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Quaker United Nations Office

Diverting the Flow: Cooperation over International Water Resources

by Steven Heywood

English Français Español

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The Quaker United Nations Office

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Contents

1 *Executive Summary*

4 *Section One: The Discourse of Water and Security*

10 Why is Water a Potential Conflict Mulitiplier?

13 *Section Two: The Role of Water in Conflict*

19 *Section Three: International Cooperation over Water Resources*

20 The Benefits of Water Treaties
22 Elements of a Successful Water Treaty

30 *Case Studies*

30 The Indus Waters Treaty
33 The Trifinio Plan
36 Central Asia

39 *Recommendations*

Executive Summary

This paper is a first attempt by the Quaker United Nations Office at exploring the complex interlinkages between climate change, resource scarcity, violent conflict and cooperation. It arises from our work on the human impacts of climate change around the world and a concern for encouraging peace and cooperation among all people. It is an attempt to shift the discourse of natural resource scarcity from one focused on preparing for war to one that concentrates on creating peace.

An increasing number of mainstream commentators are drawing attention to the security implications of climate change, arguing that conflict over scarce natural resources such as water is increasingly likely. QUNO believes that this narrative is flawed and puts too much emphasis on securitised, often military, solutions to the problems arising from climate change and natural resource scarcity. These problems are real, and need to be addressed urgently, but we feel that an emphasis on the likelihood of conflict is misguided and can lead to a misallocation of resources away from mitigation and adaptation efforts.

By exploring the actual role that water plays in international conflict, we can see that while there is a danger that water can be a pretext for violence, there is no inevitable path from water scarcity to war. Even situations that are often interpreted as being 'water wars', such as the Darfur conflict in western Sudan, can actually be attributed to a much more complex collection of causes – economic, political, social, historical, local and global, as well as environmental. We therefore argue that water is just one factor among many that can lead to conflict, that it has a potential role as a 'multiplier' for conflict in already fragile situations, but that due to its necessity for all parties it can also be used as a 'pivot' around which to begin building cooperation.

One way for States to work together to address the problems of water scarcity and reduce tensions between themselves is through bilateral or multilateral water agreements that cover transboundary watersheds. Such agreements

can create multiple benefits – benefits to the environment; financial benefits to the States involved by reducing security expenditure relating to water supplies; benefits from an improved use and management of the water itself, allowing it to be used more efficiently while improving its conservation; and improvements to the relations between States, as water cooperation can prove to be a catalyst for greater cooperation elsewhere.

The 'water rationality' of existing agreements (that is, the understanding that cooperation on transboundary waters is the best way of securing safe, continuing supplies of a vital resource) has meant that they have proved remarkably robust, continuing to operate even through full-blown war situations. Researchers have also found that watersheds with agreements are, on average, significantly more cooperative than those without.

Some of the elements that successful water agreements will need to deal with include allocation, which can range from a simple agreement on numbers to a more positive, collaborative agreement on the principles of water use; variability, as water availability may change rapidly in the coming decades and water treaties cannot afford to remain static; trust and equity, to ensure that no party feels it is losing out, and to enable further cooperation to be built on the agreement; dispute resolution mechanisms, to solve disputes at an early stage, before they become obstacles to the agreement or to peace itself; and the possible creation of a river basin organisation to administer the agreement and pool resources, as well as to provide a forum for dialogue between parties.

Lessons can also be learnt from existing examples of water agreements from around the world. These include the Indus Waters Treaty, which has survived two wars between its parties, India and Pakistan, showing that water agreements can be highly robust. The Trifinio Plan, between El Salvador, Honduras and Guatemala provides an example of water cooperation being used as part of a broader, transboundary development programme in an area previously affected by violence. The experience of Central Asia shows that even in difficult circumstances, large-scale violent conflict over water is rare. It also suggests how an initial shift in vision and discourse, from competition over water to a benefit-sharing approach, is a necessary part of fostering long-term cooperation.

Finally, we identify a number of areas in which policymakers can start to make a positive difference. Addressing climate change needs to be a key goal, and one that is undertaken with a renewed sense of urgency – the popular climate change and conflict narrative suggests we should be preparing for a worst case scenario, but it is better to work to avoid such a scenario in the first place. While doing this, we can also begin to initiate a shift away from a deterministic narrative of inevitable conflict towards one that emphasises the possibilities for cooperation in the management of water – a discourse already being advanced by many academics and water professionals, but one that needs to become more prevalent in general policy discussions.

With this shift in discourse, we hope that States and policymakers will see the rationality of reaching agreements over shared waters, either by formalising existing practices, or beginning new processes of trust-building and collaboration. Two elements that we feel are particularly important in ensuring such treaties are successful are the needs for capacity building and participation. The former refers to the need to mobilise financial, human, technical and scientific capacity to support agreements and build up knowledge and skills; the latter to the requirement that regional governments, local and national civil society, indigenous peoples' organisations and industry and business groups be meaningfully involved in the development and implementation of decisions that affect them.

This paper aims to open up avenues of discussion about new ways to conceptualise the issue of natural resource scarcity, with a focus on international issues. QUNO intends to continue its work on the linkages between climate change, natural resources, conflict and cooperation, and a later paper will look at more local- and community-level approaches to these issues. However, much research remains to be done: on other avenues of cooperation between states; on scarcity of other resources, particularly of productive land; and on a general strategy for using environmental cooperation as a tool for peacebuilding. For now, we hope this paper will encourage readers to look at resource scarcity in a new way and think about new solutions for the human problems it creates.

Section One: The Discourse of Water and Security

'Countries have not tended to go to war over water', Ed Davey, the UK Secretary of State for Energy and Climate Change recently noted, 'but I have a fear for the world that climate instability drives political instability'. The effects of climate change, he added, 'can lead to internal unrest ... and exacerbate existing tensions. We have to plan for a world where climate change makes difficult problems even worse'.[1] Other officials and politicians have also linked climate change with conflict over natural resources. Many of these pronouncements assume that climate change is at the root of the conflict, with social, ethnic or economic divisions pictured as a kind of superstructure built on the brute fact of natural resource decline. Particularly noticeable in this regard is an article by UN Secretary-General Ban Ki-moon in The Washington Post, in which he argues 'almost invariably, we discuss Darfur in a convenient military and political shorthand – an ethnic conflict pitting Arab militias against black rebels and farmers. Look to its roots, though, and you discover a more complex dynamic. Amid the diverse social and political causes, the Darfur conflict began as an ecological crisis, arising at least in part from climate change'.[2] Timothy Snyder, a history professor at Yale University, has even gone so far as to tell a symposium on genocide that 'uncertainty about resources' will lead to 'ecological panic that I'm afraid will lead to mass killings in the decades to come'.[3]

Such articles and statements are not entirely incorrect. Climate change and the subsequent decline in availability of some natural resources,

1 Harvey, F, 22 March 2012, 'Water wars between countries could be just around the corner, Davey warns', *The Guardian*, http://www.guardian.co.uk/environment/2012/mar/22/water-wars-countries-davey-warns, accessed 23 July 2012

2 Ban Ki Moon, 16 June 2007, 'A Climate Culprit in Darfur', *The Washington Post*, http://www.washingtonpost.com/wp-dyn/content/article/2007/06/15/AR2007061501857.html, accessed 23 July 2012

3 Berg, R, 24 July 2012, 'Foreign Policy Experts Discuss Ways to Avert Future Genocide', *The New York Times*, http://www.nytimes.com/2012/07/25/world/clinton-and-other-experts-discuss-ways-to-avert-genocide.html?_r=1, accessed 26 July 2012

particularly water, is a threat to peace; and careful adaptation to climate change will be a key factor in averting violent conflict, as Davey himself calls for later in his statement. However, by taking environmental scarcity to be the defining factor in conflict, they potentially encourage a more dangerous framing of the issue, which 'securitises' environmental concerns and potentially invites military responses.[4]

This way of looking at environmental problems was perhaps most famously expressed by journalist and foreign policy analyst Robert Kaplan in a 1994 essay entitled 'The Coming Anarchy',[5] in which he calls the environment 'the national-security issue of the early twenty-first century' and 'the core foreign-policy challenge from which most others will ultimately emanate'. For Kaplan, the foreign policy challenge posed by environmental degradation is based on the erosion of security for developed countries that are not directly affected by the degradation itself. He argues that a number of increasingly democratic developing countries will regress into undemocratic 'hard regimes' due to environmental scarcity, with the result that 'the Saddam Husseins of the future will have more, not fewer, opportunities'. He paints an apocalyptic picture of 'a rundown, crowded planet of skinhead Cossacks and juju warriors … battling over scraps of overused earth in guerrilla conflicts that ripple across continents and intersect in no discernible pattern'[6] – a world of almost constant insecurity, except for those protected behind the blacked-out windows of the limousine that Kaplan uses as a metaphor for the developed nations.

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4 From an academic perspective, 'securitization can be defined as the positioning through speech acts (usually by a political leader) of a particular issue as a threat to survival, which in turn (with the consent of the relevant constituency) enables emergency measures and the suspension of "normal politics" in dealing with that issue', McDonald, M, 2008, 'Securitization and the Construction of Security', *European Journal of International Relations*, 14(4), p. 567. While this particular perspective tends to lead to a focus on securitisation as a 'performative speech act', the term has entered the general lexicon of international affairs, and we will use it here in a less rigorous sense, to mean the framing of an issue as a national security problem, with the possibility of proposing stronger security and/or military measures as a solution.

5 Kaplan, RD, February 1994, 'The Coming Anarchy', *The Atlantic*, http://www.theatlantic.com/magazine/archive/1994/02/the-coming-anarchy/4670/?single_page=true, accessed 23 July 2012

6 *Ibid.*

Kaplan makes no specific recommendations for how this situation should be dealt with. But his warnings of the monopoly of violence being wrested from States, the fracturing of North America, the 'destabilizing influence on the United States'[7] of events in Africa, and the inevitability with which he expects environmental degradation to descend into death, destruction, ethnic conflict and migration, suggests a vision of increased military security and a world of barriers, rather than peaceful solutions.

Ultimately, the eighteen years since 'The Coming Anarchy' was published have shown that in its specifics, the essay was much stronger as a piece of creative writing than as a foreign policy piece with any serious predictive value. However, while no-one in foreign policy circles is seriously considering the dissolution of Canada or the return of Brazil to dictatorship as Kaplan was, his identification of environmental crises as a key security concern holds some weight – as we have seen, many analysts believe that climate change is going to be a primary cause of war in the coming years and militaries are now taking the threat equally seriously. A number of leading US military figures have discussed the importance of tackling climate change, and while many of them argue for increased climate change mitigation, their opinions are clear on how the US should deal with environmental instability if that mitigation does not take place, or is not effective.

Brigadier General Steven Anderson, has said 'climate change and the instability that that all drives, I think that that increases the likelihood there will be conflicts in which American soldiers are going to have to fight and die somewhere'. Vice Admiral Dennis McGinn, now an advisor for the policy think tank CNA, argues that under climate change 'we can expect more frequent, widespread, and intense failed state scenarios creating large scale humanitarian disasters and higher potential for conflict and terrorism'. General Chuck Wald, former Deputy Commander of US European Command, sees climate change as 'a problem ... and the military is going to be part of the solution'.[8] In a report for CNA on the national

7 *Ibid.*

8 All from Fitzsimmons, J, 30 May 2012, '15 Military Leaders Who Say Climate Change Is A National Security Threat', *Media Matters for America*, http://mediamatters.org/blog/2012/05/30/15-military-leaders-who-say-climate-change-is-a/184705, accessed 23 July 2012

security implications of climate change, Admiral T. Joseph Lopez claims that 'climate change will provide the conditions that will extend the war on terror' and General Anthony C. Zinni adds that 'it's not hard to make the connection between climate change and instability, or climate change and terrorism'.[9]

A paper by the Overseas Development Institute looks at two UN Security Council debates on the linkages between climate change and security, held in 2007 and 2011. At the second of these debates, Ban Ki-moon argued that climate change 'not only exacerbates threats to international peace and security; it is a threat to international peace and security', which 'could create dangerous security vacuums'.[10] The report goes on to argue that 'the UK has been a key player in negotiating and advocating for the consideration of the security dimensions of climate change impacts' and suggests that this may be an attempt to give climate change more weight in policy discussions due to the perceived importance of the concept of security.[11]

Meanwhile, at a 2011 London conference Rear Admiral Neil Morisetti from the British Ministry of Defence argued that 'conflict in such areas [principally the tropics] could make it more difficult and expensive to obtain goods on which countries such as Britain rely. "If there are risks to the trade routes and other areas, then it's food, it's energy," he told BBC News'.[12] The links are not made explicit, but there is a clear suggestion of the possibility of military intervention to secure resources in a worst-case scenario.

This securitised discourse is encouraged by assumptions about three major consequences of climate change. Firstly, climate change is expected to decrease availability of natural resources such as water and

9 Both from CNA, 2007, *National Security and the Threat of Climate Change*, CNA: Alexandria, VA, pp. 17, 31

10 Harris, K, 2012, *Climate Change in UK Security Policy: implications for development assistance*, Overseas Development Institute, London, p. 4

11 *Ibid.*, pp. 9, 14-1125

12 Black, R, 17 October 2011, 'Climate change "grave threat" to security and health', *BBC News*, http://www.bbc.co.uk/news/science-environment-15342682, accessed 3 August 2012

productive land in some regions of the world and to increase cross-border conflict over access to these resources. In this vision, vital resources will become increasingly rare and 'defence forces might be expected to engage in defensive or pre-emptive action in cross-border resource conflict, to gain control over scarce resources or to maintain control over resources against the threat of incursion from another state'.[13]

The second assumption is that climate change will increase unrest within countries, as scarcity will make it increasingly difficult for governments to ensure that all their citizens have the resources they need to live. This could lead to rebellions against governments, the effective withdrawal of governments from regions nominally under their control, or even government collapse and civil war. This could in turn lead to military intervention by regional or international forces.

Thirdly, climate change is assumed to increase migration across borders. Research on this topic actually finds that the majority of climate-related migration is likely to be internal, or at most regional and seasonal.[14] However, there is expected to be some rise in migration from less developed countries to more developed ones, and there is certainly a perception among States and commentators on this sensitive topic that climate change will lead to mass migration.[15] The response to this movement is often to see potential migrants

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13 Elliott, L, 2004, *The Global Politics of the Environment*, 2nd ed., Palgrave Macmillan: Basingstoke, p. 211

14 For example, Tacoli, C, 2011, *Not Only Climate Change: mobility, vulnerability and socio-economic transformations in environmentally fragile areas in Bolivia, Senegal and Tanzania*, IIED: London; Jäger, J, J Frühmann, S Grünberger & A Vag, eds., 2009, EACH-FOR Environmental Change and Forced Migration Scenarios – Synthesis Report, EACH-FOR

15 The exact patterns of any large-scale future climate change-related migration are, of course, difficult to know at the moment. Susan Martin, writing for the *World Migration Report 2010*, states that 'most migration due to climate change is likely to be internal ... A portion of such migration will undoubtedly be international, however ... [in some cases] environmental migrants will follow already established labour migration patterns that are international in scope ... [while] in other cases, new patterns of international migration may develop, particularly if climate change affects habitat and livelihoods over large areas, causing migrants to seek out new destinations', Martin, S, 2010, *Background Paper WMR 2010 – Climate Change and International Migration*, International Organization for Migration: Geneva, p. 7. For examples of some of the

as a threat to national security, and to construct ways of keeping them out, such as the 3,300km fence being built by India around low-lying Bangladesh (built to halt migration in general, but likely to have a huge impact on climate-related movements as well).[16] A team of geographers at the University of Haifa have also advocated completely enclosing Israel, including with 'sea fences', to avoid receiving additional migrants displaced by climate change.[17]

> *"We should see climate change as a 'trigger' or 'multiplier' effect in situations that are already prone to scarcity."*

The starting point for this framing of the issue – that climate change is likely, in many parts of the world, to reduce the amount and quality of available natural resources – is correct. However, through its emphasis on the possibility of violent conflict and the consequent need for militarised solutions, this approach is flawed in a number of other ways. This position assumes that both environmental scarcity and violent conflict are unavoidable, rather than encouraging creative solutions to prevent and respond to them. There is also an emphasis on a competitive

public discourse on climate migration in developed countries: Unknown Author, 10 March 2008, 'Millions of 'climate change migrants' will overwhelm Europe, says report', *The Daily Mail*, http://www.dailymail.co.uk/news/article-529113/Millions-climate-change-migrants-overwhelm-Europe-says-report.html; Smithson, S, 1 September 2010, '"Climate Migrants" predicted to flood U.S.', *The Washington Times*, http://www.washingtontimes.com/news/2010/sep/1/global-warming-will-increase-migration-report-says/?page=all; AAP, 10 November 2011, 'Climate change may create new wave of asylum seekers', *The Australian*, http://www.theaustralian.com.au/news/breaking-news/climate-change-may-create-new-wave-of-asylum-seekers/story-fn3dxix6-1226191134167, all accessed 3 August 2012

16 Friedman, L, 23 March 2009, 'How Will Climate Refugees Impact National Security?', *Scientific American*, http://www.scientificamerican.com/article.cfm?id=climage-refugees-national-security, accessed 23 July 2012; Banarjee, B, 20 December 2010, 'The Great Wall of India', *Slate*, http://www.slate.com/articles/health_and_science/green_room/2010/12/the_great_wall_of_india.html, accessed 3 August 2012

17 Udasin, S, 14 May 2012, 'Defending Israel's borders from "climate refugees"', *The Jerusalem Post*, http://www.jpost.com/NationalNews/Article.aspx?id=269948, accessed 23 July 2012

rather than cooperative approach, with an assumption that other countries and the individual victims of climate change are threats to 'our' resources. This approach leads countries to focus on military strength as the best way to secure resources for themselves, rather than looking at possibilities for wider benefit-sharing of the resources that remain. This creates a misallocation of effort, with money channelled into military activities rather than being put towards resolving problems peacefully. Finally, it assumes a monodimensional approach to violent conflict and resource scarcity, assuming that we can assign climate change as the primary cause or driver of either of these phenomena in any given situation. Instead, we should see climate change as a 'trigger' or 'multiplier' effect in situations that are already prone to scarcity, uneven distribution and conflict due to surrounding economic, social or political contexts (for more detail see box below)[18]

In the second section of this report, we will look more closely at the links between water scarcity and conflict, in order to illustrate two things: firstly, that violent conflict over water is not as common as the securitised discourse would lead us to believe; and secondly, that when violent conflict does occur in areas of water stress, it is almost always in situations that have numerous other factors contributing to tensions.

Box : Why is Water a Potential Conflict Multiplier?

Water is a perfect example of a natural resource that will be severely affected by climate change and that has the potential to act as a trigger to violent conflict as a result. The 2007 Intergovernmental Panel on Climate Change report on 'Impacts, Adaptation and Vulnerability' shows that climate change is already having some effect on freshwater resources. It states that 'spring peak discharge is occurring earlier in rivers affected by snow melt,

18 For more detailed discussions of the flaws in the security discourse around climate change, which expand on some of the points made here, see Elliott 2004, ch. 9, and Gilbert, E, 2012, 'The Militarization of Climate Change', *ACME: An International E-Journal for Critical Geographies*, 11(1), pp. 1-14

and there is evidence for enhanced glacial melt in the tropical Andes and in the Alps. Lakes and rivers around the world are warming, with effects on thermal structure and water quality'.[19]

Future impacts are likely to be considerably worse than this, with a decrease of water stored in glaciers, increased salinisation of groundwater in coastal areas through sea-level rise, increased variability of rainfall causing droughts, and increased water pollution including through sediments, salts, pathogens and pesticides. The number of people living in severely stressed[20] river basins was 1.4-1.6 billion in 1995, and the IPCC predicts with medium confidence[21] that this number will rise to between 4.3-6.9 billion by 2050, with the most affected regions including Southern Europe, Northern and Southern Africa, the Middle East, Central Asia, southeast Australia, the western US, Central America and northeastern Brazil.[22]

Climate change-induced scarcity of water resources is exacerbated by the large and increasing amount of water needed for a multitude of different sectors, including domestic water, drinking water, water used for industry, and water used for irrigation. The European Environment Agency estimates current annual global water requirements at 4,500 billion cubic metres, rising to 6,900 billion cubic metres by 2030, and notes that 'the drivers of this resource challenge are fundamentally tied to economic growth and development'[23] – as countries develop industrially and agriculturally

19 Parry, ML, OF Canziani, JP Palutikof, *et. al.*, 2007, 'Technical Summary', in *Climate Change 2007: Impacts, Adaptation and Vulnerability – Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press: Cambridge, p. 28

20 From *ibid.*, p. 93, 'A country is water-stressed if the available freshwater supply relative to water withdrawals acts an an important constraint on development. Withdrawals exceeding 20% of renewable water supply have been used as an indicator of water stress'.

21 'Medium confidence' means, in the IPCC's terms, a 50% likelihood of being correct.

22 Parry, *et al*. 2007, pp. 35-36

23 Kristensen, P, 2010, *The European Environment State and Outlook 2010 – Water Resources: Quantity and Flows*, Publications Office of the European Union: Luxembourg, p. 19

they will need to use more water, at the same time as water supplies in many places are going to become less abundant. In addition to this, 'higher temperatures and increased variability of precipitation … lead to increased irrigation water demand', with agriculture under conditions of climate change requiring 1-3% more water by the 2020s and 2-7% more by the 2070s.[24] This is just to maintain current levels of production - taking into account population projections, the International Water Management Institute suggests that the amount of water used by agriculture could increase by 70-90% by 2050.[25]

Into this fragile scenario we can introduce the fact that the boundaries of freshwater systems do not respect the political boundaries of nation States. 'One hundred and fifty-five major river systems are shared by two countries and a further 59 are shared by between three and twelve countries [and the Danube, in fact, is shared between nineteen countries[26]]… Nineteen countries receive over half their water from outside their borders'.[27] Because of this, many States face a double challenge relating to water: as well as finding enough water to sustain their own citizenry and to balance the competing requirements and demands of different sectors of their domestic economy, they must also work with neighbouring States to balance each other's requirements and extract the maximum benefit from the available water resources. If either of these challenges cannot be met, there is a possibility for water scarcity to become a trigger to violent conflict.

24 Bates, BC, ZW Kundzewicz, S Wu & JP Palutikof, eds., 2008, *Climate Change and Water: Technical Paper of the Intergovernmental Panel on Climate Change*, IPCC Secretariat: Geneva, p. 44

25 Molden, ed., 2007, *Water for Food, Water for Life Summary: A Comprehensive Assessment of Water Management in Agriculture*, Earthscan: London, p. 14

26 International Commission for the Protection of the Danube River, 'Countries of the Danube River Basin', http://www.icpdr.org/main/danube-basin/countries-danube-river-basin, accessed 2 August 2012

27 Elliott 2004, p. 204

Section Two: The Role of Water in Conflict

There is the potential for water resources to create tension and conflict between communities and nations due to a number of factors – among others, the importance of water, both physically and economically; the increasing scarcity of water in the face of climate change, and unequal access to water; the increasing demand for water due to economic development and growing populations; and the transboundary nature of many water resources.

And yet, to return to the quote that opens this report, 'countries have not tended to go to war over water'. Researcher Aaron Wolf and colleagues found that of 1,831 international water events[28] in their database, only 507 (28%) involved conflict in any way, and most of this conflict was verbal rather than physically violent. By ranking all incidents on a scale of -7 (most conflictive) to +7 (most cooperative), they claim that 'one has to go back 4500 years to find the single historical example of a true "water war," to a dispute between the city-states of Lagash and Umma on the Tigris-Euphrates'.[29] They claim there are 37 cases of 'acute conflict', below the level of an all-out war, but scoring a -5 or -6 on the scale (and thus constituting 'extensive' or 'small scale' military acts), but that 30 of these occurred before 1970 in the already highly conflict-prone situation between Israel and its neighbours. The majority of interactions over water (62%) fall in the middle of the scale, between 'official verbal support of goals, values or regime' (+2) and 'strong verbal expressions displaying hostility in interaction' (-2).[30]

When we begin to search for water conflicts it is clear that countries

28 A water event is a 'reported interaction between two or more nations, whether conflictive or cooperative, which involved water as a scarce and/or consumable resource or as a quantity to be managed, i.e.where water is the *driver* of the event', Wolf, AT, SB Yoffe & M Giordano, 2003, 'International waters: identifying basins at risk', *Water Policy*, 5, p. 32

29 Wolf, *et al*. 2003, pp. 38-39

30 *Ibid.*, pp. 34, 39

have indeed not tended to go to war over water, and that, even in situations of scarcity, water is only one factor that can contribute to the creation of violent conflict. Sadoff and Grey argue that 'the debate ... over whether there have been or will be "water wars" is misguided: shared water has always been and will always be one contributory factor in determining relations between states'[31] – that is to say, there is no single cause for any conflict, only a multitude of 'contributory factors'.

For an example of the role of water scarcity in conflict, we can look to the situation in Darfur, which some commentators have called the world's first 'climate change war'[32] due to the prominent role of environmental degradation, particularly drought, in the violence. The Darfur conflict seems to come close to Kaplan's apocalyptic vision, with a desert that encroached 100km southward in just 40 years[33] and a cycle of violence between different tribes, ethnicities and occupations – particularly between settled farmers and nomadic herders.

A UN Environment Programme (UNEP) report on the violence in Darfur is unequivocal – increasingly severe drought and desertification have played a role in this conflict, pushing an increasing number of people into a diminishing amount of productive land.[34] However, it also notes 'that while environmental problems affect rangeland and rain-fed agricultural land across virtually all of Sudan, they are clearly and strongly linked to conflict in a minority of cases and regions only. These linkages do exist, but their significance and geographic scale should not be exaggerated' and 'where environment and natural resource management issues are important, they are generally contributing factors only, not the sole cause for tension'.[35]

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31 Sadoff, CW & D Grey, 2002, 'Beyond the river: the benefits of cooperation on international rivers', *Water Policy*, 4, p. 399

32 Borger, J, 28 April 2007, 'Scorched', *The Guardian*, http://www.guardian.co.uk/environment/2007/apr/28/sudan.climatechange, accessed 23 July 2012; Biello, D, 23 November 2009, 'Can Climate Change Cause Conflict? Recent History Suggests So', *Scientific American*, http://www.scientificamerican.com/article.cfm?id=can-climate-change-cause-conflict, accessed 23 July 2012

33 Mamdani, M, 2009, *Saviours and Survivors: Darfur, Politics, and the War on Terror*, HSRC Press: Cape Town, p. 9

34 United Nations Environment Programme, 2007, *Sudan – Post-Conflict Environmental Assessment*, UNEP: Nairobi, ch. 4

35 *Ibid.*, pp. 80, 77

Mahmood Mamdani has argued that although the environmental crisis in Sudan has been one of the immediate causes of the conflict, the underlying tensions that it helped to ignite were put in place by 'a colonial legacy of parcelling Darfur between tribes, with some given homelands and others not' and 'a rebellion that brought the state into an ongoing civil (tribal) war',[36] combined with Cold War geopolitics which destabilised the whole of the Sahara region. The environmental crisis alone cannot explain the conflict.

Munzoul Assal also accepts that the environmental degradation, famine, population growth and over-exploitation of natural resources played a role in Darfur, but also points to the government policies of the 1970s onwards, which he sees as exaggerating the effects of these problems. In particular he points to the nationalisation of land that was previously considered to customarily belong to particular communities. He also highlights problems of corruption, with army officers and bureaucrats finding that they could personally benefit from the land, and the encouragement of large-scale, export-led agricultural development, which encroached on the land of both the pastoralists and the nomads.[37] The UNEP report also notes the effects of industrial agriculture in furthering natural resource scarcity in Darfur, noting that although the industrial agricultural sector is not directly involved in the conflict, it 'has played a very strong role in precipitating it in some states, through uncontrolled land take from the other two groups [nomads and pastoralists] ... combatants reported that the expansion of mechanized agricultural schemes onto their land had precipitated the fighting, which had then escalated and coalesced with the major north-south political conflict'.[38]

These examples from Sudan clearly show us that a narrative of over-exploitation and depletion of natural resources leading to fighting among (usually) desperately poor and deprived people is overly simplistic. In many cases, scarcity can be created artificially by 'structural violence' that privileges certain actors (usually wealthier ones, or ones that better fit the demographic or ideological interests of the national government) over others.[39]

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36 Mamdani 2009, p. 4

37 Assal, MAM, 2006, 'Sudan: identity and conflict over natural resources', *Development*, 49(3)

38 United Nations Environment Programme 2007, p. 81

39 For a more detailed discussion of this concept, see Borras, Jr, SM & EB Ross,

An historical example of this is the 1989 conflict between Mauritania and Senegal, which has been blamed partially on the southward migration of Arabs from the drought-stricken north of Mauritania. A 1999 UNEP report describes how they moved to the more water-rich regions around the Senegal river, and 'Mauritanian black Africans allege that the Moor-dominated Mauritanian government facilitated the expropriation of their property by abolishing the traditional landholding system'. This in turn increased existing racial tensions both within Mauritania and between Mauritania and Senegal, as black Africans in both countries rallied in opposition to the Arabs.[40] It seems, then, that the environment was a factor in increasing the tension between the Arab and black communities, but it was the actions of the Mauritanian government in response to the drought that allowed the conflict to become so serious.

Structural forces and political decisions continue to affect access to water today, threatening a similar spiral into conflict as that witnessed in Sudan and Mauritania-Senegal. The NGO Genetic Resources Action International (GRAIN) points to land purchases across Africa by multinational agribusinesses and investment funds, which often include near-unlimited access to the water that passes through the land, potentially 'putting foreign agribusiness in direct competition for the water with local farmers'.[41] The journal *Water Alternatives* further notes that 'the "neo-liberal turn" in environmental governance that has resulted in the privatisation and commodification of water ... can escalate local water conflicts ... or legitimise the dispossession of vulnerable groups'.[42]

2007, 'Land Rights, Conflict and Violence Amid Neo-Liberal Globalization', *Peace Review: A Journal of Social Justice*, 19(1)

40 Schwartz, D & A Singh, 1999, *Environmental Conditions, Resources, and Conflicts – an introductory overview and data collection,* UNEP: Nairobi, p. 30

41 GRAIN, 2012, *Squeezing Africa Dry: Behind every land grab is a water grab*, GRAIN: Barcelona, p. 12; see also Ananthaswamy, A, 26 May 2011, 'African land grab could lead to future water conflicts', *New Scientist*, http://www.newscientist.com/article/mg21028144.100-african-land-grab-could-lead-to-future-water-conflicts.html, accessed 23 July 2012

42 Mehta, L, GJ Veldwisch & J Franco, 2012, 'Introduction to the Special Issue: Water Grabbing? Focus on the (Re)appropriation of Finite Water Resources', *Water Alternatives*, 5(2), p. 198

Governments, then, far from needing to look to their militaries for protection from the effects of natural resource scarcity, often have a role in provoking it – and this can just as much apply to the governments of the developed world, who have often led the charge for privatisation, industrialisation of agriculture and maximisation of profit in the developing world.

In all of these cases, the scarcity of water is just one contributing factor to conflict. The other factors can be historical, such as existing grievances, or the legacy of colonial administration, which may have awarded 'homelands' to some tribes but not others, or split tribes and kinsfolk arbitrarily across international borders. They can also be racial or ethnic tensions that have simmered for a long time for various reasons and may then be inflamed by a sudden increase in competition for resources. Or they can be political and structural issues such as those discussed above, in which the actions of an individual government or a global system of neoliberalism can create the conditions for increased conflict in the face of scarcity.

> *"Cooperative action on water can help to create a context of wider cooperation, and build peace instead of conflict."*

Ultimately, then, water is not an inherently conflict-provoking resource, even in areas of scarcity like the Sahel, where it provides only some of the context for recent conflicts. Wolf's work suggests that it may, in fact, be quite a robust source of cooperation, as 'once cooperative water regimes are established through treaties, they turn out to be impressively resilient over time, even when between otherwise hostile riparians [water-sharing States], and even as conflict is waged over other issues'.[43] Rather than envisaging climate change and water as a weight, dragging us down towards conflict, we could instead see it as a pivot around which a series of decisions leading to either greater conflict or greater cooperation can be taken. In this situation, militarised, securitised, conflict-centred actions around water can lead towards violence, while cooperative action on water can help to create a context of wider cooperation, and build peace instead of conflict.

43 Wolf, *et al.* 2003, p. 30

The remainder of this paper will look at some of the possibilities for cooperation between States over water resources in the face of climate change and scarcity, and the additional benefits such cooperation can bring in terms of building peace.

Section Three: International Cooperation over Water Resources

If climate change were the key or only variable in creating violent conflict, the only way to avoid such conflict would be to avoid climate change. It is now broadly accepted that some degree of climate change is already taking place and further climate change is inevitable due to greenhouse gases that have already accumulated in the atmosphere. Pressures on water resources will consequently increase, and much of this will occur in areas that are already water-stressed, often with rapidly increasing populations and economic development. If the narrative that climate change leads to conflict were correct, war over water resources would be almost unavoidable in many parts of the world.

However, as discussed above, conflict is also dependent on social, economic, cultural and governmental variables, not just on blunt statistics of natural resource availability. Due to its position as an absolute necessity for all countries, water can act as an 'irritant', but can also be a 'unifier' for States.[44] Cooperation on water is possible if actors understand the necessity of it, and the benefits it can bring to them; if done well, such cooperation is usually long-lasting; and it can encourage wider cooperation by bringing together States, communities and ethnic groups that may, over other issues, be in conflict with one another.

At the national level, one of the possibilities for cooperation is the creation of bilateral or multilateral treaties and institutions to manage water-sharing. These institutions, if created and maintained in an appropriate manner, 'can function as an intervening variable in the relationship between climate change and security'[45] - turning a potential situation of violent conflict and militarised responses into one of peaceful engagement and cooperative action.

44 *Ibid.*, p. 40

45 Tir, J & DM Stinnett, 2012, 'Weathering climate change: can institutions mitigate international water conflict?', *Journal of Peace Research*, 49(1), p. 212

Wolf and colleagues go as far as to argue that poor institutional capacity is one of the primary predictors of conflict in a transboundary river basin. Their research indicates that there is only a slight correlation between levels of water stress and increased conflict, but that there is a stronger correlation between the presence of a water treaty and an increased level of cooperation: 'overall, basins without treaties were significantly more conflictive (2.6 on the BAR [Basins At Risk] scale) than basins with treaties (4.0) ... since only 117 of the world's 263 international basins have treaties, these findings are significant'.[46]

In this section we will look at the benefits of water agreements, the elements that they could contain, and some case studies of water agreements from around the world to demonstrate the possibilities for international cooperation on this issue. The case studies are not comprehensive, but are intended to present some of the positive aspects of a small sample of existing water treaties, and the lessons that can be learned from them.

The Benefits of Water Treaties

Claudia Sadoff and David Grey argue that there are four principal and interrelated benefits to cooperating over water.[47] First, it creates a benefit to the river itself, as by encouraging more sustainable use of water, cooperation tends to lead to cleaner water resources that can support more animal and plant life. Second, it reduces the costs that are incurred from the river, both by reducing tensions that lead States to put human and financial resources into militarisation and other security measures, and by allowing the possibility of interconnected regional infrastructure and a pooling of financial and technical capacity.

Third is the additional benefit that can be gained from the river. By encouraging cooperation and benefit-sharing between States, water treaties and institutions can encourage a departure from a zero-sum view of water, in

46 Wolf, *et al.* 2003, p. 45. The BAR scale has already been discussed in a mention of Wolf's work in the previous section - a +2 is 'official verbal support of goals, values or regime', while a +4 is 'non-military economic, technological or industrial agreement', *ibid.*, p. 34

47 Sadoff & Grey 2002

which it is seen principally as a finite, bounded resource. In this view, which focuses purely on the numerical allocation of the water, any water given to another party is lost from oneself. A positive-sum vision of water would centre on the multiple benefits that can be accrued from the same water rather than jealously focusing on the precise quantity of water each country receives.

By taking this approach of envisaging water as a moving, variable 'flux' rather than a static, finite 'stock', and cooperating over the management of water to ensure its most efficient utilisation, 'the pie is effectively larger than when it is viewed through the lens of the traditional paradigm, laying the foundation for a number of new options associated with non-volumetric allocation'.[48] This means, for example, that the same water can be used by different stakeholders for different purposes, such as upstream countries using water for electricity generation or fishing, while allowing downstream countries to use greater amounts of it for agriculture, with the two countries then potentially trading their surplus. For this to happen, the mindset needs to be moved away from one of competition over scarce resources towards one of cooperation for mutual benefit.

Closer cooperation can also lead to better water management practices, thus creating more common benefits by 'effectively increas[ing] the available water resources in a system by ... protecting watersheds to minimize erosion, maximiz[ing] infiltration and extend[ing] the period of run-off; providing over-year storage to buffer rainfall variability and reserve water in abundant years that would otherwise be lost; and by locating storage in areas of the basin that minimize evaporation and environmental disruption'.[49]

The fourth benefit of water cooperation lies beyond the river. Bilateral or multilateral water agreements can be catalysts for greater cooperation in other areas. In many cases, the environment is seen as an issue on which countries are willing to work together even while conflict over other issues remains. This is often framed in terms of a split between so-called 'soft' and 'hard' issues, but this may be belittling the importance of environmental

48 Turton, A, 2008, 'A South African Perspective on a Possible Benefit-Sharing Approach for Transboundary Waters in the SADC Region', *Water Alternatives*, 1(2), p. 185

49 Sadoff & Grey 2002, p. 395

issues. It may precisely be that issues such as water management are so fundamental to survival that they become easier to work on than disputes over political or ideological issues.

Alexander Carius argues that in some cases 'water problems offer one of the few chances for cooperative dialogue in otherwise heated bilateral conflicts', and points to the Trifinio Plan in Central America as an example of water being made a 'key component of regional development negotiations ... which themselves are indirect strategies of conflict prevention'.[50] Sadoff and Grey add that good water management encouraged by agreements can increase energy and agricultural production, and thus also stimulate cross-border trade and economic flows.[51]

These four suggested benefits all tend to be from the perspective of the State, but national cooperation over water can also have more localised, individual benefits. In particular, more coordinated water management aimed at bringing benefits to both sides of a transboundary watershed and ensuring sustainable use can help to secure the human right to safe and clean water.[52] Improvements in water quality and management can also reduce human vulnerabilities to disease, poverty and hunger. Indeed, the UN Development Programme (UNDP) Human Development Report 2010 made lack of access to clean water for consumption and sanitation two of the ten indicators for 'multidimensional poverty'.[53] Significantly, cooperative water management can also reduce the likelihood of localised, sub-national outbreaks of violence.

Elements of a Successful Water Treaty

A successful water agreement that encourages benefit-sharing over natural resources and also helps to promote wider cooperation is not a simple

50 Carius, A 2006, *Environmental Peacebuilding - environmental cooperation as an instrument of crisis prevention and peacebuilding: conditions for success and constraints*, German Federal Ministry for Economic Cooperation and Development: Bonn, p. 9

51 Sadoff & Grey 2002, p. 399

52 As set out in United Nations General Assembly, 3 August 2010, *Resolution A/Res/64/292. The human right to water and sanitation*

53 Klugman, J, *et al*, 2010, *Human Development Report 2010 – The Real Wealth of Nations: pathways to human development*, United Nations Development Programme: New York, p. 96

thing to create. The exact characteristics of each river basin – geographical, hydrological, political and economic – must be taken into account when designing the treaty. However, while there cannot be any simple template that can be re-used without change from basin to basin, it is possible to discuss some of the general characteristics and requirements that contribute to a successful water agreement. Below are some suggestions of the elements that policymakers must take into account when crafting water agreements, synthesised from the work of various researchers on this topic.

1) Allocation

Above, we discussed the possibility of viewing water as a flux rather than a stock – however, while this benefit-sharing paradigm is much more cooperative, and thus much preferable to the competitive paradigm, it does require a degree of trust between the parties that may not be present at the beginning of negotiations. Thus, while the final aim may be to treat the water as a joint resource with the possibility of multiple benefits for all parties, it is likely that many infant water agreements will require some kind of decision on water allocation levels.

Water allocation decisions can require highly detailed technical deliberations over the exact number of cubic metres each country will receive, but they can also be based on simpler principles. The Indus Treaty between India and Pakistan deals with six transboundary tributaries of the Indus river and simply splits the rivers between the two countries – awarding full rights to three of the rivers to India, and the other three to Pakistan.

Treaties could also be based on a less explicit allocation of water, and instead rely on principles to manage the allocation on an ongoing basis, such as equity between the parties, consultative rather than unilateral action, or agreements to prioritise particular uses or industrial or agricultural sectors.[54] However, this looser application of water allocation principles highlights a potential paradox – that less-strictly defined allocation methods are likely

54 De Stefano, L, J Duncan, S Dinar, K Stahl, KM Strzepak & AT Wolf, 2012, 'Climate change and the institutional resilience of international river basins', *Journal of Peace Research,* 49(1), p. 196

to be adopted in less cooperative, less trusting regions where States are wary of giving away too much sovereignty at the beginning of the process; while at the same time such methods probably require more trust to really work. An example of this may be found in Central Asia, where exact allocations of water among Kyrgyzstan, Kazakhstan and Uzbekistan must be renegotiated annually on the basis of general principles, leaving all the countries dependent on the goodwill of the others from year to year.

Generally speaking, however, where existing levels of trust and understanding make it possible, a less-strictly delineated allocation of water volume and a regime that treats the water resource as a unit, rather than splitting it up across hydrologically arbitrary lines, is to be preferred, as it opens up greater possibilities for cooperation and moves States away from a possessive approach to water.

2) Variability

The major effect of climate change on water resources will be to increase their level of variability – through increased or decreased rainfall, drought and desertification, increased glacier and snow melt, or increased seasonal variability. Lucia De Stefano and colleagues argue that 'the likelihood of political tensions is related to the interaction between variability or rates of change within a basin and the institutional capacity to absorb that change'.[55] One way to create that institutional capacity to absorb change is to build mechanisms to deal with water variability into the principles of the treaty – in particular, defining the processes through which agreed water allocation levels will be adjusted in the face of scarcity. These issues could be dealt with through a dispute resolution mechanism or a river basin organisation (of which more is said below). However, it is far preferable for both new and existing agreements to take into account the reality of climate change-induced water variability now, and to prepare cooperatively and with the full agreement of all parties for what to do in such a situation.

55 *Ibid.*, p. 195. See also Wolf, *et al.* 2003, p. 43 - 'The likelihood and intensity of dispute rises as the rate of change within a basin exceeds the institutional capacity to absorb that change'.

3) Trust and Equity Mechanisms

> *"A well-designed water agreement can increase the benefits of water for all parties, but it remains important that the increased benefits are spread fairly evenly."*

A potential problem with both water allocation and water variability mechanisms is the lack of trust that often characterises relations between countries negotiating water agreements. This can display itself in two forms – a feeling of 'relative deprivation', and a concern with 'free-riding'. We have said that a well-designed water agreement can increase the benefits of water for all parties, but it remains important that the increased benefits are spread fairly evenly among the parties, as even in a win-win situation it is possible for one party to feel resentful that they have, so to speak, 'won less'. This feeling of relative deprivation – that while a country may have gained benefits compared to their previous situation, their neighbours have gained even greater benefits – can erode the trust and goodwill that the water agreement is, in part, designed to foster. It is thus important that this principle be considered when designing a water treaty.[56] One potential solution is to write compensation into the agreement, such as the country that gains the most benefit from the new water regime agreeing to provide to the less advantaged party either direct monetary compensation, increased investment, or (and this is perhaps the ideal situation) a share of the beneficial products they gain through their access to the water, such as electricity or agricultural products.[57]

The fear of free-riding perhaps betrays an even greater level of mistrust, as it refers to a situation in which parties to the agreement believe that the other States will not adhere to it, and will reap the benefits of the new regime without putting in their fair share of the work. Perhaps the best way to address this issue is through effective data-sharing and monitoring of the water resource and of adherence to the provisions of the treaty. If done effectively, this can have a double benefit. Firstly, States can clearly

56 Sadoff & Grey 2002, p. 396
57 *Ibid.*, p. 397

inspect the behaviour of the other parties, providing evidence that others are acting honestly, encouraging them to do so themselves, and thus increasing trust. Furthermore, the necessary technical, financial, scientific and human capacity required for data collection, sharing and monitoring can be spread among the parties, reducing costs.[58]

4) Dispute Resolution and Enforcement Mechanisms

Another important element of a water agreement is a mechanism for resolving disputes. Water treaties can be useful tools for improving cooperation and reducing conflict between States, but they can also suffer from conflict themselves, particularly over elements such as unexpected, and unprepared for, water variability. A mechanism for dealing with such a situation in an agreed and relatively fast manner is an excellent way to ensure that ongoing cooperation can cope with temporary disagreements. Dispute resolution can either be directly between countries, through third-party arbitration, or through a mechanism that contains elements of both. The Indus Treaty provides an excellent example of different levels of dispute resolution. The Permanent Indus Commission meets at least once a year and consists of commissioners from both nations, who attempt to reach a mutual agreement in the event of a dispute. If no agreement is reached, the issue can be passed to a neutral expert, whose decision is final, or a seven-member court of arbitration.[59]

Jaroslav Tir and Douglas Stinnett suggest that enforcement mechanisms such as sanctions or other punishments for non-compliance be written into water agreements, on the basis that such actions would be seen as legitimate due to being bilaterally or multilaterally agreed, and could thus avoid the escalation of disputes while still punishing those who abrogate the terms of the treaty.[60] In an ideal situation, such enforcement mechanisms would not even need to be used, but their existence could reinforce confidence in the agreement and among the parties, and may reduce the likelihood of free-riding.

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58 Tir & Stinnett 2012, p. 216

59 Miner, M, G Patankar, S Gamkhar & DJ Eaton, 2009, 'Water sharing between India and Pakistan: a critical evaluation of the Indus Water Treaty', *Water International*, 34(2); *The Indus Waters Treaty 1960*, Article IX and Annexures F and G

60 Tir & Stinnett 2012, p. 216-7

An interesting compliance mechanism is the one under the 1999 Protocol on Water and Health to the UN Economic Commission for Europe (UNECE) Water Convention[61]. UNECE is clear that the aim of the Compliance Committee is to 'facilitate and assist Parties in resolving problems, rather than condemning Governments. The general assumption is that a situation of non-compliance with the Protocol by a Party is not the result of its intention to breach the Protocol's provisions'.[62] The Protocol also allows members of the public to submit communications about alleged non-compliance, and has created a consultation process in which States that are concerned about their ability to adhere to the Protocol can receive help and recommendations on target setting and implementation.[63] While this is a relatively new procedure and remains untested in practice,[64] if it proves to be successful it could provide a promising example of a non-adverserial compliance procedure aimed at cooperation rather than punishment, and could be taken as an inspiration for other agreements.

5) River Basin Organisations

A further possibility is the creation of a river basin organisation (RBO) to act as an overarching administrator for many of the other aspects of a treaty, as well as providing an institution for countries to work through. The advantages to creating such an organisation include the reduced costs and requirements for individual State capacity facilitated by a centralised administrative structure, and the fact that it can provide a conduit for communication, thus facilitating diplomacy and understanding. It can also allow for the clarification and, if necessary, alteration of the provisions of a treaty. As a separate organisation from all the States involved in the process,

61 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes

62 'Implementation and Compliance', United Nations Economic Commission for Europe, http://www.unece.org/env/water/pwh_implementation.html, accessed 9 August 2012

63 For more information on these processes, see *ibid.* and the official documents available on that webpage.

64 United Nations Economic Commission for Europe, 25 January 2012, *Bureau/2012/1 Protocol on Water and Health, Bureau of the Meeting of the Parties, Eighth Meeting, Annotated Provisional Agenda*, p. 4 - 'No requests for the consultation process have been submitted to date'.

it can employ experts to discuss issues on a neutral, non-political basis; it can use the opportunity for dialogue to deal with the early stages of conflict to try and avoid situations escalating; and it can contribute to a positive contractual environment in which all States are agreeing to work together in good faith.[65] Joint river management, which can also be coordinated through RBOs, is a possibility when enough trust has been built up, and can have a positive effect on economic development as well as political cooperation.

A study of the Mekong River basin found that strong, cooperative governance among and between the countries of the Mekong River Commission (Laos, Thailand, Cambodia and Vietnam) and China could almost double the economic benefits from the river for the downstream countries, and even significantly increase it for upstream China, when compared to a situation of weak, fractured and uncooperative governance. The same study also found that joint management through an RBO can increase the amount of water available for consumption, irrigation and electricity production, through better storage capacity and planned releases of water at key times.[66]

Concluding Reflections

Tir and Stinnett's research indicates that the more of these institutional aspects an agreement has, the less likely there is to be conflict – and they note that this correlation is particularly strong in situations of increased water scarcity.[67] However, they also note that very few existing water agreements have strong institutions and mechanisms such as the ones suggested above, with only 45% of existing agreements containing monitoring provisions, 35% conflict resolution mechanisms, and 35% river basin organisations.[68] De Stefano and colleagues also base their assessments of the conflict vulnerability of river basins on a combination of their institutional strength

65 *Ibid.*, p. 217, De Stefano, *et al.* 2012, p. 197

66 Houba, H, KH Pham-Do & X Zhu, 2012, 'Transboundary Water Management: A joint management approach to the Mekong River Basin', *56th AARES Annual Conference*, 7-10 February2012, Fremantle, Australia, Australian Agricultural and Resource Economics Society, pp. 11-12. The figures for downstream countries are $190m under weak, uncooperative governance, and $355m for strong, cooperative governance; and for China, $316m rising to $437m.

67 *Ibid.*, p. 221

68 *Ibid.*, pp. 216-7

and their level of water variability, among other factors. They find that the most vulnerable basins at the present time are all in Africa, but that due to increased variability of water availability, South America, Eastern Europe and Western Asia will all need 'increased resilience in their institutional systems' before 2050.[69]

It is worth noting that it is not the mere existence of institutional systems or water treaties that will prevent conflict over water scarcity, but the resilience of those systems in responding to a changing context and their ability to deal with disputes. There is no uniform approach to creating a regime that works in this area – a successful water treaty could be heavily institutionalised with a very active RBO like in the Mekong region; or it could be much more minimalist, like the Indus Treaty, with a simple allocation mechanism and annual discussions between countries. Whilst it provides for almost no joint management of the water, by creating both an agreement over water allocation and a forum for the States to discuss issues and grievances, it has successfully averted a potential flashpoint between the two governments for over fifty years now.

Ultimately, the process of creating inter-State water cooperation will be one of trial and error, as each basin finds the right institutional mix for its particular political, social, geographical and hydrological contexts. The simple suggestions above provide the first stepping stones towards more robust cooperative regimes over water management that would create dividends for other areas of inter-State cooperation.

69 De Stefano, *et al.* 2012, p. 204

Case Studies

Below are a number of case studies of water cooperation and antagonism. These studies are intended to provide illustrations for the ideas expressed above and to look at the complex realities of fostering water cooperation. They provide examples of real-world practice that we can use to inform our own thinking about water agreements.

The Indus Waters Treaty: Cooperation in a Combustible Situation

Map of Indus River Basin

The dispute between India and Pakistan over the waters of the Indus river and its tributaries can be traced back to the 1947 partition of the subcontinent, which divided the Indus and five of its major tributaries between the two countries, as well as the British-built irrigation canals that delivered water to western Punjab. Partition left the farmers of the Pakistani Punjab dependent on the goodwill of their neighbour government for the survival of their crops. That goodwill was not forthcoming in the sectarian atmosphere of the time, and the east Punjab government shut off the irrigation canals in April 1948, requiring Indian Prime Minister Jawaharlal Nehru to personally intervene to get them turned back on to prevent disaster in west Punjab. A month later, the two countries signed the Delhi Agreement in which they accepted that both had a right to water

and agreed to hold talks on the issue.[70] Despite the fact that the highly conflict-prone context made negotiations over water cooperation difficult, the Indus Waters Treaty was signed in 1960 after much encouragement from the World Bank. The Bank initially tried to get the countries to negotiate an agreement together from scratch, but eventually suggested that they each draw up their own plan and work to find common ground.[71]

The final agreement awarded all the waters of the western rivers (the Indus, Jhelum and Chenab) to Pakistan, and the eastern rivers (the Sutlej, Beas and Ravi) to India up to the point where they cross the border, giving Pakistan 80% of the total volume. This means that India can build engineering works such as hydropower plants on the eastern rivers, but must provide data and negotiate the impacts of such projects with Pakistan. India can also use its portion of all the rivers for navigation, domestic use and some irrigation, without disturbing Pakistan's allocation. Pakistan was also compensated with £62m from India for the loss of the eastern waters, and the Indus Basin Development Fund was created, and disbursed more than $1bn for infrastructure and irrigation projects. The treaty also set up the Permanent Indus Commission as a forum for discussion and dispute resolution between the two countries, with a Commissioner from each side meeting at least once a year to share information and discuss concerns.

Perhaps the biggest success of the Indus Waters Treaty is that it has survived the Indo-Pakistani wars of 1965 and 1971 and the conflict of 1999, as well as many 'bellicose statements' and much 'political rhetoric' [72]. The treaty has thus become an excellent proof of the argument that cooperation rather than conflict over water is possible, even in difficult circumstances. Undala Alam argues that cooperation between the States initially emerged because it was 'water rational', 'because water is scarce, vital, expensive, a security issue, demand is outstripping supply and a war would not guarantee future resources – neither water nor international finance – to build the

70 Alam, UZ, 2002, 'Questioning the Water Wars Rationale: A Case Study of the Indus Waters Treaty', *The Geographical Journal*, 168(4), pp. 342-343

71 Wolf, AT & JT Newton, undated, 'Case Study of Transboundary Dispute Resolution: The Indus Water Treaty', http://www.transboundarywaters.orst.edu/research/case_studies/Indus_New.htm, accessed 23 July 2012

72 Alam, 2002, p.347

infrastructure needed to use the water' [73]. These conditions are just as true, if not more so, today as they were in 1960, providing an argument in favour of water cooperation both in the subcontinent and across borders elsewhere.

The other great success of the treaty has been its exercise of dispute resolution, especially in recent years. The Permanent Indus Commission initially discusses grievances and attempts to come to a resolution, but if no agreement is reached between the States, the issue can be referred to a neutral third-party expert for a final decision. This happened in 2005 in relation to a dispute over the Indian Baglihar Hydroelectric Project, to which Pakistan objected over six technical aspects. The case was referred to a Swiss civil engineer, Raymond Lafitte, who found in favour of Pakistan on three counts and India on three, a decision accepted by both sides. More serious disputes go to a Court of Arbitration consisting of four members selected by the two countries, and three neutral lawyers or engineers.[74] This suggests the importance of bilaterally agreed dispute procedures in any water treaty.

There is, of course, some room for improvement. In particular, more local participation in river development could help quell the disgruntled feelings of sub-national governments along the river – with the Indian state of Jammu and Kashmir reportedly feeling marginalised by the treaty's restrictions on hydropower development, and disagreements between the Pakistani provinces of Balochistan and Punjab (who support the building of more dams) and Sindh and Kyhber Pakhtunkhwa (who are concerned about consequent flooding).[75] More joint action on water management and development between the States themselves would also have a positive effect on shifting long-term attitudes, and translating the existing, perhaps rather passive treaty, which works to avoid conflict, into one that actively pursues peace, understanding and cooperation.

Despite elements that could be improved, the treaty has generally been a success. Aaron Wolf and Joshua Newton list some further lessons from it that can contribute to the design of other water agreements. These include the

73 *Ibid*
74 Miner, *et al.* 2009, pp. 207-208
75 *Ibid.*, pp. 209-211

need to pay attention to power inequalities that can delay negotiations (with India in a much stronger position than Pakistan at the time, both politically and due to being the upstream State); the potential role of an active and positive third party (in this case, the World Bank); the need for financial assistance; and the need to pay attention to all concerns of the parties, not just the allocation issue (in this case, particularly Pakistan's concern with storage and the timing of the delivery of water for crop-growing purposes).[76] Perhaps the best lesson we can take from the Indus Waters Treaty, however, is that cooperation over water is both possible and, when put in place, robust, with an ability to survive even the most belligerent of situations.

The Trifinio Plan: Catalyst for Cooperation in Central America

Map of Trifinio Plan Region

The Trifinio Plan is a biosphere reserve set up in the border region between El Salvador, Honduras and Guatemala, countries that have all experienced violent conflict in the recent past. The reserve is centred around the transboundary Lempa river basin, and some of the Motagua river, which forms part of the border between Guatemala and Honduras. The plan came out of the Esquipulas regional peace agreements of 1987 and was aimed at conservation and sustainable use of water, reforestation of watershed areas and the

76 Wolf and Newton, undated

improvement of infrastructure in local towns and villages. There was also an intention of making the region a landmark example of cooperation and integration in Latin America.[77] After a decade of pilot projects, the plan was institutionalised in 1997 by the signing of a treaty that makes the Trinational Commission (consisting of the Vice Presidents of Guatemala and El Salvador and a presidential designate of Honduras) the executive body of the plan, with a secretariat and a consultative committee to support them.[78]

In an article written by Ministers of the three countries, they claim that any initiatives under the plan are discussed in-depth with civil society and the relevant local municipalities (as many as forty-five), both of which are represented on the Consultative Committee. The Ministers call this a successful example of participatory planning.[79] Researcher Raul Artiga is not quite so effusive in his praise, claiming the institutionalisation of the treaty has caused something of a focus on top-down executive decision making, He does however recognise that local municipalities view the project positively and are increasingly proactive participants. He also argues that while there is much work to do in terms of creating common infrastructural frameworks and increasing participation, the creation of a discussion forum for sustainable development and water issues and the active participation of the Vice Presidents of the three States have had a positive impact.[80]

The NGO network Impact Alliance calls the Trifinio Plan 'a symbol of peace and integration', which, through participatory water management, has given the citizens of this cross-border region an identity in common with one another. It has, they argue, become 'a model for integration that foresees and resolves potential conflicts related to water through dialogue among the

77 Artigua, R, 2003, *The Case of the Trifinio Plan in the Upper Lempa: opportunities and challenges for the shared management of Central American transnational basins*, UNESCO: Paris, pp. 2-4

78 'Trinational Commission for the Trifinio Plan (CTPT)', *Central American Integration System*, http://www.sica.int/busqueda/Informaci%C3%B3n%20Entidades.aspx?IDItem=29497&IDCat=29&IdEnt=819&Idm=2&IdmStyle=2, accessed 23 July 2012

79 Miranda, JA, K Slowing & JC Raudales, October 2010, 'South-South Learning in the Trifinio Region: Transforming Borderlands Into Areas of Peace and Development', *Development Outreach*

80 Artiga 2003, pp. 5-6, 9

partners'.[81] Trifinio provides an important lesson for those who are planning other water treaties – participation is vital to cooperation. Without being primarily concerned with the mathematics of allocation levels, the three States have encouraged both the sustainable management of water and the development of a remote region, all of it taking place across borders in a part of the world that was recently suffering from violent conflict. While much work remains, the early signs are promising indeed.

Research consultant Alexander Carius provides an excellent description of the peacebuilding tendencies of the Trifinio Plan, claiming:

> 'the Trifinio Plan also acted as a catalyst for further cooperation. For instance, the long-standing border conflict between El Salvador and Honduras was resolved through cooperation with the Commission for Delimitation of the Borders. At the local level, the Trifinio Plan has enhanced the existing cross-border relations in the economic sphere and also in other areas. Health services, for example, are jointly provided to inhabitants of the border region. After two decades of war and violence in the region, especially in El Salvador and Honduras, the Trifinio Plan promoted intergovernmental dialogue in the post-war period and played a significant role in confidence building among the countries. One of the principal objectives of the Plan is to remedy the underlying cause of many conflicts in the border region, namely the social and economic isolation of these countries'.[82]

While the plan did not focus exclusively on water, it clearly provides an example of how an emphasis on environmental concerns, including water issues, can be used to encourage cooperation, participation and development, and it can thus provide some inspiration to those developing cross-border water policies.

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81 'IDB – Coming together in the Trifinio region of El Salvador, Guatemala and Honduras', *Impact Alliance*, http://www.impactalliance.org/ev_en.php?ID=49397_201&ID2=DO_TOPIC, accessed 23 July 2012

82 Carius 2006, p. 13

Central Asia: Water Antagonism, but No Water Wars

Map of Amu Darya and Syr Darya Basins

The Central Asian example is the least institutionalised and least successful example featured in this paper, but it nonetheless provides us with some lessons about the pitfalls that other water agreements must avoid, and adds an additional level to our discussions – water cooperation is certainly within our reach, but it won't just happen, it needs to be designed and consciously worked towards.

For centuries, the watersheds of the Amu Darya and Syr Darya rivers were a key component of the Silk Road trading route between east and west. However, in the twentieth century, under the USSR, a growth in population, industry and irrigated cotton plantations put enormous stress on the area's water resources. The excessive redirection of water from the rivers for use in cotton fields during the Soviet period can be most shockingly seen in the Aral Sea disaster, where what was formerly one of the biggest lakes in the world has been reduced to a dusty, saline shadow of past glories, with villages that used to make a living from fishing now sitting over eighty kilometres from the shore.

The 'internationalisation' of the basin in 1991, with the collapse of the Soviet Union and the independence of Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan and Tajikistan, caused a number of dormant tensions to rise to the surface. The biggest one centres on the Toktogul hydropower dam in

Kyrgyzstan. In the Soviet period the dam was used mainly to manage water flows for agriculture in Kazakhstan and Uzbekistan, with any electricity generated shared among the five Republics. With independence came national interest, and tension between upstream Kyrgyzstan, which wants to release the water in the winter for generating electricity, and downstream Uzbekistan and Kazakhstan, who want the water to be released in the summer for irrigation purposes. A paper by Thomas Bernauer suggests that the discourse around the issue is being put in terms of 'national security', especially in the already-volatile Fergana Valley.[83]

In 1998 a trilateral agreement was signed by Kazakhstan, Uzbekistan and Kyrgyzstan to address the ongoing problem of their need for water from the Syr Darya at different times of the year. It was agreed that Kyrgyzstan would release more water from Toktogul in the summertime, allowing the other two States to use it for irrigation. In return, Uzbekistan and Kazakhstan would buy the hydroelectricity that was simultaneously produced, giving Kyrgyzstan the money to buy coal and oil supplies from them in the winter. This seemingly promising agreement has, however, been plagued with problems. A lack of institutionalisation means that the States need to renegotiate allocations every year, provisions on data-sharing have often been ignored, and disputes over the pricing of electricity, coal and oil have led to Kyrgyzstan sometimes refusing to release the agreed amount of water at the agreed time.[84]

Analysts have suggested a number of reasons for the relative failure of water negotiations in Central Asia: a focus on allocation levels rather than possible broader benefits; insufficient funding, with international donors too focused on the Aral Sea to the exclusion of other regional water issues; disputes over the involvement of NGOs and other aspects of civil society; little enforcement capacity; and the lack of institutionalisation meaning that

83 Bernauer, T, 2012, 'Climate Change and International Water Conflict in Central Asia', *Journal of Peace Research*, 49(1), pp. 230-232; for more on the existing social tensions in Central Asia, see Elhance, AP, 1997, 'Conflict and Cooperation over Water in the Aral Sea Basin', *Studies in Conflict and Terrorism*, 20, pp. 213-214; Walker, M, 10 June 2011, 'Kyrgyzstan: the scars of ethnic conflict run deep', *The Guardian*, http://www.guardian.co.uk/world/2011/jun/10/kyrgyzstan-ethnic-conflict-osh-uzbekistan

84 Elhance 1997, p. 215; Bernauer 2012, pp. 233-235; Weinthal, E, 2006, 'Water conflict and cooperation in Central Asia', Human Development Report Office Occasional Paper, pp. 14-15

the personal relationships and animosities between the State governments can play an important role.[85]

What does the case of Central Asia tell us about water cooperation? Firstly, it shows us that even in situations that seem to have all the prerequisites for violent conflict over water, such conflict has not occurred. In Central Asia we have a context of water stress, a growing population, pre-existing ethnic tensions and only a weak level of water institutionalisation, and yet, despite some water-related skirmishes between local communities, there are no indications that war over water between the States of the region is likely. This suggests that, as in the case of the Indus Treaty, cooperation over water resources is realised at some level to be 'water rational' – that is, the States understand that cooperation is the best way to ensure access to the resources they need. Thus, negotiations are likely to continue in some manner, despite their current lack of success.

Secondly, water agreements, like water conflicts, are not inevitable. Central Asia provides a clear lesson that successful water cooperation requires hard work and the involvement of multiple partners. In particular, a system of international funding and brokerage such as that set up for the Indus Treaty could prove useful – creating institutions for dialogue and negotiation that have committed funding, focusing on the whole region rather than just the Aral Sea, and having the full participation of the States rather than just being imposed as a condition of aid. It will also require a shift in vision, from seeing water as a zero-sum resource, to seeing the multiple benefits available for different actors, and understanding the different methods of water management and compensations that will need to be put in place for this to be effected.

85 Mosello, B, 2008, 'Water in Central Asia: A Prospect of Conflict or Cooperation?', *Journal of Public and International Affairs*, 19, pp. 162-163; Allouche 2007, p. 48

Recommendations

Address Climate Change

Throughout this paper we have argued that, contrary to the popular narrative, climate change and the water scarcity that can result from it do not inevitably lead to war. However this is no reason to be complacent, and the climate change crisis we face must be addressed as a matter of urgency.

Past performance can be seen as an indicator of future possibilities, so we believe that the lack of serious water conflicts in recent decades is a positive trend that deserves highlighting. But climate change has the potential to change the landscape considerably, politically as well as geographically. With water scarcity acting as a 'multiplier' to other causes of conflict, it is vital that mitigation and adaptation take place to ensure that the worst-case-scenarios of writers like Robert Kaplan do not become reality.

This means that a strong and equitable agreement needs to be reached in the coming years of negotiations at the UN Framework Convention on Climate Change, and we hope that the newly opened discussions on the Durban Platform will offer the opportunity for that, if countries are able to seek common interests and negotiate with increasing levels of trust. Any agreement will need to feature strong emissions reduction targets to keep the effects of climate change to the minimum possible level, as well as effective mechanisms for capacity-building and finance for adaptation in order to ensure that the most vulnerable countries are able to cope with the worst impacts.

Shift the Discourses

Current mainstream discourses on the links between climate change, water and conflict are often too negative and deterministic. They tend to assume that both environmental scarcity and violent conflict are inevitable, and

encourage militarised solutions – suggesting a world of closed borders and resource grabbing. This can lead to a misallocation of resources that would be better used in encouraging cooperative work. These discourses also risk becoming self-fulfilling prophecies – if everyone believes war is inevitable, everyone prepares for war through militarisation, in turn making war more likely.

Instead, QUNO encourages discourses that focus on the opportunities for collaboration, cooperation and the pre-emptive avoidance of violent conflict through active, environmentally-rooted peacebuilding. We suggest a multidimensional approach to conflict that considers environmental factors in conjunction with social, economic and historical ones rather than in isolation, and that moves from a possessive approach to water,towards an approach that emphasises the multiple benefits it can provide to all parties through cooperative management.

Many thinkers and commentators on water and climate change are already adopting this outlook and this shift in discourse can be encouraged by policymakers at all levels taking a collaborative approach to water issues.

Negotiate Treaties

Researchers have found that watersheds that are covered by treaties or other institutionalised agreements are, on average, less conflict-prone than others. This shows that a clear priority must be to encourage all transboundary watersheds to be covered by an agreement of the kind outlined above. In some cases this will not prove difficult, and may be simply a formalisation of existing practice. In other cases, the process may take much longer, and be linked to a long-term process of building trust between nations.

Third party mediators may be useful in such situations. The World Bank helped to bring India and Pakistan together in the middle of the last century, and it and other multilateral development banks may have a role to play in contemporary processes, particularly in providing financing and capacity-building advice. Regional cooperation organisations may also have a positive role to play in encouraging cooperation among their members.

The time to do this is now: we must approach a new, more cooperative water paradigm before the worst effects of climate change begin to take hold.

Capacity Building

To achieve and implement a successful water treaty, capacity is needed in several areas – scientific, technical, financial and staff. Some of this can be provided through the functioning of a treaty itself, by allowing for the pooling of resources across two or more countries. Some of it will have to come, for now, from outside donors, although it should be done with a progressive development mindset and the intent of a long-term transfer of not just technology, but of knowledge and skills also. As well as being necessary for aspects of the agreement, such as effective data collection, assistance in building collective capacity – from both parties themselves and outside donors – shows that the process is being taken seriously.

Ensure Participation

This paper has generally talked about water resources from the perspective of the State, and in terms of transboundary watersheds it is States who have the final authority over decision-making. However, we must not forget that ultimately water belongs to us all. To this end, participation of the widest possible range of stakeholders is a vital aspect of water agreements. While it may not be possible or appropriate at every stage of negotiations, at some point regional governments, local and national civil society, indigenous peoples' organisations and industry and business groups will have to be involved in making the decisions that affect them, and their participation will need to be real and substantial. By encouraging people to engage in matters that affect their lives, and giving them the space and tools to do so, we can help to build peace not just between nation States, but between communities, and between people.

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Water is a vital resource for domestic consumption, agriculture and industry, among other uses. It is also often a transboundary resource, with hundreds of rivers around the world flowing across political borders. These two facts mean that countries need to cooperate over water for the good of all.

Whilst some commentators claim that increased water scarcity as a result of climate change will lead to violent conflict over international resources, this paper argues that there is little historical basis for such assumptions. Climate change can act as a 'multiplier' in situations where tensions already exist, yet alone it is unlikely to lead to violent conflict. The report provides examples of cooperation between nations over water, highlighting the elements that make a successful and cooperative international water agreement.

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