownership of a natural resource, which affect the geography, production, and revenue of a resource and could determine its lootability in the eyes of rebel groups. Finally, the legality of a natural resource “refers to its legal status in domestic and international markets” and can shape the advantage or disadvantage for conflict funded by governments or rebel groups.

For example, if a resource is illegal, the rebel group has a distinct advantage over the government, which could face international sanctions if it produces an illegal resource to fund conflict. On the other hand, a legal resource is more likely to benefit a legitimate government selling to the international community than a rebel group smuggling resources on the illegal market. Le Billon combines a resource’s accessibility and legality to create four distinct categories of resources: “illegal lootables” such as narcotics, “legal lootables” including coltan, “legal non-lootables” such as dams, and “illegal non-lootables,” which Le Billon argues could include uranium (2009:19). Lootable resources, whether legal or illegal, are much more likely to be targeted by groups hoping to capture revenue to sustain conflict than resources that are difficult to control. He argues that because uranium mines are tightly controlled by industries they are not lootable, and because trade is regulated by the Nuclear Non-Proliferation Treaty (NPT), any uranium not sold by the companies in control of the mines could be considered

illegal (Le Billon 2009). These four categories can help determine the risk of different natural resources being grabbed by belligerents and turned into revenue that can prolong conflict, therefore determining a facet of conflict risk associated with different types of resources.

Conflict and conflict risk play an integral part in this research, as multiple studies find human rights violations are likely to lead to conflict or come as a result of violence and conflict. Poe, Rost, and Carey's (2006) study of conflict risk through the lens of human rights abuses addresses a perceived gap in human rights literature by developing "an early warning or risk assessment system" (485). Poe et al. use a modified version of Poe and Tate's 1994 regression model, measuring variables such as democracy, population size, GDP growth, and civil and international war. The authors note two areas of improvement distinguishing the studies: the addition of more variables and an improved system of weighting the importance of each variable. Thoms and Ron (2007) analyze the effects of human rights abuses on internal conflict risk. While Poe et al. focused more on state-level conflict and its impact on human rights abuses, Thoms and Ron modify this idea to address human rights violations as a cause of internal conflict. Thoms and Ron test the inverse of theory stating, "Empirical scholarship, including many statistical studies, suggests that civil war often entails increased levels of human rights abuse. Here it's asked, if the reverse is also true" (Thoms and Ron 2007:675). The authors conclude that violations of political and civil rights are more likely to result in violence, but violations of economic and social rights- rights that are more likely to be impacted by uranium mining- are more likely to create "grievances and group identities that may, under some circumstances, motivate civil violence" (Thoms and Ron 2007:676). Rost (2011) incorporates human rights violations as both a cause and an outcome of conflict, arguing that human rights

violations often occur in countries that are “undemocratic, poor, and large,” and violations that occur during low-level conflict increase the risk of conflict escalating to civil war (436).

Although previous literature has made the connection between resources and conflict, and in turn conflict and human rights violations, the connection between natural resource extraction and human rights violations requires a more comprehensive picture of the relationship among these three concepts. I contend that water is the key component in this complex relationship. Kemp, Bond, Franks, and Cote (2010) argue that a lack of understanding of the connection between mining activities, water management, and human rights may “increase the social and human rights risks that mining poses to local communities” (1553). Mining activities can cause serious harm to local ecosystems, through either contamination or eradication of local water supplies. The use of water in extraction processes produces waste that if not properly treated or disposed of can contaminate water systems as well as groundwater supplies (Kemp et al. 2010). If a mining company contaminates or depletes local sources of water, “these types of water impacts may represent a corporate abuse of human rights” (Kemp et al. 2010:1555). The authors argue that although a right to water may not have been specifically laid out in international law at the time this article was published, many consider it an implied or universal human right, as many specified human rights rely on the right to water in some form or another. For example, the right to life itself is dependent on access to clean and safe drinking water, and therefore water should be considered a human right as well. Many mining companies have signed other international agreements that bind companies to certain human rights standards, therefore Kemp et al. argue that the right to water is implicitly included in these stated rights and needs to be incorporated explicitly into the mining industry’s water management policies. Kemp et al. conclude that “further multidisciplinary research” must establish the connection between mining,

water, and human rights, and that a rights-based approach to water management in the mining industry is a necessary step forward that this project attempts to provide.

Linton (2012) argues that the right to water needs to be redefined as a collective relationship between human beings and water. Water when considered as an individual right ignores the complexities of water management and decision-making processes that involve more than just an individual's right to water. There needs to be a right to be involved in the decision-making process that determines one's personal right to water, and therefore there is a relationship between social norms, rules of governance, and water that needs to be incorporated into the dialogue of water rights (Linton 2012). Linton also argues that the right to water should extend to the right to wealth generated by productive water use. In the case of mining activities, this could become particularly problematic if communities claimed rights to part of mining industries' profit vis-à-vis the use of local water supplies in the extraction process.

In a follow up to the 2010 study, Kemp, Owen, Gotzmann, and Bond (2011) focus on the inequality and conflict between mining companies and the community surrounding mine sites. The authors argue that global norms need to set regulations for mining companies to abide by ethical standards when handling grievances associated with mining, and that this requires a critical understanding of the "mechanisms in practice." Their research on grievance mechanisms analyzes examples of these mechanisms from six mines in six different countries. Kemp et al. (2011) conclude that in all six cases, little was done to correct the imbalance of power between the mining company and the community, address a lack of communal dialogue, or include participants from the community in the design of the grievance mechanisms. The authors conclude that all six mechanisms were insufficient in their justice capacity.

Combining the two ideas put forth by Linton on the right to participation and wealth in relation to water, I examine how these two rights manifest themselves between mining companies and local communities. Understanding this relationship could provide insight into whether or not the human right to water can be acknowledged and protected by mining activities if communities cannot participate in decision-making processes or profit from productive water use. In comparison to the Millennium Development Goals (MDGs), the 2015 Sustainable Development Goals (SDGs) address the importance of clean water and sanitation, participation in development, and inclusive economic growth (Sustainable Development Goals Fund). The acknowledgement of clean water, as well as participation and economic productivity, are all new SDGs that were not specifically noted in the MDGs, and therefore could signal a step towards an acknowledgement of the right to water by mining companies operating in the developing world.

The next chapter analyzes two conventionally understood resources, diamonds and coltan, to consider why conflict resources have been understood in a very specific and narrow way. Both of these resources approach natural resource exploitation and conflict from an economic point of view. A traditional understanding of conflict resources focuses on the link between conflict, natural resources, and human rights through the sale of natural resources to fuel ongoing conflict. An international regulation framework has been established for one of these conventional conflict resources, diamonds, while coltan still lacks the international attention needed for a system of regulation preventing trade in conflict coltan. Chapter three examines how and why this conceptualization of conflict resources does or does not result in international attention and regulation.

## Chapter Three: “Conventional” Conflict Resources

### *Diamonds and the Kimberley Process*

In May 2000, Southern African states met in Kimberley, South Africa, with the intent of creating a mechanism to prevent trade in conflict diamonds. Months later, in December 2000, the United Nations passed Resolution 55/675, acknowledging the role of diamonds in fueling conflict and supporting “the creation and implementation of a simple and workable international certification scheme for rough diamonds” (United Nations General Assembly 2001:1). In November 2002, the Kimberley Process Certification Scheme (KPCS) was released and entered into force in 2003, signaling the first comprehensive international agreement on a conflict resource (Kimberley Process). The Kimberley Process includes 54 participating countries representing 99.8% of all diamond production worldwide, and include representatives of 81 countries, the World Diamond Council, and a number of NGOs and civil society organizations (Kimberley Process). The four basic requirements of KP participants are as follows:

- “1. Each shipment of rough diamonds crossing an international border must be:
  - a. Transported in a tamper-resistant container
  - b. Accompanied by a government-validated Kimberley Process Certificate
2. Each certificate must be resistant to forgery, uniquely numbered and describe the shipment’s contents
3. The shipment can only be exported to another Kimberley Process participant country
4. The importing country’s customs have a responsibility to check the contents of the shipment with the Kimberley Process certificate” (World Diamond Council).

The certificate must bear the statement, “the rough diamonds in this shipment have been handled in accordance with the provisions of the Kimberley Process Certification Scheme for rough



diamonds,” and the KPCS requires all participants to meet the standards of a certificate, and all are bound to import and export only diamonds that have this certificate (Kimberley Process Certification Scheme 2002:12).

In relation to this study, it’s important to consider how the KPCS came about, and why an international agreement on conflict diamonds was necessary and feasible. In 1998, the NGO Global Witness released a report that connected violence and conflict in Angola committed by the National Union for the Total Independence of Angola (UNITA) to trade in diamonds. The report states:

“The international trade in diamonds has become a major obstacle to any possible progress towards peace; and has played the major role in enabling UNITA to restock its munitions and maintain a flow of supplies which in turn has enabled it to disregard the 1992 election results and to avoid meeting its obligations under the Lusaka Protocol” (Global Witness 1998:4).

The report found that since 1992, UNITA had controlled roughly 60-70% of diamond production in Angola, producing \$3.7 billion in revenue. The lack of transparency in the international diamond market had made diamonds an easily lootable and lucrative resource for UNITA and had nearly fully funded violence that led to massive human rights violations (Global Witness 1998). Following the release of this report, the United Nations Security Council (UNSC) passed Resolution 1173, prohibiting “the direct or indirect import from Angola....of all diamonds that are not controlled through the Certificate of Origin regime of the GURN [Government of Unity and National Reconciliation]” (United Nations Security Council 1998:3). Two years later, in March 2000, the United Nations released the “Fowler Report”, finding,

“UNITA’s ongoing ability to sell rough diamonds for cash and to exchange rough diamonds for weapons not only provided the means for it to sustain its political and military activities, but also to acquire friends, maintain external support, and stockpile wealth. The report also ‘named and shamed’ companies, weapons dealers, and heads of state as ‘sanctions busters’ for their continued involvement in trafficking diamonds and weapons” (Moore 2011:23).

Partnership Africa Canada (PAC), a Canadian NGO, released a report around the same time that the Fowler Report was released, accusing the Revolutionary United Front (RUF) in Sierra Leone of smuggling diamonds into Liberia to fund civil war and mass atrocities including “crude amputations - feet, hands, lips, ears, noses - with special attention to women and children” (Smillie and Hazelton 2000:2). The report accused the diamond industry of being complicit in the trade in conflict diamonds, and the United Nations once more took action, passing Resolution 1306 banning imports of rough diamonds from Sierra Leone not accompanied by a certificate of origin (United Nations Security Council 2000).

The combined impact of these reports that exposed the deaths of millions funded by trade in conflict diamonds led to major public outcry against the diamond industry, and many NGOs campaigned for the creation of international regulations for the diamond trade. Moore (2011) suggests conflict diamonds generated so much advocacy because although diamonds were “often thought to be a symbol of love, purity, and eternity, [they] had become connected to gruesome images of war, destruction, and children with chopped-off limbs” (23). The initial meaning of a diamond and what it came to represent stood at such odds that it was easy, and upsetting, for consumers to make the connection between the jewels they wore and the deaths of millions in sub-Saharan Africa. Conflict diamonds were also brought to the attention of the public through

popular culture references to the atrocities associated with the diamond trade in Africa, such as Kanye West's song "Diamonds from Sierra Leone" and the Hollywood movie *Blood Diamond*. Constructivism provides insight into the significance of the public's relationship with diamonds, as people began to give new meaning to a valuable resource. Diamonds that had once symbolized only happiness and purity were now tainted by a new understanding of the human rights violations and atrocities committed with revenue generated from the diamond trade. Growing awareness and objection to trade in conflict diamonds led Southern African states to gather in May 2000, just months after the release of the Fowler and PAC Reports, to begin the process that eventually led to an international agreement on the regulation of conflict diamonds (Moore 2011).

Global Witness argues that one of the most impactful, and controversial, outcomes of the Kimberley Process was the definition of conflict diamonds included in the KPCS. The definition is as follows:

"[R]ough diamonds used by rebel movements or their allies to finance conflict aimed at undermining legitimate governments, as described in relevant United Nations Security Council (UNSC) resolutions insofar as they remain in effect, or in other similar UNSC resolutions which may be adopted in the future, and as understood and recognized in United Nations General Assembly (UNGA) Resolution 55/56, or in other similar UNGA resolutions which may be adopted in future" (Kimberley Process Certification Scheme 2002:3).

The first part of the definition stipulates conflict diamonds as a financial tool of conflict that specifically targets "legitimate governments" and therefore does not apply to the "broader range of risks to human rights posed by the trade in diamonds" (Global Witness 2013). Additionally,

the KPCS only applies to rough diamonds. The Kimberley Process has no mechanism to regulate the trade in conflict diamonds once they are cut and polished. This parallels roadblocks for regulating coltan, which can be difficult to trace once it has been melted down from its rough form (Moore 2011:52). As noted earlier, the International Atomic Energy Agency (IAEA) safeguards and the NPT regulate trade in uranium but only if classified as a “weapon-grade” material, which would only applied to enriched uranium (Lerner and Gilman 2004). Moore (2011) argues that despite its many weaknesses, only one of which is its definition, the KP has overall reduced the number of conflict diamonds traded internationally. This effort to regulate conflict diamonds stands as an example of what can be possible to achieve with other natural resources, such as coltan and uranium. The next sections examine why the KP has not been replicated for another natural resource that is widely accepted as a conflict resource.

### *The Case of Coltan*

Coltan and diamonds have similar characteristics; they are both “lootable resources” according to Le Billon’s (2009) definition, that are likely to be targeted for conflict revenue, and indeed have been in past and current conflicts in sub-Saharan Africa. Both are widely recognized as conflict resources, and pose similar, but not identical, challenges when it comes to regulation. Coltan- short for columbite-tantalite ore- holds electronic charge better than any other substitute material currently available (The International Consortium of Investigative Journalists 2012). Coltan is sometimes referred to as one of the 3T minerals- tungsten, tantalum, and tin- that are used in electronic devices (Enough Project 2009). As the demand for electronic devices has grown, so has the demand for the 3Ts, increasing their value on the world market. Australia was the top producer of coltan until its largest mine, Wodonga Tantalum mine, suspended operations in 2008

and again in 2012 due to an inability to compete with prices from the world's next largest producer of coltan, the Democratic Republic of the Congo (DRC) (Smith 2013). The DRC is a resource rich country, with supplies of the 3T minerals, copper, gold, cobalt, diamonds, and timber, among other resources (Global Witness 2006). The relationship between conflict and resources in the DRC provides a case study to support the theory put forward by the Collier Hoeffler model that links natural resource and conflict through economic factors including "dependence on primary commodity exports" (Bannon and Collier 2003:2)

Since 1996, the DRC has been in a perpetual state of conflict, linked to complex ethnic and economic causes. The government and rebel groups have both exploited natural resources to fund their war efforts, prolonging the duration of conflict in the DRC (Global Witness 2006). The revenue from coltan and other mineral mining is captured either by direct control of a mine or bribes at border crossings during the process of smuggling coltan out of the DRC (Enough Project 2009). A UN panel of experts in 2008 reported the following in relation to mine control:

"The FDLR [Democratic Liberation Forces of Rwanda] controls the majority of mines in South Kivu. The former CNDP [National Congress for the Defense of the People], now allied with the government after a March 23, 2009 peace accord, never directly controlled many mines, but was able to dominate much of the trade through its control of key border posts" (Enough Project 2009:4).

The lucrative nature of mine control has also led to increased violence in rural areas surrounding mining sites, as groups fight for control a resource to fund future violence (Global Witness 2006).

All mining in the DRC is artisanal mining, meaning, “it uses manual labor, simple tools, and only the most basic of technologies” (Enough Project 2009:3). Coltan mining is a form of surface mining,

“Where groups of men generally work together, digging large craters in streambeds, and scraping away dirt from the surface in order to get to the coltan underground. The workers then slosh water and mud around in large washtubs, allowing the coltan to settle at the bottom” (Bala 2002:61).

As a resource found in or near water, coltan extraction is likely to contaminate water by damaging water ecosystems, disturbing streamflow, and contaminating water sources for local populations (Maria and Taka 2012). Similarly, diamond mining uses water in its extraction process, which can also drain or pollute local water sources (World Diamond Council).

Like diamonds, coltan has gained international attention over the past few years, due to NGO and UN reports that clearly link coltan mining to conflict finances. However, unlike diamonds, no legal framework has been established at the global level to prevent or regulate trade in conflict coltan. The United States first addressed conflict minerals from the DRC in the 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act; Section 1502 requires companies to report to the SEC any purchase of conflict minerals from the DRC (United States Congress 2010). The Dodd-Frank Act does not impose any restrictions or punishments for companies that purchase conflict minerals from the DRC: it just requires a public record of their purchase. Although this is a step in the right direction, it only applies to companies, both foreign and domestic, operating within the United States.

Conflict coltan is very hard to trace once it leaves the African continent, which helps explain the lack of international regulation and restriction on conflict coltan. The supply chain for coltan and other 3T minerals is not as direct as the supply chain for diamonds (see Figure 1 for map of the supply chain); Coltan from the DRC is often smuggled into neighboring countries, where bribes generated from smuggling also contribute to rebel group revenue (Moore 2011). Once in countries like Rwanda and Uganda, the coltan is often misrepresented as local to avoid the minerals being associated with a “conflict resource” label (Enough Project 2009). The minerals are then shipped from Africa to various countries in Southeast Asia, and coltan is smelted, which is “the process of extracting the minerals from the ores through heating the minerals beyond their melting points” (Moore 2011:52). During the smelting process, coltan from the DRC is mixed with minerals from other countries, and it becomes essentially impossible to “determine the minerals’ country of origin” (Moore 2011:52). Now a metal, coltan is incorporated into a variety of electronic devices that are then sold mainly in Western countries, in Europe and North America.

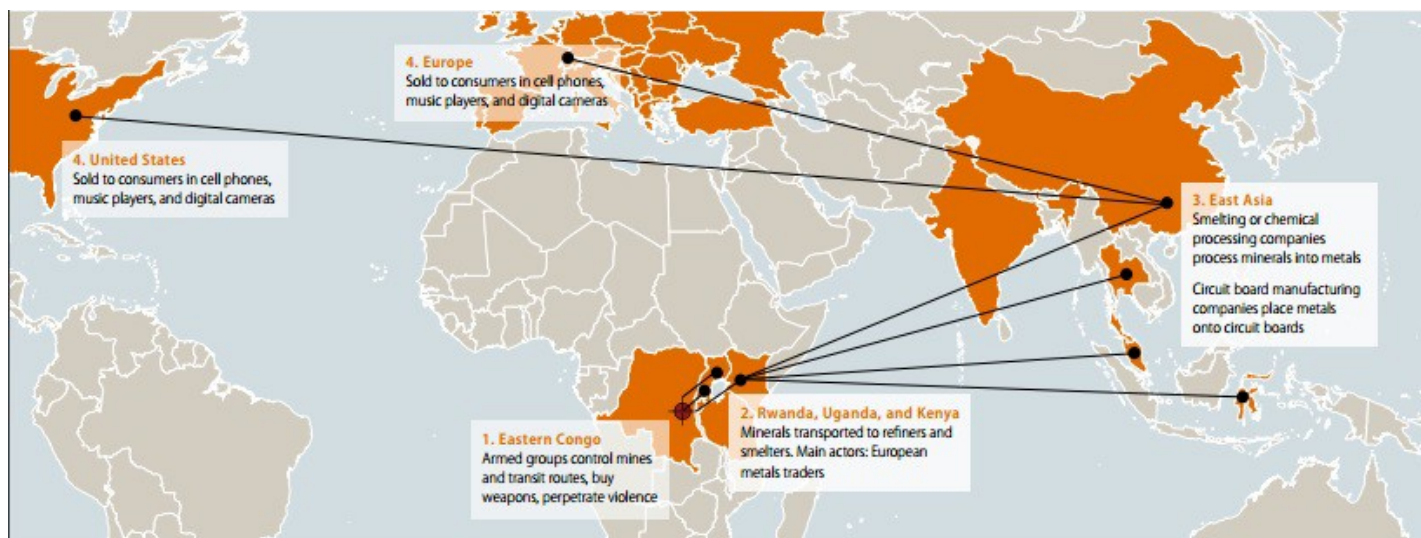


Figure 1: Coltan Supply Chain

Source: Enough Project

In addition to the Dodd-Frank Act, countries, industries, and regional organizations have attempted to regulate the trade in conflict coltan, although none have reached a level of comprehensiveness similar to the Kimberley Process. To address the difficulties associated with tracing the origin of coltan for conflict and conflict-free labelling, the German Federal Institute for Geosciences and Natural Resources (BGR) is working to develop a “‘fingerprinting’ system for tin, tantalum, and tungsten based on their mineralogical characteristics (Moore 2011:55). This system would be able to trace minerals to a site of production, which could help distinguish DRC conflict coltan from other coltan from Africa and other continents. The International Conference on the Great Lakes Region (ICGLR), a regional organization representing the countries of the African Great Lakes Region (DRC, Central African Republic, Republic of the Congo, Angola, Rwanda, Burundi, Uganda, Kenya, Sudan, Zambia, and Tanzania) established a “regional certification system” in 2010 based on the following four principles:

“1. [C]hain of custody tracking from mine site to export”

“2. Regional mineral tracking using an ICGLR database”

“3. Independent third-party audits”

“4. An independent mineral chain auditor” (Blore and Smillie 2011:8-9)

Finally, the closest coltan has come to a global regulatory framework is the Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas, released by the Organization for Economic Cooperation and Development (OECD), an organization of Western industrialized countries. The guidance “provides companies with a complete package to source minerals responsibly in order for trade in those minerals to support peace and development and not conflict” (OECD 2013:3). While the OECD Due Diligence



Guidance is voluntary like the Kimberley Process, it is a list of recommendations not requirements, and so it lacks the same weight that the Kimberley Process carries in international law (Moore 2011).

Diamonds have a much more direct supply chain than coltan, which eases the ability to distinguish conflict and conflict-free diamonds. Moore (2011) argues that regulating coltan would also be more complex and difficult than regulating diamonds because regulating coltan also requires the regulation of the other 3T minerals, and a comprehensive framework for three different minerals would be very difficult to attain. However, even if coltan could be regulated separately from tungsten and tin, the lack of political will pose a major challenge for coltan. As previously explained, part of what drove countries to develop the Kimberley Process was a combination of scathing reports on conflict diamonds, “naming and shaming” of the diamond industry, and significant public outcry. This may, once again, be due to the more direct connection between diamonds and conflict in sub-Saharan Africa, as it is much easier for consumers to see a connection between the jewels they purchase and the conflict they fund. Because the public has a relatively weak knowledge of their relationship with coltan, the conflict associated with its extraction does not shape peoples’ understanding of their world, specifically their experience with electronic devices. In other words, using a laptop or a cell phone does not conjure images of mass atrocities and human rights violations in the same way it had with diamonds in previous decades. Coltan, with its complex supply chain and ubiquitous use within electronic devices, makes it more difficult for the public to see the connections between conflict in the DRC and their cell phones.

## *Conclusions*

This chapter examined diamonds and coltan as “widely accepted” conflict resources with varying levels of international regulation. Both diamonds and coltan can be controlled directly or indirectly by armed groups to generate revenue to fuel existing conflict, but are unlikely to serve as a root cause of conflict. Water is part of the extraction process of both resources, however it receives scant attention in terms of its connection to traditional conflict resources. The most significant connection, for the purpose of this research, between coltan and diamonds is their role as revenue resources during conflict. Since this is an integral part of the existing definition of conflict resources, they both fit the Global Witness description of a conflict resource well, unlike a resource such as uranium, which is explored in more depth in the next chapter. Although the relative success of the Kimberley Process is debated, diamonds have reached a level of success not obtained by most other conflict resources: a comprehensive international framework agreement that is legally enforceable. Coltan, another well-established conflict resource, has yet to obtain the same level of comprehensive regulation; the lack of political will, public advocacy, and a complex supply chain make a legally enforceable international framework difficult, if not impossible to achieve. In the next chapter, I examine uranium extraction, a resource that is tightly regulated by the Nuclear Non-Proliferation Treaty, but lacks the attention of the media and the public needed to make the connection between uranium, water, and conflict.

## Chapter Four: Uranium, Water, and Conflict

Africa is home to two of the world's top five uranium producers yet rarely perceived as connected to nuclear activity due to the lack of nuclear weapons on the continent. Uranium mining, however, enables the production of both nuclear weapons and nuclear energy. This helps explain why a developing country would invest in uranium mining. How does that investment affect the surrounding population? Unlike diamonds and coltan, which are narrowly recognized as conflict resources and whose trade revenue is used to fund violence and the committing of human rights violations, uranium provides an example of a resource that might be considered a conflict resource within a broader contextual understanding of the term. This chapter seeks to determine whether uranium mining increases the risk of conflict through water stress. An increased risk of conflict can either lead to or result from the violation of human rights. Uranium might be identified as a conflict resource if we better understand the relationship between water, uranium mining, and conflict risk. To explore these connections I conduct a comparative case study of Niger, Sudan, Namibia, and Ghana; each state displays varying combinations of uranium mining and conflict. I argue that water stress caused by uranium mining increases the risk of conflict in areas predisposed to high risk of violence due to a history of conflict, political instability, lack of political representation, low human development, and slow economic growth.

### *Location within the Academic Literature*

Gabrielle Hecht has done extensive research on uranium mining in Africa, in particular surrounding the struggle for recognized “nuclearity” on the African continent; that is, whether uranium mining is legally considered a nuclear activity or a mining activity (2009). For many years, uranium mining was not considered to be nuclear, and therefore the suffering of uranium

mining workers went undocumented as part of the cost of the nuclear age. Hecht argues this oversight occurred due to “the friction between the transnational politics of knowledge and (post)colonial power, between abstract prescriptions and embodied, instrumentalized practices” (Hecht 2009:897). Her 2009 study focuses on three cases in Madagascar, Gabon, and South Africa, and concludes that “nuclearity” varied across space and time, and that the same circumstances and considerations could not be applied in every case. Her research finds uranium mining results in adverse health consequences for workers digging uranium ore out of the ground; I expand her research to include research on the consequences of uranium mining on the entire surrounding population.

In *Being Nuclear: Africans and the Global Uranium Trade*, Hecht (2012) addresses the political economy of uranium, the historical relationship of colonialism and the price of uranium, and the consequences of radiation exposure for uranium miners. This study reveals a complicated relationship between African mining states and international actors, including France as a colonial power and the International Atomic Energy Agency (IAEA). Actors vacillated between keeping the price low by treating uranium as a “normal” commoditized good and wanting to emphasize uranium as a unique commodity. Emphasizing uranium’s “exceptionalism” led to a higher price for the good, but at the expense of increased costs of production related to acknowledging the nuclear uses of uranium and the dangers it posed to uranium mineworkers. Hecht’s research regarding the price and production of uranium provides a foundation for my analysis of the rates of production and price fluctuations as measurements of uranium mining activity in this project.

Carlo Koos and Matthias Basedau (2013) identify uranium mining as a cause of increased civil conflict risk in Africa. They analyzed conflicts from 1961 to 2008, using a comparative case

study of countries that have witnessed conflict and uranium mining, and focused on roles of uranium mining and ethnicity as causes of conflict. Koos and Basedau concluded that uranium mining results in an increase in conflict risk when it exacerbates ethnic discrimination, specifically in the case of Niger. The authors find evidence that during Tuareg Rebellions in the 1990s and 2000s, the ethnic group demanded “a higher share of the revenues from the uranium being extracted in their homelands” (Koos and Basedau 2013:320). They conclude that the fight over uranium mining “played a strong role” in instigating the conflict that followed (Koos and Basedau 2013:321). The authors completed a comparative case study using four cases “where armed conflict broke out after uranium operations started (DR Congo, Central African Republic, Niger and South Africa)” (Koos and Basedau 2013:306).

In this project, I refine and update the research done by Koos and Basedau. I examine four cases that exemplify different variations of my two variables, uranium mining and conflict, instead of using four that present both variables, as Koos and Basedau did, in hopes of finding a more nuanced explanation of the connection between conflict and uranium mining. This study concentrates on three features of uranium mining that Koos and Basedau link to conflict risk: motives, opportunities, and indirect mechanisms. My research focuses on the first feature, because the other two features, opportunities and indirect mechanisms, are less relevant to a comparative case study involving states that do not have uranium mining operations.

Additionally, I do not examine the role of ethnicity in conflict because I want to identify common sources of conflict, whereas ethnicity varies greatly across contexts. Koos and Basedau describe “motives” as the aspects of uranium mining that would motivate a struggle against the government or the mining company. The authors list radiation, water contamination or depletion,

and the displacement of persons as motivations for conflict. Mining effects on water sources will be the focus of my research.

*Thesis, Framework, and Methodology*

I examine uranium mining in sub-Saharan Africa because I want to know if uranium mining increases conflict risk within affected populations. I hope to identify a relationship between the

Figure 2

	History of Conflict	No History of Conflict
Presence of Uranium Mining	Niger	Namibia
No Presence of Uranium Mining	Sudan	Ghana

impacts of uranium on indigenous populations and conflict risk that can be extrapolated to predict conflict in other states or areas with a similar set of circumstances. Uranium mining is the independent concept because the effects of uranium mining influence the risk of civil conflict, the dependent concept, in the surrounding area. I conduct a comparative case study, collecting data on uranium mining and conflict across four different countries in sub-Saharan Africa that display different combinations of the two variables. The purpose of this study is to compare countries with and without uranium mining and with or without conflict to pinpoint precisely the circumstances under which uranium mining causes an increase in conflict risk. The four cases I use are Niger, Sudan, Namibia, and Ghana (see Figure 2). I analyzed the period of 2008 to 2014, to pick up where Koos and Basedau’s study left off and to provide new information on uranium mining and conflict risk.

I approach this study from a constructivist worldview, looking for an explanation for the connection between uranium mining and conflict. Water contamination or depletion as a result of

uranium mining sheds new light to the meaning of conflict resources, and could expand our understanding of conflict resources. Koos and Basedau conclude that uranium mining has no history as an “independent conflict risk in Africa” and will only lead to conflict under certain circumstances (2013:325). I expand on this conclusion to address water stress as a circumstance that, when combined with uranium mining, could lead to increased conflict risk. Examining the impact of water stress as a result of uranium mining can broaden our understanding of a “conflict resource.” Koos and Basedau’s research also worked with African countries, and like them, I predict that uranium mining brings about a certain number of unique conditions that in turn result in an increase in conflict risk. I argue that uranium mining and conflict risk are related because the environmental effects of mining, specifically water stress, disproportionately affect people in the communities surrounding uranium mining areas. These effects could result in increasing tensions and conflict over land and resources. I build on literature reviewed in chapter one to hypothesize that the relationship between uranium mining and risk of civil conflict is positive because uranium mining affects the living conditions of the population, which in turn increases the risk of civil conflict and affects larger security implications that could affect the stability of countries and regions.

For uranium mining, I collected data on the presence of uranium mining in countries in sub-Saharan Africa primarily from the World Nuclear Association. This includes data on the construction of uranium mines, price fluctuations of uranium mining on the world market, and uranium supplies in each case country. To analyze conflict, I collected data on the frequency of violence occurring in the four case study countries. The Global Peace Index provides a comprehensive measure of many indicators of conflict of violence. I looked for correlations between uranium mining and conflict, to apply the analysis with a view of conflict resource risk

reduction. The link between these two variables that I look to establish is uranium mining's effect on resources and living conditions, particularly the role of water, and in turn the relationship between these effects, conflict risk, and open conflict.

### *Uranium Mining*

Figure 3: Open Pit Mining

Source: IAEA

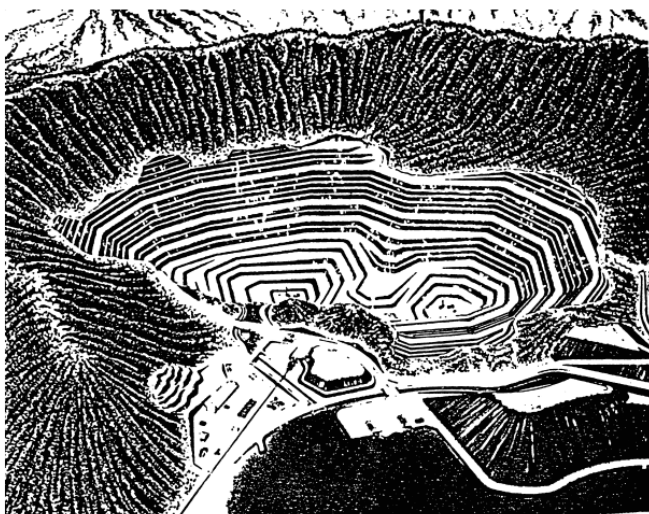
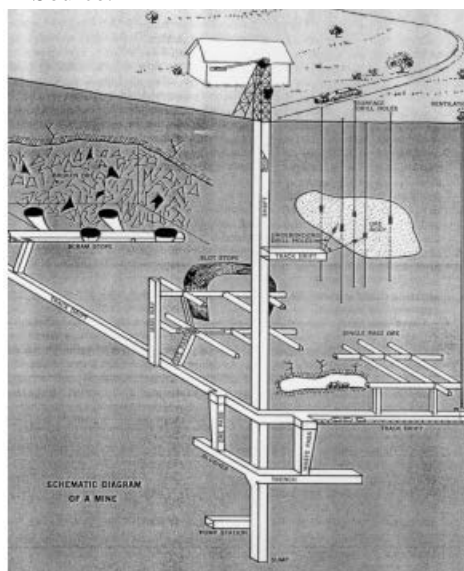


Figure 4: Underground Mining

Source: IAEA



Uranium mining is defined as “the process of extracting uranium ore from the ground. Methods include open pit, underground and in situ leach mining” (Beyond Nuclear 2013). The mining method is usually determined by economics.

Surface mining is cheapest and easiest, but open pit mining (see Figure 3) only occurs when the uranium ore is close to the surface, and can be easily accessed by digging through the surface soil (Ulmer-Scholle 2015). Generally, risks of water pollution, air contamination, and the health of miners are significant with open pit mining. Surface runoff from open pit mining must be purified before the water can be returned to the environment, but this process is very expensive (Nicolet 2000). Underground mining (see Figure 4) is used when the uranium ore is too deep to reach from the surface, and instead is drilled, “blasted to create debris which is then transported to the surface, then on to a mill” (Ulmer-Scholle 2015). Underground mining is more expensive



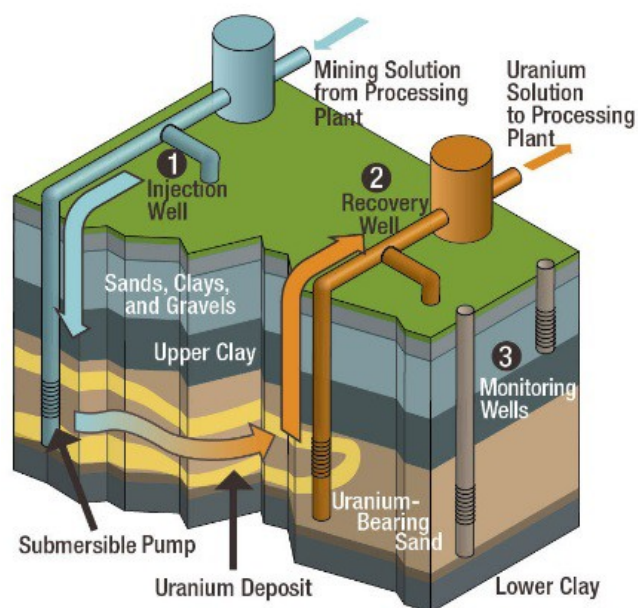
than open pit mining, and poses great risks to both water and air quality. The radiation from the blasted debris poses serious health risks to miners, and radiation can infiltrate the water unless it “is confined in pipelines and pumped directly to surface” (Nicolet 2000:18). In situ leach mining (ISL mining) combines mining and extraction cheaply and more environmentally friendly than open pit or underground mining (see Figure 5). The process is cheap; however, it requires advanced technology and infrastructure that many developing countries have difficulty accessing. Although the risk of radiation exposure is lower with ISL mining, this type of mining requires a significant amount of water, with extensive aquifers and purification methods (Nicolet 2000). The two primary methods of mining used in Niger and Namibia are open pit and underground mining, according to the World Nuclear Association.

### *Explanation of Measurements*

## **Uranium Mining**

Uranium world market price and production levels are the clearest measures of uranium mining. Figure 6 maps the price of uranium on the world market, and production levels in Niger and Namibia from 2008 to 2014. Namibia’s production dropped off in 2011, following a similar pattern to production levels worldwide post Fukushima. Production in Namibia correlates well with the price of uranium; however, the same cannot be said

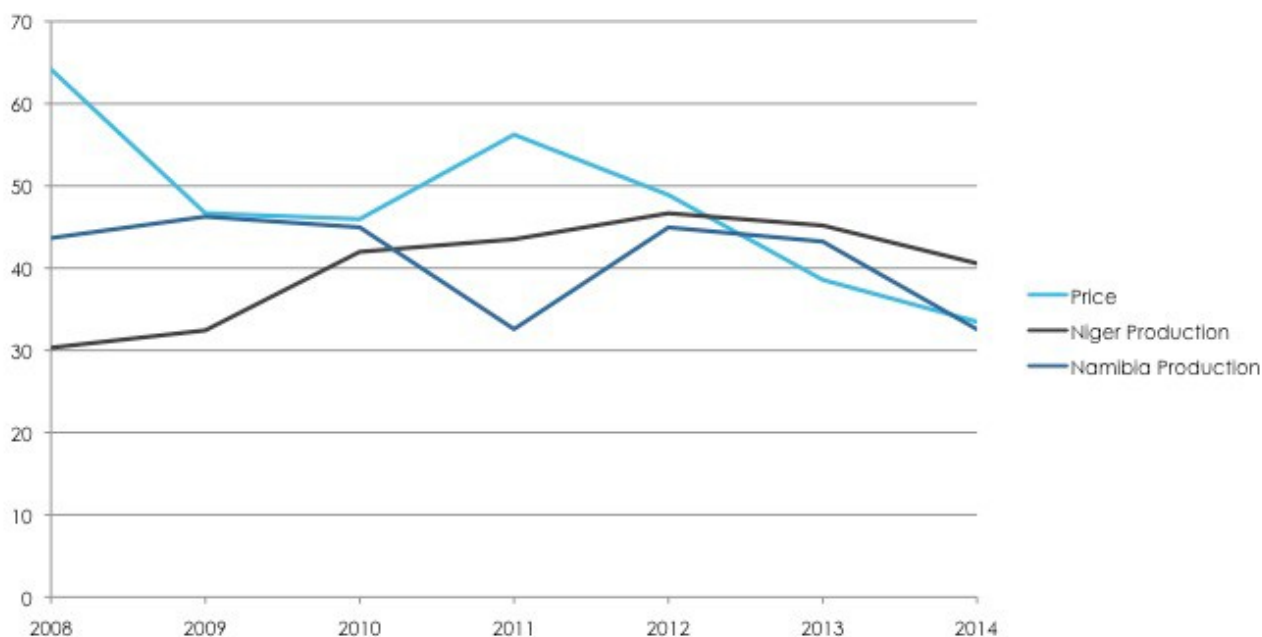
Figure 5: ISL Mining Source: US Regulatory Commission



for Niger. Production continued despite fluctuations in the global market price. Areva and Niger negotiated the price of uranium separate from world market prices, and therefore was not as impacted by the shifts in the global market (Flynn and De Clercq 2014).

Figure 6: Uranium Price and Production

Source: World Nuclear Association, IMF



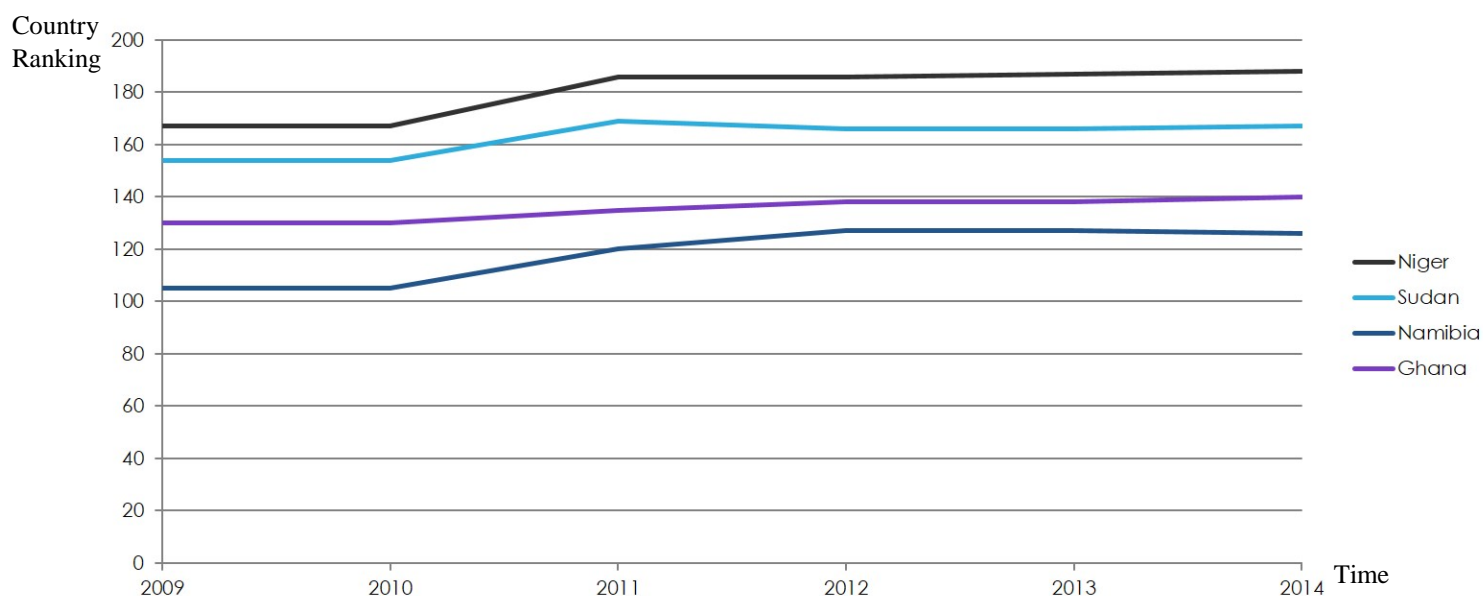
## Conflict Risk

To measure the risk of conflict due to the root causes of inequality, state collapse, economic decline, and history identified by the 2001 Department for International Development report, I conducted a secondary analysis of multiple datasets. The remaining root cause of conflict, natural resources, will be explored more closely in each case study; however, the other measures are important to note in a comparison across all four states. I used three primary datasets in my analysis: the United Nations Human Development Index, the Global Peace Index, and Freedom House's *Freedom in the World* Reports.

I compiled data from the Human Development Index (HDI) as an indicator of inequality and history, because the index addresses three key dimensions: health, education, and living standards (United Nations). All three of these dimensions play a role in societal inequality and are likely to act as secondary or tertiary causes of conflict if they are significantly poor in a country. Regularly low levels of human development could indicate a history of conflict, or

Figure 7: Human Development Index Country Rankings, 2009-2014

Source: HDI



probability of falling into a conflict cycle. Figure 7 illustrates the HDI rankings of all four case study countries from 2009 to 2014; the higher the number in rank, the lower that country's HDI score. The 2008 HDI data was not released as an official report, and therefore has no definite list of rankings. In 2011, the number of countries including in the rankings jumped from 169 to 187, and from 187 to 188 in 2014, hence the parallel shifts in rankings those years. Note that out of 187 countries included, Niger ranked 187<sup>th</sup> in 2013 and 188<sup>th</sup> in 2014 after consistently falling in the bottom five of the index. This indicates a high risk of conflict related to social inequality.

The Global Peace Index (GPI) is a relatively new composite of indicators, calculated by the Economist Intelligence Unit, measuring worldwide levels of peace. The first report was released in 2007 (GPI 2012). The index measures internal and external levels of peace through three categories each comprised of multiple indicators: societal safety and security, ongoing conflict, and

Figure 8: GPI Indicators

Source: Global Peace Index

militarization (GPI 2015). I focus on the first two indicators, because formal militarization is primarily measured by indicators of

Societal Safety and Security	Ongoing Conflict
- Level of perceived criminality in society (3)	- Number and duration of internal conflicts (2.56)
- Number of refugees and IDPs as a percent of the population (4)	- Number of deaths from organized conflict [internal and external] (5)
- Political instability (4)	- Number, duration, and role in external conflict (2.28)
- Political terror scale/ respect for human rights (4)	- Intensity of organized internal conflict (5)
- Impact of terrorism (2)	- Relations with neighboring countries (5)
- Number of homicides per 100,000 people (4)	
- Level of violent crime (4)	
- Likelihood of violent demonstrations (3)	
- Number of jailed people per 100,000 (3)	
- Number of police per 100,000 (3)	

formal involvement in conflict, such as military expenditure, peacekeeping contributions, and nuclear capabilities (GPI 2015). Like the HDI, the GPI provides a comprehensive measure of factors that could lead to conflict as a result of inequality and history. Figure 8 details the indicators that comprise the GPI measures of societal safety and security and ongoing conflict; the corresponding number indicates the weight of each measure in the final GPI score. The scores are calculated on a scale of one to five, with five being the least peaceful. These indicators, particular those depicting societal safety, are excellent indicators of conflict risk, because they help to paint a picture of the security situation in each country, determining levels of tension that could result in outbreaks of violence. Figure 9 maps the progression of GPI

country rankings from 2008 to 2014; like the HDI, a higher number indicates a lower GPI score, and therefore lower levels of peace. Niger was not included in the GPI until 2010, and therefore I calculated the country's GPI rank in 2008 and 2009 as an average of Niger's rank from 2010 to 2014.

The contrast of GPI rankings with HDI rankings is of particular note. While HDI rankings across the four states shift in parallel and are relatively close, the GPI rankings clearly point to a contrast between conflict states (Niger and Sudan) and relatively more peaceful states (Namibia and Ghana). Starting in 2013, the GPI began breaking down individual country scores for each of the three measures. Figure 10 displays the scores of each country for societal safety and security and ongoing conflict; like the overall scores for the GPI, these operate on a scale of one to five, with five being the least peaceful. Although three of the four countries have relatively similar scores, Sudan is the only one of the four currently in a state of conflict. Of the

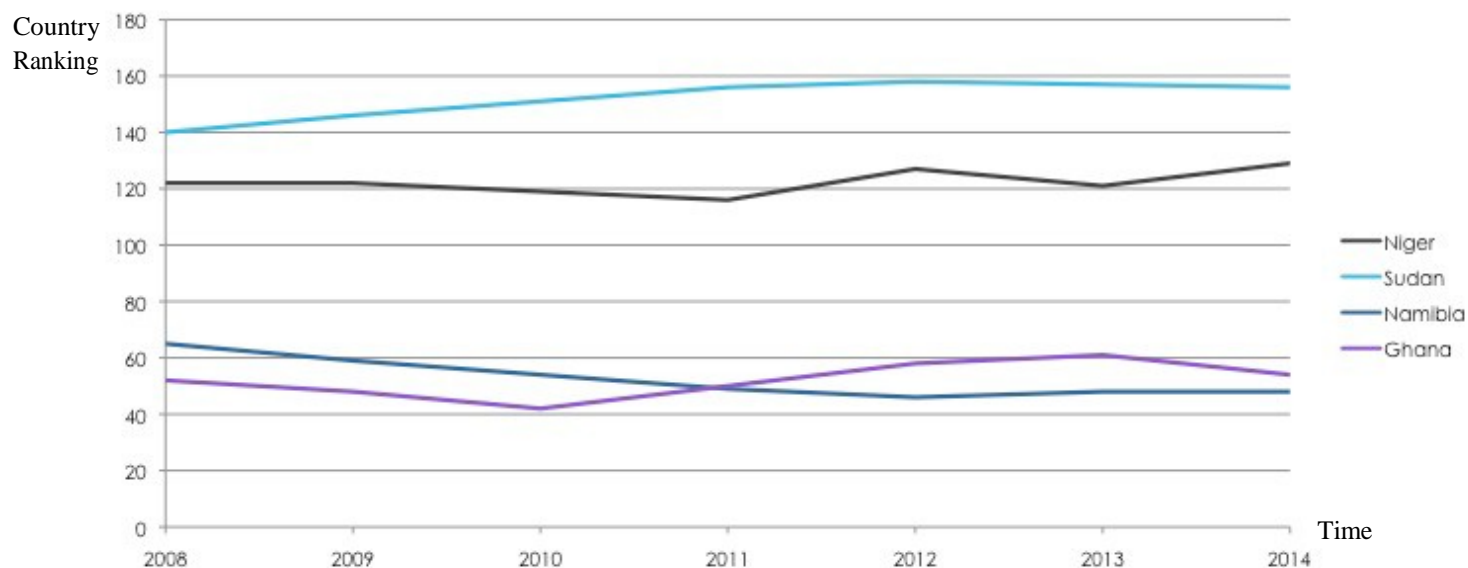


Figure 9: Global Peace Index Country Rankings, 2008-2014

Source: Global Peace Index

three countries not currently in conflict, Niger has scores significantly higher than the other two, and above the median score of 2.5/5.

Figure 10: Societal Safety and Ongoing Conflict

Source: Global Peace Index

Societal Safety				
Year	Niger	Sudan	Namibia	Ghana
2013	2.706	3.794	2.294	2.412
2014	2.88	3.87	2.41	2.34
Ongoing Conflict				
Year	Niger	Sudan	Namibia	Ghana
2013	2.2	3.4	1.2	1.4
2014	2.1	3.33	1.17	1.43

Freedom House's *Freedom in the World* reports detail the status of political rights and civil liberties in every country, creating categories of "free," "partly free," and "not free" (Freedom House 2015). Some of the root causes of conflict indicate a lack of political or civil freedom, such as state collapse and inequality; therefore, I note the level of freedom in each of the four case studies. Separate scores are calculated for political rights and civil liberties, and each score contains different indicators. The indicators measure political rights, such as political participation and election processes, and civil rights including rule of law and freedom of expression (Freedom House 2015). All four states have maintained essentially the same respective scores from 2008 to 2014; however, there are drastically different levels of freedom across the four. Namibia and Ghana were classified as "free" from 2008 to 2014; Niger was labeled as "partly free" for the six-year period; and Sudan was consistently classified not only as "not free" but labeled among "the worst of the worst" (Freedom House).

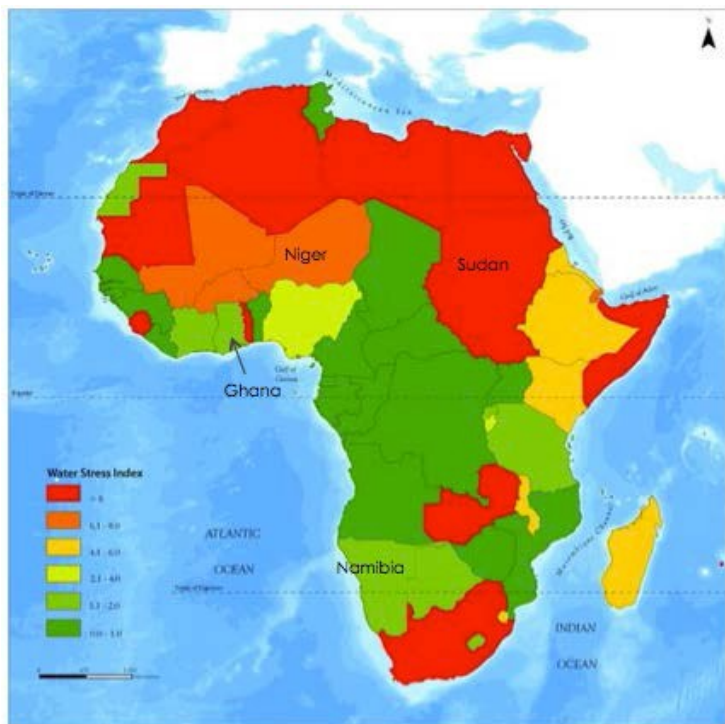


Figure 11: Water Stress

Source: United Nations

### *Water Stress*

The Council on Foreign Relations defines water stress as “economic, social, or environmental problems caused by unmet water needs”

(Tatlock 2006). The most serious

water-stressed states in Africa are in

the northern Sahel region, which

includes Niger and parts of Sudan;

however, researchers estimate that by

2025 twenty-five African countries

could suffer from water stress (Tatlock 2006). Africa is particularly vulnerable to water stress

due to a lack of infrastructure in addition to generally low water supplies. Figure 11 depicts

levels of water stress across the African continent, and the darker areas in red and orange

represent areas of greater stress. Namibia and Ghana experience lower levels of water stress than

Niger and Sudan. A lack of water can lead to high mortality rates, low human development and

economic growth, and desperation that can often result in conflict. Many water conflicts also

stem from the “transboundary” nature of water; state borders often do not coincide with bodies of water, leaving many states at risk of conflict over sources of water (Tatlock 2006).

### *Findings: Niger*

Niger produces 7.5% of the world’s uranium, primarily in the north of the country (World

Nuclear Association). There are two main mines, both operated by the French nuclear company,

Areva. Société des Mines de l’Air (SOMAIR) is a conglomerate of four different mines in the

same area, all using open pit mining (World Nuclear Association). Mining began at SOMAIR in 1971, shortly following Niger's independence from France; however, post-colonial ties explain the French ownership of Niger's two biggest mines. Compagnie Minière d'Akouta (COMINAK) is an underground mine that opened in 1978; also owned by Areva, this mine has recently moved its production to new deposits of uranium ore to remain competitive on the world market (World Nuclear Association). Areva is a foreign-owned and operated nuclear energy company, meaning that it is not simply a corporation producing uranium, and its primary objective is to produce nuclear energy. SOMAIR and COMINAK combined make up over half of Areva's uranium supply, and there are plans to build a third mine in the area of Imouaren, but its construction is currently suspended because of low output and profit (Greenpeace International 2010). The government of Niger and Areva have set up a strategic committee to determine when production should begin at Imouaren, possibly by 2020 or when COMINAK's supply of uranium is depleted (World Nuclear Association). When production at Imouaren begins, it will become the largest mining project in Niger and the biggest open pit uranium mine in Africa (World Nuclear Association).

Société du Patrimoine des Mines du Niger (SOPAMIN), a Nigerien mining assets company, owns roughly 30% of SOMAIR, COMINAK, and Imouaren; however, the government of Niger only owns part of Société des Mines d'Azelik (SOMINA), a small mine established in 2007 that closed in February 2015 due to very low levels of production (World Nuclear Association). Both COMINAK and SOMAIR are certified under the International Sanitation Organization's ISO 14001 for environmental management, meaning that both mines claim to meet the criteria for environmentally safe mining (World Nuclear Association). Although owned by a foreign company and not the state of Niger, mines are not immune to conflict when it occurs in the area; in 2013, SOMAIR production declined due to terrorism in the region, and French



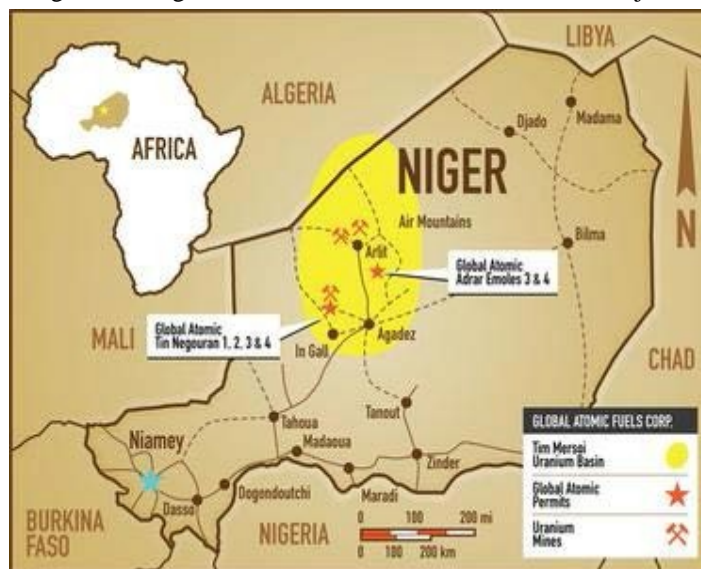
nationals and SOMAIR employees were kidnapped in 2010 (World Nuclear Association).

Niger's government may not be susceptible to violence to gain control of the mine since mines are not state-owned; however, these incidents indicate that mines are not immune to surrounding circumstances. Uranium mines could be targeted during outbreaks of violence.

Two towns, Arlit and Akokan, are located very close to Areva's mines in northern Niger, as seen in Figure 12. Both towns were established after the mines opened, as people rushed to the area hoping to find work and benefit from economic growth as a result of uranium mining (Dixon 2010).

However, this economic growth has not

Figure 12: Nigerien Mines Source: NGA Africa Project



occurred, since the majority of the profits from uranium mining are exported along with the uranium. In 2014, Niger and Areva negotiated a new contract; however, the details of this contract have yet to be released to the public, which violates Niger's 2010 constitutional stipulation requiring the publication of natural resource contracts (Hicks 2014). The few aspects accessible to the public indicate that Areva will now pay higher royalties on mining production to increase government revenue and benefit the Nigerien population (Hicks 2014).

Other effects of mining have greatly influenced the lives of the surrounding population; however, these effects are mostly negative. In 2009, Greenpeace and the Commission de Recherche et d'Information Indépendantes sur la RADioactivité (CRIIRAD) conducted an investigation in Arlit and Akokan, testing radiation levels of the area's water, soil, and air. The

investigation revealed radiation levels over 100 times over the limits imposed by internationally recognized standards (Dixon 2010). Water pollution and depletion was particularly significant, and a CRIIRAD engineer stated:

“The analysis we have performed show that the uranium contamination in four out of five water samples exceed World Health Organization safety limits. We found evidence of radon, a radioactive gas dissolved in water, and also chemical elements. Even so, this water is still being distributed to the population and the workers for consumption” (Greenpeace International 2010).

Although Areva’s mines supposedly meet international standards of environmental management, this study revealed that this is not the case, and much of the surrounding area is significantly contaminated. The mines require a large amount of water to conduct operations; however, northern Niger is a desert with limited water supplies and no access to large bodies of water, such as oceans or lakes. Therefore, a large portion of the water in the area is either contaminated or depleted, leading to increased levels of water stress in northern Niger.

#### *Case Summary*

Uranium mining in Niger makes up a significant portion of the world’s uranium supply, and over half of the uranium supply for the world’s largest nuclear company, Areva. However, this production has not had a positive effect on the people of Niger. Almoustapha Alhacen, President of the local Nigerian NGO Aghir in’ Man states:

“Radioactivity increases poverty because it creates more victims. With each day passes we are exposed to radiation and continue to be surrounded by poisoned air, polluted

water and earth- while AREVA makes hundreds of millions from our natural resources”  
(Greenpeace 2010).

Niger is ranked as the lowest developed country by HDI, and combined with a low peaceful ranking by the GPI, Niger is at a high risk of conflict. Increasing water stress as a result of mining activity exacerbates already high levels of tension in the region that could trigger conflict, particularly since northern Niger is already at risk of conflict spillover from conflict in Nigeria involving Boko Haram.

#### *Findings: Sudan*

Sudan has two different but significantly overlapping conflicts currently occurring within its borders: the war in Darfur and the conflict in South Kordofan and Blue Nile, often referred to as the “Third Sudanese Civil War.” Media portrays the war in Darfur as an ethnically based conflict; however, the conflict more closely resembles the previously defined “regional conflict” in which ethnic tensions are exploited by factional or proxy powers, and natural resources are targeted as a source of revenue for rebel groups (DFID 2001). The violence in Darfur stems from a combination of all five root causes of conflict; however, the three primary causes are social inequality, natural resource wealth, and environmental degradation (Sikainga 2009). Ethnicity may not be a direct cause of violence in Darfur, but the angle was certainly exploited. Economic and political marginalization disproportionately affects certain ethnic groups in Sudan; primarily Sudanese political elites, who in turn encourage factional proxies to exploit ethnicity as a cause for violence, control this marginalization. In regional conflicts such as those in Sudan, elites often encourage proxies to self-sustain their missions through the exploitation of natural resources, which can lead to drawn out or intractable conflict, as Bannon and Collier (2003) document.

Environmental impacts such as climate change patterns and severe droughts were a major source of conflict, as they negatively affected the livelihoods of pastoralists and farmers and led to territory disputes, overgrazing, and water stress (Sikainga 2009). According to a report by the Council on Foreign Relations:

“the crisis in Darfur stems in part from disputes over water: The conflict that led to the crisis arose from tensions between nomadic farming groups who were competing for water and grazing land-both increasingly scarce due to the expanding Sahara Desert” (Tatlock 2006).

As groups continue to fight for control of water access, water becomes a secondary and tertiary cause of conflict; violence is likely to continue without an end in sight if the most basic necessity of life and livelihood is linked to ongoing conflict.

#### *Case Summary*

While Sudan is not engaged in uranium mining, conflict has occurred continuously for decades, resulting in a GPI rank as one of the least peaceful countries on earth and a cycle of conflict that is incredibly hard to break. Natural resource wealth certainly plays a role in this conflict as groups fight for control of the revenue. The effects of natural resource exploitation such as water stress exacerbate conflict. Freedom House has listed Sudan as one of the “worst of the worst” for good reason, as state collapse and political and economic marginalization are major causes of conflict in the region. Water stress has played a role in Sudanese conflict at multiple stages, acting as a source of conflict as well as an obstruction to conflict resolution. The role of water in Sudan’s conflict indicates that even without uranium mining, water stress contributes to multiple stages of

conflict. Therefore, countries like Niger that experience increased water stress due to uranium mining are at an increased risk of conflict as a result of the mine's activities.

### *Findings: Namibia*

Namibia produces 6% of the world's uranium primarily through two mines, Rossing and Langer Heinrich, displayed in Figure 13 (World Nuclear Association).

Rossing is an open pit mine that began production in 1976 while Namibia was still controlled by South Africa. The mine is majority owned by the UK Company

Rio Tinto. The Namibian government owns 3% of the mine as well (World Nuclear Association). Like Niger,



Figure 13

Source: Fat Prophets

Rossing is own primarily by a foreign company; however, Rio Tinto is specifically a mining company, and not a nuclear energy company like Areva. The same is true for Langer Heinrich, an open pit mine established in 2006. The Australian mining company, Paladin Energy, with China holding a major share in the mine as well, owns the mine (World Nuclear Association).

The Namibian government owns part of the mines. Government ownership, although quite small, may play a role in mining operations. The Namibian people are likely to see more than just the negative effects of uranium mining if their government- and just a foreign company- profits from the production. Rossing uses a significant amount of water in its production process, 3 million m<sup>3</sup> per year. There are plans to build a desalination plant to alleviate the level of water stress in the surrounding area. Unlike landlocked Niger, Namibia is located on the Atlantic Ocean, and therefore has the option of using other sources of water for uranium production. Additionally, Namibia's lower HDI and GPI ranks indicate that Namibia may have more money

to spend on environmental management than Niger, where government revenue needed for basic needs and safety to improve upon low levels of peace and development. A UN report indicates that Namibia's national budget funds projects protecting the country's freshwater sources and ensuring "environmentally sound management" of toxic chemicals and hazardous wastes (United Nations 2002:26-28).

In 2011 and 2012, a Strategic Environmental Assessment produced an Environmental Management Plan addressing the supply of water to Namibian mines. The Erongo desalination plant owned by Areva operates on the coast of Namibia; Areva plans to sell its share in the plant to the Namibian Water Corps. The Namibian government plans to set up an adjacent plant, creating a public-private partnership in the distribution of water to surrounding mines. Rossing and Langer Heinrich both planned to sign agreements with Namibian Water Corps for the distribution of water to their respective plants; however, in July 2014 Rossing announced that it was unable to reach an agreement on water supplied by Erongo, and has since announced plans to build its own desalination plant in Swakopmund (World Nuclear Association). Swakopmund and Walvis Bay are coastal towns located near Namibia's major uranium mines. Both towns are suffering from water shortages following a severe drought that decreased water supplies from nearby aquifers (World Nuclear Association).

### *Case Summary*

Namibia and Niger produce comparable percentages of the world's uranium supply, but have drastically different HDI and GPI rankings. Namibia has much higher levels of peace and development, which significantly reduce the country's risk of conflict. Water stress and drought as a result of uranium production is therefore unlikely to trigger conflict, because the state is stable enough to manage fluctuations in water supply without resulting to violence. Additionally,

Freedom House notes that Namibia is sufficiently free, with high levels of respect for political rights and civil liberties. As a result, Namibia is less likely to experience violence than Niger as a means to address high levels of water stress due to uranium mining. Additionally, state ownership of uranium mines and water desalination plants may reduce negative sentiments towards uranium mining in Namibia among the population.

### *Findings: Ghana*

Ghana is not a producer of uranium and has been relatively peaceful since independence. I included it in this study as a control case, to determine what factors attributed to Ghana's peaceful state might vary from both conflict states like Sudan and peaceful uranium-producing states like Namibia. Ghana was one of the first African colonies to gain independence in 1957 from the United Kingdom, and it was able to do so peacefully without resorting to war as seen in Namibia and Sudan. Although Ghana experienced a few decades of political volatility, none resulted in significant conflict, and the country once again experienced a peaceful transition to democracy in 2000. The country has remained democratic for the last fifteen years, and Freedom House has consistently labeled Ghana as "free" with some of the best scores for political rights and civil liberties in Africa (Freedom House).

In 2012, divisions appeared within one of Ghana's main political parties, the National Democratic Congress (NDC), and "in anticipation of potential violence, all major political parties agreed in 2011 to curtail vitriolic campaign language and to denounce the use of intimidation tactics" (Freedom House 2013). This quick coordination to prevent violence requires structure, political leadership, and democratic processes that countries like Niger and Sudan lack. The country has also seen steady economic growth over the last few years and significant foreign investment from countries like China. Last year's increased inflation was

alleviated through peaceful and democratic means as the Ghanaian government worked hand in hand with the International Monetary Fund (IMF) to increase “investor confidence” in Ghana (Freedom House 2015). Ghana has significantly lower water stress levels than Namibia, Niger, and Sudan, which all lie in water stressed regions, according to the Council on Foreign Relations.

### *Case Summary*

Ghana demonstrates some of the highest levels of peace and development in sub-Saharan Africa, and this is mainly due to its status as a successful democracy. Democratic countries have the capacity to mitigate disputes without the use of conflict. A population feeling it is well represented by the government is less likely to result to violence. Additionally, foreign companies and countries are more inclined to invest in stable, democratic countries because the risk of investment is much lower. Foreign investment contributes to positive economic growth, and provides resources for government to improve services within the country and reduce economic disparity among the people. Ghana presents an example of the factors other African countries should be striving to achieve: representative government, foreign investment, and economic growth.

### *Conclusions*

This chapter set out to analyze the effect of uranium mining on conflict risk in four sub-Saharan countries, with a specific focus on the role of water linked to uranium mining activities. Niger and Namibia both experience water stress as a result of uranium mining, as they both practice forms of mining that contaminate water supplies. In countries with high risk of violence or ongoing conflict like Niger and Sudan, water stress is certainly present either as a cause of violence or a contributing factor that inhibits a resolution to conflict. In Niger, low levels of



development, economic growth, and democratic representation contribute to a high risk of conflict. This is aggravated by the negative effects of uranium mining on water supplies, which could increase the likelihood of populations resorting to violence. Conflict in Sudan may have started for root causes related to state collapse and social, economic, and political equality; however, water has played a clear role in the conflict at a local level, as rebel groups fight for control of dwindling water supplies. Like Niger, Namibia has witnessed depleting water supplies as a result of uranium mining. Steady economic growth, high development, and a representative democracy indicate that the population likely has other means of resolving water disputes that decrease the likelihood of conflict; similar factors prevent conflict from erupting in Ghana. I conclude that while uranium mining can lead to increased water stress through contamination and depletion, this only correlates with an increased risk of conflict if countries have a history of resorting to violence to solve disputes, have low economic growth and development, and do not feel free or politically represented. This chapter establishes the importance of understanding the role of water; how we conceptualize water is essential in the connection between natural resources, conflict, and human rights. The next chapter analyzes the right to water and its impact on our understanding of conflict resources.

## Chapter Five: The Human Right to Water

Unlike diamonds, coltan, and uranium, “water is live-giving and non-substitutable” (Sultana and Loftus 2012:1). The biological need for water adds more than economic value to this resource, and therefore a broader understanding of the role of water is essential. How we think about water affects its uses and distribution as well as the relationship between water, people, and the environment. The United Nations General Assembly and Human Rights Council passed Resolutions 64/292 (2010) and 15/L.14 (2010) respectively, recognizing “the right to safe and clean drinking water and sanitation as a human right that is essential for the full enjoyment of life and all human rights” (United Nations General Assembly- Human Rights Council 2010). The human right to water has implications for the dominant narrative of how water is thought about and used, as well as how those in positions of power treat it. This chapter examines how the right to water broadens the meaning of conflict resources to incorporate the contamination and/or depletion of water as a human rights violation. Uranium mining in Niger, addressed in chapter four, will again serve as a case study in this chapter, to assess how a resource not typically considered a conflict resource links to human rights violations. Although the details of this case study are unique to Niger, insights about the relationship between resource extraction, water, and human rights can be applied to other cases to explain the impact of mining on the human right to water.

How we think about water and view its connections to other aspects of life affects how we utilize it, and therefore we need to consider the complex meanings of water. A constructivist framework helps us to understand the broader meanings of water other than its economic value. Other natural resources like diamonds, coltan, and uranium are valued primarily based on their

economic worth, but water has many more values and meanings than impact on profit. Water is connected to conflict, natural resource extraction, and human rights, and the literature below examines the linkages between water and these three concepts. I begin with an analysis of how we think about water. Water has meaning within social, cultural, and political contexts that can affect how water is treated based on how we think about it. Within the past twenty-five years, water has been defined as both an economic good and a human right. In 1992, the Dublin Statement declared that “water has an economic value in all its competing uses and should be recognized as an economic good” (The Dublin Statement on Water and Sustainable Development quoted in Salzman 2006:95). Just a few years later, the Cochabamba Declaration declared water as a human right, and the United Nations confirmed this view of water in 2010 (Salzman 2006). Salzman (2006) identifies water as a physical, social, cultural, political, and economic resource. Such a multi-faceted view of water indicates that the true value of water is complex and often socially constructed by those who use and relate to it. Salzman argues, “How we think about water...both influences and is influenced by how we manage access to drinking water” (2006:97).

Religious traditions in both Judaism and Islam dictate a right to thirst, in which “sharing water is a holy duty” and drinking water is prioritized above all other uses of water (Salzman 2006:100). Salzman points out that while water may be restricted when scarce, it was seldom commodified, possibly because it was seen as too socially and culturally valuable to be sold as a good (2006:103). Rome is arguably the first city to commodify water; there were public wells and fountains available to the public free of charge, but water for luxury purposes like private baths was taxed (Salzman 2006). This system of public and private water, Salzman argues, determines that the right to water and economic value of water are not necessarily mutually

exclusive, but “by treating water purely as an economic resource” we ignore “water’s significant nature as a social resource” including the human right to water (Salzman 2006:120).

Linton argues that people tend to think about water “as a fixed thing rather than a principle or process out of which things occur” (2010:4). Water is fluid through time, space, and society, and by examining water as a process, we can understand how people come to know and relate to water. In the 20<sup>th</sup> century, Linton argues that people, particularly those in Western countries, took “water for granted in a material sense” but conditions such as climate change have shifted our associations of water towards “scarcity, pollution, war, and crisis” (2010:6). Linton refers to this understanding of water as “modern water” born out of more recent and Western ideals of dominion (2010). The phrase “modern water,” therefore, is meant to represent the fact that water as a material good has dominated all other relationships between humans, water, and the environment to become the “hegemonic construction of water” (Linton 2010:9). This shift in association, according to Linton, has changed and complicated the way we think about water, resulting in what he refers to as the “water crisis” (2010:7). The water crisis challenges what we know and understand about the nature of water, because “we can no longer presume a simple identity for water” (Linton 2010:7).

One implication of a new understanding of water in light of scarcity is a possibility of water-related conflict. In *Water, Peace, and War*, Chellaney (2013) examines the connection between conflict and water. He argues that since water often intersects with multiple issues, it “tends to manifest itself in a broader context rather than as an issue by itself” (2013:46). Water wars can take the form of competition over aquifers or river diversion, and Chellaney argues that this type of water war will become more likely as water becomes scarcer. The question remains, however, if outright displays of force will qualify as water wars “even if fought by another

name” (Chellaney 2013:48). In the Israeli Six-Day War and Pakistan’s attack on India in 1965, according to the author, “water was as key a driver as land in the initiation of both wars. Yet few called them water wars” (Chellaney 2013:48). In many areas of the world, particularly where water is scarce, national security and water have become inherently linked, which makes it likely that water will continue to be at least part of the motivation behind future conflicts. Water is more often an underlying driver of conflict rather than an overt cause, but when “deeper issues divide nations, disputes over common watercourses tend to become a catalyst for confrontation” (Chellaney 2013:54).

Gunasekara, Kazama, Yamazaki, and Oki (2013) conducted a study to assess the risk of future water-related conflicts in different regions of the world. The authors define water conflict as “a conflict that necessarily has its roots in issues of water resources” and measure different levels of conflict to account for the intensity of the violence caused by water-related disputes (Gunasekara et al. 2013:171). The authors base their predictions on water vulnerability and the unequal distribution of water supplies. As water stress is higher in arid regions, countries in Africa tend to be more water vulnerable than countries of Western Europe, for example. Gunasekara et al. conclude that the most water-vulnerable countries are almost all in the developing world, in Africa, parts of South and Southeast Asia, South America, and Eastern Europe. When two vulnerable countries neighbor each other, and when neighboring countries have drastically different levels of vulnerability, unequal distribution of water is “highly significant in identifying water conflicts” (Gunasekara 2013:183). This is likely an indication of unequal power in the management of water between neighboring states, or a lack of power altogether that can lead to increased conflict risk when water becomes scarce. On a smaller scale, this kind of unequal distribution of water and power can exist between a local community that

lacks clean water and a large private company that uses massive amounts of water for the extraction of natural resources.

Water vulnerability can increase during the extraction of other natural resources, particularly if a complex understanding of water is not considered. As previously noted, Kemp et al. (2010) point to the connection between mining and water pollution, as mining processes often produce waste that contaminates local water supplies if not properly managed. Rodgher et al. (2012) take a more physical and scientific view of water, examining the impact of mining activity on water quality, specifically of surface water linked to uranium mining. Rodgher et al. note that previous studies have found that uranium mining affects water quality; this particular study in Brazil found levels of contamination around mining sites well above legal limits. The authors highlights a need for improved control and treatment of uranium-contaminated water (Rodgher et al. 2012:2404). Soon after this report and others finding contamination above WHO limits, some of the contaminated water wells were closed (Dixon 2010). The outcomes of this study, while scientific in nature, support my research by incorporating different understandings of water to consider the full impact of water contamination and depletion. Additionally, these kinds of studies can have a real impact on political outcomes, such as the closing of contaminated water wells.

While Rodgher et al. examined the quantitative impacts of mining contamination, Dogaru et al. (2009) analyze the qualitative perceptions of water quality surrounding mines in Romania. Members of the local community were surveyed and asked to rate how polluted they felt their rivers and drinking water were. The study finds that socio-economic factors are much better indicators of how polluted people thought the water was, rather than the physical appearance of the water itself. For example, those with higher education levels are more likely to view the

water as “highly polluted,” supporting the view that “more educated people have a better understanding of the environmental problems” (Dogaru et al. 2009:1140). The authors compare communal perceptions of water pollution to quantitative data on the levels of pollution in the community. They find that the community’s perceptions corresponded strongly to the actual levels of pollution (Dogaru et al. 2009). This indicates that how people perceive water in their community can correlate with other measures of water, and therefore broadens our understanding of the impact of water contamination from mining activities.

The literature above examines the relationship between water and conflict as well as water and natural resources. To further expand the meaning of water, I analyze the relationship between water and human beings. Contaminated drinking water through mining activity and increased conflict risk during water scarcity both affect people and their relationship with and understanding of water. This is particularly significant in light of United Nations recognition of the human right to water; if people have the right to water; this affects our understanding of natural resources and conflict. Barlow argues that lack of access to clean water “in terms of sheer numbers affected, is arguably the single most urgent human rights issue of our time” (2013:10). The principle of water as a human right “recognizes that denying people or communities access to drinking water and sanitation is a violation of their human rights” (Barlow 2013:7). Poor, marginalized, and rural communities in the developing world are particularly at risk.

Barlow argues that the “growing commodification of the world’s water” leaves many unable to pay for clean water; forcing them to live off water of insufficient quantity or quality (2013:11). The right to water was not specified in the 1948 Universal Declaration of Human Rights, and Barlow argues that this was because “no one could conceive of a world lacking clean water” (2013:20). Water was taken for granted and use copiously without seeing the potential

consequences: “believing that water was indestructible and infinite, people took it for granted and wantonly polluted, mismanaged, and displaced it for our convenience” (Barlow 2013:20). This correlates with Linton’s belief that a dominant narrative and understanding of water has left many unable to see the complexities and externalities involved in irresponsible water management and governance. Barlow (2013) argues that a market-based approach to water that prioritizes water used for production and profit has led to over-extraction disproportionately affecting those who cannot afford to pay market prices for water. Although the right to water does not necessarily equal the right to free water, Barlow argues that it does guarantee “clean, accessible drinking water” and is therefore more an issue of “justice, not charity” (2013:7). If people are guaranteed clean water and sanitation as a human right, they are able to hold governments and corporations accountable for actions that violate this right (Barlow 2013).

Morgan (2004) also addresses the opposing views of water as a human right and water as an economic good, specifically in terms of differences in regulation. Morgan argues that conflict between these two views derives from the fact that how water services are delivered “is increasingly presented as one of commodification versus the protection of human rights” (2004:2). Human rights are increasingly becoming part of regulatory concerns, and problems of how to provide and distribute services guaranteed as human rights start to emerge. Corporations are trying to frame their interests in water within the human rights agenda, but human rights themselves become more complex as they “confront the intricacies of regulatory politics” (Morgan 2004:2). According to Morgan, current regulatory processes address the right to water as a governance issue and promote a market-based approach to water services as the solution to lack of access to clean water (2004). In contrast, human rights activists have opposed the view of water as a commodity and an issue of “good governance.” Instead, they promote water as a



human right and the importance of participatory democracy as a necessary tool in realizing this right (Morgan 2004). Morgan concludes that while the human right to water and commodified water may not be mutually exclusive concepts, the role of participation becomes the main source of tension when rectifying these two understandings of water. Human rights activists argue for a “bottom-up vision of participatory democracy” that would empower local communities to be a larger stakeholder in the face of dominant ideas of water as a commodified good and privatized management and governance (Morgan 2004:13).

Linton (2012), previously discussed in this paper, argues that the right to be involved in decision-making process of water management and governance is part of the right to water. He argues that participation could even be considered as a prerequisite to the human right to water. Therefore, a violation of the human right to water could occur if there is a lack of participatory democracy in decisions related to water. Clark (2012) also argues that community participation plays an important role in the right to water, specifically through examining the Mazibuko water case in South Africa and the role of water as a common good. The court’s decision regarding the introduction of prepaid water meters in Soweto, Clark argues, did not examine the community’s lack of power to affect the outcome of the participation process; participation processes were “tokenistic” and did not provide real ways for communities to affect the decisions being made about water governance in their community (2012).

Clark further argues that a perception of mismanagement at the community level stems from Hardin’s concept of the *tragedy of the commons* (1968) which maintained that private ownership was the only way to prevent the destruction of collective goods. Hardin’s viewpoint ignores historical successes in community water management that demonstrate a better model than alternatives such as privatization. Viewing water as a commons enables a broader

understanding of the role of water, because it “expresses relationships in society that are inseparable from relations to nature” (Clark 2012:183). In her conclusion, Clark, like Linton, argues that participation is a prerequisite for making rights claims and that participation needs to consider the existing power dynamics at play in the decision-making process.

Sultana and Loftus (2012) emphasize the need to consider the implications of the human right to water, particularly the importance of democracy, justice, and equity. The right to water legally binds signatories to “respect, protect, and fulfill” the right to water; however, it does not specify how water is to be provided and by whom (Sultana and Loftus 2012:1). Corporations were among some of the first to declare the human right to water, because it was seen as an opportunity to profit from an expanding market. If all humans were guaranteed access to clean water, there was no stipulation that prohibited corporations from providing that water for a price. However, Sultana and Loftus argue that here we see “the need for greater focus on power relations in decision-making about water” (2012:4). A significant implication of the legally binding human right to water is that “authorities can be held politically and legally accountable” for ensuring the right to water (Sultana and Loftus 2012:5). In other words, people and communities now have a mechanism with which to realize and fight for their right to clean water and sanitation; participatory democracy is therefore an integral part of the right to water. Sultana and Loftus conclude:

“The right to water has the potential to mean far more than achieving access to sufficient volumes of safe water. Potentially, it means the right to be able to participate more democratically...it might assume a role in the remaking of our world in more fair, just and democratic ways” (2012:8).

A broader understanding of what water is and the human right to clean water and sanitation clarifies the right to water “intersects with and transforms or challenges other rights” (Sultana and Loftus 2012:8). Therefore, water may be the foundation upon which we can realize additional specified human rights. If we consider water as a fundamental human right, then the right to water could be the key to preventing the violation of other human rights.

The mining and extraction of natural resources developed during the period Linton (2010) identifies as a time when water was considered mainly as a material good and taken for granted in the mass production and consumption of water-dependent goods. The development of nuclear energy has only increased this demand, as “uranium mining and processing consumes far more water than the mining and supply of fossil fuels” (Chellaney 2013:95). The waste generated during the mining of uranium needs to be disposed of carefully to avoid contamination of groundwater and local water systems. Here, power and accountability become important factors, because when companies have significantly more power than those who call for proper health and safety precautions in mining and waste disposal, then activity is not likely to be monitored and companies can pollute water systems surrounding mines without consequence.

As previously discussed, Kemp et al. (2011) argue for the enforcement of ethical standards that regulate how mining companies handle community grievances. They conclude that an accountability system is an important step in correcting the imbalance of power between mining companies and local communities. Large multinational mining companies have much more power than the communities in which they operate, particularly in developing countries where mining provides a large portion of the government’s revenue. Successful incorporation of an effective grievance mechanism, as a form of participation in the decision-making process,

would allow local citizens to have a say in how local water systems are managed and shift power back to the people.

Greenpeace's research of uranium mines in Niger highlights the unequal power dynamics between a large corporation and a marginalized local community. Uranium mines near the towns of Arlit and Akokan have used a total of 270 billion liters of water in the 40 years since operations began, and though the French operating company, Areva, claims water usage has declined in recent years, there was an increase of water use at the SOMAIR mine that uses a more water-intensive form of mining (Dixon 2010). Additionally, when Greenpeace's report was released in 2010, uranium production in Niger had been steadily increasing (see Figure 6 in chapter four) and "the more uranium produced, the more water used" (Dixon 2010:21). The mines are draining the groundwater table at a rate too rapid for natural replenishment, which takes millions of years (Dixon 2010). The massive use of water is compounded by the externalities of mining processes:

"The SOMAIR open pit mine and the COMINAK underground mine cut through the Tarat aquifer. Radioactive materials previously caught and immobilized in the ore are disturbed by the mining operations. The aquifer is opened up to the contaminants, which can spread throughout the water table. At those places the groundwater is removed from the mines in order to mine the ore. The removed 'industrial' water becomes contaminated by the uranium and other radionuclides and can no longer be used as drinking water, which decreases the supply of clean, potable water" (Dixon 2010:22).

Niger is already a very dry country, vulnerable to the increasing desertification of the Sahel region. Only 11.5% of land in Niger is "arable" and increased water scarcity has serious

implications for the livelihoods of many who rely on nomadic herding for a source of income and sustenance (Dixon 2010).

When mining activities disturb or remove the protection between toxins and water, clean, potable water sources can become contaminated and undrinkable. As previously noted, Greenpeace and Commission de Recherche et d'Information Indépendantes sur la RADioactivité (CRIIRAD) sampling of water sources in the towns of Arlit and Akokan found “alpha activity” or radiation levels up to 100 times over WHO standards for clean drinking water (Dixon 2010:24). The level of radiation in Nigerien water sources is higher than that of the Brazilian wells closed following similar studies that found unacceptable levels of radiation (Dixon 2010). Although Areva did close some of the wells following the first study CRIIRAD did of Niger water sources in 2003, the company “has never admitted this was due to uranium in the water” (Dixon 2010:24). Additionally, Greenpeace accuses Areva of knowing “for several years about the uranium levels in the drinking water supply” (Dixon 2010:24). A 2004 letter from the laboratory Areva’s SOMAIR mine uses to test water supplies states that “water would not meet the criteria for potability” but the wells remained opened until CRIIRAD’s report claimed the water was contaminated (CRIIRAD 2005).

Areva has continued to claim, even after CRIIRAD’s report was released in 2005, that the water showed no signs of contamination. The company released a statement following the release of Greenpeace’s report in 2010, stating that “many of the conclusions and statements issued by Greenpeace are unfounded” and that all international inspections have found Areva’s mines in compliance with international standards (Areva Press Release 2010). Notably all the inspections Areva mentions in this press release were conducted by French companies. France is highly dependent on nuclear energy. About 75% of the country’s electricity comes from nuclear

power, and although the French government has not released exact figures, NGOs estimate that one in three lightbulbs in France is powered by uranium from Niger (Tran 2014). It is not in France's economic interest to accuse of Areva of neglecting properly dispose of mining waste in Niger, nor is it in the economic interest of the government of Niger to demand Areva to regulate contamination. Additionally, 40% of Niger's budget is supplied by aid from Western countries, of which France is the largest donor (Flynn and de Clerq 2014). Niger is highly dependent on mining as a source of revenue, but the profit made by the government of Niger is insignificant compared to that of France and Areva (Tran 2014).

This case of uranium mining in Niger exemplifies the unbalanced and problematic relationship between mining and water. The evidence of multiple studies has found the mines have not been properly disposing of waste, resulting in the contamination of water supplies used by the local population. Water in Niger is scarce, as much of the country is a desert, so there are few alternatives for those living near the mines, particularly since Nigeriens are among the poorest in the world and score at the bottom of the Human Development Index. As a result, the local population continues to drink contaminated water. The long-term effects of this can be detrimental to the health of the community. The President of l'Association des Femmes des Quartiers Peripheriques d'Arlit, Fatima Daoui, states "there are diseases that have come in recent years...Typhoid, cancer, cough, weakness of the joints, kidney diseases, foot pains, sexual impotence..." (Dixon 2010:27). Areva is contractually obligated to provide water to the town, and although the water is not required to be free, it is required to be clean. The water, clearly not clean or drinkable, not only violates Areva's contract, but also violates "the right to safe and clean drinking water and sanitation" (United Nations General Assembly- Human Rights Council 2010).

Unfortunately, the power of Areva has dominated the relationship between the company and Niger, and profitability has trumped accountability. The government holds very little leverage, since it relies so heavily on the profits from uranium and French aid. The power of participation could make a significant impact on this relationship in light of the Human Right to Clean Water and Sanitation. All signatories of the Resolution, including both Niger and France, are legally bound to “respect, protect, and fulfill the right” and if states do not do so, the people have the right to hold the state accountable for violating this right (Sultana and Loftus 2012:1). The human right to water can provide a platform for democratic participation needed to create a more balanced power dynamic between a large Western corporation and communities currently marginalized by the supremacy of profit in countries like Niger.

How we think about water affects how it is treated, both by communities and by corporations. A purely economic view of water has been the dominant framework, and as a result, water has been overused and mismanaged for the better part of the last century without considering the consequences (Linton 2010). However, water is so complex and versatile that it is necessary to consider all the effects of water usage. In the case of natural resource extraction, water is not only part of the process, but also an externality of the process itself, which can negatively affect the surrounding population. Water contamination affects the health of the population, their livelihoods, and way of life. A desire to profit from natural resources can affect the physical, social, cultural, and political aspects of water that are not accounted for when water is viewed simply as an economic good. Water is connected to both conflict and natural resource extraction, and how we view water matters when examining the linkages between water, conflict, and natural resources. If we view water as a human right, this can help identify the larger impacts of natural resource mining, because the human right to water is both a culmination and a

jumping-off point for how we understand human rights. In many ways, the right to water is an acknowledgement of its role in many other specified rights, including a person's "right to a standard of living adequate for the health and well-being of himself and of his family" and "the right to life" itself (United Nations 1948). However, the right to water is, in many other ways, the beginning of a new age of understanding the complexity of water to be greater than that of a purely economic good.



## Chapter Six: Conclusions

In the past few decades, conflict resources have increasingly been viewed through an economic lens. Diamonds and coltan both exemplify this growing understanding of the relationship between conflict and resource extraction, as both are mined and sold to fuel conflict. Ten years ago, Global Witness released a comprehensive definition of conflict resources:

“natural resources whose systematic exploitation and trade in a context of conflict contribute to, benefit from or result in the commission of serious violations of human rights, violations of international humanitarian law or violations amounting to crimes under international law” (Global Witness 2006:1).

The exploitation and trade in diamonds and coltan has resulted in profits used to fuel conflict and commit human rights violations. However, these two conventional conflict resources have been addressed independently of one another and have witnessed different levels of reaction and regulation from the international community. An international framework was created to restrict trade in conflict diamonds over a decade ago, and yet there is still no regulation framework for coltan. Public advocacy, political will, and the ability to track diamonds led to the creation of an international system of regulation that, despite its shortcomings, is more than what can be said for the international community’s response to other conflict resources.

Coltan is, arguably, more essential than diamonds in the modern age. It is used in the production of electronic devices including cell phones, which are becoming almost necessary to own in many Western countries. Despite its necessary purpose and the established link between coltan mining and conflict in the DRC, there is no comprehensive framework regarding exploitation and trade in coltan. I argue this is mainly due to a lack of understanding linkages, ability, and political will. This stems from a complex supply chain that makes coltan difficult to

track once it is smuggled out of the DRC and affects the awareness of consumers. Coltan is a now necessary natural resource, but it is not as visible or individually valuable to consumers as diamonds. Although cell phones themselves may hold incredible value, the value of coltan in the production of a phone is not obvious at first glance. Therefore, consumer awareness and advocacy is not as strong for conflict coltan as was seen in previous years regarding conflict diamonds.

What about natural resources not normally considered conflict resources? If the international community has essentially failed to create a regulation framework for coltan, a resource with a clear and established link to conflict in sub-Saharan Africa, there is little hope for “unconventional” conflict resources such as uranium. Uranium is not extracted and sold to fuel conflict, as seen with diamonds and coltan, but the mining process in sub-Saharan Africa causes human rights violations that are likely to increase the risk of conflict. The contamination and depletion of water in communities surrounding uranium mines is arguably, in light of the 2010 United Nations Resolution, a violation of the human right to water. Little attention has been paid to this violation of human rights occurring as a result of uranium mining, yet it is essential to understand when considering a broader meaning of conflict resources. Similar to coltan, uranium and its connection to water lacks the level of public advocacy seen in response to conflict diamonds. There have been very few studies or reports investigating the contamination and depletion of water as an impact of uranium mining activity. Uranium is not a resource that many would consider an important part of their daily life; like coltan, its value is not as visible as that of diamonds. However, as noted in chapter five, countries like France are highly dependent on nuclear energy, and around one in three lightbulbs in France are powered by uranium from Niger. The connection between the general public and uranium mining in Africa seems very far

away, even if it isn't. Although it may not hold the same visible values of love and purity associated with diamonds, uranium holds incredible value in the form of energy for Western countries. Although Greenpeace's report blew the whistle on the problems associated with Areva's mines in Niger, there needs to be an increase in public knowledge of the human rights violations occurring as a result of uranium mining and advocacy for company accountability and clean water access for local populations.

The extraction of diamonds and coltan is an intermediary between conflict and human rights violations. In both cases, conflict is ongoing, and resources are mined and sold to fund ongoing violence and human rights violations. This reflects a common understanding that conflict leads to human rights violations, but uranium mining reflects the inverse of this theory, as Thoms and Ron (2007) sought to analyze in their research on the violation of human rights as a cause of conflict. Uranium mining causes the contamination and depletion of water, which is a violation of the human right to water, and could lead to an increased risk of conflict.

A broader understanding of conflict resources must include resources such as uranium that are not normally associated with conflict and human rights violations. This is important because international frameworks are more likely to occur when we label a resource a conflict resource. A narrow and categorical understanding of conflict resources does not consider all the externalities of mining extraction, which means that the extraction of resources like uranium are not likely to garner the same level of international attention and advocacy necessary for a regulatory framework. We also need to consider the impact of power, and who has it and who does not, when examining why some natural resources garner more attention than others do. In the case of both diamonds and coltan, much of the power to influence whether or not the international community comes together to create an international regulation framework lies with

consumers, primarily those in Western countries. Advocacy on the part of Western NGOs, public outcry, and pop culture references from consumers of diamonds helped push countries to the negotiation table to form the Kimberley Process. Power that could help push for international regulation of conflict coltan lies once again mainly with consumers and states, but consumers aren't as aware of their connection to conflict coltan or uranium, and states lack the political will necessary for cooperation.

The human right to water, however, can help shift the power dynamics at play in the extraction of resources like uranium, where foreign corporations currently hold much of the power in decision-making and regulation. If water is considered a human right, may make claims to this right through participation in decision-making process. In the case of conflict resources like uranium, which affect the population through the contamination or depletion of water, the human right to water can empower local populations to advocate for accountability in the extraction of natural resources and access to clean drinking water. Human rights violations are committed with impunity and there is no accountability for the consequences for the extraction of those resources, but the human right to water could be the vessel people employ to account for the actions of corporations and ensure access to clean water. When we consider the wider consequences of natural resource mining, we can further our understanding of conflict and natural resources, including water, and the connections between them that result in the violation of human rights.

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