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Facing Global Environmental Change

Environmental, Human, Energy, Food,
Health and Water Security Concepts

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21 Linkages Between Sub-national and International Water Conflicts: The Eastern Nile Basin

Simon A Mason, Tobias Hagmann, Christine Bichsel, Eva Ludi and Yacob Arsano

21.1 Introduction¹

Water conflicts in transboundary rivers systems have been the object of a growing literature and ongoing debates among scholars of political science, international relations and political geography. The subject is approached from two main angles: 1) if, how and under what conditions does water scarcity lead to violent conflict or even war (Starr 1991; Homer-Dixon 1999; Libiszewski 1999; Toset/Gleditsch/Hegre 2000; Lonergan 2001)?² 2) how can international rivers be managed and water conflicts be mitigated (Trollaldalen 1992; Biswas/Kolars/Murakami/Waterbury/Wolf 1997; Waterbury 2002; Wolf 2000, 2002a)? The 'water wars' hypothesis that partly shaped the first question could not be substantiated and should therefore be dismissed. There is an increasingly wide consensus that water scarcity does not lead to war (Allan 1997; Trondalen 1997; Wolf 1998; Amer/Arsano/El-Battahani/Hamad/Hefny/Tamrat 2005). Water scarcity, however, may be a politically destabilizing factor that can lead to political tensions and hinder sustainable development. Violent conflicts over scarce water are

more likely to be found on the sub-national level than on the international level (Wolf 1998). This article focuses on the second question, how conflicts over the use of scarce water resources can be mitigated. The aim of the article is to improve the transformation of international river conflicts through the systematic assessment of the linkages between the local, national, international and global level. *Linkages* refers to the interaction between the system (e.g. international river conflict) and its sub-system (e.g. local conflict) and super-system (e.g. global food market). The main argument of this chapter is that these linkages are often neglected in the analysis of international river conflicts, based upon which faulty mitigation strategies are then initiated. One exception is the article by Giordano et al (2002). According to these authors, there is a link between interstate and intrastate relations over water resources, but the nature of this link and the degree to which it is present varies considerably by country and region (Giordano/Giordano/Wolf 2002). The linkage approach seems to be especially relevant in river basins characterized by two factors, first, where some of the riparian countries experience water stress (i.e. less than 1700 m³/person and year) and due to this they import food from the global market, and second, where weak economies and political instability make the management of water conflicts difficult. The Nile, Euphrates, Jordan, and Senqu are examples. The Nile Basin is used in this article to demonstrate the proposed conceptual approach. This linkage approach to conflict is in line with the reconceptualization of security after 1990. Security studies were 'deepened' to no longer exclusively focus on the national state as the key actor, but rather to highlight the interaction between the local, national, international and global actors and levels.

The present chapter is in part a continuation, in part a major refocusing of the 'Swiss group's' research on environment and conflicts that began with the Environment and Conflicts Project (ENCOP) in 1992

1 The research for this paper was carried out within the Individual Project 7 (Environmental Change and Conflict Transformation) of the Swiss National Centre of Competence in Research (NCCR) North-South: Research Partnerships for Mitigating Syndromes of Global Change, co-funded by the Swiss National Science Foundation (SNF) and the Swiss Agency for Development and Cooperation (SDC).

2 Examples of water conflicts and management events are listed in these two databases: 1) Wolf, Aaron T., 2000: "Transboundary Freshwater Dispute Database, International Water Events Database 1948-1999", International Events 2000, Oregon State University, at: <<http://ocid.nacse.org/cgi-bin/qml/tfdd/eventsearch.qml>>; 2) Gleick, Peter, 2000: "Water Conflict Chronology", September 2000 version, at: <<http://www.worldwater.org/conflict.htm>>.

(Baechler/Böge/Klötzli/Libiszewski/Spillmann 1996). ENCOP's *environmental induced conflict* definition focused on the degradation of the environment as a cause of violent conflict – similar to the first question above. Subsequent research projects focused on how to deal with conflict (also non-violent) over the use of resources and the environment – similar to the second question above.³

The reason for the conceptual refocusing after ENCOP was due to the limitations of its definition in relation to questions of multi-causality and the systemic nature of conflict (Mason/Spillmann 2003) and the problems related to the assumption that the 'environment' determines human behaviour (Hagmann 2005). Some of the case studies of ENCOP, e.g. Libiszewski (1995) on cooperation over the Jordan River, had already moved on from the original environmental induced conflict hypothesis (Libiszewski 1992: 13). Thus the refocusing of research from 'environmentally induced conflicts' to the 'management of conflicts over the use of resources and the environment' was influenced by case study findings that pointed to the need of better understanding the relationship between (non-violent) water and land use conflicts and cooperative sustainable development (Baechler/Spillmann/Suliman 2002; Arsano 2004; Mason 2004; Arsano 2005). Research showed that armed conflicts are more directly related to non-renewable resources such as oil, and 'lootable' resources such as diamonds or coltan, rather than to the degradation of the environment or scarcity of water or land (Ross 2004). Nevertheless, there is also continuity in the 'Swiss group's' approach. This mainly entails a process-tracing, case study methodology (Schwartz/Deligiannis/Homer-Dixon 2001) and close cooperation with academics and practitioners in the actual case study regions.

The *conflict transformation approach* towards water and land use that replaced the environmentally induced conflict paradigm is presented in Baechler (2002) and Mason (2004). A conflict transformative approach sees the development potential in conflicts, conflict is a 'transforming agent for systemic change' inherent in all societies, manifest on all levels of social interaction (Lederach 1995: 18). Its key tenets in this context are: 1) the need for direct participation of af-

ected actors in the conflict management process, 2) approaches from the natural and social sciences need to be combined in transdisciplinary research, and 3) any results developed in the participatory approaches need to be institutionalized.

After some nine years of research using the conflict transformation approach in relation to water and land conflicts, lessons have been learned concerning the participatory approach. The publications of Amer, Arsano, El-Battahani, Hamad, Hefny, and Tamrat (2005), Arsano and Tamrat (2005), Hamad and El-Battahani (2005), as well as of Hefny and Amer (2005), are examples of joint research and conflict analysis of an international river basin carried out by researchers and practitioners from the region. The second and third points on transdisciplinarity and institutionalization are still underdeveloped. Further open questions are: 1) The conflict transformation approach has not yet sufficiently addressed the question of how to deal with power asymmetries between conflict actors and the role of 'oppression' in conflict (Deutsch 2002), and 2) The approach has not adequately addressed the linkages between different conflict system levels. The last point is addressed here as it is missing in a large number of conflict case studies (Homer-Dixon/Blitt 1998) and statistical analyses of conflicts using aggregate country data (Toest/Gleditsch/Hegre 2000).

The chapter is structured as follows: first we introduce our conceptual model with its *physical* water linkages between the sub-national, national and international systems of an international river basin, and its *political* conflict/cooperation linkages between the same levels. The conceptual model is then applied to the case of the Nile Basin in the following section. The article concludes with a summary of the advantages of the linkage approach when attempting to mitigate water conflicts.

21.2 The Linkages Approach: Addressing Physical and Non-Physical Links

Competition over freshwater in international river basins affects three interdependent levels. First, the natural river basin can be viewed as a system, where riparian countries of the same basin agree, dispute and/or negotiate over who gets which quantity and quality of water, in the following referred to as the *international level*. Second, the riparian countries and regions represent subsystems, where different sectors

3 These projects included: *Environment and Conflict Management* (ECOMAN) 1996-1999; *Environment and Cooperation in the Nile Basin* (ECONILE) 1999-2004 and NCCR North-South "Environmental Change and Conflict Transformation" 2001 ongoing.

and territorial units compete for their share within these countries. We refer to this as the *sub-national level*. Third, global food production and markets can be seen as a super-system, in that water scarce countries import water in the form of food ('virtual water') and thus mitigate water related tensions on the regional or national level, this is called the *global level*. In terms of conflict analysis, the allocation of water between and within countries raises the question how forms of cooperation (or conflict) on the international level reinforce conflict (or cooperation) on the sub-national level and vice versa. A central question is whether and through which pathways water and conflicts and cooperation over scarce resources are transferred - 'shifted' - from one level to another, and what the implications are for conflict mitigation.

Conflicts can be differentiated according to their intensity ranging from 'competition' to 'violent conflict' as well as a number of other criteria according to the outcomes, actors, level or scale, duration or the issues involved in conflict. While a number of definitions have aimed to grasp violent environmental conflicts (Libiszewski 1992; Homer-Dixon 1999; Gleditsch 2001), here a more generic definition is adopted focusing on conflict prevention and transformation. We define environmental conflicts as interactions between at least two actors (individuals or groups) over the use of natural resources and the environment, where at least one of the actors is negatively affected by this interaction, and the other actor intended or ignored these negative impacts that resulted from his/her actions (adapted from Coser 1956; Trolldallen 1992; Glasl 2002). This follows a conflict analysis⁴ approach, encompassing different levels of intensity between interdependent actors involved in resource use, in this case, freshwater in transboundary river basins. Conflicts over the use of resources and the environment need to address both the socio-economic and political dimensions and the physical, ecological dimensions, thus our distinction between physical and non physical linkages.

The relationship between the content and the context is a key question in a systems approach (Bateson 1972: 518). The relationship between the international

river conflict (the 'content') and the sub-national or global conflict/cooperation (the 'context') is referred to as *linkage*. The delineation of what is content and context entails subjective elements, as the observer is part of the system observed (von Foerster 1981). The acknowledgement of this key aspect clarifies many misunderstandings regarding conflicts in relation to the environment. Dalby (2007), for example, states that violence in relation to the environment is a matter of "... the control of relatively abundant resources in poor economies." If the system boundary is delineated on a global level, a resource such as gold, diamonds or oil is not abundant, but scarce, else there would be no incentive to gain control over it. Regarding water, it is relatively abundant on the global level, but relatively scarce in numerous regions. Thus, the subjective delineation of a system decides if a resource is scarce or abundant, rather than the physical availability of the resource.

What are the *physical linkages* between the systems of an international river basin?⁵ This article focuses on water quantity; this means water for food, as 70 per cent of the world water withdrawal is used for food production (SEI 1997). The linkages between the sub-national and international arenas are all related to the transport of water, either in the form of water or in the form of food, i.e. 'virtual water' (Allan 1997). It takes about 1000 litres to produce 1 kg of bread, and 15000 litres to produce 1 kg of beef, thus transporting food is a very efficient way of transporting water (Allan 1997; Yang/Zehnder 2002; Yang/Reichert/Abbaspour/Zehnder 2003). All stakeholders in a river basin are related to each other in an upstream-downstream relationship as they are dependent on the same water as it flows from source to river mouth. Physical water linkages may either be natural, as water rains and flows downstream, or influenced by human behaviour, if water is diverted, dammed, withdrawn or transported as food.

What are the *socio-economic and political linkages* between the systems of an international water basin? Dyadic relationships between actors competing for water uses in river basins are empirically observable on different, politically and historically constituted

4 The goals of conflict analysis are a structured approach to conflict dynamics, a full understanding of the critical issues or 'breaking points' that determine the course of conflict, the identification of optimal opportunities for intervention, the determination of adequate intervention steps, and the understanding of escalation and de-escalation phases (Fisher/Abdi/Ludin/Smith/Williams/Williams 2000).

5 A river basin is the area of land from which all surface run-off flows through a sequence of streams, rivers and lakes into the sea at a single river mouth, estuary or delta. Directive 2000/60/EC of 23 October 2000 establishing a framework for Community action in the field of water policy (Water Framework Directive). In: *EEA multilingual environmental glossary*, at: <http://glossary.eea.eu.int/EEAGlossary/R/river_basin>.

levels; namely in local, national and international arenas. To simplify, the article distinguishes between sub-national and international and global 'water conflict systems'. The first includes non-state and state actors of the same national territory while the latter refers to conflict between different national governmental (and sometimes non-governmental) organizations. The third level concerns the political economy of global food markets. These water conflict systems are characterized by the involvement of diverse actors, from intergovernmental bodies to local communities and by varying degrees of cooperation and conflict intensity, from interstate tensions over water allocation to acute conflict over property rights between villagers. In addition to water as a physical resource linking actors of different levels, the transfer of non-material and symbolic resources (e.g. political legitimacy or the cultural-religious meaning of rivers) relate these different levels with each other in interdependent conflict systems (see also McGinnis 1999). On a more abstract level, these material and non-material linkages are shaped by principles concerning *how* the resources are transferred from one level to another. Governance, for example, including policies, regime type and opportunities for political involvement, link the different water conflict arenas by structuring the behaviour and strategies of actors. Such structuring factors influence actors confronted with the choice of adopting means to defend their resource-related interests.

Thus, the political linkages between conflict and cooperation over water resources on the sub-national and international levels can be conceptualized as three distinct, yet often complementary key processes in interdependent conflict systems. Firstly, conflicts and cooperative relations between actor groups over resources can be *transferred* from the sub-national level to the international level and vice versa. Thus for example conflict on the international level 'spills over' - is transferred - to conflict on the sub-national level. A second form of linkage is when conflicts are *transformed* into cooperative relations.⁶ A third form of linkage is when cooperative relations *escalate* into non-violent or violent conflicts. The linkages should not be understood in terms of linear cause and effect, but in terms of circularity and dynamic processes - transfer, transformation, escalation - leading to changes in the conflict system which in turn is shaped by a number of context and proximate factors.

6 Terminology refers to 'conflict transformation' approaches (Bush/Folger 1992, Lederach 1995, Reimann 2001).

21.2.1 Factors Influencing Linkages

Past empirical research has identified and studied a number of factors significantly influencing the dynamics of international river conflicts and cooperation. These can be divided into context factors, that are harder to influence directly, and the more malleable proximate factors, directly influencing water relations between and within riparian states. *Context factors* include the natural availability of water resources⁷, the level of economic and political integration and existence of non-environmental conflicts in the region⁸, the symmetry of power between riparian countries⁹, the number of riparian states¹⁰, the economic development of the riparian states and the world market for agricultural products (Durth 1996; Allan 1997; Marty 2001; Wolf 2002a). *Proximate factors* include: national policies affecting water management and water allocation to different sectors¹¹, international policies, the institutional¹², legal setting in the river basin, and the form of extra-basin involvement, and political participation of different actor groups on the sub-national and international level related to water management and allocation (Delli Priscoli 1996; Trondalen 1997; Libiszewski 1999; Wolf 2002a; Mason 2004). From the standpoint of conflict mitigation, proximate

7 Water dependency is calculated as the percentage of internal renewable water resources of the total actual renewable water resources, i.e. dependency on rainfall outside of a state's territory. See: AQUASTAT, FAO's Information System on Water and Agriculture, at: <<http://www.fao.org/ag/agl/aglw/aquastat/main/index.stm>>.

8 The more non-environmental conflicts, the more difficult it is to resolve water conflicts, as tensions between the countries are already sensitive. Examples are given in: Mason/Spillmann (2003).

9 According to Frey (1984), conflict is more likely if the downstream riparian state is highly dependant on water and is powerful in comparison to the upstream riparian state. Recent developments in the Nile Basin and Euphrates/Tigris basin contradict this argument, however. The downstream country is always geographically weaker. A powerful downstream country (economically, diplomatically and militarily) can partly compensate the geographical weakness. This may lead to power symmetry that can enable cooperation, as in the Nile Basin. An upstream country (e.g. Turkey), that is also economically more powerful than the downstream country (Syria, Iraq), has little incentive to cooperate, and the downstream country has little leverage to influence the upstream country.

10 The more riparian states, the harder the coordination task. This is one reason why Egypt is interested in a unified Sudan.

Figure 21.1: Countries of the Nile Basin. The Nile Basin includes two main sub-basins: the Eastern Nile Sub-basin (Egypt, Ethiopia, Eritrea and Sudan) and the Equatorial Lakes Sub-basin (Burundi, Dem. Rep. of Congo, Egypt, Kenya, Rwanda, Sudan, Tanzania and Uganda). The country borders do not represent officially recognized country borders. **Source:** From Amer et al., 2005 © EAWAG, Duebendorf, 2005; reproduced with permission of Eawag.



factors are of special interest to our analysis as they are less static than context factors and are (partly) explicative of the dynamics of conflict and cooperation in different water conflict arenas. The proximate and

context factors only *implicitly* influence the linkages between an international system and its sub- and super-system. The following case study focuses *explicitly* on the factors influencing the linkages in an international river basin. First, the Nile conflict on the international level regarding the water allocation between the countries in the Eastern Nile Basin is presented, as is typically done in international river case studies.

12 Wolf (2002a: 15) remarks that “... it is when the rate of change within a basin exceeds the institutional capacity to absorb that change when we find tensions”.

Then two water conflict/cooperation linkages are explored: 1) linkage between the sub-national and the international systems through projects planned on the international level but implemented on the sub-national level, and 2) linkage between the global food market system and the international river system, through the trade in 'virtual water'.

21.3 International Conflict and Cooperation in the Eastern Nile Basin

The Nile River is shared by ten countries (Egypt, Sudan, Ethiopia, Eritrea, Tanzania, Uganda, Burundi, Rwanda, D.R. Congo, and Kenya, figure 21.1) and is home to more than 160 million people; its population is growing by 2-3 per cent per year. Measured at Aswan, the Nile River has a yearly flow of 87.1 km³/year¹³. 86 per cent of the Nile's water at Aswan stems from the Ethiopian highlands in the Eastern Nile Basin, the rest originates mainly from the watersheds of the equatorial lakes (Waterbury 2002). Many countries in the Nile Basin are highly dependent on the Nile's water, as they are situated in an arid or semi-arid region. More than 95 per cent of Egypt's water stems from the Nile, this means that it depends on rainfall outside of its territory. Egypt has therefore always closely observed Ethiopia's water development plans. Ethiopia's irrigation plans are of great concern since they could reduce the water flow in the Nile. Currently, Ethiopia's economic capacity does not yet allow full implementation of its irrigation plans (Mason 2004). Rain-fed agriculture, upon which Ethiopia's food production depends at the moment, is un-

reliable because of the unpredictability of the seasonal rains.¹⁴

The national capacity to address the water development needs of the Nile countries is limited. The civil war in Sudan, civil war in Ethiopia and the interstate war between Ethiopia and Eritrea during the second half of the 20th century are indications of the political instability in the region. On the international level, the absence of a basin-wide water agreement has caused tensions between the riparian states and hindered access to international development support. Egypt and Sudan uphold the validity of the 1959 agreement that was signed by these two countries¹⁵; the upstream countries, however, do not consider it to be relevant for them. Many international development banks require the consent of downstream countries before financing development projects on international rivers, thereby protecting the geographically weaker downstream states. A lack of consent from the downstream states can hinder development upstream, one of the main concerns of Ethiopia.¹⁶ The conflict between Egypt and Ethiopia over water rights is at the core of the Nile conflict in the international arena. Sudan, the country between Egypt and Ethiopia plays an important role in the Eastern Nile Basin, as it is dependent on good relations with both countries. Recent developments towards cooperation in the Nile

11 Negative externalities resulting from industrial or municipal pollution are generally easier to mitigate than those resulting from irrigation, as water is consumed. A water treatment plant can improve the water quality, but water that is consumed in irrigated agriculture is lost through evapotranspiration. Irrigated agriculture is responsible for 70 per cent of the global water withdrawal, while the industrial sector consumes 20 per cent and the municipal sector 10 per cent only (SEI 1997). Water used for hydroelectric power production (HEP) can also lead to conflicts. Since water used for HEP is a question of timing and not one of absolute quantity, it is generally less contentious than large irrigation schemes.

13 See: SHI, 1999: *World Water Resources and Their Use*, State Hydrological Institute (SHI), Russia and UNESCO, at: <http://espejo.unesco.org.uy/part%604/I_africa/index.htm>, 1 January 2002.

14 The periodic fluctuations in the Nile's flow is demonstrated by the two extremes of 1916 with a water flow of 120 km³/year, and 1984 with a flow of 42 km³/year measured at Aswan (Collins 1990: 402).

15 Agreement between the Republic of the Sudan and the United Arab Republic for the full utilization of the Nile waters signed at Cairo Egypt, 8 November 1959. Food and Agriculture Organization [cited 15 March 2002], at: <<http://www.fao.org/docrep/W7414B/w7414b13.htm>>, 2 July 2002.

16 "Although the need has always been there, Ethiopia has failed to develop its water resources to feed its needy population, mainly because of a lack of the required financial resources. Policies of international financial institutions like the World Bank, which have made it difficult for upper riparian countries to secure finance for development projects without the consent of the downstream riparian countries, have a significant contribution in this regard. (...) The downstream riparian states, therefore, have maintained the right to veto the development endeavors of the upstream states. As a result, upper riparian countries are naturally left with little choice other than to resort to a reciprocal measure of unilateralism", Lemma, S., 2001: "Cooperating on the Nile: Not a Zero-sum Game", in: UN Chronicle, vol.,1. (March): 65, at: <<http://www.un.org/Pubs/chronicle/2001/issue3/0103p65.html>>, 4 July 2002.

Basin resulted from Egypt accepting a discussion on a basin wide legal framework, and Ethiopia accepting a start for cooperation on a project by project basis (Mason 2004). The Nile Basin Initiative (NBI) was launched in Dar es Salaam in February 1999 by the Basin countries as a transitional forum to facilitate these cooperative efforts with the aim of a binding basin-wide institution in the future.¹⁷

21.3.1 Linkage Between Sub-national and International Systems

Many plans to augment the total amount of available water in the Nile Basin through supply-side¹⁸ projects hinge around the evaporation losses in the Sudd swamps¹⁹ in Sudan or in the swamps of the Baro-Akobo/Sobat, on Ethiopian territory. Through canals, the retention time of water in the swamps can be reduced, and less water is then lost to evaporation.²⁰ The two examples, the historic one in Sudan and the planned one in Ethiopia are presented below.

As part of the agreement of 1959 between Sudan and Egypt on the 'Full Utilization of the Nile Water', the two countries decided to build the Jonglei Canal I and share the net benefit of 4.7 km³/year water (3.8 km³/year measured at Aswan) equally between each other (Collins 1990: 317). 267 km of the 300 km long Jonglei Canal were built, when the bucket wheel used to dig the canal was destroyed by the Sudan People's Liberation Army in 1983, the year the second civil war broke out (Collins 1990: 401). Economic, political and historical disparities between the North and South, actor groups channelled by ethnic and religious differences, and competition over the access to water, land and oil are some of the factors fuelling this war (Suliman 1999c). John Garang, later to become head of the Sudan People's Liberation Army, wrote his PhD at Iowa University on the Jonglei Canal, mainly criticiz-

ing the limited development strategies, which would make it benefit Northern Sudan and Egypt, rather than the local populations where the project was to be implemented (Collins 1990: 383). The project did not have the support of many groups in South Sudan and it was also debatable internationally, since the impacts on the environment²¹ and local population were unclear (Howell/Lock/Cobb 1988).

In summary, there was no compensation for the water that was to be 'transported' from the local Sudd area in South Sudan to the North Sudan and Egypt. Furthermore, the local communities were not involved in the planning process. Water that evaporated and was thus part of the sub-national eco- and social-systems was to be used in the North, without sufficient compensation and political participation. Thus cooperation between North Sudan and Egypt over water, neglecting the needs of people in South Sudan, escalated into conflict on the sub-national level.

In the framework of the Nile Basin Initiative, the 'Baro-Akobo Multi-Purpose Water Resources Sub-Project' in Gambella, south-western Ethiopia on the Ethiopian-Sudanese border is planned (NBI 2001). The three countries, Egypt, Sudan and Ethiopia have agreed on building a canal through the swamps of the Baro-Akobo River, allocating the additional water to Egypt and Sudan, and allocating an equal amount from the Blue Nile River to Ethiopia.²² It seems that some lessons were learnt from the Jonglei Canal experience, one of the main ones being that the project has to benefit the people directly affected and that they need to be involved in the planning process. Thus besides increasing the water yield, the multi-purpose project aims at the production of hydroelectric power and irrigation projects, by which livelihoods and income opportunities in the sub-basin shall be enhanced. Broad stakeholder consultation and involvement in the identification, planning and design phases are planned. The preparation of the project is estimated to cost 3 million USD, and the implementation to be more than 400 million USD (NBI 2001: 25-26).

Some questions remain, however. In the Gambella national regional state that would be affected by the Baro-Akobo/Sobat project nothing has been done so

17 NBI, 2002: Nile Basin Initiative, About the NBI, History of NBI, Update Nov. 2002, at: <<http://www.nilebasin.org/>>.

18 Supply side water management indicates efforts to increase the water available for withdrawal. Demand-side management indicates efforts to increase intra- or inter-sector efficiency, to make better use per unit of water withdrawn.

19 19200 km² in 1980 (Howell/ Lock/Cobb 1988).

20 Projects on the Upper White Nile to build canals through the wetlands of Sudan are estimated to be able to increase the total amount of available water by 18 km³/year (Jonglei I: 3.8, Jonglei II: 3.2, Machar Marshes: 4, Bahr el Ghazal: 7 (Whittington/McClelland 1992).

21 Whittington and McClelland (1992) calculated the opportunity costs of the Jonglei Canal I project at 500 million USD per year or about 5 billion USD lump sum, suggesting that international agencies could pay for the upkeep of Europe's most important southern range for migratory birds.

22 Interview with an Ethiopian academic, Addis Ababa, April 2001.

far regarding land re-allocation since the overthrow of the Derg regime in 1991. Pastoralists view land and other natural resources including water as communal property in pastoral areas and all the communities have equal rights to use land, which are controlled and managed by identifiable groups at the local level. The communities have established their own socially accepted rules to use and manage resources collectively even if these are not formally recognized by the government. As 85 per cent of the Gambella people are directly dependant on the 'Baro-Akobo river system for cultivation, livestock production and other supplementary food collection such as fish, any project planned at the international and national level will have a direct impact at the sub-national and local level.²³ In addition to regarding linkages between the local and national level, there are also conflicts between different actors on the local level (e.g. between agribusiness vs. small land-holders). The power asymmetry between the stakeholders on the local level greatly shapes these conflicts, as different actors have different interests and means regarding land and water use, depending on their access to financial, political and human capital.

In view of the Jonglei canal experience, the linkage approach must be considered in future water development projects. If water is channelled and taken out of the local system, how can the local people be compensated and included in the decision making process? Since the systems of property rights are different (communal property managed at the local level on the one hand, and government or private property rights for agro-businesses on the other hand), classical compensation in the form of land or money is not likely to satisfy the local needs adequately. As there are already tensions between the local groups in the area, as well as between the local lowlanders and the formal government of Gambella, who are linked to the central government of Ethiopia, the Baro-Akobo project could escalate already existing conflicts²⁴ if it is not planned and implemented with utmost care.

21.3.2 Linkage Between the Global and International Systems

Already today 15 km³/year are imported into the Nile Basin from the global system in the form of 'virtual water', i.e. water embedded in food (Mason 2004). As water becomes scarcer, it may be reallocated between sectors according to its highest economic value, an example of inter-sector efficiency increase. Food is imported, for example, allowing for less water to be used in the agricultural sector. This saved water can then be used in the industrial sector where it yields a higher economic return. Table 21.1 shows that Egypt is the main cereal importer into the Nile Basin, with 130 kg per capita and year. Egypt produces about 60% of its cereals and imports the rest, mainly from the USA (Yang/Zehnder 2002). While the virtual water strategy makes economic sense in the case of Egypt, potential negative effects on Egypt's social and political stability (decreasing employment in the agricultural sector) must be considered.

The situation is different for Ethiopia that imports food as food aid, not because it is water scarce, but because its weak economic and political situation have hindered the use of its available water resources. Egypt on the one hand, and Sudan and Ethiopia on the other hand, demonstrate that different strategies are required for a country to be food secure. If a country experiences physical water scarcity²⁵ like Egypt, virtual water is an important part of the solution (see Table 21.1). If a county experiences economic water scarcity, like Sudan and Ethiopia, virtual water is not an adequate strategy; rather the institutions and infrastructure to use the primary available water resources should be developed. While food aid in Ethiopia (about 11% of national cereals production) helps household food security in rural Ethiopia, inappropriate food aid interventions may increase dependence on the household and national level. Mid-term strategies include stabilization of agricultural yields, long-term strategies involve diversification away from rainfall dependent livelihoods (Devereux 2000).

23 Interview with Moges Shiferaw, Zurich, June 2003.

24 Ethiopia: The Gambella Conflict - Structures and Prognosis, 2004. Wiretnet independent analysis, practical management, UK. at: <<http://www.unhcr.ch/cgi-bin/texis/vtx/publ/open-doc.pdf?tbl=RSDCOI&cid=4186616c4&page=publ>>.

25 Countries experiencing 'physical water scarcity' do not have enough primary water resources to feed their population. Countries suffering from 'economic water scarcity' have sufficient water resources to meet their additional primary water supply, but need additional storage and conveyance facilities to make use of the naturally available water. Most of these countries face severe financial and development capacity problems (International Water Management Institute at: <<http://www.iwmi.cgiar.org>>).

Table 21.1: Food security in the Nile Countries. **Source:** Mason (2004), based on data from: a) FAO (2000b); b) FAO (2000d); c) FAO (2000c); d) UNDP (2000). Human Development Index includes indicators for life expectancy, adult literacy, combined primary, secondary, tertiary gross enrolment ratio and Gross National Product per capita; and e) UNFPA (2002).

	Proportion of population undernourished 1996-1998 (a)	Reasons for food emergency (FAO 2000) (b)	Annual cereal import per capita 1989-98 (pop. 1998) (c)	Human Development Index value 1997 (d)	Population in millions 2002 (e)
Burundi	65 %	Civil strife, population displacement	6.21	0.324	6.7
D. R. Congo	60%	Civil strife, population displacement	8.05	0.479	54.3
Egypt	5%	No information	128.69	0.616	70.3
Eritrea	65%	War-displaced people and returnees, drought	64.86	0.346	4
Ethiopia	50%	Drought, large number of vulnerable people, internally displaced people (IDP)	9.18	0.298	66
Kenya	40%	Drought	22.41	0.519	31.9
Rwanda	40%	Insecurity in parts	18.61	0.397	8.1
Sudan	20%	Civil strife in the south	23.16	0.475	32.6
Tanzania	40%	Successive poor harvests in several regions	6.80	0.421	36.8
Uganda	30%	Civil strife in parts, drought	3.14	0.404	24.8

In summary: Water is brought into the Nile system in the form of food, and it is compensated for, i.e. Egypt pays for it, and farmers in the USA are interested in exporting cereals. There is economic participation of those involved, e.g. the American farmers, and political participation through their government in shaping world trade regulations. Thus the transfer of water from the global system into the international Nile system transforms the conflict between the countries of the Nile and makes cooperation possible. If Egypt would have to be self-sufficient by growing its own food for a growing population and remain dependent on the waters of the Nile for this, then the tensions towards the upstream countries would be much greater. Virtual water explains why water scarce countries do not go to war (Allan 1997). However, Egypt is also concerned about becoming too dependent on food exporting countries, and any political strings tied to such imports. To ease such concerns, various ideas have been proposed: a regime that buys the

wheat and sells to water scarce counties without geopolitical strings attached (Ohlsson 1999: 239) or a private company that does the same thing (Yang/Zehnder 2002).

One more water conflict mitigation strategy deserves mention here, as it can ease the need for moving water across the local, national and international systems. This strategy concerns demand-side management, i.e. increased efficiency in irrigation or rain fed agriculture. There is greater benefit per unit of water withdrawn or unit of rain that has fallen, if less water has to be withdrawn and thus upstream-downstream conflicts both on a sub-national and international level can be eased. According to Egyptian estimates, an additional 20.9 km³/year could be made available through recycling water, by changing irrigation techniques and adopting water efficient crops and cropping patterns (El Quosy/Tarek 1999: EGY-r8.8). This is equal to 30% of the water that is being used at present in Egypt (Mason 2004).

21.4 Conclusions

The Eastern Nile case indicates that the success of international river development projects depends to a large degree on how people are affected by such projects on the sub-national level can be compensated and involved in the decision making process. The difficulties involved with such supply-side projects need to be carefully assessed in relationship to the alternative opportunities of demand-side projects. Examples of demand-side projects in the Nile case are increased efficiency in irrigation in Egypt, greater yields by developing rain-fed agriculture in Ethiopia, or the possibility for economically strong countries such as Egypt to import food from the global market. Concerning the transformation of international river conflicts in general, and the Nile river in particular, the linkage approach calls for dialogue processes between grass-roots and government actors ('vertical dialogue') and between governments ('horizontal dialogue'), long term demand-side management through increased efficiency and inter-sector reallocation of water, stabilization of the world food markets, and adequate compensation mechanisms for peoples directly affected when water is taken out of a sub-system.

The two elements of (economic) compensation and political participation are central to the linkage approach - similar to Allan's (2003a) fourth and fifth water management paradigms. A key result of our case study, therefore, is the following hypothesis: If water is taken out of a system (physical linkage) without compensation and without the participation of the people directly affected (economic and political linkage), conflict escalates or is transferred across the systems. Inversely, water conflicts are transformed or cooperation is transferred across systems, when water is brought into a system or is withdrawn and compensated, and this compensation happens with the participation of the people affected. This hypothesis needs to be tested in other river basins to verify its generality.

More generally, the article argues that environmental conflicts always deal with physical and non-physical dimensions. These are thus the two types of links researchers and practitioners need to focus on. Generally, a 'deepening' of security studies is understood as focusing on other actors besides the nation state. The approach presented here goes a step further, rather than only focusing on further actors (e.g. human security instead of national security), there are indications that security studies need to focus on the *links* between the actors (and their respective levels), rather than just on the actors themselves. Specifically

regarding environmental security, the relations between the physical and non-physical linkages should be highlighted. For water and land resources, the concept of 'virtual' land and water is helpful to trace the physical linkage throughout their entire 'life-cycle'. People eat virtual land and water when they consume food. This can be part of the solution, i.e. in physically water scarce countries, that import food and therefore have less pressure on national or international river resources. On the other hand, it can also be problematic, when the production or marketing of food is related to conflicts that are ignored because the food is consumed far away. For resources such as oil or 'lootable' resources such as diamonds, gold or coltan, the actual resource can be traced from its mining, transportation, marketing to its consumption - often in the affluent countries. The socio-economic and political linkages that go hand in hand with the physical linkages are often harder to trace. Market regulation through political participation of people directly affected is needed to shape the physical linkages: be this in the case of the Nile a pastoralist in South Sudan, a high-land farmer in Ethiopia, a city dweller in Khartoum, a peasant farmer in North Egypt, or a high-tech farmer in the US.

On a conceptual level, the linkage approach to conflicts over the use of resources and the environment fills one of the gaps often found in case study approaches or statistical analyses using national data. This gap entails focusing on the content, the 'conflict', and its causes, rather than on how the 'conflict' is related to its context - both on a sub level (e.g. local conflict dynamics) and super level (e.g. global markets). The added value of the linkage approach is not only to understand conflict as being influenced by its context, but to place this relationship at the heart of the analysis. If these links are addressed, the number of management options increases. Water as a physical resource 'trickling down' and sometimes 'spilling over' these different arenas serves to demonstrate some of the questions involved.

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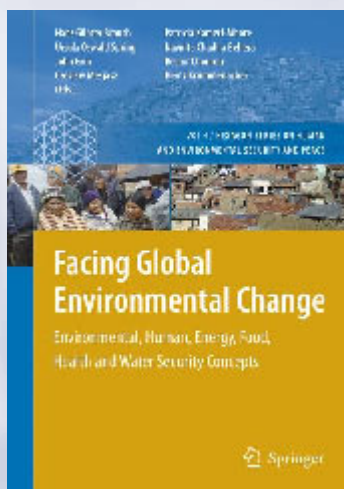
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