The Politics of ‘Water Scarcity’ in the Nile Basin: the Case of Egypt

Laura Parkes

Abstract

Water insecurity is a key developmental issue for the 21st century. However, it is necessary to recognise that water insecurity in the Nile basin does not wholly stem from a physical shortage of water. This paper argues that the relative power of riparian states is vital to understanding how access to and distribution of water in the Nile basin has come to be dealt with and how this may change in future. As traditionally the most powerful state in the region, Egypt has been dominant in trans-boundary water negotiations and has been able to secure for itself an inequitable share of the region’s water resources, so as to support its agriculture and economy. There are now signs that this traditional dominance is being challenged by upstream states, as they become individually more powerful and work together co-operatively to challenge Egypt’s weakening hegemony. Policy-makers should adjust to this by proactively seeking to negotiate a more equitable sharing of the Nile’s water resources.

Keywords: water scarcity, water interdependency, Nile basin, Egypt, hydro-hegemony
1 Introduction: Research Context, Conceptual Framework and Focus for this Paper

1.1 Introduction

There is a growing consensus among commentators, especially in the media, that we are rapidly heading towards a situation of global water shortage as a result of excessive water resource consumption and human-induced environmental change. Typical accounts of the ‘impending water crisis’ (Rogers & Leal 2010: 2, emphasis added) combine sensationalist assertions regarding declining water availability with fantastical images of dried-up lakes and rivers, to create an ‘apocalyptic’ vision of the future (United Nations Development Programme (UNDP) 2006: 133). Those studies with an exclusive focus on water ‘scarcity’ in the Nile basin region have unsurprisingly tended to couple information relating to the region’s natural deficit in water resources with trends in increasing demand for water and variability of climate, with striking effect.

Unconvinced by this supply-side interpretation of water insecurity in the Nile basin, this paper takes a closer look at the politics of transboundary water interaction, in order to re-identify the underlying causes of the water ‘crisis’.

1.2 Conceptual framework: physical scarcity vs. economic/political scarcity

In this paper I will argue that water insecurity in the Nile river basin does not wholly stem from a supply-side shortage of water. Rather, on closer inspection, it can be seen to relate just as significantly to the unequal distribution of Nile waters in favour of the basin's hegemon, Egypt, in the absence of an institutional framework with the legal jurisdiction to enforce equitable transboundary water-sharing. An examination of the politics of Nile water allocation serves to highlight how power asymmetry (more specifically, relative Egyptian dominance in several spheres of ‘structural’, ‘bargaining’ and ‘ideational’ power) accounts for current Egyptian control of Nile water resources, its denial of upper riparian (basin state) water rights and the differential allocation of water between Egypt and upstream states.

1.3 Focus for this report: the Nile basin

It is easy to adopt an ecological perspective, whilst examining the principal drivers of water insecurity in arid regions such as the Nile river basin. The regularity with which articles,
seeking to highlight the worsening state of a supply-side water crisis in the Nile basin, are produced confirms this. I chose to focus on the Nile basin case study, precisely because I felt it was necessary to highlight the inaccuracy of current perceptions regarding water insecurity in that region. I was also attracted by the injustice of current water-'sharing’ arrangements, and the covert power plays on the part of the basin's hegemon, Egypt.

1.4 Importance of this study

1.4.1 Water for human and state development

Sustainable access to water underpins all human life (UNDP 2006: 204). 1.8 million children die each year – i.e. 4,900 each day - from diarrhoea, due to insufficient access to clean water (UNDP 2006: 3). In view of the human cost of water deficiency, ‘water security’ is increasingly seen as part of the broader concept of ‘human security’ - a development paradigm set out in the United Nations’ Human Development Report of 1994 (UNDP 1994: 4) – and is included as part of the United Nations’ eight Millennium Development Goals (UN 2013). As well as the human cost of poor access to water, states must also withstand colossal economic costs that accompany water-related illness, including spending on health, as well as the financial loss associated with shortfalls in productivity and ‘labour diversions’ (UNDP 2006: 6). In Sub-Saharan Africa, this figure is estimated at $28.4 billion USD annually (UNDP 2006: 6).

In view of statistics like these, it is clear that resolving water crises remains one of the greatest human development challenges of the 21st century. By identifying the underlying cause of water insecurity in the Nile basin, this paper was conceived in the hope of helping us to move one step closer to accomplishing that goal.

1.4.2 The extent of global water interdependency

Most people are unaware of the extent to which hydrological interdependence pervades the global system. In fact, two in every five people in the world live in an international river basin – i.e. a water catchment area shared by two or more countries (UNDP 2006: 205). Furthermore, 145 countries (accounting for 90 per cent of the world’s population (UNDP 2006: 205)) currently have territorial shares in 263 river basins (UNDESA 2013). Whilst the majority of these basins are shared by no more than two countries, 13 are shared by 5-8
countries, 5 are shared by 9-11 countries, and 18 states have a stake in the Danube river (UNDESA 2013).

This paper reflects on the way in which power asymmetry can serve to prevent the equitable distribution of water resources in a particular transboundary water setting. Although this paper focuses exclusively on the Nile basin case study, it is worth noting that its thesis can be applied more widely to a variety of highly politicised international river basins.

1.5 The problem with transboundary water-sharing

States who share transboundary water resources are dependent upon each other for their hydrological security – i.e. they are ‘hydrologically interdependent’ (Ostrom 1990: 30, emphasis added). For example, the consumption of water in one country impacts its availability in other countries (Ostrom 1990: 30). Crucially, with hydrological interdependence also comes social and economic interdependence (UN 2008: 1), since water plays a fundamental role in the generation of wealth and well being (UNDP 2006: 204). Thus, in the Nile basin, near-absolute Egyptian control of Nile river water resources has the twofold effect of not only undermining water security upstream, but also affecting state social and economic security, with implications for future growth and development.

National sovereignty remains the basic principle on which international law is founded; yet water-flows have ‘no respect for political boundaries’ (Green Cross International 2000, emphasis added). Unsurprisingly, the fundamental problem underlying issues of cooperative transboundary water management relate to states’ professed sovereignty over water resources that lie in their territories (Kliot 1994: 5), not to mention their responsibilities to fellow riparians. In the Nile basin, the general ambiguity surrounding property rights is made more complicated by the absence of a supra-national body with the legal jurisdiction to manage and enforce the equitable sharing of water resources (De Bruyne & Fischhendler 2012: 2).

1.6 Organisation of sections

Excluding my introduction (Section One), my research is divided into three major sections followed by a conclusion. Section Two provides an initial overview of the Nile basin region. It serves largely to outline the widely acknowledged argument that water insecurity in the Nile basin is an absolute product of regional water shortage. Whilst the argument’s main tenets are regarded as significant, its all too frequent and clumsy application to the Nile basin
case study is noted, and an alternative thesis linking water insecurity in upstream Nile basin states to Egyptian control over Nile waters is put forward. In Section Three, I develop this thesis through an evaluation of the grounds for Egyptian ‘hydro-hegemony’ to date. In light of Egyptian dominance in several spheres of power, a review of the country’s absolute dependence on Nile waters concludes that a voluntary readjustment of Nile water allocation is unlikely. In my final Section Four, I assess the extent to which Egypt’s grip on the Nile has grown weaker as a consequence of the counter-hegemonic actions of non-hegemonic states in light of changes to the basin’s power dynamic. My analysis supports my hypothesis regarding the positive correlation between high levels of power asymmetry in the Nile river basin and experiences of water insecurity amongst the non-hegemonic riparian states.

2 Physical Water Scarcity in the Nile Basin: the Defining Feature of Water Insecurity?

2.1 Introduction

In this section I will examine the claim that the problem of regional water ‘scarcity’ (or more accurately water insecurity), specifically in the Nile basin, can be primarily attributed to a physical supply-side shortage of Nile water resources. My appraisal is made in view of widely documented trends of increasing regional demand for water (as related to population growth and development) and climatic variability in association with global climate change. Whilst I will recognise that the supply-side limits of the Nile river must be acknowledged, I conclude, in the particular case of the Nile basin, that this exclusively physical interpretation of water insecurity to be limited to the point of inaccuracy. Mindful of the multitude of components that may determine water security in an international river basin, I instead argue that in the Nile basin, water insecurity is essentially a product of Egyptian hegemony at the river basin level (or ‘hydro-hegemony’).

2.2 Overview of the Nile River Basin

In order to understand the basis for any of the various interpretations of water insecurity in the Nile basin, it is important to comprehend the complex nature of the environment within which the river Nile flows, as it travels towards the Mediterranean from its southernmost source in Burundi, as well as the quantity of water in the Nile system. This section provides
an illustrated analysis of the Nile’s hydrological and topographical course, as it cuts through eleven basin-states, to reveal the river’s paradoxically small discharge relative to its length (Tvedt 1992: 81). This helps explain why one might naturally be inclined to adopt an environmental perspective, when diagnosing water insecurity in the particularly arid Nile basin region.

My second aim is to highlight the situation of inequitable access to Nile water resources, as well as the contradiction between the position of an upstream/downstream riparian state, its territorial share in the river basin area, the water contributions to it, and Nile water entitlement.

2.2.1 Mapping the course of the Nile River

Running from south to north over an estimated 6,700km, and extending over an area of 3 million km\(^2\), the Nile remains the longest river system in the world (Nile Basin Initiative 2013). Eleven ‘riparian’ states located in varying climatic zones (El Zain 2007: 5) form some part of the Nile’s basin, including: the Democratic Republic of Congo (DRC), Burundi, Rwanda, Tanzania, Kenya, Uganda, Ethiopia, Eritrea, Sudan, South Sudan and Egypt.

The White Nile, Blue Nile, Atbara and Sobat tributaries provide the bulk of the Nile’s 84 Billion Cubic Meters (BCM) annual flow (as measured at Aswan) (Treffner et al. 2010: 361), but vary in their individual water contributions (as can be seen in Table 2), given their differing topographic and climatic origins (El Zain 2007: 4). The following account of the Nile River’s course should be used in conjunction with Maps 1 and 2.

Rising in Burundi to meet the Kagera River in Tanzania, and flowing onward into Lake Victoria, the Ruvyironza (Luvironza) tributary is generally considered the southernmost source of the Nile River (Nile Basin Initiative 2013). Once released from Lake Victoria’s northern outlet - Owen Falls - to form the Upper Victoria Nile, this water flows on to meet Lake Kioga and eventually Lake Albert on the border between Uganda and the DRC, where it combines with Mufumbiru and Ruwenzori mountain runoff, supplied by the Semliki River (Kliot 1994: 16). Leaving Lake Albert, the river flows through northern Uganda, and becomes the Bahr al Jabal at the South Sudan border (Nile Basin Initiative 2013). Here, a large part of the Nile’s discharge is lost to evaporation (Kliot 1994: 19), as the river flows through the ‘papyrus-choked’ Sudd floodplains (Encyclopaedia Britannica 2013).
Map 1: The Nile River Basin

Map 2: The Southern Nile Basin

Source: Kliot (1994: 17 with modifications)
At Lake No, the Nile meets the western Bahr al Ghazal tributary, and then flows east, joining the Sobat river branch in western Ethiopia to form the White Nile (Bahral Abyad) (Encyclopaedia Britannica 2013). The Blue Nile (Bahr al Azraq), descending from the Abbai spring above Lake Tana in the Ethiopian highlands, meets the White Nile at Khartoum (Nile Basin Initiative 2013). Once combined, the Nile flows northeast where it is joined by the Atbara tributary, before flowing onto Aswan to meet the Aswan High Dam (Nile Basin Initiative 2013). Formally competed in 1971, the 111m high and 3,830m long dam continues to provide 169 BCM of reservoir storage at Lake Nasser, for the continued irrigation of farmland during dry periods (a consequence of considerable fluctuation in Nile flow), and for hydroelectric power generation amongst other uses (Encyclopaedia Britannica 2013). Once released, the Nile flows onto Cairo and eventually drains into the Mediterranean Sea (Teffner et al. 2010: 361), having received no additional tributary (or substantial rainfall) contributions (Carroll 1999: 273).

2.2.2 The peculiarity of the Nile’s modest discharge

Whilst the Nile River covers one tenth of the African continent, its natural discharge is considerably lower than that of other large rivers of a similar size (see Table 1) (Hulme, cited in Kliot 1994: 15). This is due to a combination of the region’s climate, geomorphic processes, soil and flora (Tapela 2012: 7). For example, the existence of sizeable lakes and floodplains in areas of high temperature lead to evaporation losses of over 40 BCM annually (El Zain 2007: 10). 50 per cent of water is lost when the White Nile reaches the Sudd floodplain, while a significant volume is lost at Lakes Victoria, Albert and Nasser, the Machar Marshes and Jebel Aulia Dam (El Zain 2007: 10). Low precipitation rates in Egypt and parts of the Sudan, combined with monthly fluctuations in White and Blue Nile flows, also limit the total volume of water available for human consumption (Kliot 1994: 22). For those who emphasise the Earth’s ‘finitude’ (in terms of its limited resources and ‘carrying capacity for population’) (Dolatyar & Gray 2000: 48, emphasis added), whilst making a case for a physical supply-side water ‘crisis’, the naturally arid and water-deficient Nile basin region would appear an appropriate case study.
Table 1: River systems of the World - length in relation to discharge at mouth

<table>
<thead>
<tr>
<th>River system</th>
<th>Continent</th>
<th>Length (km to source of longest tributary, approx.)</th>
<th>Discharge at mouth (Cubic Metres (CM) per second)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nile</td>
<td>Africa</td>
<td>6,484</td>
<td>1,584</td>
</tr>
<tr>
<td>Amazon</td>
<td>South America</td>
<td>6,516</td>
<td>180,000</td>
</tr>
<tr>
<td>Mississippi (Missouri)</td>
<td>North America</td>
<td>6,019</td>
<td>17,545</td>
</tr>
<tr>
<td>Yangtze</td>
<td>Asia</td>
<td>5,800</td>
<td>35,000</td>
</tr>
<tr>
<td>Congo (DRC)</td>
<td>Africa</td>
<td>4,700</td>
<td>42,000</td>
</tr>
<tr>
<td>Volga</td>
<td>Europe</td>
<td>3,688</td>
<td>8,000</td>
</tr>
</tbody>
</table>

Adapted from: Revnet (2010)

2.2.3 Contradictions in Nile water entitlement

Assuming an 84 BCM annual average flow of Nile waters (with 10 BCM set aside for evaporation and seepage losses) (Wolf & Newton 2013), the 1959 Full Utilization of the Nile Waters Treaty granted Egypt a fixed 55.5 BCM (75 per cent) annual share of Nile waters, whilst allocating 18.5 BCM (25 per cent) to Sudan (Treffner et al. 2010: 361). Since the combined water needs of upstream riparians were considered negligible at the time (estimated at no more than 1-2 BCM), these states were excluded from negotiations (Wolf & Newton 2013).

The same Nile water allocations still stand today, some 54 years later, yet they remain inequitable and, crucially, do not correspond to factors such as a riparian’s territorial share in the river basin area or related water contribution, in direct contradiction to the 1966 Helsinki guidelines for equitable utilisation of international river basins (Kliot 1994: 6). Table 2 shows that Ethiopia remains the most important contributor to the Nile, providing 86 per cent of the river’s water annually, and 96 per cent during flood periods, yet it was (and is still is) excluded from 1959 Treaty negotiations. Similarly, Sudan (prior to South Sudanese independence) possessed the largest share of the drainage area, yet was granted only a minor share of Nile waters in 1959 (and before that in 1929).
Table 2: Riparian share in the Nile’s drainage basin

<table>
<thead>
<tr>
<th>River</th>
<th>Area of drainage basin (km²)</th>
<th>Share per country in drainage basin (%)</th>
<th>Mean discharge (BCM)</th>
<th>Mean discharge (annual) (%)</th>
<th>Mean discharge (flood period) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Blue Nile</strong></td>
<td>324,530</td>
<td>Ethiopia 92, Sudan 8</td>
<td>49.7</td>
<td>55.5</td>
<td>59</td>
</tr>
<tr>
<td>(Khartoum)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>68</td>
</tr>
<tr>
<td><strong>Atbara</strong></td>
<td>100,400</td>
<td>Ethiopia 45, Sudan 55</td>
<td>11.7</td>
<td>13.5</td>
<td>13</td>
</tr>
<tr>
<td>(mouth)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>22</td>
</tr>
<tr>
<td><strong>Sobat</strong></td>
<td>225,000</td>
<td>Ethiopia 40, Sudan 60</td>
<td>13.7</td>
<td>15.5</td>
<td>14</td>
</tr>
<tr>
<td>(mouth)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td><strong>White Nile</strong></td>
<td>1,332,070</td>
<td>Sudan 64, DRC 2.5, Kenya 4, Rwanda 3.5,</td>
<td>29.6</td>
<td>33.5</td>
<td>14</td>
</tr>
<tr>
<td>(Malakal)</td>
<td></td>
<td>Uganda 13, Burundi 3.5, Tanzania 9.5</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td><strong>Main Nile</strong></td>
<td>3,030,700</td>
<td>Sudan 62.7, Ethiopia 12.1, Egypt 9.9</td>
<td>84-88</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>(Aswan)</td>
<td></td>
<td>Uganda 7.7, Tanzania 3.8, Kenya 1.8,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1899-1971)</td>
<td></td>
<td>DRC 0.8, Rwanda 0.7, Burundi 0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As a downstream riparian with a minimal share in the White Nile only, and contributing little to nothing to the Nile’s total flow (see Table 2), Egypt continues to control a majority share of water resources in spite of the needs of other basin riparians. This would suggest that water insecurity amongst the basin states cannot be wholly attributed to a physical shortage of water resources, and that problems inequitable access must be considered.

2.3 The case for physical water ‘scarcity’ in the Nile basin

It is argued that the growing demand for, and variability in the supply of, water will lead to a global shortage of water resources (Black & King 2009; Rogers & Leal 2010). With reference to the Middle East and North African (MENA) region, ecologically-affiliated commentators have suggested that natural deficits in water will be exacerbated by high population growth rates, urbanisation (as related to continued economic development) and climate change (Laki 1998: 288), resulting in a shortfall in the supply of fresh water in relation to human needs – a phenomenon referred to as physical water ‘scarcity’ (Food and Agriculture Organisation (FAO) 2012: 5). In this section I consider the ecological discourse surrounding water insecurity in the Nile basin, so as to familiarise the reader with the prevailing views that I wish to challenge in this paper.

2.3.1 Population growth

Physical water ‘scarcity’ is often primarily attributed to the increase in demand for water resources associated with spiralling population growth (Axworthy & Sandford 2012: 12). Viewed from this perspective, water insecurity is a result of too many people chasing too few water resources, as reflected by a region’s worsening water per capita figures (Falkenmark Water Stress Index and Kummu et al. 2010: 2). The following classification system, devised by Malin Falkenmark, was created to distinguish between varying regional levels of water stress (as indicated by per capita water usage):

*Figure 1: Water barrier differentiation (proposed by Falkenmark (1989))*

<table>
<thead>
<tr>
<th>Index (m³ per capita)</th>
<th>Category/Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;1,700</td>
<td>No Stress</td>
</tr>
<tr>
<td>1,000-1,700</td>
<td>Stress</td>
</tr>
<tr>
<td>500-1,000</td>
<td>Scarcity</td>
</tr>
<tr>
<td>&lt;500</td>
<td>Absolute Scarcity</td>
</tr>
</tbody>
</table>

*Source: Brown & Matlock (2011)*
Approximately 1000 Cubic Metres (CM) of water is believed necessary to meet the nutritional and domestic requirements of a single individual satisfactorily (Allan 2011: 21).

According to the United Nations Population Division (UNPD) (FAO 2005), the population of Nile basin countries is predicted to reach approximately 654 million in 2030, from 372 million in 2005. In view of this trend (and assuming a fixed supply of Nile water), the United Nations has predicted a growing gap between human needs and the available supply of water in the Nile basin for the period 1995 - 2025 (see Table 3). Even the lowest estimates of per capita water yields suggest water ‘scarcity’ and even ‘absolute scarcity’ in the majority of the states considered, which suggests a future regional water ‘crisis’ (FAO 2012: 1).

Table 3: Per capita water yield in Nile basin countries: comparing 1995 availability to UN low, medium and high projections for 2025

<table>
<thead>
<tr>
<th>Country</th>
<th>1995 standard (m³)</th>
<th>2025 low (m³)</th>
<th>2025 medium (m³)</th>
<th>2025 high (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burundi</td>
<td>594</td>
<td>300</td>
<td>282</td>
<td>273</td>
</tr>
<tr>
<td>Egypt</td>
<td>936</td>
<td>663</td>
<td>607</td>
<td>559</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>1,950</td>
<td>873</td>
<td>807</td>
<td>758</td>
</tr>
<tr>
<td>Kenya</td>
<td>1,112</td>
<td>639</td>
<td>602</td>
<td>568</td>
</tr>
<tr>
<td>Rwanda</td>
<td>1,215</td>
<td>506</td>
<td>465</td>
<td>469</td>
</tr>
<tr>
<td>Sudan</td>
<td>5,766</td>
<td>3,482</td>
<td>3,287</td>
<td>3,120</td>
</tr>
<tr>
<td>Tanzania</td>
<td>2,984</td>
<td>1,476</td>
<td>1,425</td>
<td>1,379</td>
</tr>
<tr>
<td>Uganda</td>
<td>3,352</td>
<td>1,603</td>
<td>1,467</td>
<td>1,306</td>
</tr>
<tr>
<td>DRC</td>
<td>22,419</td>
<td>9,916</td>
<td>9,620</td>
<td>8,928</td>
</tr>
</tbody>
</table>

Notes: Numbers in bold represent water stress (i.e. below 1,700 cubic metres); those underlined represent water scarcity (below 1,000 cubic metres). The figures for the DRC include Congo Basin water.


Such a prediction resonates with an earlier prediction of future global food crisis put forward by Thomas Malthus (see UNDP 2006: 133), who prophesied that uncontrolled population growth would prompt a state of ‘war, poverty, famine and disease’ (Selby 2003: 32, emphasis added).

2.3.2 Economic growth

Many have posited the connection between rising incomes (as linked to economic growth) and increases in the demand for water (Menta 2003: 3). At the household level, people are
expected to use more water for washing and bathing, whilst at the municipal level, it is believed that more water will be required for the maintenance of parks and recreational facilities (FAO 2012: 14). Expected consumption changes, as related to the rise in the per capita demand for food (particularly water-intensive foods) (Axworthy & Sandford 2012: 13), as well as in the increased purchase of manufactured goods, are also thought to put additional strain on regional water supplies (FAO 2012: 13). Table 4 shows largely positive Gross Domestic Product (GDP) growth rates for the majority of Nile basin riparians, which suggests ever-increasing demand for water in view of the trends referred to above.

Table 4: GDP growth in riparian countries (2010-2012)

<table>
<thead>
<tr>
<th>Riparian</th>
<th>GDP real growth rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2012</td>
</tr>
<tr>
<td>Rwanda</td>
<td>7.7</td>
</tr>
<tr>
<td>Burundi</td>
<td>4.2</td>
</tr>
<tr>
<td>DRC</td>
<td>7.1</td>
</tr>
<tr>
<td>Tanzania</td>
<td>6.5</td>
</tr>
<tr>
<td>Kenya</td>
<td>5.1</td>
</tr>
<tr>
<td>Uganda</td>
<td>4.2</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>7</td>
</tr>
<tr>
<td>Eritrea</td>
<td>7.5</td>
</tr>
<tr>
<td>Sudan</td>
<td>-11.2</td>
</tr>
<tr>
<td>South Sudan</td>
<td>-55</td>
</tr>
<tr>
<td>Egypt</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: adapted from CIA (2013c)

2.3.3 Climate change

According to the Fourth Assessment Report (AR4) by the Intergovernmental Panel on Climate Change (IPCC), an estimated 75-250 million Africans will experience increased water stress due to climatic change by 2020 (Martens 2011: 12). The majority of regional
models point to significant alterations in evapotranspiration (the sum of evaporation and plant transpiration) and precipitation levels (Allan, 2011: 21; UNDP 2006: 161), due to an estimated 1-1.5°C rise in temperature by 2030 (United Nations Environment Programme (UNEP) 2009: 45). As suggested by Figure 2, it is believed that the Nile river will incur significant further losses to evaporation in view of a predicted 4 per cent increase in evaporation per °C rise in temperature (Organisation for Economic Co-operation and Development (OECD) 2004: 14). Temperature increases are also predicted to bring about land deterioration due to a loss of soil moisture (Vella 2012: 2) as a consequence of decreases in surface runoff (‘precipitation that neither evaporates, transpires nor penetrates the surface to become groundwater’ (WW2010 2010, emphasis added)) (see Figure 2). Whilst estimates surrounding changes in precipitation rates in the Nile basin remain ambiguous, periods of rainfall are expected to become more intense in equatorial countries (Martens 2011: 12), whilst one should expect a general reduction in rainfall in arid and semi-arid areas such as Egypt (FAO 2012: 13).

Figure 2: Impact of climate change on Nile basin runoff, precipitation (precip) and potential evapotranspiration (ET) (% change from 2000 values)

![Figure 2: Impact of climate change on Nile basin runoff, precipitation (precip) and potential evapotranspiration (ET) (% change from 2000 values)](source: Martens (2011: 12))

Ultimately, climate change is expected to exacerbate the natural deficit of water resources in the Nile basin region, with a negative effect on food production (Vella 2012: 2) and, in particular, public confidence in supply (Mukheibit 2010: 1028).
2.4 The defining feature of water insecurity?

2.4.1 Acknowledging the multifaceted nature of scarcity

In the majority of the literature, and also at the international political level, regional water 'scarcity' is often portrayed exclusively in terms of an absolute physical shortage of fresh water (Menta 2003: 3). Yet physical water scarcity is only one dimension of water insecurity (UNDP 2006: 155) - a phenomenon with multiple causes (El Zain 2007: 21), representative of the variety of relevant scientific and political fields of study (Mukheibit 2010: 1028). Debates concerning water insecurity's definitive foundation tend to range around the issues of physical supply or demand management (including governance (Brundtland 2012: 2)) (UNDP 2006: 133), 'or a combination of both' (Rijsberman, cited in Mukheibit 2010: 1027, author italics).

2.4.2 The case for power in determining water security in the Nile basin

Whilst there has existed no definitive explanation for water insecurity (FAO 2012: 1), numerous observers have advanced often clumsy and sometimes sensational interpretations of 'scarcity' (Allan 2002: 4). ‘Too conveniently’ has the argument surrounding a physical dearth of water been applied to explain situations of water vulnerability (Mukheibit 2010: 1029).

In the next section of this paper, I argue that water insecurity in the Nile basin cannot be understood purely as a problem of supply. Rather, water ‘crisis’ is to a large degree a problem of inequitable access to Nile water resources, owing to unequal power relations among riparian basin states.

3 The Politics of Water ‘Scarcity’ in the Nile basin

3.1 Introduction

Throughout this section, by use of a framework of ‘hydro-hegemony’ espoused by Carles (2006), Warner (2006), Zeitoun (2006, 2009, 2010, 2012) and Cascão (2009, 2010), I explore how asymmetric power relations in the Nile basin account for the current, inequitable distribution of the river’s waters in favour of Egypt (Carles 2006: 9) and, in doing so, challenge the prevailing discourse surrounding a physical supply-side crisis, as outlined in the previous section. An analysis of four foundational pillars of riparian state power (Cascão &
Zeitoun 2010: 32) serves to confirm Egyptian dominance in the spheres of ‘structural’, ‘bargaining’ and ‘ideational’ capacity, and is used to explain the means with which Egypt has maintained its position as hydro-hegemon since its realisation under British rule (Carles 2006: 35-6).

97 per cent of Egypt’s water resources (FAO 1997) originate in the territories of upstream states (Zeitoun 2012: 9). Paradoxically, as a downstream riparian state contributing little or nothing to the Nile’s flow, Egypt has historically enjoyed the largest share of its waters – officially (but rather more than) 55.5 BCM or two thirds (as dictated by the 1959 Treaty) – at the expense of its upstream neighbours (Cascão 2009: 247). For years it has successfully thwarted attempts to re-allocate Nile waters equitably (Rahman 2010), and further entrenched its position as the basin’s ‘hydro-hegemon’ by means of its dominant power position.

The survival of the naturally arid Egyptian state depends wholly on unobstructed access to Nile water resources (Lowi 1999: 381). Indeed, an analysis of current water usage in Egypt set out in the second part of this section emphasises the importance of Nile water for a variety of state operations - household and industrial consumption, irrigation and sanitation, for example. For popularly elected Egyptian policy-makers then, any diminution (in this case following attempts to capture water upstream) or degradation of Nile water resources constitutes a threat to national security (given the possible negative affect on citizen welfare) (Lowi 1999: 380), and must therefore be averted. Since the ‘equitable’ distribution of Nile waters called for by upstream riparians requires the ceding of a significant part of Egypt’s consumption (deemed essential by Egypt to meet its current requirements), voluntary adjustment of water apportionments on behalf of the state is therefore improbable, while sustained resistance to revisionist demands may be expected.

### 3.2 Framework of hydro-hegemony

Water insecurity is often understood as a consequence of dwindling regional supply. However, an examination of water distribution among Nile riparians demonstrates that current experiences of state water ‘scarcity’ ultimately stem from the unequal distribution of Nile water resources, as dictated by ‘hydro-hegemon’ Egypt. An evaluation of the grounds for Egyptian power (as embedded in the realist framework of ‘hydro-hegemony’) is necessary in order to fully comprehend how Egypt has, to date, succeeded in preserving a majority share of Nile waters at the expense of its neighbours.
A state is considered ‘hegemonic’, if it is able to assume a regional leadership position by means of its ‘authority’ rather than solely by force or intimidation (Zeitoun & Warner 2006: 438). The degree of hegemony obtained depends on a dominant state’s capacity to legitimise its position by exploiting its existing material and non-material capabilities (Cascão & Zeitoun 2010: 31). For this reason, regional power relations cannot be considered ‘static’ (Cascão & Zeitoun 2010: 30). ‘Hydro-hegemony’ simply refers to ‘hegemony at the river basin level’ (Zeitoun & Warner 2006: 435, emphasis added).

It is important to acknowledge that hydro-hegemony can have a positive as well as negative effect on the welfare of less capable riparian states in a basin (Zeitoun & Warner 2006: 439). For example, by means of its governing capacity, a hydro-hegemon can provide ‘stability’, ‘order’ and ‘greater assurance of flow’ (Zeitoun & Warner 2006: 439, emphasis added) – ‘international goods’ that create certainty and confidence, which in turn may allow for stable prices, investment and sustainable economic growth (Economics 2013). However, in the case of the Nile basin (and a similar point could be made with respect to the Tigris, Euphrates and Jordan basins), the hydro-hegemon (in this case Egypt) has sought to consolidate control over the river’s waters for its own use, whilst simultaneously suppressing upstream infrastructural development, with the result that it has enhanced its national economic and related power position (Zeitoun & Warner 2006: 435).

3.3 Asymmetric power relations in the Nile basin

3.3.1 Historic realisation and initial consolidation of Egyptian hydro-hegemony

Before considering the power-related explanations for Egyptian hydro-hegemony to date, it is important to understand the historical complexities underlying Egyptian control of Nile waters.

Although the significance of Nile water for irrigation, flood control and navigational use was realised during the course of the pre-colonial period (from 1811-1882), Egyptian control over Nile waters is generally seen to have been cemented under British colonial rule from 1882-1952 (Rahman 2011). In order to strengthen Britain’s position politically (by means of Egyptian economic stability) and for the production of cotton, so as to meet demand in the metropolis (Kliot 1994: 33), the British administration effectively blocked upstream water development and consolidated Egyptian control over Nile water resources by use of a set of agreements with other colonial powers in the basin – for example the 1902 Addis Ababa Agreement with Italy (Ethiopia) and 1906 Nile Tripartite Treaty with Italy (Ethiopia) and
France (Carles 2006: 36). It was the 1929 Anglo-Egyptian Nile Waters Agreement however which represented the culmination of British efforts to consolidate Egyptian control of Nile waters formally (Carles 2006: 38). The bilateral agreement served officially to quantify Nile water allocations between Egypt (48 BCM) and Sudan (4 BCM) only (Kliot 1994: 36), in an attempt to force the compliance of upstream states in line with British/Egyptian interests (Carles 2006: 43).

Post-independence, Egypt was swift to engineer the 1959 Treaty for the Full Utilisation of Nile Waters (which revised prior quantities, to allocate 55.5 BCM and 18.5 BCM to Egypt and Sudan respectively (Kliot 1994: 84)), in order to entrench its hydro-hegemonical position vis-à-vis other riparians in the basin. The inclusion of newly-independent Sudan formed part of a strategy of integration and containment, for the strengthening of a preferred discourse surrounding ‘prior usage’/‘historic rights’, as well as for the eventual construction of the Aswan High Dam in 1971 and corresponding ‘capture’ of its waters (Carles 2006: 41).

Egypt still stands by its ‘historic right’ to a majority share of Nile waters. The next part of this paper will explain how it has succeeded in achieving this position.

3.3.2 Explanations for Egyptian hydro-hegemony to date:

3.3.2.1 Application of four foundational pillars of riparian power

In this part, I briefly evaluate four ‘geographical’/‘positional’, ‘structural’, ‘bargaining’ and ‘ideational’ (Cascão & Zeitoun 2010: 31) foundations of Egyptian state power in relation to those of upstream riparians’, and find unrivalled Egyptian primacy in all sectors (with the exception of geographical location). Using examples, I demonstrate how Egypt has chosen to exploit its position of power through use of various associated ‘coercive’, ‘normative’, ‘utilitarian’ and ‘hegemonic’ ‘compliance-producing mechanisms’, so as to preserve a majority share of Nile waters (Zeitoun & Warner 2006: 446-9, emphasis added).

It is important to recognise how a riparian’s geographical location can affect its control over a river’s water resources (Frey & Naff 1985: 65). In the case of the Nile basin, however, the upstream states’ theoretical advantage (in terms of the ability to manipulate water-flows) has been displaced by downstream Egypt’s continued ability to dictate water allocation (Zeitoun 2012: 9) by means of its dominant position in other fields of power (Carles 2006: 26).
‘Hard’ or ‘structural’ power describes a state’s ability to influence the behaviour of its counterparts through use of its material capacity (Zeitoun 2012: 27), and consists of economic strength, military might, technical capability and international financial support (Carles 2006: 27-8; Cascão 2009: 246). Egypt benefits from a highly diversified economy compared to its riparian neighbours (agriculture accounting for as little as 14.7 per cent of GDP, industry 37.4 per cent and services 47.9 per cent in 2012), whilst it enjoys an enviable GDP per capita of USD $6,600 (CIA 2013a). The data presented in Table 5 confirm that, among Nile basin states (most of whose growth has been impeded by the internal and regional complexities arising from conflict (Carles 2006: 29)), Egypt is clearly the dominant economic power.

It is additionally acknowledged that Egypt possesses the greatest military power among Nile basin riparians (Carles 2006: 28) (see Table 5), in part due to its position as a major recipient of international financial assistance. For example, in 2010 the USA donated $1.3 billion to support Egyptian military capability (Telegraph 2011). The threat of Egyptian military action has historically served to silence revisionary claims to Nile water and is intended to visibly deter infrastructural development upstream (Zeitoun 2012: 13).

‘Technical control’ refers to a state’s capacity to capture Nile water by use of its hydraulic infrastructure (Cascão 2009: 246) and water resource management ‘expertise’ (Elissa, cited in Carles 2006: 26). With British assistance during the colonial period and by its own efforts afterwards, Egypt was able to establish relative water independence comparatively early by way of ‘resource capture’ (Zeitoun & Warner 2006: 449) following the construction of infrastructural projects (such as the Aswan High Dam in 1971). This contrasts with the subsequent ‘hydraulic missions’ of upstream riparians, which were traditionally impeded by their relatively weaker financial positions (Cascão 2009: 246).

Crucially, Egypt has (until recently – see Section Four) enjoyed favourable diplomatic and trade relations with Western nations due to its dominant power position in the Middle East and North Africa, its role as regional peace-maker (integral to the process of Israeli-Palestinian reconciliation), its geo-strategic location as overseer of the Suez Canal shipping route (Embassy of Egypt 2013) and due to its oil and gas resources (Allan 2011: 25).
Table 5: GDP per capita and annual military forces spending of Nile basin states

<table>
<thead>
<tr>
<th>Riparian</th>
<th>GDP per capita (Purchasing Power Parity (PPP)) (2012 est.)</th>
<th>Annual military forces spending (2012 est.) (in millions of $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rwanda</td>
<td>1,400</td>
<td>60</td>
</tr>
<tr>
<td>Burundi</td>
<td>600</td>
<td>45</td>
</tr>
<tr>
<td>DRC</td>
<td>400</td>
<td>200</td>
</tr>
<tr>
<td>Tanzania</td>
<td>1,700</td>
<td>210</td>
</tr>
<tr>
<td>Kenya</td>
<td>1,800</td>
<td>360</td>
</tr>
<tr>
<td>Uganda</td>
<td>1,400</td>
<td>400</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>1,200</td>
<td>350</td>
</tr>
<tr>
<td>Eritrea</td>
<td>800</td>
<td>200</td>
</tr>
<tr>
<td>Sudan</td>
<td>2,400</td>
<td>600</td>
</tr>
<tr>
<td>South Sudan</td>
<td>900</td>
<td>N/A</td>
</tr>
<tr>
<td>Egypt</td>
<td><strong>6,600</strong></td>
<td><strong>3,400</strong></td>
</tr>
</tbody>
</table>

Source: CIA (2013b) & Strategy Page (2013a, 2013b)

Significantly, the country has used its international position and presence - Egyptian officials are employed in various international water bodies (Elissa, cited in Carles 2006: 26) - to block loan support for upstream projects, especially in Ethiopia (Carles 2006: 52). Unsurprisingly, Egypt also receives considerable international financial support in exchange for partnership (Cascão 2009: 248). In addition to the military assistance outlined above, the country has received the second largest sum of American foreign aid annually (after Israel) since 1979 (Beaty 2012), which has acted to buttress its economic position further.

What amounts to Egyptian dominance in the fields of economic, military, technical and international diplomatic capacity among basin riparians demonstrates overwhelming strength, and has allowed for unchallenged unilateral development of Nile water resources and the concurrent deflection of upstream pressures to re-negotiate Nile water allocations (Zeitoun 2012: 27).

A state’s ‘soft’ or ‘bargaining’ power is determined by its ‘negotiating’ ability (Carles 2006: 29) or its capacity to set and control an agenda (Lukes, cited in Cascão & Zeitoun 2010: 31)
by means of its perceived ‘authority’ and ‘legitimacy’ (Zeitoun 2012: 28). The strength and effectiveness of Egyptian bargaining power are reflected in its proficiency thus far to preserve its share of 55.5 BCM of Nile water since 1959, and to determine the parameters of the basin’s ‘hydropolitical agenda’ at the regional and international level in order to serve its interests (Cascão 2009: 248). Related to bargaining power is a state’s capacity to legitimise and sanction a particular set of ideas– its ‘ideational power’ (Cascão & Zeitoun 2010: 32). Egypt has demonstrated its ability to impose successfully its preferred view of current Nile allocations through the construction of a narrative regarding its ‘absolute dependency’ on the river’s waters. By emphasising the idea of Nile water as an issue relating to ‘national security’, whilst promoting its ‘prior use’ claim (Cascão 2009: 248), Egypt has succeeded in countering demands for ‘equitable sharing’ (thus delaying any revision to current allocations) (Cascão & Zeitoun 2010: 32) and has therefore (for the most part) legitimised its hegemonic position among regional and international actors (Carles 2006: 29).

When analysed through the lens of power inequality then, ‘water scarcity’ emerges as a ‘scarcity’ of state capability (Ohlsson & Appelgren 1998). In the case of the Nile basin, Egyptian dominance (to date) in the fields of structural, bargaining and ideational power relative to that of the weak individual and collective capacities of upstream nations (Carles 2006: 29), has allowed for Egyptian hydro-hegemony and the inequitable allocation of Nile waters (Cascão 2009: 248; Cascão & Zeitoun 2010: 32). Figure 3 provides a visual illustration of a section of the region’s hydro-hegemonic configuration, which supports my findings in the sections above.

**Figure 3: A visual illustration of relative state power in the Nile basin**

(HH = hydro-hegemon)

*Source: Cascão & Zeitoun (2010: 33)*
In the next part of this section, I discuss the importance of Nile water for the Egyptian state, and show that its subsequent determination to secure Nile water resources has served to solidify this situation of inequity.

3.3.2.2 Water as an Egyptian security issue

‘State security’ refers to a state’s ability to uphold its ‘physical and functional integrity’ and directly relates to the wellbeing of a nation’s citizens (Lowi 1999: 376, emphasis added). Water plays a central role in a variety of state operational activities - for human and industrial consumption, irrigation and sanitation (Soffer 1999: 1) – and thus sustained access to water resources is considered integral to the survival of nation states (and is particularly important for those located in arid or semi-arid regions). For states sharing transboundary river resources, a variety of factors may determine the extent to which water is considered a national security concern, including the riparian position upstream or downstream, the degree of state water dependence, political relations among riparians and the existence of international water law (Lowi 1999: 380). For the most downstream Nile state, Egypt, whose reliance on and control of Nile waters remain ‘absolute’ and which is resented by riparians (in the absence of an internationally-recognised water-sharing agreement), water is indeed a security issue (Lowi 1999: 381-2). For that reason, any upstream adjustment to Nile river flows will be resisted by Egypt in view of its negative effect on welfare (reflecting ‘zero-sum thinking’ (Falkenmark & Widstrand 1992: 5, emphasis added)), and conflict may then result, if deemed necessary to ensure sustained access to Nile water resources (Gleick 1993: 79).

Nile river water is believed to have provided the basis for the formation of Egyptian civilisation from 3,400BC (Kliot 1994: 32). Indeed, both Hecataeus and Herodotus refer to Egypt as ‘a gift of the river’ in their ancient writings (Griffiths 1966: 57). Sustained access to Nile water remains a key feature of Egypt’s foreign and domestic policy. In this section, I analyse the current requirements of (and corresponding pressures on) Egypt’s 55.5 BCM share of Nile water resources. I conclude that, given the importance of Nile water for human wellbeing and for the ‘production’ processes of ‘agriculture, industry, energy [and] transport’ (Grey & Sadoff 2007: 547, emphasis added), it is unlikely that Egypt will readily endorse (or even tolerate) revisionist calls for ‘equitable sharing’ of Nile flows.

The population of Egypt in 2012 stood at approximately 83.5 million and is predicted to grow at an annual rate of 1.92 per cent (CIA 2013a) (or 1.6 million), to reach an estimated 144
Such a rapidly growing population requires a greater supply of water to meet demand – in May 2012, it was estimated that the country would require at least 50 per cent more Nile water by 2050. However, Egypt already exceeds the 55.5 BCM allocated to it (Nile TV International 2013), and increased provision will not be possible without further encroaching on upstream apportionments. In reality, average per capita water usage is decreasing, and currently stands at 700 CM per year (Cunningham 2012b) – a figure already well below the international water poverty line of 1,000 CM per capita per year (Reuters 2009).

Egypt relies on the continued efficiency and productivity of its industrial sector, which is worth 37.4 per cent of GDP (CIA 2013a), to sustain its current level of economic growth and more recently for its economic recovery in light of the global financial crisis (Mobarak 2001: v). Water is essential for manufacturing - necessary for the industries that produce ‘metals, wood and paper products, chemicals, gasoline and oils’ (United States Geological Survey (USGS) 2005, emphasis added), and thus a significant proportion of Egypt’s total water consumption is and will be required for industry; this figure was 11 per cent in 2000 (Doss & Milne 2001: 5).

As touched upon in Section Two, it is generally acknowledged that there exists a positive correlation between income and domestic water consumption (Katz 2010), and this is reflected in Egyptian demands for more domestic water – 3.1 BCM in 1990 and 5.3 BCM in 2000 (Abdin & Gaafar 2009: 13). Similarly, rises in living standards generally necessitate more electricity for newly purchased luxury goods, such as TVs and radios, which in turn require more water for electrical power generation. Power consumption in Egypt has been increasing by an average annual rate of 7 per cent over thirty years (in line with growth) (El-Kholy unknown date), to reach 115.8 billion Kilowatt Hour (kWh) in 2009 (Central Intelligence Agency (CIA) 2013a). 11.4 per cent of this was generated using hydroelectric power plants (CIA 2013a).

Water scarcity is not solely a quantitative issue (Gersfelt 2007: 8). Egypt’s water supply problem is exacerbated by issues of quality in the absence of appropriate technology and legislation relating to waste water management. Despite its positive contribution to economic growth, industrialisation generates substantial waste material, much of which is discharged directly into the Nile without treatment (Abdel-Shafy & Aly 2002). Sewage water (a result of
minimal sewage facilities in rural areas), agricultural drainage water and the ‘liquid wastes of Nile cruise activities’ all further serve to pollute Nile waters with high levels of bacteria, ammonia and salt (Allam & Allam 2007: 209), rendering them unsuitable for drinking or even irrigation (Abdel-Shafy & Aly 2002).

Only 4 per cent of Egyptian land is occupied (ICID 2005: 3). The majority of Egyptian citizens live in the fertile Nile Delta area north of Cairo (Cunningham 2012b). Egypt’s urban population and rate of annual urbanisation stands at 43.4 per cent and 2.1 per cent respectively (CIA 2013a). In order to ease this situation of over-crowding and to feed its growing population, the Egyptian government has embarked on a series of schemes to irrigate 7,560 km$^2$ of reclaimed desert land, including the West Delta irrigation Project, the North Sinai Agriculture Development Project and the South Valley/Toska Development Project (Cascão 2009: 249). Unsurprisingly, these ventures require vast quantities of water (Abdin & Gaafar 2009: 16) - agriculture already accounts for 80 per cent of Egypt’s total water consumption (Gersfelt 2007: 2) - and have put further strain on an inefficient irrigation network (Vella 2012: 4), which is already struggling to supply water to 98 per cent of Egypt’s croplands (Allan 2011: 15).

### 3.4 The current position

In this section I have explored how asymmetric power relations in the Nile river basin shape riparian states’ experiences of water security and sought to demonstrate that current experiences of water ‘scarcity’ upstream stem largely from a traditional divergence in power between hegemonic Egypt and less capable states. My analysis has further noted the extent to which Egypt (as an arid state with little or no alternative supply) remains wholly dependent on Nile water resources. While demand for water continues to escalate, hegemonic control over Nile waters will remain a key feature of Egypt’s national security policy.

So long as Egypt retains its position of power relative to other riparian states, it is hard to envisage any voluntary readjustment to Nile water allocations for the benefit of those upstream. Instead, it is more likely that Egypt will continue to resist revision and act to entrench its position as hydro-hegemon yet further.
4 Testing my hypothesis:

Changing Power Relations in the Nile Basin: implications for Egyptian Hydro-hegemony

4.1 Introduction

As we have seen, Egyptian dominance in several spheres of state power has enabled it to preserve its monopolistic share of Nile waters. However, as can be seen from Section Three, it is clear that the region’s hegemonic configuration is not immutable; only if Egypt remains absolutely powerful can it continue to withstand the counter-hegemonic actions of non-hegemonic states, and preserve its majority share of Nile waters. Accordingly, my final Section assesses the way in which changes to the region’s power dynamic have weakened (and may continue to weaken) Egypt’s grip on the Nile.

4.2 The implications of political and economic change among upstream riparians

4.2.1 Shifts in the regional balance of power

As discussed in Section Three, owing to their structural weaknesses in terms of economic underdevelopment and political instability, as well as scarce ‘bargaining’ and ‘ideational’ power resources, upstream states have historically been unable to challenge Egyptian hydro-hegemony. However, recent political and economic advances among riparians, most crucially in the Eastern Nile basin (given the area’s contribution to Nile water flows), have served to alter the relative power capabilities of basin states. This shift in the regional balance of power has implications for future Nile water utilisation and the current state of Egyptian dominance (Cascão 2009: 248).

Prolonged internal conflict and corresponding economic frailty in Ethiopia up until the 1990s explain the country’s past failure to address the inequitable status quo (Cascão 2009: 253). However, economic and diplomatic advances after 1991, following the installation of Meles Zenawi as President, have provided the country with the means to confront Egyptian hydro-hegemony through the unilateral development of hydraulic infrastructure (Cascão 2009: 255). Similar developments in the equatorial region have also contributed to the new sense of determination among members of the upstream coalition (Cascão 2009: 253).
4.2.2 Increasing riparian demand for water

With economic and political advances comes population growth, which brings with it its own problems associated with increased resource consumption. Population and growth-related increases in states’ water demands have increasingly provoked widespread riparian feelings of injustice concerning Nile water allocation among riparian challengers to Egyptian dominance.

The Total Fertility Rate (TFR) of all Nile basin states, bar Egypt, remains above 4.5 children per woman (Ethiopia – 4.6, DRC – 6.1). The population of the Nile Basin Initiative (NBI) countries is expected roughly to double over the next 40 years, from 429 million in 2012 to 945 million by 2052. The corresponding increase in demand for water and energy resources that has accompanied demographic change and developmental advancement, has already overloaded states’ water supply systems, and led to considerable inflationary pressures, to the detriment of further growth. For example, in 2012 food and fuel price inflation in Ethiopia led to a 4 per cent drop in the annual GDP growth rate, despite considerable economic progress (Lamere 2012). Significantly, riparian dependence on Nile water is made more problematic by the relative economic and technological weakness of Nile basin countries, which restricts states’ ability to import food to satisfy the needs of their populations (Kliot 1994: 74), as demonstrated by the Kenyan government’s proposal to instigate a two-child policy in November 2012 (Ooska News 2012d). Additional factors, such as a reliance on agriculture for state revenue (Uganda, Burundi and Tanzania), as well as the disruptive effects of civil war and drought in the region (North and South Sudan, the DRC), further serve to augment riparian water requirements (Kliot 1994: 75).

4.2.3 A coalition of riparian states

With a shared interest in an immediate revision of Nile water rights, riparian states have come together in a strategy to counter-balance Egyptian hegemony by means of combined opposition to the status quo.

NBI negotiations – the first attempt at a co-operative partnership for an equitable allocation of Nile water resources – are believed to have come to a standstill following Egyptian and North Sudanese resistance to any meaningful re-allocation of water rights (Lamere 2012).
The recent breakdown is seen to have prompted the formation of a coalition of four East African states – Ethiopia, Tanzania, Uganda and Rwanda – whose representatives met in Entebbe in May 2010, to sign a Co-operative Framework Agreement (CFA) (BBC News 2010). Later signed by Kenya and Burundi to meet the six signatory requirement, this Agreement ultimately allows for Nile basin development without Egyptian consent (Nile Basin Initiative 2011a), removing the country’s previous ‘absolute veto power’ over projects affecting Nile water distribution (Lamere 2012, emphasis added). The Entebbe Agreement, which represents a strategy by which riparians have pooled their strength, has acted to alter the regional power dynamic, with implications for future Egyptian control over Nile waters.

4.2.4 South Sudanese independence

The collective strength of the Egyptian-Sudan pact, prior to South Sudanese secession in July 2011, presented a formidable obstacle to upstream efforts for Nile water re-allocation (Lowi 1993: 71). As vulnerable downstream states, their unity stemmed from a shared interest in safeguarding each country’s respective share of Nile waters, as apportioned in 1959. South Sudan became the eleventh riparian state in July 2011, following independence, taking with it a 20 per cent stake in the Nile basin and 28 per cent of its flow, which crucially must cross over its territory before reaching North Sudan and then Egypt (see Map 2) (Water Politics 2012). The country joined the NBI in July 2012, but its position on Nile water allocation has, until recently, remained unclear (Evans 2011). It was, however, widely expected to align with the coalition of revisionist states, given a shared interest in equitable allocation and ties of ethnicity, geographical proximity and history (Water Politics 2012). It was not surprising then, when in March 2013, Water and Irrigation minister Paul Mayom Akech declared the country’s opposition to the 1959 Nile Waters Agreement whilst also revealing that it had already made some progress in joining the CFA (Amos 2013).

Given its upstream advantage, the loss of South Sudan to the revisionist coalition threatens to isolate Egypt politically, and will serve to further weaken its ‘absolutely inferior’ riparian position (Lowi 1993: 72). Furthermore, loss of control over the Sudd marsh region, which is considered a major potential source of supplementary water downstream (given its high evaporation and transpiration losses, and home to the suspended Jonglei Canal project), to a country whose citizens have historically opposed any marsh development (Water Politics 2012) may limit the potential for extraction.
4.2.5 Regime change

Egyptian control of Nile waters has also been called into question by recent instability within the country - the result of the January 2011 uprisings and the subsequent ousting of President Hosni Mubarak - as well as a resurgence in dissent in light of what are seen as authoritarian moves by President Mohamed Morsi and the Islamic Brotherhood party. Political and economic volatility accompanying regime change has altered riparian perceptions of Egyptian power and is thought to have created a ‘new optimism’ (Evans 2011) among riparians seeking changes to the hegemonic status quo.

Strikes and mass demonstrations in Tahrir Square in the early months of 2011 resulted in severe supply-side disruption - a consequence of worker stoppages in most sectors, the closure of factories and shops, and the loss of tourism revenue (estimated at 6 per cent of Egyptian GDP) (Maher 2011) – at a cost of approximately USD $310 million per day (Credit Agricole Bank in Maher 2011). The low level of confidence accompanying insecurity (in 2011 and presently) has negatively affected the country’s investment climate (news@auc 2012), contributing significantly to the present situation of economic decline. Significantly, economic turmoil and civilian unrest are thought to have largely diverted the new government’s attention away from Egyptian water security concerns (Ooska News 2012a), whilst the removal of Hosni Mubarak, a noteworthy political bulwark against any revision to the terms of the 1959 Nile Waters Agreement, is seen as significant by commentators who view his departure as a threat to Egyptian dominance regionally. Indeed, the Mubarak regime did not hesitate to express its views forcefully on potential threats to Egyptian water security (Keys 2011), and it was quick to make use of Egyptian political power and diplomatic strength to stifle riparian, unilateral water development attempts, for example in its attempt to isolate Ethiopia from external funding by pressuring various bodies such as the Arab League (Evans 2011).

Meanwhile, the ‘erratic’ and dictatorial behaviour of the Morsi government has served to ‘shake up’ relations with the USA (Cunningham 2012a) – the provider of USD $2 billion in annual economic and military assistance on average since 1979 (Sharp 2011: i) - and other international institutions instrumental in maintaining Egyptian dominance. The interim Supreme Council of the Armed Forces’ decision to try 19 Americans for their work relating to the promotion of democracy in February 2012 (Cook 2012), Morsi’s failure to condemn a
US embassy siege in September 2012 (Bradley et al. 2012) and recent moves towards authoritarianism in attempts to entrench Presidential power have all alienated Western observers. They have displeased the USA in particular, which has largely bankrolled Egypt’s military primacy, offering invaluable diplomatic support in the face of challenges to its water allocation. Egypt’s historical ability to frame the debate about Nile waters in its favour at the international level (Tutwiler, cited in Cunningham 2012a), in order to prevent revision to allocation (Anderson, cited in Cunningham 2012a) has indeed much to do with US support, given the USA’s position as primary stakeholder in both the International Monetary Fund (IMF) and World Bank. Naïve rejections of international funding, such as a USD $3.2 billion loan from the IMF in 2011 (Cunningham 2012a), together with neglect of the US partnership, are seen to have compromised Egypt’s ability to manipulate the international agenda.

Riparians have been quick to exploit the situation of Egyptian turmoil. It is thought that while Egypt is concerned with its domestic affairs, it is unlikely to retaliate against revisionary developments upstream (Lamere 2012). For example, having pledged to remain outside the 2010 Entebbe Agreement prior to Mubarak’s dismissal, Burundi took steps to become a signatory following regime change in Egypt (Lamere 2012). Similarly, Ethiopia’s former Prime Minister Meles Zehawi broadcasted his plan for a ‘Grand Renaissance Dam’ project in March 2011. The dam's reservoir is to hold 67 BCM of water, and thereby poses a threat to downstream flows (Evans 2012); it has been hastened towards its completion in the absence of Egyptian ‘oversight’ (Ooska News 2012e). The USD $5 billion dam is expected to be in its final stages of construction by 2015 (Ooska News 2012b).

4.3 External factors

4.3.1 The political economy of ‘Land Grabs’

There are a number of international factors, stemming from a global scramble for water resources (Grain 2012), which need to be considered in an assessment of the sustainability of Egyptian control over the Nile.

In February 2012, the Food and Agriculture Organisation (FAO) reported a 34 per cent increase from the previous year in the global food price index (Green 2012). Global food prices jumped a further 10 per cent from June to July 2012 (BBC News 2012), following severe drought in the USA. For the governments of arid states which rely on food imports, or
even subsidise the cost of food for their citizens, food price volatility is destabilising (Green 2012) and has generated an extensive ‘scramble’ for African agricultural land, for the production of wheat, rice and corn for export (Brown 2011). Since 2001, an estimated area of approximately 530,000km$^2$ - roughly the size of France – has been appropriated (generally by way of lease or licensing) by (i) Asian and Gulf State nations (such as China, South Korea, India, Saudi Arabia (Brown, 2011), Qatar, UAE, Libya and Syria), (ii) their sovereign wealth funds (such as Al-Qudra) (Green 2012) and (iii) private equity firms from around the world, such as Karaturi Global, Saudi Star (Grain 2012) and Citadel Capital (with regional investments of USD $8.6 billion) (Musyoka & Kaburo 2011). These acquisitions are known as ‘land grabs’ (Femia & Werrell 2011).

Table 6: African 'land grabs': a selection

<table>
<thead>
<tr>
<th>Buyer</th>
<th>Vendor</th>
<th>Portion of land accumulated (km$^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citadel Capital</td>
<td>South Sudan</td>
<td>55,777.00</td>
</tr>
<tr>
<td>South Korea</td>
<td>Sudan</td>
<td>6,879.70</td>
</tr>
<tr>
<td>India</td>
<td>Ethiopia</td>
<td>404.69</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>Ethiopia</td>
<td>101.17</td>
</tr>
</tbody>
</table>

*Source: Brown (2011); Manson (2011)*

Since to produce one kilogram of wheat requires approximately 1,000 litres of water (Grain 2012), the export of crops ultimately represents the export of ‘virtual’ water (Femia & Werrell 2011). These ventures thus serve to compromise the supply of water resources in African states themselves, and have accordingly been described as hydrologically ‘suicidal’ (Grain 2012). The additional pressure on states’ water supplies has unsurprisingly increased the appeal of a more equitable distribution of Nile water resources, which is of concern to Egypt.

Together with the considerable revenue accrued from leasing, there is another important dimension to external penetration - that of loan-support and technical assistance (used as a strategy to enable investment). This foreign interest may prove to augment riparian economic capabilities significantly, having served to constrain unilateral Nile development in the past (Swain & Jamali 2011: 7). China’s efforts to facilitate access is most widely reported, having enabled the construction of hydropower dams in Ethiopia, Sudan, Uganda, Burundi and the...
DRC (Bosshard, cited in Swain & Jamali 2011: 8), generally by way of Export-Import Bank (EXIM Bank) financial assistance, with, crucially, no requirement for prior riparian consent (Cascão, cited in Swain & Jamali 2011: 8). Chinese financial and technical support for Ethiopian infrastructure projects is most worrying for Egyptian officials (Cunningham 2012a), given the country’s aggressive rejection of historical water agreements. Financial assistance has enabled the construction of several dams, including that of Tekezé in 2002 (USD $224 million of which was provided by China’s Sinohydro), Gibe III on the Omo River in 2010 (USD $500 million of which was financed by the Industrial and Commercial Bank of China), Fincha Amerti Nesche (by Gezhouba Water and Power Co.) (Swain & Jamali 2011: 8), and most recently, the Grand Renaissance Dam, whose turbines and electrical equipment China is reported to have underwritten (The Economist 2011).

4.3.2 Israel

As the fifth most water-scarce country in the MENA region (as ranked by Maplecroft) (Aburawa 2011), Israel has not shied away from publicising its need for water (Bleier 1997: 120), or even its desire to acquire a portion of Nile waters (El Shopky 2012: 53) by means of a pipeline across the Sinai desert, or through tunnels underneath the Suez Canal (Bleier 1997: 113). There has been a suggestion that Israeli support of Nile basin riparians is a strategy, by which to pressure Egypt into an agreement of this kind (Pearce 2010). Indeed, Israel has been quick to capitalise on South Sudanese secession (its interest in the region already noted by Sudanese President Al Bashir in 1994 (Bleier 1997: 117)), having signed a co-operation agreement involving water management assistance in July 2012 (Sudan Tribune 2012). Israel’s long-standing contributions of aid to Ethiopia are also highlighted, particularly given reports alluding to the country’s support for Ethiopian dam construction during the Mubarak era, and Egyptian People’s Assembly threats of war following Israeli hydrologist and surveyor presence in Ethiopia during 1989 (Bleier 1997: 117). In its extension of financial assistance and agricultural expertise to riparian states, such as Ethiopia, Kenya and Uganda, Israel is seen to ‘incite’ African resistance to previous Nile water agreements (El Bahi 2010). Israeli Deputy Foreign Minister, Danny Ayalon’s state visit to Addis Ababa, Kampala and Nairobi in August 2012 to promote agricultural cooperation (Cuen 2012), cooperation with USAID over food security in Uganda and Ethiopia (by means of contributions of expertise relating to irrigation and agricultural production), as well as reported plans to extend ties with the DRC (Cuen 2012) have all been considered causes for concern. During a summit in May
2010, President Mubarak reportedly urged Israeli Prime Minister Benjamin Netanyahu to discontinue the country’s attempts to revise historic water rights (Ezzat 2010). In August 2012, Egypt’s new Minister for Irrigation and Water Resources, Mohamed Bahaeddine, was also reported to have said that Israel’s presence in Nile Basin countries was ‘unwelcome’ (Ooska News 2012b). If by undermining Egypt’s water security, Israel intends to reduce Cairo’s role in the continuing Arab-Israeli conflict (Nassar 2009), finding an Egyptian solution and/or counter-strategy may prove more problematic.

The emergence of new regional players has thus largely undermined Egypt’s historical, international campaign to counter financial support for other riparian states. It has also encouraged unilateral upstream water development, outside of past water-sharing agreements (Swain & Jamali 2011: 9). Tanzania is reportedly seeking to collaborate with Rwanda and Burundi in cultivating cotton, using the waters of the Kagera River and Lake Victoria, whilst Uganda supposedly hopes to begin several projects in Tonga, which could deplete water stored in Lake Albert (El Shopky 2012: 66). Kenyan plans to construct eight dams to supply drinking water to 3.9 million of its population, as well as to irrigate 1280 km² of farmland, were additionally reported in early December of last year (Ooska News 2012d).

4.4 The future

The formation of a coalition of riparian states (excluding Egypt) with a mutual interest in re-negotiating Nile water allocation has the ability to alter the regional power dynamic in light of Egypt's current, increased vulnerability. A perceived lack of Egyptian control has already begun to prompt riparian basin development, for example by Ethiopia. The loss of territorial control to South Sudan following secession, and the weaker relationship with the USA and wider international community of late, may also diminish Egypt’s ability to frame the debate over Nile waters in its favour. A ‘scramble’ for Nile basin riparian agricultural land, by governments and private companies, for the production and export of cereals for food or use as biofuel, represents a threat to water sustainability and will put additional pressure on already-strained water supplies upstream. Simultaneously, financial and technical assistance offered by external actors (as part of an overall strategy to facilitate market access) has also allowed the previously unfeasible construction of upstream dams and the expansion of irrigation for agriculture, whilst Israel's position further complicates the issue of Egyptian water security.
Whilst Egypt remained completely dominant, it has been able to control the distribution of Nile waters in its favour, stifling competition by means of a variety of power-related strategies and tactics. However, this section has outlined how changes in the region’s power dynamic have begun to weaken Egypt’s grip on the Nile. In this way, my analysis helps to confirm my hypothesis regarding the historical correlation between high levels of power asymmetry in the Nile river basin and riparian experiences of water insecurity.

5 Conclusion

5.1 Summary of sections

This study began by examining whether water insecurity in the Nile basin region could be fully explained by supply-side shortages of Nile river water resources. Whilst the argument’s main tenets - regarding trends in increasing regional demand for water and variability of climate - were acknowledged as significant, it was concluded that an exclusively physical interpretation of water insecurity in the case of the Nile basin not only overlooked the multifaceted nature of water scarcity, but also failed to recognise the importance of power in determining water security. The all too frequent and ‘clumsy’ application of the physical explanation was noted, as was the continued lack of consensus over the explanation for water insecurity.

This was followed by the development in Section Three of an alternative thesis based on the relative power of riparian states. Using the case of Egypt in the Nile basin as the focal point of my analysis, a link was made between relative Egyptian state dominance in the spheres of ‘structural’, ‘bargaining’ and ‘ideational’ power, and the country’s historical hegemony with respect to Nile waters. Conditions of water ‘scarcity’ experienced by basin riparians were thus shown to derive from inequitable access to Nile waters arising from the difference in power between hegemonic Egypt and less powerful states upstream. Section Three also referred to the extent to which Egypt remains dependent on Nile water resources as an arid state with little or no alternative water supply. Due to the pressures on Egypt’s already-strained water reserves, it was concluded that maintaining dominant control over Nile waters would remain a key feature of the country’s national security policy, despite the calls for re-adjustment of Nile water allocations upstream.
My final section on the subject of changing power relations in the Nile basin was designed to test my hypothesis regarding the positive correlation between high levels of power asymmetry in a river basin and riparian experiences of water insecurity. In Section Three, it was argued that, so long as Egypt remained completely dominant, a voluntary readjustment of its allocation of Nile waters for the benefit of those upstream was very unlikely, and thus high levels of water stress would continue. An assessment of the impact on Egyptian control of Nile water resources of the changing power relations among Nile riparians was provided in Section Four. My analysis found that significant regional political and economic advancements, combined with technical and financial assistance from external actors, has strengthened the relative power positions of upstream riparians, especially in light of Egyptian vulnerability following regime change and South Sudanese independence. The implications of these recent developments were reflected in my review of the revisionist activities of an increasingly outspoken coalition of upstream states, and more significantly the unilateral construction of riparian dams and irrigation infrastructure outside of the 1959 Nile Waters Treaty.

5.2 Thesis: the politics of water ‘scarcity’

This paper seeks to challenge the view that upstream state experiences of water insecurity in the Nile basin primarily related to an absolute physical shortage of Nile water resources. It argues that, whilst it is important to acknowledge the supply-side limits of the Nile River itself, an exclusively physical interpretation of water insecurity within the basin was not only inadequate but also inaccurate.

My alternative thesis regarding the politics of water ‘scarcity’ was informed largely by the individual and combined works of Mark Zeitoun (2006, 2009, 2010, 2012), Jeroen Warner (2006), and Ana Elisa Cascão (2009, 2010), all of which provide detailed commentary on the theory of ‘hydro-hegemony’ and power theory as applied to international river basins. In view of this research, my paper seeks to draw attention the relationship between relative power and access to water.

My examination of Nile water distribution among basin riparians exposed differences in the allocation of the river’s water resources in favour of Egypt and, to a lesser extent, Sudan. Egypt’s historical dominance with regard to Nile water resources was then traced to the
prolonged use of various compliance-producing mechanisms related to its dominant position in the spheres of ‘structural’, ‘bargaining’ and ‘ideational’ state power. In light of these findings, the link was made between conditions of water ‘scarcity’ in upstream basin states and Egyptian hydro-hegemony.

5.3 Limitations of this study: suggestions for further refinement of this framework
This paper began by critiquing predominantly supply-oriented explanations for water insecurity in the Nile basin region, arguing that this kind of hypothesis had been applied too frequently and without sufficient investigation of the relevant factors. Little attention had been paid to the significance of unequal power relations among states in a river basin, not to mention the multi-faceted nature of water scarcity.

Word constraints have prohibited a more extensive and hierarchical analysis of the multitude of explanations for water insecurity in the Nile river basin. I therefore recognise it could be argued that, having overlooked a variety of demand-side and management-related explanations for water insecurity in my promotion of an hypothesis surrounding power relations, my thesis is no more inclusive of the multitude of explanations for water scarcity than those accounts which I have criticised.

My argument was formulated against the background of numerous incidences of power asymmetry in international river basins. Variations of my thesis have been applied to the Jordan river basin, in reference to Palestinian-Israeli water conflict - for example see Mark Zeitoun’s (2011) book ‘Power and Water in the Middle East: The Hidden Politics of the Palestinian-Israeli Water Conflict’. However, in my view the role of power and power asymmetry in determining water security at the river basin level remains universally under-acknowledged. In order to develop and strengthen my argument further, it would be necessary to apply it more extensively across a variety of international river basins. For example, my thesis could in principle be applied to highly politicised basins such as the Ganges (in view of the India-Bangladesh water dispute) and Tigris-Euphrates (which involves water issues between Turkey, Iraq and Syria); its application to areas of lesser regional tension might however prove less fruitful.
5.4 Concluding remarks

The process of allocating trans-boundary water resources is highly political, yet the link between power asymmetry and water insecurity remains universally under-acknowledged. An accurate understanding of the roots of water insecurity in international river basins is essential, if we wish to resolve the problems that arise from competition for inadequate resources. Equipped with that understanding, policy-makers should address such problems pro-actively and aim to resolve them in an equitable way by negotiation, before they become the subject of conflict between states. I hope that my thesis may help move us one small step closer to accomplishing that goal.

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