Overview and Purpose

This policy brief introduces newly coded data on natural resources in Egypt. To illustrate the data, we consider whether natural resources or other valuable materials had an effect on the recent unrest in Egypt during the Arab Spring. We coded data from the U.S. Geological Survey's Egypt mineral study and then merged those data with conflict data from the Armed Conflict Location and Event Data Project (ACLED). Within ArcGIS we compared the natural resource facility sites and conflict patterns and show preliminarily with geographically weighted regression that there is a statistically meaningful relationship between resource production facilities and conflict in the Cairo and Shamal Sina Governorates where most of the conflict occurred.

Scholars have argued that natural resources may lead to civil conflict under some conditions. And yet very few subnational investigations have been conducted. In this brief, we thus explore the relationship in the specific context of Egypt during the Arab Spring? Some have argued that the increase in the price of staple goods contributed to general dissatisfaction with the state of economic affairs in Egypt. We move beyond the focus

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1 This material is based upon work supported by, or in part by, the U. S. Army Research Laboratory and the U. S. Army Research Office through the Minerva Initiative under grant number W911NF-13-0332
5 “Food and the Arab Spring, Let Them Eat Baklava” The Economist, March 17, 2012 http://www.economist.com/node/21550328
on staple goods and instead add evidence on general production levels for various commodities in Egypt leading up to the events of the Arab Spring. We hope to understand better whether resources affect ongoing civil conflict. This exercise does not seek to break new ground theoretically, but rather explore possible relationships using newly coded resource data.

We first offer some background on resources and politics in Egypt. Following, we preview the methodology employed in coding resources and coupling the resource data with conflict data to explore possible relationships. We then discuss the results and conclude with some observations about next steps forward in studying resources and conflict in Egypt as well as using the resource data more generally in other contexts.

**Political Background of Egypt**

On October 6, 1981, extremists assassinated Egyptian President Anwar el Sadat. Former President Sadat was generally well regarded for successfully conducting peace talks with Israel. However, the religious extremists taking part in Sadat’s assassination opposed his endeavors to facilitate peace.6

Hosni Mubarak, Sadat’s vice president, took office following the assassination. President Mubarak served for four terms (through 2005) before the first election with multiple candidates. Many Egyptians opposed Mubarak’s continuous leadership—but September 27, 2005 Mubarak managed to win the presidential election and began serving a fifth term. And yet, opposition candidates most notably from the Muslim Brotherhood gained Parliamentary seats. Thus, for the first time Mubarak began to face a real opposition in government. In 2006, Mubarak expanded his authoritarian capacity and declared himself “president for life.” However, in the weeks following the Arab Spring – which commenced on January 25, 2011, also known as the “Day of Wrath,” - Mubarak stepped down from the presidency in February 2011.7

Following Mubarak’s resignation, Egypt’s acting head of state, Mohamed Hussein Tantawi, replaced Mubarak until June 2012.8 In June 2012, Mohamed Morsi became the official president of Egypt through a democratic election. Morsi, ruled in an undemocratic fashion by granting himself the authority to unilaterally legislate power and to suspend judicial oversight.9 After another round of unrest demanded the removal of President Morsi, Abdel Fattah el Sisi and the Egyptian military overthrew Morsi in June 2013. Sisi maintained sizeable public support for the ouster from large segments of society, including liberals, Christians, and mainstream Muslim clerics. Sisi installed a caretaker government and instituted a “roadmap” that included new elections to form a “consensus government,”10 and on June 8, 2014, Sisi was sworn as the President of Egypt.11 All in

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7 Ibid.
all, through the initial opposition to President Mubarak, the ensuing protests against the new Morsi government, and the subsequent military coup, Egypt has seen consistent and simmering level of unrest since the Spring of 2011.

**Egyptian Resource Wealth**

Resources have historically played a critical role in Egypt’s economy. Through the distribution of oil and gas revenues, tolls from the Suez Canal, and the crucial role of the Nile River in the country’s economy, Egypt has often been described as a textbook case of a resource-dependent economy and political structure. In 2012, Egypt was Africa’s second highest producer of both natural gas and crude steel. Egypt was also the continent’s fifth-largest producer of crude oil. Worldwide, Egypt was also the leading supplier and producer of fuel minerals, cement, gold, nitrogen fertilizer, and phosphate rock.

In 2012, Egypt’s petroleum exports amounted to $8.8 billion. Chemicals, nitrogen, phosphate-based fertilizers, and phosphate rock amounted to $1.2 billion in exports. Italy, India, the United States, Saudi Arabia, Turkey, France, Spain, and Japan are the major recipients of Egypt’s natural resources. These exports represent a large portion of Egypt’s GDP, and any dramatic changes in production or valuation could have tremendous consequences for the domestic economy and the well-being of Egyptian citizens.

**Methodology**

The two key variables of interest to this project are as follows: natural resources and conflict events. The first required significant manual coding, whereas we obtained the second from the Armed Conflict Location & Event Data Project (ACLED). For events of conflict, we used the Armed Conflict Location and Event Data Project (ACLED). The ACLED data provided specific location information, including the geographic coordinates for each reported event. ACLED places event types into broad categories that include battles, rebel activities, non-violent events, protests, riots, and violence against civilians. Additionally, types of actors fall under eight categories: government forces, rebel forces, political militia, ethnic militia, rioters, protesters, civilians, and outside forces. ACLED also defines each event type and actor category.

For natural resources, the Minerva Initiative team at the University of Texas gathered its data mainly from the U.S. Geological Survey (USGS). While the USGS maintains a large database, which includes sites for all countries, their individual country reports contain far more detail, which we recoded. Our analysis finds that, on average, using the country reports more than doubles the number of known sites over the continent-wide reports. In addition, the continent-wide databases are for 2008 only. Our analysis covers all years available from 2003-2012.

The team coded each location for the site name, the type

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14 Ibid, p. 2
15 All conflict data used in this study can be obtained from ACLED at http://www.acleddata.com/
17 Ibid.
of material located there, the owner of the site, the longitude and latitude of the facility (with a measure of precision when the exact site is difficult to locate precisely, given the available information), and the production capacity of the location.\textsuperscript{18} The team then combined this data with available price information on a yearly basis. The result is a dataset that covers a range of time and gives indications of changes in value, ownership, and capacity. These inclusions expand our ability to make inferences based on change over time.

We used DIVA-GIS to obtain GIS shapefiles of Egypt. By obtaining the necessary shapefiles, it was then possible to upload the acquired data pertaining to resources and conflict. We examined the possible correlation between resources and conflict at the Governorate administrative division level. Temporally, we specifically focus on natural resource and conflict trends during the Arab Spring.

Following the hand coding of geographic coordinates, the various data were merged in ArcGIS to create single common data source. After doing so, we conducted a geographically weighted regression (GWR) to examine the general correlation between resources in a governorate and the political violence located within that same administrative boundary. Generally understood, the geographically weighted regression results indicate areas in which violence was different than the general correlation would predict.

**Findings**

For reference, Figures 1 and 2 are maps of Egypt and its Governorates.

Figure 2 illustrates the location of natural resource extraction and material production sites in 2010, as well as the average political violence from 2010 to 2012. The units of analysis are the governorates, and the variables are the counts of facility sites and violence.

\textsuperscript{18} In some cases, the US Geological Survey coding is quite imprecise, and an exact location could not be determined. There are around 20 yearly cases of this in Egypt.
Al Qahirah, Al Iskandariyah, and As Suways Governorates have the most reported facility sites. It is important to note that the Al Qahirah Governorate (hereinafter referred to as “Cairo Governorate”) is abundant in the extraction and production of metals, such as steel and aluminum. The Cairo Governorate has production facilities in cement and fertilizers. The As Suways and Al Iskandariyah Governorates are more abundant in fertilizer facilities.

Both Cairo and Al Iskandariyah Governorates have more facility sites and higher levels of political violence. Interestingly, the Shamal Sina Governorate has fewer facility sites, yet high levels of political violence.

Figure 3 depicts a geographically weighted regression of facility sites and reported political violence from figure 2. In this regression analysis, the natural resource/material facility sites is the main independent variable and political violence is the dependent variable. Based on these analyses, both the Cairo and Shamal Sina Governorates reveal a significant correlation between resources and violence. The results are not strong for the other major Governorates. In both Cairo and Shamal Sina Governorates, there was a much higher correlation between the two than would otherwise be predicted.

**Discussion**

By assessing the geographically weighted regression results from 2010 to 2012, the findings show that there is a strong correlation in just a few locations, including Cairo. However, natural resource facility sites and conflict do not appear to be correlated across most of Egypt. The positive correlation likely has several explanations that both pre-date and post-date the revolution, which we discuss here.

First, in the several years prior to the revolution, the Mubarak regime undertook an aggressive privatization agenda in which many previously state-owned production facilities were sold to private enterprise. After the sale, many of these companies took dramatic restructuring steps that generally occur after privatization, and these steps included significant reductions in pay and benefits.
for workers. These events added to the general level of discontent simmering throughout Egyptian society leading up to the protests in Tahrir Square.

Many international companies also stopped doing business in the Cairo area following various outbursts of violence, which increased the number of unemployed individuals and therefore the frustration level within the population of the area. The Cairo area was the recipient of the majority of investment in production and manufacturing, and therefore it also suffered the most immediate negative consequences of reduced investment.

Furthermore, the price of basic staples fluctuated significantly both before and after the Arab Spring. In particular, food prices saw a steep spike around the time that the protests began, and they saw further volatility following the outbreak of protests. Putting these issues together, resources may have played a large (though indirect) role in hitting the population of the Cairo area all at once. Factories closed, wages were cut, production was interrupted by strikes, and the price of basic staples increased – and this all happened at roughly the same time.

While the exact causal path of any movement is difficult to ascertain, there is significant evidence to suggest that price shocks and unemployment can play a large role in creating an environment of discontent and dissatisfaction that can contribute to the outbreak of revolutionary activity. Therefore, this study finds that examinations of the relationship between resources and violence may be more accurate at the subnational level. A cross national-level study with predictions for Egypt as a whole is unlikely to find significant results, because (as the maps show) most areas did not have a correlation between the two. However, on a subnational level, there are key areas in which the relationship appears to play a vital role in ongoing tensions.

Other factors and the Arab Spring’s Impact

Although this research solely focuses on natural resource/material sites as the independent variable, there may be other factors that contributed to Egypt’s political violence, especially during the Arab Spring.

- Food Insecurity – According to the UN World Food Programme (WFP) and Egypt’s Central Agency for Public Mobilization and Statistics (CAPMAS), 17 percent of Egyptians faced food insecurity in 2011, whereas 14 percent...
percent of Egyptians faced food insecurity in 2009. Food insecurity is prominent in urban, densely populated areas—the Greater Cairo region has large impoverished and food insecure populations.  

• Production – In 2011, the Egyptian Revolution and its subsequent demonstrations impacted the nation’s gross domestic product growth—a slow growth of 1.8 percent. The GDP rate in 2010 was 5.1 percent. The acute reduction in tourism revenues and foreign direct investments impacted Egypt’s economic decline. The sluggish growth in 2012 was because of weak performance in virtually all economic sectors following the January 25th Revolution in 2011 and continued political instability in the country.

• Population – An important, yet theoretically underdeveloped factor, that could account for higher resource presence and conflict may simply be higher levels of population in Cairo. That would not account for the connections in Shamal Sina, but ongoing contestation in that region might otherwise.

Appendix

Figure A.1 illustrates the location of natural resource/material facility sites and political violence in 2010. The Cairo Governorate not only has more sites, but it also has higher levels of political violence. Additionally, the AI Iskandariyah Governorate also has higher sites and higher levels of political conflict. Interestingly, the Shamal Sina Governorate has fewer sites, yet high levels of political violence. Furthermore, the As Suways Governorate had more reported sites than reported political violence. In 2010, Egypt had 133 sites and 135 reported political violent events.

Figure A.2 illustrates the location of natural resource/material sites and political violence in 2011. The Cairo Governorate continued to have more sites and higher levels of political violence. Additionally, the Al Iskandariyah Governorate had more sites and higher levels of political conflict. In addition to a natural gas facility, the Matruh

28 “Food Security and Nutritional Status in Egypt Worsening Amidst Economic Challenges,” World Food Programme, retrieved from: http://www.wfp.org/node/3611/3690/443992

Governorate gained a salt facility, and the governorate’s reported political violence remained low. Similar to the 2010 findings, the As Suways Governorate had more sites—however, the reported political violence increased within the governorate in the following year. The Shamal Sina Governorate still had more sites and higher levels of reported conflict. In 2011, Egypt had 133 sites and 365 reported political violent events. Therefore, the total reported political violence increased substantially over the year.

**Figure A.3** illustrates the location of natural resource/material sites and political violence in 2012. The Cairo Governorate has more sites in 2012, but it also has highest reported political violence, 218 total events. Additionally, the Al Iskandariyah Governorate reported more natural resource sites and higher levels of political conflict. Overall, comparisons remained similar to 2011, but the number of natural resource facilities sites and incidents of political violence increased over the year. In 2012, Egypt had 146 natural resource sites and 450 reported political violent events. Therefore, the total reported political violence increased substantially over the year.

**Figure B.1** depicts a geographically weighted regression of natural resource/material sites and reported political violence in 2010. In this regression analysis, the natural resource facility sites are the independent variable and political violence is the dependent variable. Both the Cairo and Shamal Sina Governorates show statistically significant relationships. According to the GWR, there is a correlation between natural resource facility sites and political violence in within those governorates. The results of the As Suways, Al Bahr al Ahmar, Al Qalyubiyah, and Asmar Governorates are statistically insignificant.

**Figure B.2** illustrates a geographically weighted regression of natural resource/material sites and reported political violence in 2011. Similar to figure 3.1, the sites are
the independent variable and political violence is the dependent variable. The Cairo Governorate’s and Shamal Sina Governorate’s are also statistically significant. According to the GWR, there is a correlation between natural resource facility sites and political violence in within those governorates. The As Suways, Aswan Governorates and Al Iskandariyah Governorates are statistically insignificant.

Figure B.3 illustrates a geographically weighted regression of natural resource/material sites and reported political violence in 2012. Similar to figures 3.1 and 3.2, the natural resource facility sites are the independent variable and political violence is the dependent variable. The Cairo Governorate’s and Shamal Sina Governorate’s are also statistically significant. Therefore, within those governorates, there is a correlation between natural resource facility sites and political violence in Egypt. As Suways, Aswan, Al Bahr al Ahmar, Al Qalyubiyah, and Ad Daqahliyah Governorates are statistically insignificant.