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A Treaty over Troubled Waters

The relationship between water treaties and conflict in shared water-basins

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Contents

Abstract

Many sources of recent literature suggest a growing concern regarding conflict over freshwater. Since freshwater is both the source of economic growth and human livelihood, one can expect that sharing its management are bound to generate conflict. To avoid disagreements from escalating, many states have established treaties regulating the use and consumption of shared rivers. However, the influence of water treaties on reducing regional tensions over water use requires further research. Thus, this paper attempts to determine whether water-sharing treaties can be used a mechanism to reduce conflict. This begs the question: do transboundary water treaties have an influence on reducing conflict between shared water-basin countries? In order to determine this relationship, this paper has drawn from three case studies, the Indus, Mekong, and the Nile river basin for a comparative case study design. I have compared the level of conflict before and after the treaties were introduced in the Indus and Mekong, to determine whether the treaties had an influence on conflict or cooperation. Subsequently, I compared the results in the Indus and Mekong to the Nile basin, which does not have a treaty. Results have shown that while water treaties do not necessarily have an influence on reducing transboundary conflict, they may have an influence on preventing conflict from escalating. This study further found that water scarcity, high water withdrawals, and particular treaty provisions were more likely to influence conflict in shared river basins. Thus, it is argued that while water sharing treaties do not necessarily have an influence on limiting the instances of conflict, they do likely a strong relationship with reducing the degree of conflict since they provide a system to resolve issues before they escalate.

I-Introduction

It is commonly believed that freshwater is widely available for use because it is a renewable resource. However, the global demand for freshwater is seemingly growing while the supply is becoming increasingly scarce. This is partially attributed to a growing world population, demands from the commercial and agricultural sector, and the effects of climate change. Consequently, water scarcity is becoming a larger issue as 35% of the world's population in 2005 were living under extreme water stress.[1] The circumstances may escalate since the population in the next 50 years is expected to increase to 9-10 billion while the same, if not better, standards of

[1] "Population and Sustainable Development."UNFPA.org. http://www.unfpa.org/6billion/populationissues/development.htm. (Accessed March 29th, 2014).

living will likely still be demanded.[2] This will likely have a huge impact on the demand and supply of freshwater, putting into question its sustainability.

This is particularly important for countries that share bodies of water, as it can create a source of friction over misuse. Some literature has suggested that freshwater will be a source of major conflict between countries in the future.[3] Since freshwater is both a source of economic growth and human livelihood, one can expect that sharing its management are bound to generate conflict. This is because when freshwater sources become scarce, states often begin to perceive the use of the resource as a threat to its national integrity.[4] Conflict over freshwater resources, defined here more broadly than armed conflict, has occurred for centuries.[5] According to the Pacific Institute, there has been approximately 343 instances of conflict that were related to the management of freshwater basins from 3000 BC to 2014.[6] This is particularly problematic when approximately 60% of waterways are shared between two or more countries.[7] To avoid disagreements from escalating, many states have established agreements with each other regulating the use and consumption of shared rivers. In fact, since 1820, over 450 international arrangements have been developed regarding transboundary waterways.[8] While this is quite a large number of treaties, the relationship between water treaties and de-escalating regional tensions requires further

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[2] "Population and Sustainable Development."UNFPA.org. http://www.unfpa.org/6billion/populationissues/development.htm. (Accessed March 29th, 2014).
[3] Wolf, Aaron T. "Shared Waters: Conflict and Cooperation." *The Annual Review of Environment and Resources* (2007): 243
[4] Peter H. Gleick, "Water and Conflict." *International Security* (1993):80
[5] Ibid, 83
[6] "Water Conflict Chronology List." *The Pacific Institute.* http://www2.worldwater.org/conflict/list/.(Accessed June 2015).
[7] "Water Rights and Water Fights: Preventing and resolving conflicts before they boil over." *American Journal of Public Health* (2011).
[8] "Transboundary Waters." *UN Water.org*. http://www.unwater.org/fileadmin/user_upload/unwater_new/docs/transboundary_waters.pdf. (accessed April 1, 2015).

research. Consequently, this paper attempts to determine whether water-sharing treaties can be used as one mechanism to reduce inter-basin conflict, as water is becoming increasingly scarce. Thus, this paper will ask: do transboundary water treaties have an influence on reducing conflict between shared water-basin countries?

In order to determine this relationship, this paper has drawn from three case studies, the Indus, Mekong, and the Nile river basins. More specifically, I have compared the level of conflict before and after the treaties were introduced in the Indus and Mekong, to determine whether the treaties had an influence on conflict or cooperation**.** Utilizing a before and after approach allowed me to use a most similar system design, which attempts to isolate different factors that influence conflict. This involves examining other factors that could have influenced conflict in river basins and determine if they changed after introducing the treaty. Hypothetically, if other factors remain constant after the treaty date, it would show that the introduction of a treaty had an influence. Subsequently, I then compared the results from the Indus and Mekong to the Nile basin, as it does not currently have a treaty, to demonstrate the possible influence of treaties. This also involves employing a most similar system design, as I compared factors present in the Indus and Mekong basin with the Nile basin. This attempts to isolate differences between explanations and the outcomes of each case study. Instead of comparing factors within the case study over time, this approach is trying to see whether there is more conflict in the Nile, and if so, are the conditions similar, despite not having a treaty. This may demonstrate that treaties generally have a strong relationship with reduced conflict in transboundary river basins. Subsequently, this paper compared the case studies' treaties, the Mekong and Indus, with their conflict results, which determined whether certain treaty provisions had provided better outcomes than others. Similarly,

this uses a most similar system design as it compares treaty provisions in relation to the level of cooperation or conflict to discern any differences that may indicate a more optimal treaty design.

The strengths of this research design is that it offers the ability to go into specific detail about the surrounding conditions that have influenced conflict in each case. At the same time, utilizing a comparative case study design offers the ability to provide results that are more generalizable, since they take the complexities of each case into account, while providing generalizable explanations by comparing results. That being said, the method is not completely generalizable. Since the cases are arbitrarily selected and only consider a few factors, there is a risk that this study misses an important factor that could be the cause of reduced water basin conflict, instead of treaties. Furthermore, there is a risk that the case studies' results are anomalies compared to other river basins, thus complicating the paper's generalizability.

Theoretically, it is expected that freshwater treaties inevitably have an influence on improving collaboration in river systems, simply because establishing a formal agreement is already an indication of states willing to cooperate. That being said, states are not bound by an international governing authority and are thus not forced to cooperate if they don't want to. However, following the methodology section, this paper examined the theoretical foundations of the relationship between conflict and transboundary water treaties. In theory, treaties provide a mechanism for nations to resolve potential issues before they escalate, which would reduce the instances of conflict. While the potential for countries to enter into disagreement over river basin management is quite high, history has shown that this often pushes countries to actually enter into dialogue and cooperate to resolve issues in a rather productive and peaceful manner.[9] Treaties

[9] Wolf, 247

reduce the incentive for countries to engage in conflict because they reduce the uncertainty that countries will misuse the shared resource. This is typically demonstrated by habitual compliance to the defined rules and guidelines established in the treaty. Therefore, it is hypothesized that transboundary water treaties do have an influence on reducing conflict between riparian states, as they provide a level of certainty and dialogue over the management of shared resources.

While theoretically it would seem that conflict would be reduced after a water sharing treaty is introduced, the case study results provide different conclusions. In both the Indus and the Mekong basin, there wasn't any discernable trend in the reduction of conflict as a whole, after the treaty was implemented. In fact, in the Indus, there was an increase in the number of instances of conflict after the treaty was introduced in 1960. In the Mekong basin, there were low instances of conflict after the treaty; however levels of cooperation were seemingly declining. That being said, the degree of conflict was minimal in the Indus and Mekong, as compared to the Nile basin. The Nile case showed higher degrees of conflict and a higher variability between years. This may demonstrate that while treaties do not necessarily eliminate basin conflict completely, they do reduce likelihood of disputes escalating, since they often provide predictability regarding state behaviour and a conflict resolution processes to resolve potential issues. Consequently, the conflict that occurred in the Indus basin was predominantly risen in the dispute settlement system, while the conflict that occurred in the Nile was far more dramatic. While other factors, such as water availability and withdrawals, did seem to have an influence on number of instances of conflict in both the Nile and Indus, as both basins had areas of high water stress and water consumption, the degree of conflict between the Nile and Indus differed.

Comparing both the Indus and the Mekong treaties, it was seen that the Mekong treaty may have been more effectively designed, as it had less instances of conflict than the Indus basin. In particular, the Mekong treaty had superior data sharing, forums that encourage dialogue, did not include allocation requirements and a legal dispute settlement system in the treaty provisions. That being said, as other factors like water withdrawals and availability likely have a strong relationship with the number of instances of river basin conflict, we are unable to truly ascertain whether those certain treaty aspects had influence on conflict. Thus, this paper will argue that while water sharing treaties do not necessarily have an influence on limiting the instances of conflict, they do likely a strong relationship with reducing the degree of conflict since they provide a system to resolve issues before they escalate.

2- Methodology

In order to answer the research question, this paper employed a comparative case study design. This research design typically covers two or more cases in an effort to provide more generalizable results about typically causal questions.[10] Often the method compares similar cases to find similarities or differences between cases that share a similar outcome.[11] Typically this involves the use of both quantitative and qualitative evidence.[12] This can provide positive results as it is able to examine the specific context of each case without forgoing the broader implications, which is impossible under an experimental design.[13] Providing context by using a case study design allows for a greater understanding about specific factors that may influence the outcome of

[10] Goodrick, Delwyn. "Comparative Case Studies." *United Nations International Children's Emergency Fund Methodological briefs* (2014): 1
[11] Goodrick, 1
[12] Ibid
[13] Ibid

the study.[14] The results also allow for more tailored policy initiatives, as it provides policymakers with more context about the underlying factors that influence policy formation. While typically comparative case studies attempt to find causal links, the findings are limited in generalizability as they only use a small sample, and thus run the risk of not truly representing the causal relationship.[15] Furthermore, as a comparative case study design examines the context of each factor, unlike an experimental design, there is a risk that it fails to consider other variables that could have influenced the causal outcome.

That being said, while I am unable to fully make a causal claim, I have chosen this method for a number of reasons. First, the goal is to understand the circumstances and the context of river basin conflict, which is difficult using statistical methods. While with a comparative case study design it is impossible to find the causal relationship between treaties and basin conflict, this approach, instead, attempts to find whether a relationship exists between treaties and transboundary conflict, which can be further tested for external validity in further studies. Second, as some indicators cannot be collected through primary research, such as conducting surveys and interviews, due to time and financial constraints, a comparative case study that employs secondary sources as well as data from international organizations provides a sufficient means to analyze relationships. Therefore, I rely on a variety of different data sources collected by academics, the media, and international organizations for the purpose of this research.

To ensure a rich understanding of the subject matter, I employed a mixed methods approach, utilizing both qualitative and quantitative data. Most of the quantitative data in this report is by international organizations, such as the World Bank, Food and Agriculture

[14] Goodrick, 1
[15] Ibid

Organization, and UN Comtrade. All other quantitative data originate from credible secondary sources. Qualitative measures were used predominantly to provide some context for analyzing conflict outcomes, and the relationship with other factors. This includes analyzing media reports, treaty provisions, and historical documents that provide greater context to the relationship

Three different cases were used to determine the relationship between water treaties and conflict, the Indus, Mekong, and Nile river basins. In the first part of the study, I use a most similar systems design to determine the relationship between water sharing treaties and conflict. A most similar system design isolates different factors by comparing common cases that control for variation.[16] This involves examining dissimilar factors that would explain a change in outcome.[17] I do this by analyzing the conditions individually in the Indus and the Mekong before and after the water sharing treaty is implemented. If the conditions remain the same before and after the treaty, but conflict decreases, one can infer that the treaty may have influenced the conflicts' decline. Subsequently, I again use a most similar system design by comparing the conditions of the Indus and Mekong with the Nile River, which does not have a treaty. Consequently, if the conditions remain similar in the Nile to the Indus and Mekong, but have higher levels of conflict, than it is likely that treaties have a large role in conflict reduction.

I have selected the Indus as a case because while Pakistan and India have historically had many incidents of conflict, the Indus Water Treaty has been consistently claimed as a robust agreement to serve as a model to other countries. Thus, this warrants closer examination. The Mekong River basin was chosen as the second case because not only are there multiple parties to the treaty, in contrast to the Indus, but there is also a lot of mistrust among riparian states.

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[16] Peters, Guy. *Comparative Politics, Theory and Method.* (New York, University Press) (!998): 36
[17] Ibid

Consequently, this warrants investigation to see if the treaty had any influence in reducing conflict in the region. Lastly, I chose the Nile as the case without a treaty because not only is it one of the few transboundary rivers that does not have a formal treaty among most of the riparian states, but there has also been both varied degrees of conflict and cooperation, which provides interesting results. While the region does have a treaty between the lower riparian states, Egypt and Sudan, and indirectly South Sudan, it does not cover all other eight riparian states and thus does not have a treaty for the basin's members.

The second part of this study is to examine the treaty differences between the Indus and the Mekong. Using a most similar systems design, this section compares treaty elements between cases, such as data sharing, to the case's outcome to determine which provisions have a greater influence on reducing conflict. When comparing treaties, if there are different elements in one treaty, in contrast to the other, and has lower instances of conflict, then it can be suggested that certain provisions have a stronger relationship with decreasing conflict. Thus, a stronger decrease in conflict will likely suggest a more optimal treaty design.

For each case study, I compare a number of factors to determine if they have a strong relationship with the level of conflict. This report addresses the following possible factors: the level of water availability, water withdrawals, economic interdependence, and the gap between countries' military strength. Each of these could provide an equally strong explanation of reduced conflict, as compared to treaties. For instance, if the level of water availability is quite low, then states may be more inclined to raise issues, such as hydropower development. Similarly, if the consumption is low among riparian states, then countries may be less argumentative if there are modest increases in water use. Economic interdependence may also decrease the level of conflict since commercial interests can make conflict more costly. Lastly, if there are large military gaps

between riparian states, then weaker states may be less inclined to confront countries with stronger militaries.

There are a number of indicators that can be used to test each factor. First, to determine if a water treaty exists there must be a formally signed agreement between most, if not all, of the riparian states on governing the shared waterway. However, the treaty must encompass most states, by area, in the basin to be considered valid within this study. In regards to conflict, basin conflict is measured by using the Oregon State International Water Event Database: 1950-2008, which is a database that summarizes events found in second sources by assigning a numerical value to their level conflict/cooperation. Consequently, this report added up and averaged the number of instances from 1948-2008 in each case to determine trends.

For analyzing the other factors' indicators that could influence the degree of conflict, I used data obtained from international organizations. In regards to water availability and water withdrawals by each country, I used data from the United Nations Food and Agriculture Organization. The degree of water availability was determined by finding the annual renewable water supply per capita, and the water withdrawal rate was calculated by finding the annual water use per person. Economic interdependence was found by calculating trade dependencies between countries. This is done by calculating the total exports, as well as imports, to other riparian states and then dividing it by the country's total exports/imports. The trade data for post 2000 is from the International Trade Centre, while data before 2000 is largely from the UN Commodity Trade Statistic Database. Lastly, data on the number of military personnel, which is an indicator of military strength, was publicly available by the World Bank.

As mentioned, while this paper attempts to examine the relationship between treaties and conflict, it does not attempt to prove causation. At best this may provide evidence of a strong

relationship between reduced conflict and treaties. Furthermore, as I am using approximately three case studies to test the hypothesis, there is risk that I fail to consider other possible factors or that I am missing certain elements of each case. As the more cases I have, the less depth i am able to cover within each case. Thus, I am sacrificing some depth for stronger generalizable results. There is also risk that water treaties do not have any effect on conflict, and the change of conflict is in response to a different factor. This is because treaties are self-imposed, which means countries are already wanting to avoid conflict by binding themselves to a formal agreement. Thus, there may be an underlying causal factor that could have influenced countries to further cooperate by signing an agreement. Again, this makes it difficult to make any causal claims about the effect of water treaties.

3- Theoretical Framework-The role of Treaties

Before I go into examining the influence of water-sharing treaties in each case study, it may be useful to provide a theoretical foundation. This is important since it will provide a basis for analysis of the research results. In order to do this, this section first examines the theoretical basis of how water conflict occurs in transboundary river basins. Subsequently, the second half of this section examines how treaties play a role in reducing conflict in transboundary waters.

Conflict theory- Why river basins

Transboundary water basins are by definition a shared natural resource. While the value of water is not yet a global commodity that can be exchanged in the market, it is a natural resource that is vital to both the economy and human development. Therefore, given certain circumstances, water can be viewed as a valuable natural resource. Valuable natural resources have been

competed and fought over for centuries in order to enhance personal livelihood. According to Buckles and Rusnak, the only difference is the dimension, level, and intensity of the conflict.[18] According to Homer-Dixon and Percival, the context of the situation, such as power dynamics, quantity and supply of the resource, and the economic structural relations between parties can determine an outbreak of conflict and how the resources will inevitably be managed.[19]

Conflict over shared resources can occur in a number of ways. Buckles and Rusnak suggest that because consumption of shared resources can generate adverse effects on other regions, tensions can occur between countries.[20] They provide the example of the Calico River in Nicaragua, in which irrigation by upstream farmers had negatively impacted the supply for downstream communities.[21] Consequently, upstream farmers and downstream communities were pitted against each other over different needs of using the river.[22]

Similarly, Homer Dixon and Percival argue that resource scarcity amplifies grievances when there is a perception that its effects will inevitably reduce the standard of living.[23] Alternatively, they also suggest that such grievances are likely to occur when people perceive that other countries are unfairly benefiting from exploiting the resource, while they are unable to fully benefit under the status quo.[24] As a result, grievances can shift the perception of whether opportunities exist for conflict.[25] Resource scarcity often shifts a country's priorities into a more

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[18] Daniel Buckles and Gerett Rusnak. "Conflict and Collaboration in Natural Resource management." in Daniel Buckles *Cultivating Peace- Conflict and Collaboration in Natural Resource Management* (The World Bank, 1999).
[19] Val Percival and Thomas Homer-Dixon. " Environmental Scarcity and Violent Conflict: The Case of South Africa." *Journal of Peace Research* (1998): 280.
[20] Buckles and Rusnak, 1998
[21] Buckles and Rusnak, 1998
[22] Ibid
[23] Percival and Homer-Dixon, 280
[24] Percival and Homer-Dixon, 280
[25] Ibid, 281

narrow focus of survival, or at least survival of the current quality of life. As a country shifts its concern inwards towards meeting the demands of falling agricultural yields, economic contraction, and the social costs to people's' livelihood, demands on the state increase.[26] As a result, the state, under increased domestic pressure, will likely seek resolve an issue in any way possible.

Wolf, on the other hand, suggests that because water is used for all facets of society, the economy and the environment, water management is, by definition, the management of conflict.[27] Not only is it a vital natural resource, but also its availability fluctuates significantly over time. This makes it difficult to manage, especially when it is shared between countries. Furthermore, unlike most other resources, managing freshwater is impossible to do for meeting a single purpose, as it serves for multiple objectives, from economic to navigation. Consequently, a country must balance the interests of industries, farmers, communities, the energy sector, and environmentalists that can often be at odds with each other, in order to reach a mutually acceptable policy. This is exponentially more difficult when the resource is shared between states.[28]

Wolf further suggests that when countries implement development projects unilaterally, thus avoiding prolonged talks on river management with other states, it often spark tensions that take years to resolve.[29] As a result, Wolf argues that because such projects disrupt confidence that the state is willing to cooperate and/or is concerned about the quantity and quality of water that is delivered to populations that are affected, it often takes years of talks to restore cooperation.[30] Buckles and Rusnak similarly claim that conflict over shared resources is more likely when groups

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[26] Percival and Homer-Dixon, 280
[27] Wolf, Aaron T. "Shared Waters: Conflict and Cooperation." *Annual Review of Environment and Resources* (2007): 3.5
[28] Wolf, 3.5
[29] Ibid, 3.8
[30] Ibid

poorly communicate about development plans.[31] This is because it is perceived as a direct challenge to respecting a country's ownership rights of its resource.[32] Furthermore, even in cases where projects have little attributed impact to the resource, local grievances can still arise as people often have a symbolic connection to the resource.[33] For many communities, resources are more than something to economically benefit from, many base their cultural identity on its activity, such as being a fisherman, farmer, logger, or miner.[34] Therefore, impromptu foreign development projects that seemingly use resources without consent can seem like a direct challenge on one's identity, which is bound to create tensions.[35]

The degrading quality of a natural resource is also an issue that sprouts conflict. For instance, when there is a shortage or excess of nutrients in surface water it can lead to soil erosion, which can negatively affect agricultural yields and ecosystems in downstream rivers.[36] Since in many cases, the costs of degrading water quality can be enormous, countries without a proper dispute settlement system are at risk of having conflict escalate.[37] Therefore, states must overcome the costs of non-cooperation to develop a framework to manage shared resources, such as transboundary rivers.

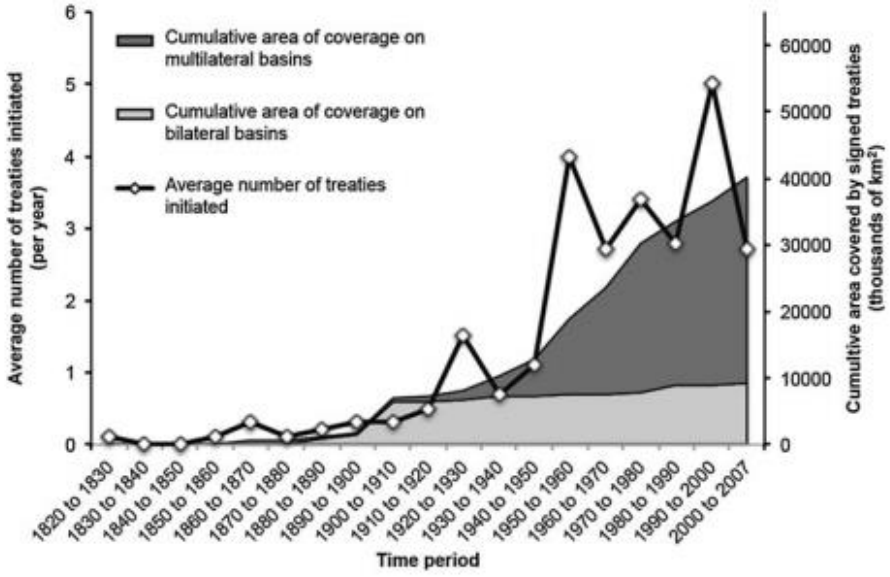
Conflict over resources- A role for treaties?

Theoretically, treaties governing shared waters should mitigate and resolve issues before they escalate. As a result, the international community has long advocated for treaty development

[31] Buckles and Rusnak, 1999
[32] Ibid
[33] Buckles and Rusnak, 1999
[34] Ibid
[35] Buckles and Rusnak, 1999
[36] Wolf, 3.9
[37] Ibid

on international waterways.[38]As one can see in *Figure 1,* which shows the number of treaties per year and the basin area covered, the number of treaties governing shared rivers increased significantly from 1900.[39] By 2007, 43% of international river basins had at least one treaty between countries.[40] Therefore, treaties have been the main instrument for the international community in limiting resource conflict over shared waterways.

Figure 1- Average number of transboundary water treaties signed per year and cumulative area covered.[41]



Just because water treaties have grown in the past century, does not mean that they are theoretically effective at reducing conflict. It could even be suggested that because customary international law, which has largely been codified, does provide rules on managing freshwater, countries may not necessarily need regional treaties. For instance, it is an international customary

[38] Wolf, 3.15
[39] "Mark Giordano, Alena Drieschova, James A. Duncan, Yoshiko Sayama, Lucia De Stefano and Aaron T. Wolf. "A review of the Evolution and state of transboundary freshwater treaties." *International Environmental Agreements: Politics, Law and Economics.*" (Springer, 2013).
[40] Ibid
[41] Giordano et al. 2013

law that countries do not cause any harm to lower riparian states, in terms of managing transboundary rivers.[42] Furthermore, countries are also required to provide 'equitable utilization' of surface water, which means that other countries are legally entitled to fair use of the resource.[43] Thus, in theory, states would be able to effectively manage shared waters since they are bound by customary law to ensure resources are provided to downstream nations. However, because these concepts are ambiguous, like how is a nation sufficiently harmed, riparian states often disagree over the proper definitions of each concept and thus do not make any progress in resolving disputes.

Instead, it has been theorized, under regime theory[44], that treaties act as a more effective tool in managing shared natural resources.[45] Their quintessential purpose is to change current behaviour for enhancing stability and reducing uncertainty, which limits the potential for conflict.[46] This is because formal agreements can help define expectations, acceptable behaviour, and how to resolve issues that arise.[47] Zentner claims that when states understand their roles and responsibilities for river management the likelihood of conflict decreases, as legitimate channels are formed to communicate and resolve disputes.[48] Thus, complicated issues are better able to be resolved before they escalate. This is because formal procedures are available to address issues collectively, rather than having countries implement rash unilateral action. While Wolf does

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[42] Barrett, Scott. "Chapter 5-Customary rights and responsibilities." in *Environment and Statecraft: The strategy of Environmental Treaty-Making* (Oxford University Press, 2006).
[43] Zentner, Matthew. "Design and Impact of Water Treaties: Managing Climate Change." *Oregon State University* (2011).
[44] This theory argues that regimes set norms, rules, and procedures which change the expectations and behaviour of states in international relations. Stephen D. Krasner. *International Regimes*. (Cornell University Press, 1983). 2
[45] Ibid
[46] Ibid
[47] Ibid
[48] Ibid

mention that water treaties can be a source of inefficiencies as well as conflict themselves, he does suggest that the amount of cooperation exceeds the instances of acute conflict.[49]

Water treaties are not only useful in constraining behaviour at the time of their establishment; they also provide effective patterns of cooperation in the long-term. This is because they are often able to provide incentives for states to change behaviour, which eventually becomes habit.[50] Treaties that encourage consistent dialogue further help to provide patterns of cooperation, which de-escalate issues that arise. This can be through a variety of mechanisms such as dispute resolution processes, monitoring systems, data collection, as well as consultation measures. Therefore, theoretically treaties do have a basis for reducing conflict in transboundary waterways.

As mentioned, they may also not be as effective as presumed, since states were already willing to cooperate by drafting and forming an agreement. Barrett acknowledges that in many cases, environmental treaties merely codified what states were planning to do anyway.[51]It is unsurprising as nations may learn from conflict or a particular negative outcome that cooperation is in their best interest without needing to enter into a treaty.[52] Consequently, a change in state behaviour may have occurred without the implementation of a treaty. Furthermore, treaties are self-imposed and treaty compliance is largely dependent on whether the state is willing to comply. However, this assumes that domestic politics as well national interests remain the same over time. In reality, the circumstances where it was in their best interest to cooperate may have changed, or new governments may not see the same value of cooperating and thus change their stance. Therefore, having a treaty, in theory, constrains states to comply and cooperate with other riparian

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[49] Wolf, 3.7

[50] Keohane, Robert. *Cooperation and international regimes.* (Princeton University Press, 1984).

[51]Barrett, Scott. "Chapter 1-Introduction." in *Environment and Statecraft: The Strategy of Environmental treaty-making*. (Oxford Scholarship Online) (2005): 10

[52] Ibid

countries. Realism, an international relations theory, discounts the role that treaties play in shaping state behaviour by claiming that states comply to the objectives of a treaty if it only serves their interest.[53] However, this fails to take into account instances when states comply with treaties that restrict behaviour and are against their individual best interest, such as emission reduction contributions from countries in Europe.

4-Case Study Results

4.1-Indus River Basin

The Indus River basin stretches from the Himalayan Mountains to southern Pakistan for a total area of 1.12 million km²[54], making it the 12th largest river basin in the world.[55] While the Indus River runs through China and Afghanistan, the river only encompasses 8% and 6% of the total basin respectively.[56] Most of the freshwater supply is within Pakistan and India, accounting for 39% of its supply in India and 47% within Pakistan.[57] It is estimated that over 300 million people rely on the river for their basic livelihood.[58] As one can see in *Figure 2*, most of the Indus' tributaries in India are primarily concentrated in the northwest, in the states of Punjab and Jammu and Kashmir. Most of Pakistan, on the other hand, is covered within the basin.

The largest source of the Indus' flow originates from melting glaciers, snow, and glacial lake runoff from the Himalayas.[59] While the River's water levels are also replenished by rainfall,

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[53] Keohane, Robert. "Realism, Institutionalism and Cooperation." After Hegemony: Cooperation and Discord in the World Political Economy. (Princeton University Press, 2005): 7
[54] "Indus Basin." *Aquastat Food and Agriculture Organization of the United Nations.* (2011). http://www.fao.org/nr/water/aquastat/basins/indus/index.stm. (accessed April 8th, 2015)
[55] Ibid
[56] Ibid
[57] Ibid
[58] Ibid
[59] "Indus Basin." *Aquastat Food and Agriculture Organization of the United Nations.* (2011). http://www.fao.org/nr/water/aquastat/basins/indus/index.stm. (accessed April 8th, 2015)

the region is largely arid as most precipitation rates are low for most of the year. The highest concentration of rainfall comes during the monsoon season. In fact, the level of rainfall is so varied that precipitation rates can range from 100 to 2000 mm.[60] Furthermore, rainfall in the region has shown to become more erratic, with monsoons arriving irregularly with different volumes of water per year.[61] The unpredictability of monsoons has often been attributed to rising global temperatures.[62] Therefore, the base flow is largely concentrated by freshwater that is released when the Himalayan glaciers melt in the spring.[63]

In fact, the Himalayas, in the uppermost part of the Indus basin, is home to the largest area of glacial ice outside of the Polar Regions.[64] As the glaciers melt, the freshwater starts to flow into different rivers that eventually form the Indus. The largest tributary in the Indus is the Panjnad, which relies mainly on five rivers that flow from northern India.[65] This includes the Chenab and Jhelum rivers, also categorized as the Western Rivers, and the Sutlej, Beas, and Ravi Rivers, often called the Eastern Rivers.[66]

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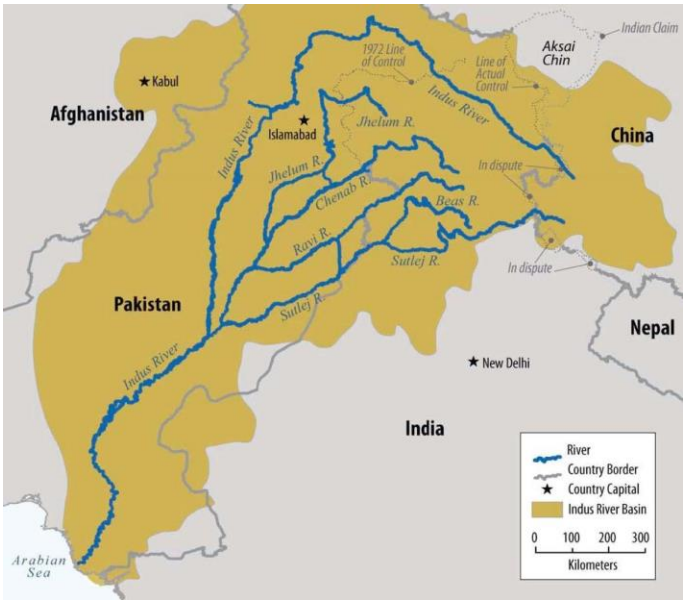
[60] "Indus Basin." *Aquastat Food and Agriculture Organization of the United Nations.* (2011). http://www.fao.org/nr/water/aquastat/basins/indus/index.stm. (accessed April 8th, 2015)
[61] "India's climate- Monsoon , or later." *The Economist* (July 28, 2012).
[62] "The Indian Monsoon in a Changing Climate." *The Royal Meteorological Society*. http://www.rmets.org/weather-and-climate/climate/indian-monsoon-changing-climate. (Accessed June 20, 2015)
[63] FAO, 2011
[64] FAO, 2011
[65] FAO, 2011
[66] Ibid

Figure 2- Indus Basin[67]



The Indus Treaty

The Indus Water Treaty (IWT) is an agreement on the governance of the Indus River on water distribution between Pakistan and India. After decades of attempts to form an agreement, it was finally signed in 1960.[68] As it was difficult for each party to come to an agreement, the World Bank offered assistance by providing a proposal to be used as a framework for an agreement. The World Bank's proposal, which was agreed by both parties to become the treaty, was to allocate water by dividing rights to the Western and Eastern Rivers.[69] Under Article II of the IWT, India has the unrestricted right to consume water born from the Sutlej, Beas, and Ravi Rivers, also

[67] US Senate report, 2011
[68] Miner et al. "Water sharing between India and Pakistan: a critical evaluation of the Indus Water Treaty." *Water International* (June 2009): 204
[69] Ibid

known as the Eastern Rivers.[70] In contrast, Article III allows Pakistan the unrestricted use of the Western rivers, which includes the Jhelum, Indus, and Chenab Rivers.[71] Under the treaty, neither India nor Pakistan is able to obstruct or consume waters that are designated to the other signatory, except for irrigation, non-consumptive uses, domestic consumption, and hydroelectricity generation.[72]

The treaty also provides a framework for a dispute settlement process, should a party feel that the other is not meeting its obligations. In an event where conflict arises, parties are able to resolve the issue in the Permanent Indus Commission (PIC).[73] According to Article VIII of the IWT, officials from India and Pakistan represent the Commission and meet at least once per year.[74] The PIC does not only meet to resolve potential issues, but also shares technical information regarding changes to the rivers' hydrology. Sharing technical information often allows the two signatory parties to avoid issues before they escalate, and allows the capacity for countries to enter into dialogue about new developments. The treaty also provides a mechanism for situations where neither Commissioner is able to come to an agreement over a dispute. In such event, either party can seek judgment by a Neutral Expert (NE).[75] The NE is primarily appointed in cases where there is disagreement over a technical matter. It is important to note that should a Neutral Expert come to a decision, it is both final and binding on both parties to the IWT.[76] However, in a case where

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[70] Miner et al, 204
[71] Ibid
[72] Ibid
[73] Miner et al, 204
[74] "Indus Water Treaty, 1960." *The World Bank*. http://siteresources.worldbank.org/INTSOUTHASIA/Resources/223497-1105737253588/IndusWatersTreaty1960.pdf. (Accessed April 09 2015.)
[75] IWT, Article IX, 1960
[76] Ibid

the NE is unable to come to a decision, the dispute can be referred to a Court of Arbitration as determined by Article IX of the IWT.[77] Once the Court reaches a decision, it must be respected and followed by all parties.

Role for the IWT: Results on reducing conflict

As previously mentioned, conflict is defined here more broadly than armed violence. While conflict and disagreement are traditionally common occurrences between Pakistan and India, this paper examines only conflict that is related to the management of the Indus basin. In the conflict database provided by Oregon State University, the lowest value on the scale is -7, which means a formal declaration of war. In contrast, voluntary unification into one nation is the highest value on the scale, or 7. The database only incorporates instances of conflict when it is related to the management of the basin. I have not only collected all of the instances of conflict in the region, but the instances of cooperation as well, from 1948 to 2008. As cooperation contradicts conflict, it is important to analyze it as an indicator of reduced conflict. In order to analyze the relevance of water sharing treaties, this section will examine the level of conflict before and after the IWT was introduced in 1960.

Initially, it would seem that the IWT had no influence on reducing conflict between both riparian states. In fact, it would seem that decades after the agreement, instances of conflict occurred more often than before the treaty. As demonstrated in Figure 3, on an average of 5 years, instances of conflict increased after 1965. It is not surprising that the basin's peak of cooperation, thereby the lowest instances of conflict, are between 1960 and 1970, which are the years during and following the establishment of the IWT. However, from 1995 to 2008, it would seem that there

[77] IWT, Article IX, 1960

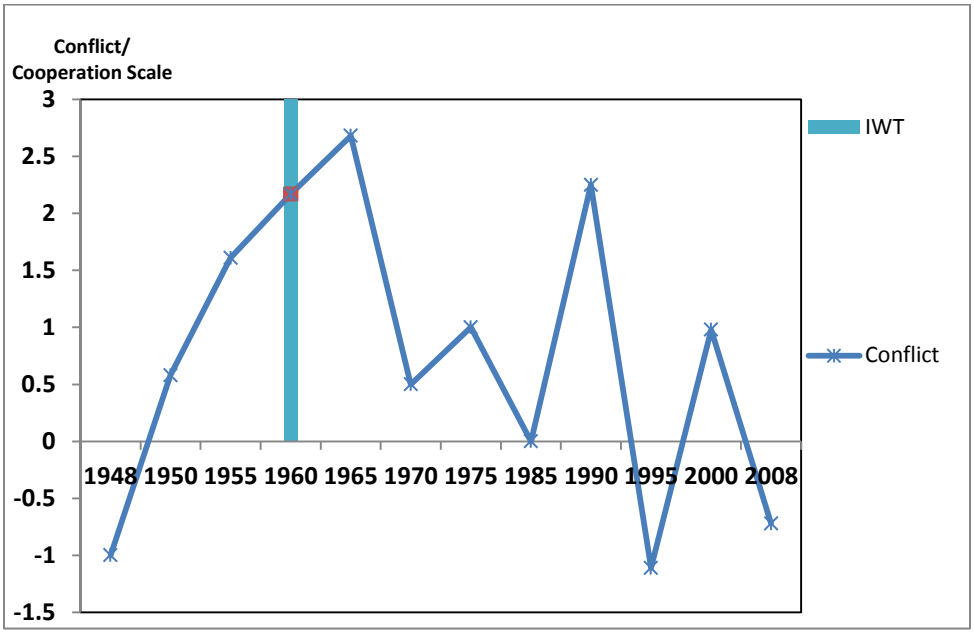
were more instances of conflict than there were before. In fact, it would appear that there was a 172% increase in conflict from 1950 and 2008. Therefore, if we examine the events within the basin on a five year average, it would seem that the IWT had little to no influence on reducing conflict between riparian states. It is important to note that this does not necessarily mean that the treaty has increased the level conflict in the region, as there are likely other factors that have played a role.

To avoid oversimplifying events by taking a five year average, Figure 4 demonstrates the average level of conflict or cooperation per year. As one can see, it is more difficult to discern any trends from before and after the IWT was implemented. However, like the other graph, it shows that cooperation in the Indus was highest, thereby making conflict at its lowest, immediately before and after the IWT was signed. Similarly, it also shows that on average, there were more instances of conflict from 1995 to 2008. Consequently, it would seem so far that the IWT did not have a significant influence on reducing conflict related to governing the Indus basin.

While there have been quite a few instances of conflict in the Indus, despite having an agreement in place, the severity has been quite limited. According to the database, water-related conflict in the Indus only escalated to -3 on the scale, which translates to diplomatic-economic hostile actions. This includes unilaterally constructing projects that are opposed by other states, intentionally reducing the supply of water to another state, or abolishing a water agreement. There were more instances -3 conflicts after the agreement, or from 1998-2005, than before 1960. Furthermore, ignoring events associated with the signing of the IWT, the highest degree of cooperation were instances where India and Pakistan had a non-military economic, technological, or industrial agreement (+4). This includes legal and cooperative agreements that are not treaties, including cooperative projects for water basin management or irrigation. Interestingly, it would

appear that the number of instances of cooperation reaching this level did not change after 1960. Thus, while on average there were more instances of conflict after the establishment of the treaty, high levels of cooperation still remained.

Figure 3- Instances of conflict/ cooperation on an average of 5 years (1948-2008)

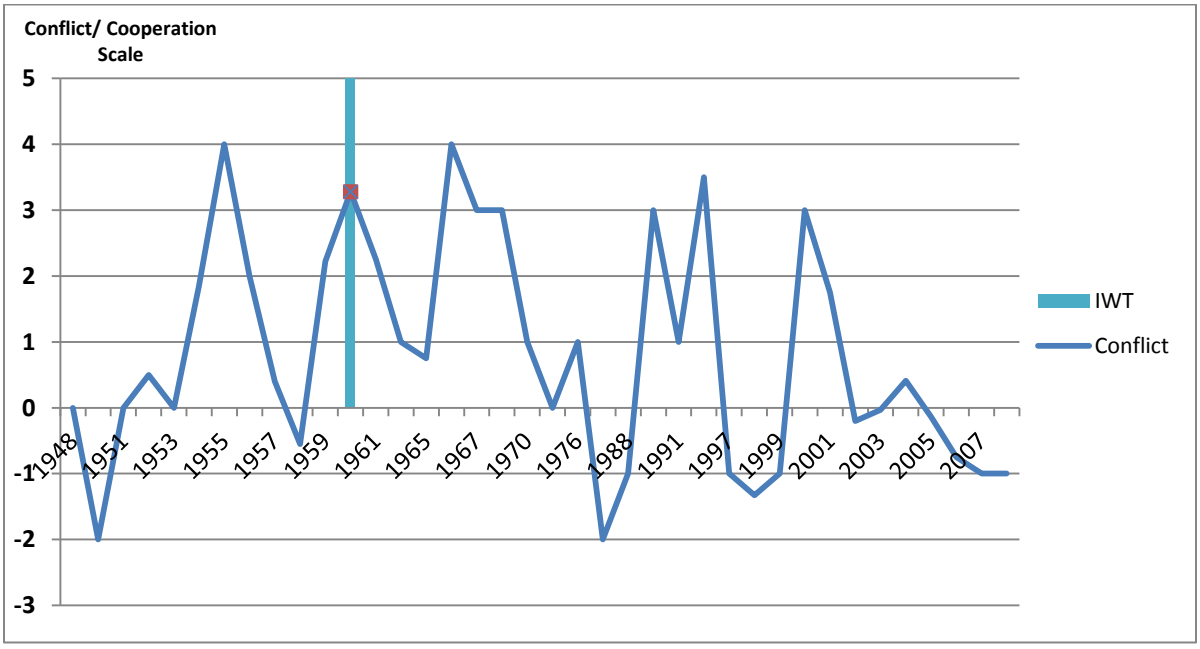


The results prove to be surprising as the Indus Water Treaty is often regarded as an example of a robust water-sharing treaty that should serve as model for other countries.[78] This is because Indian and Pakistani relations have been quite poor since 1950. Many authors have pointed out that the IWT has survived three India-Pakistan wars in 1965, 1971, and the Kargil war in 1999.[79] It has also weathered through instances of major bilateral tensions, including the Brasstacks Exercise (1986-1987), Kashmir (1990), Border Confrontation (2001-2002), and the

[78] P.R, Chari, " Indus Waters Treaty-II: Optimizing the Potential." *Institute of Peace and Conflict Studies* (2014): 3
[79] Chari, 3

Mumbai attacks (2008).[80] While none of these were water related, India, as the upper riparian state, could have easily violated the treaty by restricting water flow, in order to put pressure on Pakistan during the war. However, this did not occur and India followed the treaty despite being at war with Pakistan.

Figure 4- Instances of conflict/cooperation on average per year (1948-2008)



Despite the amount of conflict post-IWT, one reason why it is often heralded as a success story is because many conflicts over the Indus are dealt efficiently and productively in part due to the IWT. At worst, cases are brought to a Court of Arbitration. While this method arguably takes more time and money to resolve disputes, it is effective at resolving issues between parties. Thus, the treaty at least provides a mechanism for addressing conflict early and constructively before it escalates to a higher degree of conflict. Thus, it can be argued that even though a trend may exist

[80] Chari, 3

regarding an increase in conflict post-IWT, it may have contributed to the prevention of higher degrees of conflict that would have occurred without a treaty.

The influence of Water Availability

As stated previously, an increase in water scarcity in the Indus could increase the likelihood of conflict. States could place blame on each other for low levels of water availability since it is a shared resource. The idea is that because water is quintessential to the economy, countries are less likely to respect formal rules if they have extremely low levels of water. According to the United Nations, water scarcity is defined as the point where the annual supply of water is below 1,000 cubic meters per capita.[81] Conditions of water stress, which is less serious than water scarcity, is defined as the point where per capita water levels are below 1,700 per year.[82] Therefore, if the Indus basin is under conditions of water scarcity or water stress after the IWT was signed, but not before, then it would likely have an influence on levels of conflict.

In the 1950s, years prior to IWT, water in the Indus was much more abundant than today. According to different sources of literature, the basin's water availability ranged to about 5,000 cubic meters per person.[83] Therefore, water was quite abundant before the agreement in 1960. Post IWT, water availability per capita has been approximately 1,500 cubic meters per year.[84] This is a 70% drop in water availability for a period of around 55 years. This is significant because water

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[81] "Water Scarcity-International Decade for Action 'Water For Life' 2005-2015." *United Nations Department of Economic and Social Affairs (UNDESA).* http://www.un.org/waterforlifedecade/scarcity.shtml. (Accessed December 2014).
[82] Ibid
[83] Kugelman, Michael. " Introduction." *in* Michael Kugelman and Rover Hathaway, *Running on Empty-Pakistan's Water Crisis*. (Woodrow Wilson International Center for Scholars, Washington DC): 5
[84] Ibid

availability that is below 1,700 cubic meters is considered to be under water stress, thus making the river basin frequently under water stress in recent years.

The conditions are even worse in Pakistan. In some regions, post –IWT water levels are below 1,000 m^3 per capita annually.[85] Thus, having some regions under water scarcity may place quite a lot of stress on Pakistan, especially considering it significantly relies on agriculture and textiles, which are both highly water intensive products. In fact, the agricultural sector employs 45% of Pakistan's labour force.[86] Furthermore, Pakistan exported over $13.8 billion in textile products in 2012, representing 63% of its national exports.[87] In contrast, according to the Food and Agriculture Organization of the United Nations, water availability in India has been approximately 1,500 m^3 per person.[88] Therefore, Northwest India's water availability is similar to the water stress levels of the entire region. As a result, Pakistan and India may have been more in conflict with each other because both nations are under pressure to address a growing demand for water, while quantities are becoming more stressed, especially for Pakistan. Thus, this may have had a large influence on the frequency of conflict after the 1960 treaty.

The influence of water withdrawals

While levels of water scarcity demonstrate the amount of water availability in a given region per person, water consumption data shows the degree of water that is used. Both are useful tools for examining basin stress, as water scarcity shows the supply of water, while withdrawals

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[85] Kugelman, 5

[86] "Chapter 2- Agriculture." In *Finance.gov.pk Survey*. http://www.finance.gov.pk/survey/chapter_12/02-Agriculture.pdf. (accessed April 09. 2015).

[87] Leon Kaye. "Clothing to dye for: the textile sector must confront water risks." *The Guardian*. (August 12, 2013).

[88] "Aquastat-India" *Food and Agriculture Organization of the United Nations.*http://www.fao.org/nr/water/aquastat/countries_regions/ind/index.stm (Accessed May 15, 2015).

indicate demand. High levels of water consumption could be a factor in increasing conflict since riparian states may resent each other, especially upper riparian states, if it is perceived that they are overconsuming. This is because overconsumption can inevitably lead to declining water tables that affect the river's ability to rejuvenate. Therefore, large variations of water consumption prior to treaty formation as compared to present levels could indicate that water consumption is a driver of conflict.

Within the Indus basin, water withdrawals have increased significantly in the last 30 years. Unfortunately, data on water withdrawals in the Indus region in the 1950s was not collected, and thus, later data must be used. According to data from the Food and Agriculture Organization, total water withdrawals increased by 77%, from 544.4 to 944.5 km^3 between 1970 and 2008.[89] While this provides little information about the water usage prior to the IWT, population data could suggest an increase in consumption levels. This is a logical assumption as a larger population will require increased quantities of water. From 1955 to 1975, population in both India and Pakistan grew by 53.9%.[90] Thus, we can assume that water consumption in the 1950s was lower than in 1975. Consequently, water consumption has drastically increased from prior to IWT.

These results are unsurprising as water withdrawals are naturally going to coincide with both economic and population growth. Increased water consumption will not necessarily encourage conflict on its own; however, if it affects the renewable supply of water, conflict may be more likely to occur. According to the FAO, in 2010 surface water and groundwater withdrawals

[89] It is important to note that 1 cubic kilometer = 1 billion cubic meters ."Aquastat database, 2012," *Food and Agriculture Organization of the United Nations*. http://www.fao.org/nr/water/aquastat/main/index.stm.(Accessed May 2015).
[90] "Worldmeters." *Worldmeters.* http://www.worldometers.info/. (Accessed June 2015).

accounted for 40% of total renewable water resources in India.[91] In Pakistan, the total surface water and groundwater withdrawals represented 74% of the total renewable water sources in 2008.[92] While this is aggregate country level data, Pakistan relies on the Indus for almost all of its water supply, while India relies less on the Indus considering the country's access to the Ganges-Brahmaputra basin.

Reports of overconsumption by both Pakistan and India have shown growing concerns about increasing water withdrawals while the renewable supply is seemingly receding.[93] Consequently, if both states are concerned about overconsumption of the river, it may have an influence on the amount of conflict in the region. As Pakistan is one of the most water stressed regions in the world, and consumes large quantities of water to support agriculture and textile production. Therefore, tensions could be high between the two states over a perceived view of poor water management. Therefore, the number of increased instances of conflict may have been partially due to high water withdrawals post-IWT.

Indus Economic Interdependence

While high levels of economic interdependence won't necessarily cause a reduction in conflict, it may be a factor in encouraging cooperation. The reasoning is that countries may be reluctant to oppose each other if they benefit economically from close cooperation. Therefore, if there are low levels of economic interdependence, then we can expect that states would be more likely to object to certain issues or even engage in physical conflict. Copeland, in fact, argues that

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[91] "Aquastat-India." *Food and Agriculture Organization of the United Nations* (2011). http://www.fao.org/nr/water/aquastat/countries_regions/ind/index.stm. (Accessed April 2015).
[92] "Aquastat-Pakistan." *Food and Agriculture Organization of the United Nations* (2011). http://www.fao.org/nr/water/aquastat/countries_regions/pak/index.stm. (Accessed April 2015).
[93] Shakil A Romshoo. "Indus River Basin-Common Concerns and the Roadmap to Resolution." *Centre for Dialogue and Reconciliation.* (2012): 24

when there is a positive expectation that future trade will provide long-term benefits between countries, then countries are less likely to engage in armed conflict, as they do not want to disrupt commercial interests.[94] This section will examine trade dependence as an indicator of economic interdependence. Thus, low levels of trade between nations may suggest a positive relationship with the number of instances of conflict.

For Pakistan, trade dependency with India was quite high prior to the IWT. In fact in 1949/1950, Pakistan imported 31% of its goods from India, while Pakistan's exports to India represented 35% of its total exports.[95] In contrast, in 2010, Pakistan's exports to India amounted to 1.2% of its total exports.[96] In regards to imports, Pakistan relied on India for 5.9% of its imports in 2010.[97] Therefore, Pakistan significantly relies less on India for trade than it did before the IWT. This is unsurprising given the fact that Pakistan gained its independence in 1947, in which both India and Pakistan were British colonies. Furthermore, since global trade has increased significantly in last few decades, it is only logical that Pakistan would rely more on trade from countries like China and the U.S.

Imports from Pakistan as a percent of total imports was lower for India than it was for Pakistan. From 1951-1956, India imported on average 5% of its imports from Pakistan.[98] Similarly, India's total exports to Pakistan only amounted to about 6.5% of its total exports.[99]

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[94] Copeland, Dale C. *Economic Interdependence and War*. (Princeton Studies in International History and Politics, November 2014): 2

[95] "Pakistan Economy in 1950." *The Economic Weekly* (February 3, 1951): 135

[96] " International trade in goods- exports 2001-2014." *International Trade Centre.* http://www.intracen.org/itc/market-info-tools/statistics-export-country-product/.(Accessed May 2015).

[97] Ibid

[98] M. Nasrulllah Mirza. "Economic Cooperation between Pakistan and India: Need, Problems, and Prospects." *Program in Arms Control, Disarmament and International Security* (2005):13

[99] Syed Imran Sardar. "Trade Liberalization Between India and Pakistan: Focussing Direct and Indirect Barriers." *Institute of Regional Studies:* 5

Hence, India was not overly economically dependent on Pakistan prior to the 1960 agreement. Interestingly, trade interdependence with Pakistan has further decreased in recent years. According to the International Trade Centre, in 2010 India's exports to Pakistan accounted for 1% of its total exports.[100] India's import reliance on Pakistan is even smaller, with India's imports from Pakistan representing 0.7% of total imports.[101] Thus, while it could be argued that India would be more likely to engage in conflict with Pakistan, since it is not overly trade dependent with the country, it is unlikely that it had any influence on the number of instances of conflict in the past 2 decades. This is because its economic dependence levels did not overly change since before 1960. That being said, as Pakistan drastically became less economically dependent on India, it could afford to be more confrontational with India. Consequently, this could have influenced the number of disputes that Pakistan brought up on India for arbitration.

Indus Military inequalities

This section examines the military strength between the two countries to determine if there are power imbalances. The reasoning is that conflict is less likely to occur if there are large military power imbalances since a smaller state, fearing for its survival, is more likely to be coerced into complying with a larger state. Therefore, we can expect that conflict is more likely to occur if military power in the region is contested amongst states, since states have more freedom to raise potential issues. This isn't to say that conflict will necessarily occur from equalized military strength, but it may have an influence on encouraging states to be more vocal on issues about river management.

[100] ITC, 2010
[101] Ibid

Unfortunately, it would seem that there was not any available data on the number of armed personnel between Pakistan and India in the 1950s. However, since there was a war between Pakistan and India between 1947-1948, it is logical to assume that the number of armed forces immediately following the war were at similar levels as both sides had a similar number of casualties, about 2,000.[102] The number of armed forces in the last few years has not diverged. According to data from the World Bank, in 2010 Pakistan had a standing army of 946,000 active duty members.[103] India's armed personnel, on the other hand, greatly outnumbered those of Pakistan, which had a third of India's numbers. In 2010, India employed 2,625,586 active duty military personnel.[104]

Since India's military seems to be considerably stronger, we would expect to see lower levels of conflict due to military coercion. However, since the instances of conflict have increased in the last couple of decades, it would seem that military power differences may not have played a role in the region. This is because conflict over managing the Indus increased over time, despite military power imbalances.

4.2- Mekong River Basin

The Mekong River is ranked as the 21st largest river basin in the world, covering a total area of 795,000 km².[105] Like the Indus River, the Mekong River originates from the Himalayan Mountains, but eventually flows down to the sea in southern Vietnam. The Mekong river basin is

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[102] "Indo-Pakistani Wars." *New World Encyclopedia*. http://www.newworldencyclopedia.org/entry/Indo-Pakistani_Wars. (Accessed June 2015).
[103] "Armed forces personnel, total." *The World Bank.* http://data.worldbank.org/indicator/MS.MIL.TOTL.P1. (Accessed May, 2015).
[104] Ibid
[105] "Mekong Basin." Food and Agriculture Organization of the United Nations (2011). http://www.fao.org/nr/water/aquastat/basins/mekong/index.stm. (Accessed April 24, 2015)

distributed between six riparian states: China, Myanmar, Laos, Thailand, Cambodia, and Vietnam.[106] The largest distribution of the basin's area is in Laos, accounting for 25% of the basin's total area, followed by Thailand with 23%.[107] The next subsequent highest is China, Cambodia, and Vietnam with 21%, 20%, and 8% respectively.[108] Myanmar has the lowest distribution of the river's total area with 3%.[109] Furthermore, according to the Food and Agriculture Organization, approximately 70 million people rely on the Mekong.[110] As one can see in Figure 5, most of the river is concentrated in the central parts of Laos and Cambodia, while the river is only located in southwestern China, eastern Myanmar and Thailand, and southern Vietnam. That being said, the Mekong splits into a variety of different tributaries that form sub-basins.

While most of the Mekong's flow originates from the Himalayas, the upper basin, which is largely located in China, it only accounts for 16% of flow per year.[111] However, when the region is undergoing its dry season, the basin relies on 30% of flow from the Himalayas as well as water from China.[112] Thus, rainfall remains a high influence in maintaining the river's flow. The southwest monsoon season lasts quite long, which occurs from approximately May until September or October.[113] However, this heavily depends on the area. Similar to the Indus, the monsoon season is becoming more irregular in the amount of water delivered as well as the timing of the year, which is largely thought to be due to climate change.

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[106] FAO Mekong, 2011
[107] FAO Mekong, 2011
[108] Ibid
[109] Ibid
[110] Ibid
[111] FAO Mekong, 2011
[112] Ibid
[113] Ibid

Figure 5- Mekong river basin[114]

The Mekong River Commission

The Mekong River Commission (MRC) was established in 1995 between Laos, Cambodia, Thailand, and Vietnam.[115] This agreement provides a mechanism for joint management and economic development of the Mekong River system.[116] However, this agreement has evolved since its previous attempts in 1945. In 1947, the United Nations sought to increase certainty in the region and knowledge of the basin in order to prepare for major hydroelectric development by establishing an agreement.[117] This was accomplished by establishing the Mekong Committee (MC)

[114] "Mekong River Basin." *Great Rivers Partnership.* http://www.greatriverspartnership.org/en-us/asiapacific/mekong/pages/default.aspx. (Accessed June 2015).
[115] Ibid
[116] Ibid
[117] "The BDP Story." *Mekong River Commission Secretariat* (2013): IV

and the National Mekong Committees in 1959.[118] The primary purpose of the MC was to help facilitate hydroelectric projects. In the 1970s, management of the Mekong was stalled due to the amount of political conflict in the region.[119] Consequently, three of the riparian states, Thailand, Laos, and Vietnam established the Interim Mekong Committee in 1978, which only implemented small hydroelectric projects in the region. After the Khmer Rouge regime fell, negotiations for a separate UN agreement, which would be recognized under international treaty law, began in 1994. In 1996, both China and Myanmar agreed to work and cooperate within the framework of the MRC, becoming Dialogue Partners.

The MRC is made up of three permanent bodies: 1) the Council, 2) the Secretariat, and 3) the Joint Committee.[120] The Council consists of one member of cabinet, or a senior political representative from each country, to make decisions on major issues of governance and coordination over the management of the basin.[121] Furthermore, the Council only meets once a year. Members of the Joint Committee are often senior officials of government departments that are responsible for implementing policies related to the MRC from their respective member governments. Its major function is to supervise the Secretariat and ensure the implementation of MRC policies, such as the management board.[122] Lastly, the Secretariat's main responsibility is to carry out the operations of the MRC as well as to provide technical knowledge to the Joint Committee and Council.

[118] Mekong River Commission Secretariat, 2013
[119] Mekong River Commission Secretariat, 2013
[120] FAO Mekong, 2011
[121] Ibid
[122] Ibid

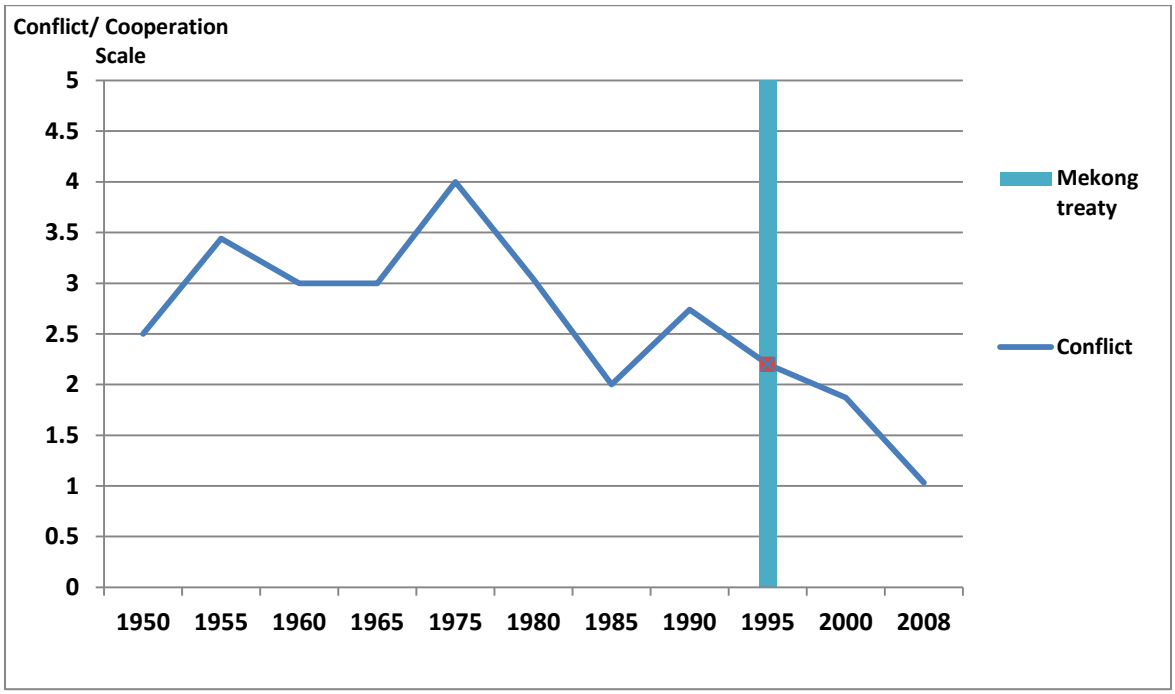
Role for the MRC: Results on reducing conflict

According to the data results, it would appear that the MRC had no distinguishable influence on reducing conflict. As depicted in Figure 6, while on average of 5 years, there has been little to no conflict before and after the treaty, it does appear that the degree of cooperation is decreasing. In fact, the degree of cooperation decreased, on average, by 70% from 1955 and 2008. These findings do not necessarily point to a negative outcome, in which treaties lead to conflict. In fact, high degrees of cooperation may not be required to resolve minor issues that can be addressed and resolved early. Hence, mechanisms in the MRC may be in place to resolve potential conflict between parties without needing significant degrees of cooperation.

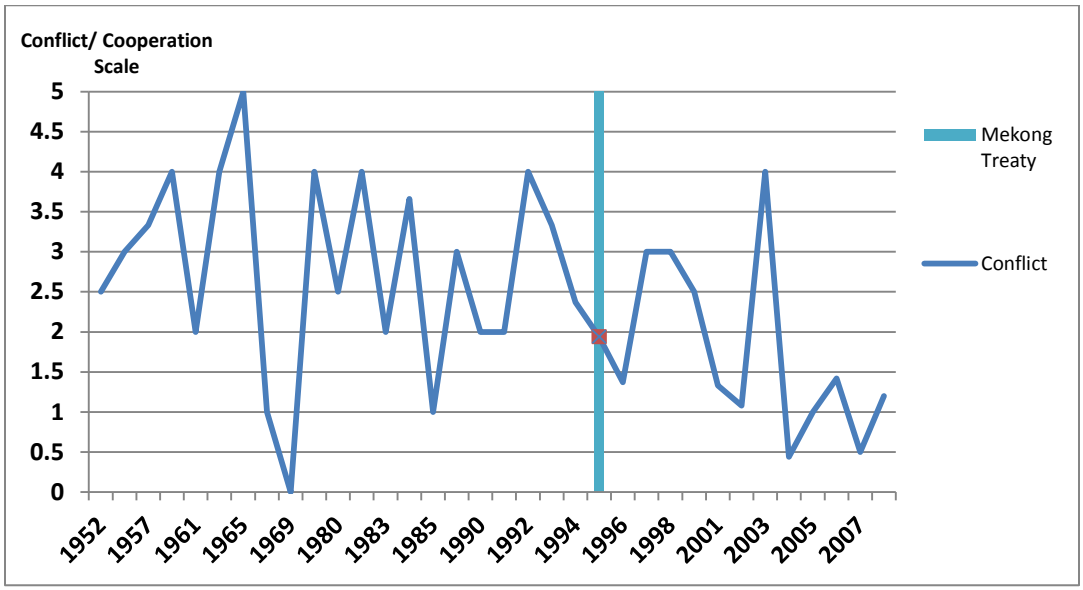
According to the data, the highest degree of conflict in the Mekong basin has been mild verbal expressions displaying discord in interaction, or -1 on the scale. These expressions are often unofficial and official requests from one party to the other on changing its policies. It would seem that this rarely occurred before the MRC, and only appeared after the establishment of the MRC. Furthermore, not only does it appear that there were more instances of cooperation before the treaty, even despite two decades of conflict in the region, there is also a higher degree of cooperation before the agreement. For example, there were two instances where cooperation had reached +6, known on the scale as an international freshwater treaty or major strategic alliance. However, this is largely due to the establishment of the Mekong Committee as well as an agreement on energy development between Thailand and Laos. This is logical as cooperation would naturally decrease immediately following the formation of a treaty. However, it also shows that the treaty had no influence on increasing the instances of conflict, which is different to what we found in the Indus.

If we examine the average degree of conflict or cooperation per year, it provides similar results. Figure 7 demonstrates that while it would appear that the level of cooperation is declining, there is a higher degree of variability per year. Furthermore, both graphs fail to highlight the establishment of the MRC as the highest point of cooperation within the basin. This is interesting, as one would expect that the formation of an international intergovernmental organization would clearly be reflected in the graph. A possible explanation is that there have been a large number of agreements to share or invest in hydroelectric generation. This includes memorandums of understandings (MOUs) on irrigation and electricity between Thailand, Laos, and Vietnam.

Figure 6-Instances of Conflict/cooperation on an average of 5 years in Mekong River (1950-2008)



F**igure 7**-Instances of conflict/cooperation on an annual average in the Mekong River (1950-2008)



The influence of water availability

Water availability in the Mekong basin, like it did in the Indus, varies among countries. In 1992, Laos, the state with the highest water availability in the region, had an annual supply of 74,146 m^3 per capita.[123] For lower riparian states, Thailand in 1992 had the lowest water availability in the basin, with an annual supply of 7,379 m^3 per capita.[124] While China has a lower water availability rate (2,368 m^3 per capita), its rate encompasses water availability of the entire country, and China's highest water scarcity levels are in the north. Consequently, this does not provide an accurate depiction of Chinese water availability in the Mekong region.[125] While post Mekong treaty the renewable water supply per capita decreased, no country in the Mekong basin

[123] "United Nations Economic and Social Commission for Asia and the Pacific." UNESCAP.org.http://www.unescap.org/resources/21-water-availability-and-use. (Accessed June 2015)
[124] Ibid
[125] Ibid

approached conditions of water stress. In 2007, the country with the lowest water availability, other than China, was Thailand, with a water availability rate of 6,637.5 m^3 per capita annually.[126] For Thailand this is a 10% decline in renewable water supplies. Furthermore, in 2007 Laos remained the most water available country per person in the region, with a annual supply of 55,460 m^3. For Laos, this was a 25.2% decline from 1992.[127]

While the river basin saw a steady drop in cooperation post 1995 treaty, it is unlikely that the decrease in water availability had any influence. As mentioned, decreasing degrees of cooperation do not necessarily mean that more instances of conflict will occur, as management of the river becomes increasingly business as usual. Furthermore, according to the World Resources Institute, the Mekong basin is within the top 15 least water stressed rivers in the world.[128] Therefore, the current supply is likely to be able to cover national needs without causing contention between members.

Water consumption on conflict

As one might expect, water withdrawals per capita have largely increased in the Mekong from levels before the 1995 treaty. In the 1990s Vietnam had the highest per capita withdrawals, with 915 m^3 per year, which represented 20% of its water availability.[129] While Vietnam does not rely on the Mekong River for its total water withdrawals, it still represents a significant amount of annual withdrawals in the south. In contrast, Cambodia withdrew the least amount of water in the

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[126] "United Nations Economic and Social Commission for Asia and the Pacific." UNESCAP.org.http://www.unescap.org/resources/21-water-availability-and-use. (Accessed June 2015)
[127] UNESCAP, 2007
[128] "Aqueduct Country and River Basin Rankings." *The World Resources Institute* (2013). http://www.wri.org/publication/aqueduct-country-river-basin-rankings. (Accessed May 2015).
[129] Ringler, Claudia. "Optimal Water Allocation in the Mekong River Basin." *Center for Development Research* (2001): 8

1990s, accounting for annually 90 m^3 per person.[130] This represented 1% of Cambodia's total water availability.[131] Myanmar consumed less than Cambodia, with approximately 86 m^3 per year, however it is likely that much of that was outside the Mekong basin.[132] This is only because the Mekong only drains 4.2% of the basin within Myanmar, thus likely accounting for not a large percentage of the country's total consumption.[133]

Like in the Indus, it would seem that water consumption per capita increased from prior to the Mekong treaty. Vietnam in 2005 withdrew 963.7 m^3 per person, a 5.3% increase in consumption, which were the highest withdrawals per person in the region.[134] According to the Food and Agriculture Organization, Vietnam's total water withdrawals in 2005 accounted for 9.3% of its total renewable water supply.[135] Cambodia remained the lowest consumer of the river with 161 m^3per capita.[136]This was a 79% increase in water use, which accounted for 0.5% of its total renewable water supply.[137]

While a per capita increase in water consumption could cause tensions between Mekong riparian states, the degree of withdrawals do not seem to be high enough to warrant conflict. Considering both the highest and lowest consumers of the river withdrawal water at a rate that is well below the total renewable supply, it would be unlikely to induce any conflict between countries. This may be why the instances of conflict remain low. Therefore, the treaty may have

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[130]Ringler, 8
[131] Ibid
[132] Ibid
[133] "Aquastat-Myanmar." *Food and Agriculture Organization of the United Nations.* http://www.fao.org/nr/water/aquastat/countries_regions/mmr/index.stm. (Accessed May, 2015).
[134] UNESCAP, 2005
[135] "Aquastat-Vietnam." *Food and Agriculture Organization of the United Nations.* *http://www.fao.org/nr/water/aquastat/countries_regions/vnm/index.stm.* (Accessed May 2015).
[136] UNESCAP, 2006
[137] "Aquastat-Cambodia." *Food and Agriculture Organization of the United Nations.*http://www.fao.org/nr/water/aquastat/countries_regions/khm/index.stm. (Accessed May, 2015).

provided a role with the low levels of conflict in the Mekong since water availability and water consumption remained quite high before and after the treaty was implemented.

Economic Interdependence-Mekong

Surprisingly, there was little data on trade within the Mekong before the treaty in 1995. It is possible that this is because many countries in the region were preoccupied with recovering from war and domestic turmoil in the 1970s and 1980s.This is likely why the only available data during that period was from Thailand and China. Cambodia reported minimal exports in the early 1990s, as it was starting to open its borders after the departure of the Khmer Rouge and Vietnam's subsequent occupation. In 1993, China and Thailand were not economically dependent on trade from other Mekong countries. According to data from the United Nations Commodity Trade Statistic Database, China imported 0.7% of its total imports and exported 0.9% of its total exports from Mekong countries.[138] While Thailand reported a higher trade dependence on Mekong countries than China, in 1993 it still remained minimal. Thailand exported 2.7% of its total exports and imported 2.8% of its total imports from Mekong countries. Thus, before the Mekong treaty in 1995, trade dependency was quite low between countries. That being said, trade with Mekong countries increased by 200% for China since 1993, thus showing increasing trade reliance between members in the region.

Trade interdependence increased dramatically since 1993, with some countries depending on more than half of its trade from within the Mekong. In 2008, Laos was dependent on 86.1% of

[138] "UN Comtrade Database."*United Nations Commodity Trade Statistic Database*. http://comtrade.un.org/. (Accessed June 2015).

its total imports and 72.7% of its exports from Mekong river countries.[139] The least dependent on trade from other Mekong countries was China, accounting for 2.2% of its total exports and 2.6% of its total imports.[140] Most countries are dependent on about 5-10% of their total trade with countries in the region, but have been increasing trade over the years.[141] This could have had a positive influence on reducing conflict, as countries are less eager to confront each over issues, such as hydropower projects, when there are commercial interests at stake. It is difficult to determine whether this factor has had any influence on the region since the Mekong reported minimal instances of conflict before and after the treaty. Therefore, it is difficult to be certain whether trade dependence had a role in reducing conflict in the transboundary basin, given there was a significant change in economic dependence post treaty implementation.

Military force inequalities

As it might be expected, China had the largest number of armed personnel in the 1990s, with 3,500,000 in 1990.[142] In the same period, the country with the next highest number of active military members is quite a bit lower than China's. Following China, Vietnam enlisted 1,050,000 active Vietnamese military personnel in 1990, which is a third of the size of the Chinese military.[143] Comparatively, Laos had the smallest force, with 55,000 members in 1990.[144] Thus, prior to the Mekong treaty, there was a large gap in the sizes of militaries between Mekong countries, which may explain the low levels of conflict in the region.

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[139] "Trade Map. *"International Trade Centre*. http://www.trademap.org/Index.aspx. (Accessed June 2015).
[140] Ibid
[141] Ibid
[142] World Bank, 2015
[143] Ibid
[144] Ibid

Post 1995 treaty, the number of forces in both the top two countries fell. By 2010, China had 2,945,000 and Vietnam had 522,000 total armed military members.[145] The gap between the two countries with the highest military members was larger than in 1990, with China having more than 80% more forces. Laos remained to have the smallest military compared to other countries in the region with approximately 129,100 members in 2010.[146]

Since China's military is seemingly considerably stronger than the next highest, it is expected that instances of conflict will be minimal. While the theory did not hold in the Indus, it may have had an influence in the Mekong since there were low instances of conflict. Lately, there has also been concern about China's hydroelectric development in the basin, however the data demonstrates minimal instances of conflict. Therefore, it may be possible that lower Mekong nations have been careful in addressing concerns with China since its military force remains considerably stronger than the next largest military, Vietnam. Thus, this may indicate a larger role for Mekong coercive strength in reducing the instances of conflict, compared to the MRC.

4.3- The Nile River Basin

The Nile River basin stretches for 6,695 kilometers from the headwaters of the Kagera basin, near Burundi and Rwanda, to the Nile Delta in northern Egypt.[147] This covers an area of approximately 3.2 million km², which is about 10% of the African continent.[148] The source of the Nile flow originates from two main river systems: the Blue Nile, which comes from freshwater stored in the Ethiopian highlands, and the White Nile, which is sourced by the Equatorial Lake

[145] The World Bank, 2015
[146] Ibid
[147] "Understanding the Nile Basin." *The Nile Basin Initiative.* http://www.nilebasin.org/index.php/about-us/the-river-nile. (Accessed June 22, 2015).
[148] Ibid

Plateau in southeast Africa (near Burundi, Rwanda, and Tanzania), as seen in Figure 8.[149] The Nile has 11 riparian states, with Sudan and South Sudan covering the largest area of the basin, with 63.7% of the total area.[150] This is followed by Ethiopia with 11.7%, Egypt with 10.5%, Uganda at 7.4%, Tanzania at 2.4%, Kenya at 1.5%, Eritrea at 0.8%, and the Democratic Republic of Congo at 0.7%.[151] The last two countries with the lowest percent of area are Rwanda and Burundi, with 0.6% and 0.4% of total basin area respectively. According the World Wildlife Fund (WWF), the basin supports over 360 million people that use the river for their basic livelihood.[152]

Rainfall in the basin varies greatly depending on the region. For instance, near the source of the Blue Nile, in Ethiopia, rainfall can reach levels of over 1000 mm per year.[153] In contrast, precipitation in Egypt and Sudan can be quite limited. In fact, on average, Egypt receives less than 20 mm a year.[154] As a result, both Egypt and Sudan largely rely on flow from outside their territory, approximately 97% and 77% of water, respectively, come from other countries. In contrast, while many of the upper riparian states have less percentage of the basin's total area, they have most of the river's supply, as it is produced internally.[155]

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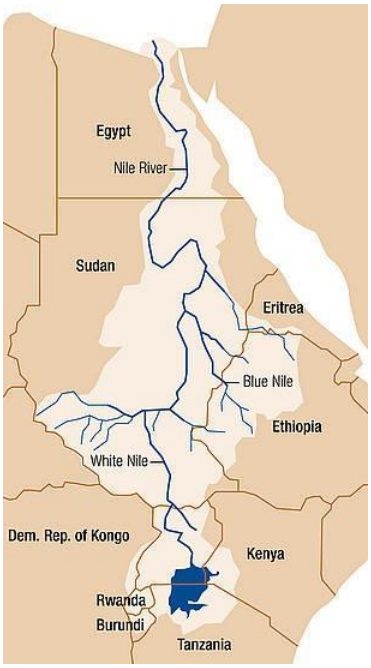
[149] "Irrigation potential in Africa: A basin approach." *Food and Agriculture Organization Corporate Repository.* http://www.fao.org/docrep/w4347e/w4347e0k.htm. (Accessed April 24, 2015).
[150] Ibid
[151] Ibid
[152] "Nile." *World WildLife Fund Global* .http://wwf.panda.org/about_our_earth/about_freshwater/rivers/nile/. (Accessed June 22, 2015).
[153] FAO Corporate Repository, 2015
[154] FAO Corporate Repository, 2015
[155] Ibid

Figure 8- The Nile River Basin[156]



The Nile: A river without a treaty?

As previously suggested, this paper is examining the level of conflict in the Nile precisely because it does not have a treaty among most of its riparian states. This allows us to compare and contrast the results with the other two basins that have implemented treaties. However, it is important to note that the Nile basin is not entirely treaty free. There are a number of colonial era bilateral treaties between countries. It is my intention to treat the Nile as a case without a water treaty largely because it does not have an encompassing modern regional agreement that provides

[156] "Nile." *World WildLife Fund Global* .*http://wwf.panda.org/about_our_earth/about_freshwater/rivers/nile/*. (Accessed June 22, 2015).

a framework for governing the river. More importantly, under international law, treaties become no longer valid for former colonies after states secede from states that colonized them.[157]

The United Kingdom entered into five water treaties on behalf of Egypt from 1891-1925, often with other European powers.[158] For instance, in April 1891, Italy and the UK signed an agreement to protect Egyptian interests in the Nile.[159] In 1925, in cooperation with the UK, Italy on the behalf of its states in Africa, such as Ethiopia, officially recognized Egypt and Sudan's prior hydraulic rights of the White and Blue Nile.[160] Consequently, they agreed to refrain from developing rivers that would restrict the Nile's flow. The most controversial of these agreements was the 1929 Nile Waters Agreement, which guaranteed an increase of water supply to Egypt, as well as restricted any measures to develop the river by Sudan or any other country under British control.[161] This treaty was signed by Egypt and the United Kingdom on behalf of Sudan and other nations it controlled. The agreement essentially provided Egypt with a veto over the development and administration of the Nile. However, due to the fact that these states have since gained independence, they are not bound by the UK's treaty obligations and the treaties signed on their behalf.

While treaties become binding if they have been signed after the decolonization period, there has been only one water sharing treaty in the region since. In 1959, Sudan and Egypt entered into a bilateral agreement over utilizing the Nile River.[162] This guaranteed an annual allotment of 84 billion cubic meters of water to Egypt, a joint hydroelectric project, and established a

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[157] Okoth-Owiro, Arthur. "Occasional Papers: The Nile Treaty." *Konrad Adenauer Stiftung* (2004) :11
[158] Okoth-Owiro, Arthur. "Occasional Papers: The Nile Treaty." *Konrad Adenauer Stiftung* (2004) :6
[159] Okoth-Owiro,6
[160] Ibid
[161] Ibid, 8
[162] Okoth-Owiro, 11

Permanent Technical Commission.[163] Consequently, this bilateral agreement is the only water treaty that is currently valid within the Nile, which excludes approximately 81% (or 9 out of 11) of the riparian states from formal obligations regarding management of the Nile.

While some may argue that the Nile Basin Initiative, an agreement to facilitate joint management of the Nile, could be seen as a treaty, it is false to attribute the organization as a treaty. The Nile Basin initiative (NBI) is an intergovernmental partnership between all riparian states, except for Eritrea, that creates a forum for dialogue and cooperation over the Nile.[164] That being said, the NBI was established in 1999 as an interim organization for the development of the Cooperative Framework Agreement, which has yet to be established.[165] Thus, because the NBI is not a formal agreement on governing the Nile, and it is temporary in nature, it is not categorized as a treaty.

The Ungoverned Nile: Results on reducing conflict

After examining the data from the International Water Event Database from 1948-2008, it would appear that conflict levels occur sporadically, by increasing and decreasing each year. As one can see in Figure 9 and Figure 10, there does not appear to be any distinguishable trend regarding the amount of conflict, on both a yearly and 5 year average. While it was hypothesized that conflict would increase without the formation of water treaty, the Nile case provides somewhat different results.

Not having a water-sharing agreement may explain why conflict sporadically increases and decreases in the Nile. Without having a framework that outlines roles and responsibilities for

[163] Okoth-Owiro, 11
[164] "About Us-The Nile Basin Initiative." *The Nile Basin Initiative.* http://www.nilebasin.org/index.php/about-us/nile-basin-initiative(June 22, 2015).
[165] Ibid

governing the shared river system, unilateral decisions are more likely to occur due to uncertainty. Furthermore, while the recently formed NBI can act as a forum for discussions, tensions are able to escalate as rules are not in place to inform countries on national objectives. Lastly, since treaties can provide a formal framework for resolving disputes between riparian states, such as a Court of Arbitration in the IWT, conflict may be more easily escalated in basins without treaties because there may not be system in place to constructively address concerns. As a result, higher degrees of conflict and cooperation are likely to occur sporadically.

Unlike the other case studies, the Nile had both the highest degree of conflict as well as similar degrees of cooperation. In fact, there was one instance of an extensive act of war that caused deaths, dislocations, or strategic cost (-6), as well as several small scale military instances of conflict (-5). As we have seen, this is the highest degree of conflict in either case studies. Interestingly, it also reached cooperation levels of +4, or instances of non-military economic, technological or industrial agreements, which was common among the treaty basin countries. Therefore, this may mean that water-sharing treaties may provide a mechanism for regulating conflict, despite having gone through periods of small instances of conflict themselves. Thus, it may be plausible that basins without treaties have higher degrees of variability between high levels of cooperation as well as conflict, as compared to those with treaties.

Figure 9- Instance of conflict/cooperation on an average of 5 years in the Nile River Basin (1948-2008)

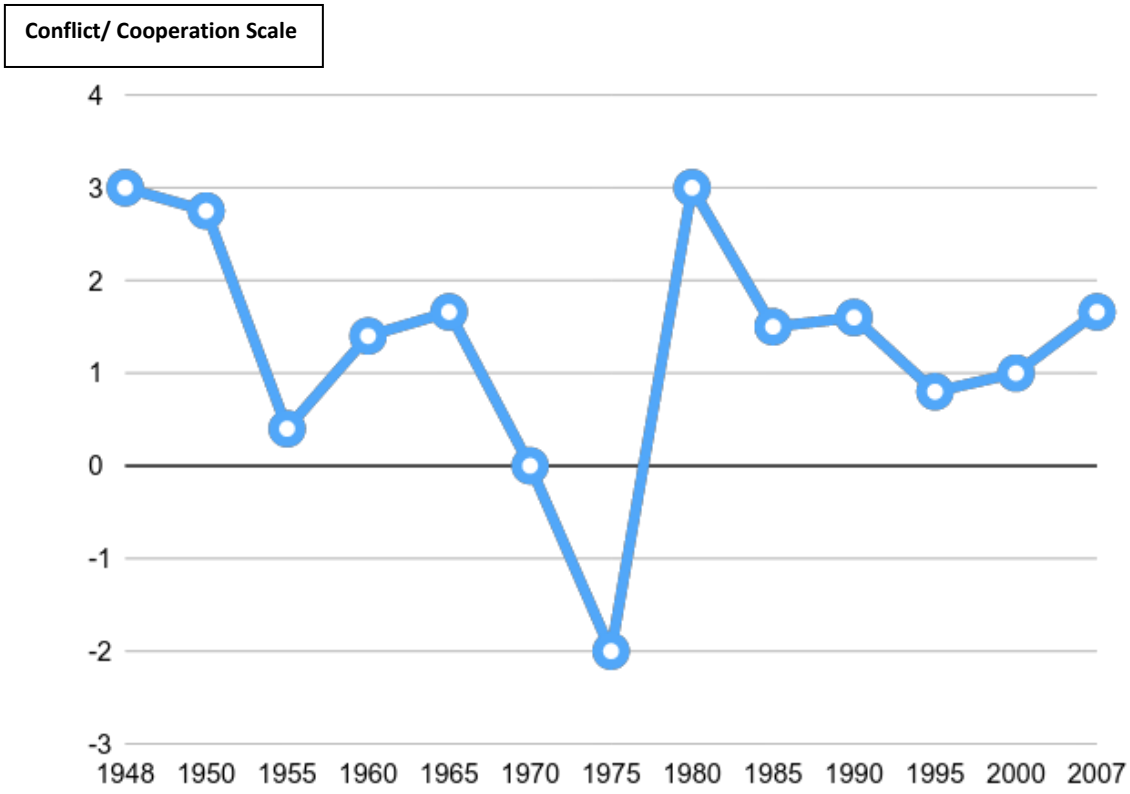
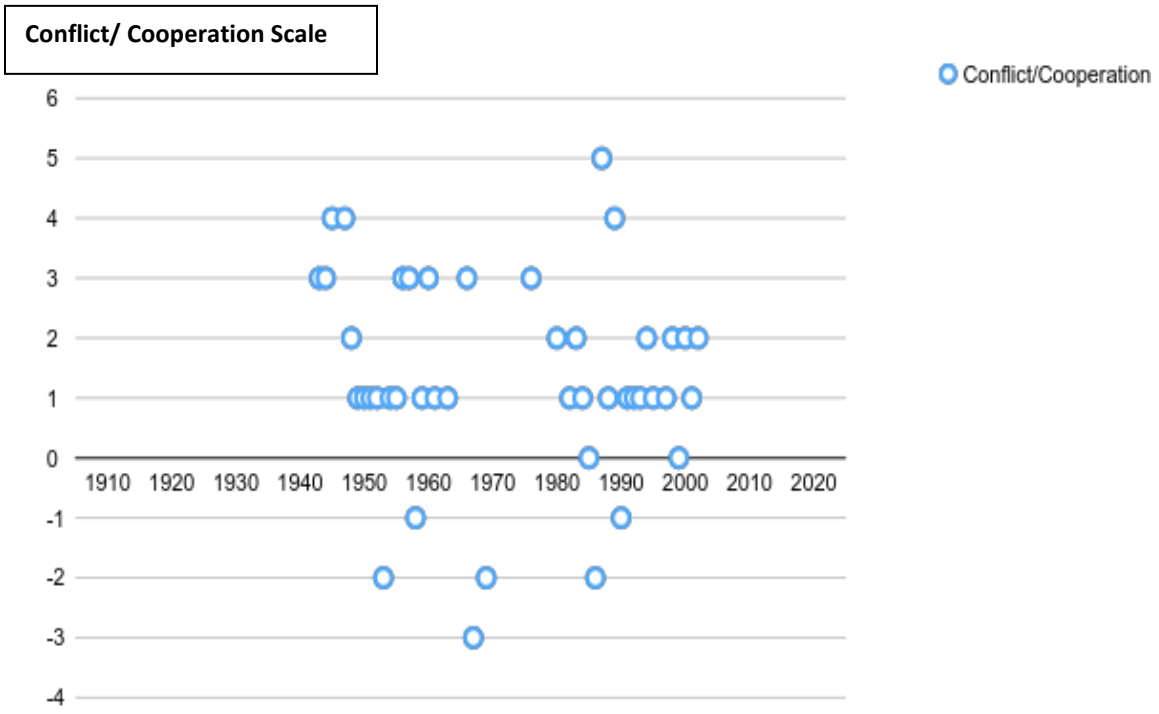


Figure 10- Instance of conflict/cooperation on average per year: the Nile River Basin (1948-2008)



The impact of water availability

Like the other case studies, the degree water availability in the Nile depends on the country. For instance, in 1994 the Democratic Republic of Congo (DRC) had the highest per capita water availability in the Nile with 23,111 m^3. Burundi, on the other hand, was under water scarcity by having a water availability rate of 563 m^3 per person.[166] Furthermore, many countries in the Nile saw a decline in the annual water supply per capita after 1994. In 2005 the DRC had a water availability of 19,003 m^3, which is a decline of 17% from 1994.[167] Other countries increased their

[166] Diana Rizzolio Karyabwite. "Water Sharing in the Nile River Valley." *United Nations Environmental Programme* (2000):11

[167] "Aquastat-Republique Democratique du Congo." *Organisation des Nations Unies pour L'alimentation et l'agriculture.* http://www.fao.org/nr/water/aquastat/countries_regions/cod/indexfra.stm. (Accessed May, 2015).

annual actual renewable water resources per person. Similarly, Burundi increased their annual renewable freshwater supply to 1,234 m^3 from 1994 to 2005.[168] For Burundi, this is a 119% increase from 1994.

While both periods had only 3 countries under conditions of water scarcity (1,000 m^3 per person), the number of countries under water stress (under 1,700 m^3 per person) increased from 5 to 68. This may have caused significant tensions between states, as this can hinder industry development, agricultural yields, and human quality of life. Furthermore, as there is no treaty that establishes rules and guidelines over managing the river, Nile states are more likely to blame each other for their water stress. Not only does this explain the high degrees of conflict, but it also shows the high instances of cooperation as well. As unmanaged water stress can provide considerable pressure on states, Nile countries have been eager to work together and establish a treaty. While there is a lot of disagreement over prior treaty rights, there is at least is an agreement that the current system needs to be reformed to address the decline in water supply. Therefore, water availability likely has had a significant influence on the on the degree of conflict in the Nile.

It would seem that water availability does play a role on influencing conflict in transboundary river basins. As we saw with the three case studies, the only basins that had countries that were under water stress or water scarcity reported increased instances of conflict, as shown in the Indus and Nile. As we can see, the Mekong region reported high level of water availability and yet low instances of conflict, thus indicating a possible relationship. This does not necessarily negate the role of water treaties, since the Indus reported lower degrees of conflict than the Nile, but it does suggest that low levels of water availability could drive countries to

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[168] "Aquastat- Burundi."*Organisation des Nations Unies pour L'alimentation et l'agriculture.*http://www.fao.org/nr/water/aquastat/countries_regions/BDI/index.stm. (Accessed May, 2015).

contention. This is because declining water supplies causes considerable economic and social stress on countries, which some attribute blame to other countries. Thus, water scarcity could influence the number of instances of conflict within a water basin, however a treaty may determine its severity.

The impact of Water withdrawals

Surprisingly, water withdrawals per person for most countries in the Nile did not increase by a large amount since the 1990s. The largest increase in consumption was from Uganda, from 12.23 to 17.53m^3, which is a 43.3% increase.[169] In contrast, Kenya decreased their withdrawals by 11.4% from 1990-2000, from 81.43 to 72.45 m^3 per person.[170] As one can see, Uganda's increase in withdrawals is minimal when it is compared to the total volume of water consumed by other riparian states. In the Nile, Egypt remains the largest consumer of the river, accounting for 1,000m^3 per person, which is considerably higher than Uganda's annual withdrawals.[171] While overall the region's increase in water consumption is minimal overconsumption remains rampant i some areas. This is considering the fact that many countries are under water stress as well as 90% of the region's renewable water supply is consumed annually.[172] It is especially high in Egypt and Sudan (including South Sudan), which account for withdrawals of 57% and 31% of the total water supply in the entire basin.[173] While Nile countries have different demographics and economic structures, Egypt and Sudan's annual withdrawals still remain extremely high. On a per capita

[169] FAO, 2008
[170] Ibid
[171] Ibid
[172] "Adaption to Climate-change induced Water Stress in the Nile Basin: A Vulnerability report." *United Nations Environment Programme* (2013):5
[173] Ibid

basis, Egypt and Sudan consume more than 10 to 15 times more than any other country in the basin.[174]

Unequal withdrawals at that magnitude are likely to cause significant tension between countries, especially given that some are under water stress. That being said, as Sudan and Egypt are both lower riparian states, like Pakistan and Vietnam, there is nothing technically preventing countries like Kenya and Rwanda from increasing their annual consumption, unlike the other cases as they have formal agreements. However, this would likely be quite contentious since the water supply mostly comes from outside Sudan and Egypt's territory. For instance, Egypt reported that 97% of its water came outside its territory.[175] Therefore, providing a higher burden on the water supply by allowing upper riparian states to consume levels similar to Egypt and Sudan, would likely both significantly damage the renewable supply of the river and cause significant conflict between nations. This has already been witnessed as Ethiopia has been increasingly seeking to develop its hydropower on the Blue Nile.[176] This has caused conflict with Egypt, as they claim the project threatens their national security since the river supplies Egypt with approximately 85% of its total water supply. Consequently, Egypt warned that further action could warrant military action.[177]

As we saw in the last cases, the Indus had high water withdrawal rates, while the Mekong less so. As the number of instances of conflict were higher in the Indus and the the Nile, it could be suggested that water withdrawals have a large influence on sprouting conflict. This because both the Nile and Indus had high per capita water withdrawal rates, yet only the Indus had a treaty in

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[174] "Adaption to Climate-change induced Water Stress in the Nile Basin: A Vulnerability report." *United Nations Environment Programme* (2013):5
[175] FAO, 2000
[176] MacDiarmid, Campbell. "Egypt to 'escalate' Ethiopian dam dispute." *Al Jazeera* (April 21, 2014).
[177] MacDiarmid, Campbell. "Egypt to 'escalate' Ethiopian dam dispute." *Al Jazeera* (April 21, 2014).

place. Therefore, it is likely that the level of water consumption plays a vital role in influencing conflict. It is likely that the combination of low water supplies, like in the Indus and Nile, and high water demand significantly influenced the number instances of conflict in both transboundary water basins. However, because the Indus reported lower less severe instances of conflict than the Indus, the treaty may have played a role in regulating state behaviour over water disputes.

The Impact of Economic Interdependence

There were similar problems with obtaining data on trade flow in the Nile before 2001, as many countries failed to report data. While it is uncertain why there is little publicly available trade data, it could be due to a lack of institutional capacity and a preoccupation with domestic instability in some of the Nile nations.That being said, trade data was available between Egypt and Nile countries in 1996. Surprisingly, Egypt was not dependent on trade from Nile countries to the slightest, since its exports to the region accounted for 0.1% of its total exports and 0.7% of its total imports.[178] While it unlikely that trade between Egypt and other countries in 1996 was an adequate representation of trade dependency in the entire region, it does provide a window into the possible level of interdependence between countries. However, if this does represent the level of trade interdependence in the Nile, then countries would not be persuaded to forgo conflict due to economic benefits from cooperation.

Unlike the Mekong, it would seem that trade interdependence between Nile states has remained low. In fact, Egypt reported a 42.8% decrease in imports from Nile countries from 1996 to 2008, from 0.7% to 0.4% of total imports.[179]Egyptian exports, on the other hand, increased from

[178] UN Comtrade, 2015
[179] Ibid

0.1% to 0.9% of total exports, which is a 800% increase.[180] Kenya remained an exception to most countries, as it reported a high dependence on trade with Nile countries. According to UN Comtrade, Kenya exported 3.2% of its total exports and imported over 33% of its total imports from the region.[181] However, bilateral and multilateral trade between Nile countries remained limited in 2008, from approximately 0.1% to 2%.[182]

As we saw in each case, more instances of conflict often occurred during periods of low economic interdependence. The proportion of trade between Pakistan and India declined significantly after 1960, which also saw an increase in the number of instances of conflict. In contrast, the Mekong region likely saw a significant increase in inter-basin trade, while remained relatively conflict free. While it is difficult to measure the difference in trade between 1996 and 2008 for the Nile, the proportion of inter-basin trade remained quite low in 2008, and thus does not disprove the theory as conflict remained. Consequently, economic interdependence may prove to be a vital factor in reducing conflict in transboundary river basins, if combined with a treaty.

Military force inequalities

Since the early 1990s, many Nile countries increased their military sizes substantially. For example, the Democratic Republic of Congo and Eritrea increased the number of military members by 297% (40,000 to 159,000) and 266% (55,000 to 201,750) respectively from 1993 to 2010.[183] While this would likely cause some concern among Nile states, neither country has the largest military in the region. Egypt continued to have the most military members in both 1993 and

[180] UN Comtrade, 2015
[181] Ibid
[182] Ibid
[183] The World Bank, 2015

2010, accounting for 424,000 in 1993 and 835,500 in 2010.[184] After Egypt, Eritrea contains the second largest military with 201,750. However, Eritrea's military force is less than a quarter (24.1%) of Egypt's, thus providing a large inequality in military forces. In 1993, Ethiopia had the second largest military in the region, accounting for 120,000 members, which was just over a quarter (28.3%) of the size of Egypt's force.[185]

Since the gap between military forces decreased over time, one might suggest that instances of conflict increased because other nations felt less threatened to be in contention with Egypt. That being said, not only is the gap decrease minimal, but Egypt's military remains quite larger than other states. While there is a lot less of a gap between other states, many of the Nile issues are located in the lower riparian, which is dominated militarily by Egypt. Furthermore, the basin saw high degrees of conflict during times when Egypt had significantly larger gaps between its military and other states, thus, in conflict with the theory.

As we saw in other cases, the Indus and Nile had a high number of instances of conflict, yet both had large military disparities between riparian states. Therefore, while we would expect conflict to decrease or remain stagnant, in the case of the Indus and in some cases the Nile, conflict increased. While the theory holds in the Mekong, since there was higher contention between states, there were very few reported instances of conflict in the basin, and thus were unlikely to be influenced by military size differences. Thus, it is likely that this factor does not play a large role in influencing transboundary water conflict, which may show a larger role for treaties.

[184] The World Bank, 2015
[185] The World Bank, 2015

6- What treaty is effective- Analysis of both case studies

Since it has been determined that treaties may have an influence in preventing conflict from escalating, this section will compare the MRC and the IWT to discern whether particular treaty elements are more effective at limiting the degree of water basin conflict. As seen in the previous section, the Mekong basin appeared to have lower frequencies and levels of conflict than the Indus. Thus, this section will analyze treaty elements that were present in the MRC treaty that may not have been in the IWT. In particular, we examine dispute settlement provisions, forums that create dialogue, technical data sharing, and allocation rights for their potential influence in preventing conflict from escalating, see Figure 11 for a summary of the differences between treaties.

Figure 11- Main differences between the Indus and Mekong treaty

Treaty Elements	Indus Water Treaty	Mekong treaty
Dispute settlement	Article IX allows parties to settle disputes through a Neutral Expert or Court of Arbitration	Chapter 5 stipulates that states must resolve disputes in the Mekong Council. Not through legal arbitration
Forums of dialogue	Article VIII establishes the Permanent Indus Commission (PIC), which is a forum for representatives of both countries to discuss plans or issues.	Article 12 establishes the Mekong Council, Joint Committee, and the Secretariat, which all play a role in coordination and dialogue.
Data sharing	Article VI stipulates that data shall be exchanged between members in the PIC.	Article 12 stipulates that both the Joint Committee and the Secretariat are responsible for data collection, sharing, and harmonisation.
Allocation rights	The Annexures provide fixed allocations for India in regards to withdrawals from the Western Rivers, which are designated to Pakistan.	Under the treaty, there are no allocation requirements. The Mekong River Commission can restrict allocations when the data indicates low flow.

Provisions for dispute settlement

Including clear dispute settlement provisions in a water-sharing treaty provide a means to settle conflicts before they escalate. This allows parties to discuss potential issues in a constructive manner that encourages future cooperation. Furthermore, such procedures provide a level of certainty and legitimacy that potential issues can be addressed through a formal legal framework.[186] While many treaties include articles underlining measures for conflict resolution, they are far from homogenous.

In the Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin, the official treaty establishing the MRC, and the Indus Water Treaty, both have provisions outlining methods to resolve conflict. As previously mentioned, Article IX of the IWT stipulates that disputes between parties must first be addressed by the Permanent Indus Commission.[187] This means that potential disputes must first be brought up during one of the PIC meetings between both parties' Commissioners. Consequently, this allows both parties to attempt to resolve the disagreement in a formal setting. Similarly, Chapter 5 of the MRC treaty stipulates that any conflict that arises between two or more members must first attempt to be resolved during a Council meeting.[188] Therefore, both agreements have provisions to address conflict between party representatives before they escalate.

The dispute settlement provisions in both treaties begin to diverge after an issue is not resolved in the PIC or the Mekong Council. In the Indus basin, should the PIC be unable to resolve

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[186] Drieschova, Alena. "A Toolkit of Mechanisms to Reduce Uncertainty in International Water Treaties." *Hebrew University of Jerusalem*: 8

[187] "Indus Water Treaty 1960 between the Government of India, the Government of Pakistan and the International Bank for reconstruction and development." *IWT.* http://gis.nacse.org/tfdd/tfdddocs/242ENG.pdf. (Accessed March 2015).

[188] "The Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin 5 April 1995." *Mekong River Commission* (1995).

a potential dispute, the concerned party is able to bring the argument to a Neutral Expert. Under Article IX, the Neutral Expert may be appointed if it is a highly qualified engineer that is able to resolve a technical issue.[189] If the matter is not technical in nature, then the Commission shall settle the dispute through a Court of Arbitration. It is important to note that the decision by the Neutral Expert, and if required, the decision by the Court of Arbitration, is legally binding on both parties. In contrast, in the Mekong basin, should a dispute be unable to be resolved in the Council, then the issue must be addressed through diplomatic negotiations by party governments. [190] While there is a sentence in the Mekong treaty suggesting mediation could occur if members are unable to resolve the dispute amongst each other, it does not provide any formal mechanism to do so. Therefore, it would appear that the IWT has a stronger formal and legally binding mechanism to resolve disputes outside the treaty organization.

This does not necessarily mean that basins that have treaties that include third party dispute settlement mechanisms are more likely to incur higher degrees of conflict. Arguably, it is more likely that because there is little trust between Pakistan and India, due to historical animosities, both parties are more likely to seek third party guidance on issues. As a result, there may be more instances of conflict in the Indus because parties are able to bring each other to a dispute body. This may be seen more as a forum for resolving conflict than the Council. Settling a matter at a dispute settlement body is by definition addressing a conflict to be resolved via legal body, while Council meetings is by no means a system solely dedicated to addressing conflict. Therefore, treaties that have provisions that include a mechanism for resolving disagreements through a legal dispute resolution process may have higher frequencies of conflict than those that do not.

[189] Indus Water Treaty, 1960
[190] Mekong River Commission, 1995

However, the degree of conflict is not necessarily higher with agreements that have such provisions, as cases are able to be resolved peacefully in a seemingly legitimate manner.

Treaty provisions that create forums of dialogue

Treaties that incorporate measures that encourage dialogue through an institutional capacity may provide a means for resolving conflict openly before it damages relations. Institutions, established by a treaty, can provide an environment that parties can discuss and manage particular issues without going through formal diplomatic channels.[191] Often, such organizations have technical experts that can advise member states on changes to basin hydrology, potential impacts of development projects, and ecosystem status updates, which can avoid misinformation between states. Since many of these organizations' mandates are broad, it leaves them with the flexibility to adapt and respond to changes in the river system.[192] While this does not guarantee better river management as well as increased levels of coordination, research has shown that such institutional bodies have de-escalated instances of conflict.[193]

As apparent, Article VIII of the Indus Water Treaty established the PIC to serve as forum for exchanging data, providing notices for new development projects, as well as addressing issues between parties.[194] Furthermore, under the treaty the PIC must meet at least once a year or at the request by another Commissioner.[195] This provides a level of flexibility should either party want to discuss potential issues before they intensify. The PIC has been a useful tool for discussing potential obstacles. For instance, India notified Pakistan through the PIC regarding its construction

[191] Drieschova, 21
[192] Drieschova, 21
[193] Ibid
[194] "The Indus Water Treaty." *Stimson.* http://www.stimson.org/research-pages/the-indus-waters-treaty/. (Accessed June 2015).
[195] IWT, 1960

of the Baglihar dam by specifying its technical measurements, and Pakistan used the PIC to express its concerns about the potential impacts of the dam.[196] Thus, the PIC provision in the IWT could have potentially reduced the level of conflict by creating an open forum of communication between nations that distrust each other.

Article 12 of Mekong treaty established three permanent institutions: the Council, Joint Committee, and the Secretariat.[197] In short, the council acts as a forum for dialogue, as its main function is to make decisions that promote the cooperation of joint initiatives as well as to address and resolve issues or disputes that are brought up from member states, Council members, or the Joint Committee.[198] The Joint Committee is a body of senior governmental officials that meet to discuss the implementation of policies set by the Council. This is accomplished by coordinating and resolving issues in the Committee, and reporting to the Council when necessary.[199]The Secretariat's main purpose is to provide the Council and Joint Committee with technical information. This is so that they are able to avoid misinformation and can work more cooperatively. While the Secretariat is a permanent body located in Laos, the Council is required to meet at least once a year and the Joint Committee is required to hold two sessions a year.[200] Both the Joint Committee and the Council are also required meet upon request by member states.[201] Thus, since both bodies are mandated with resolving potential issues, the Mekong treaty seemingly provides mechanisms to encourage coordination and dialogue in order to avoid large scale conflict.

[196] Romshoo, 22
[197] MRC, 5
[198] Ibid
[199] MRC, 5
[200] Ibid, 6
[201] MRC, 7

Considering the Mekong basin had fewer instances of conflict, and to a lesser degree, than the Indus, one could partially attribute it to the Mekong's larger institutional capacity. Since the Mekong treaty established three institutional bodies that are responsible for encouraging dialogue and improving technical knowledge between members, it is more likely that potential issues are addressed early and thus are less likely to escalate. While the IWT has the institutional capacity to increase communication and dialogue about problems in water management, the PIC meets less regularly and likely does not have the same institutional strength as the MRC. However, it is important to note that the PIC only represents commissioners from two countries, while MRC has 4 members with 2 observers. Institutions with a larger membership are more likely to have coordination issues, as there are many competing interests. Thus, provision to include three bodies may be due to the need for a larger institutional capacity to deal with a larger array of interests. That being said, the Mekong basin reported lower instances of conflict than the Indus, which means that the Mekong's higher institutional capacity may have been a factor in the region's level of cooperation.

Technical data sharing

Provisions in treaties that include reporting and sharing technical data may also be mechanism that has eased tensions. Collecting and sharing technical data could potentially avoid conflict escalation by reducing uncertainty and disagreement over technical issues such as flow, runoff, ecosystem harm, or withdrawals. Uncertainty over correct information can lead states to distrust each other's intentions, which is a quite large obstacle for cooperation. For instance, many disputes between India and Bangladesh in the 1990s were over data uncertainty.[202] Therefore,

[202] Drieschova, 9

treaty provisions that attempt to collect and share data are better able to reduce knowledge gaps by providing a platform for building mutual cooperation and trust.[203] However, this can come in different forms, which may provide alternative results.

Article VI of the Indus Water Treaty stipulates that data shall be exchanged between members regularly, with Article VIII providing the role to the PIC.[204] Furthermore, the treaty outlines that the PIC will share data on flow, withdrawals, daily discharge rates, extractions or release from reservoirs, and water that is linked to managing canals.[205] However, despite data sharing between Commissioners, Pakistan has been increasingly raising technical issues with India over its hydroelectric projects, such as the recent Kishenganga hydroelectric project.[206] Therefore, even though the IWT encourages India and Pakistan to exchange data, both countries still remain in disagreement over specific technical issues. Consequently, both parties have been seeking third party mediation to settle technical disputes, which has likely influenced the number of instances of conflict in the region.

While data is collected and shared between governments in the Indus basin, the Mekong treaty incorporates a multifaceted approach. According to the agreement, both the Joint Committee and the Secretariat are responsible for data collection, sharing, and harmonisation.[207] In operation, the Joint Committee collects and updates technical data by having one or more government agencies responsible for updating the data and disseminating it within the MRC.[208] The Secretariat, in turn, helps to supply the data to MRC members as well as assists in helping to update and

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[203] Drieschova, 18
[204] IWT, 1960
[205] Ibid
[206] Sharma, Amol. "India and Pakistan Feud over Indus Waters," *The Wall Street Journal* (March 30, 2010).
[207] MRC, 1995
[208] Ibid

maintain the data, if needed.[209] Therefore, while the Joint Committee has responsibilities similar to the PIC, the Mekong River goes further by having an instrument that harmonizes the data and ensures data integrity. This is interesting because, unlike Indus, the Mekong has an instrument to verify data and ensure its integrity, thereby acting as a extra check and balance.

As we can see from comparing both cases, treaty provisions that provide a mandate to verify and consolidate technical data to an objective organizational body, such as a secretariat, may have an effect on reducing inter-basin conflict. The Mekong basin reported less instances of conflict than the Indus, while having two bodies that are responsible for data management. Seemingly, the Indus basin reported more difficulty exchanging data, which is largely due to a lack of trust between members. Therefore, it is possible that treaties that share responsibility to collect, share, and manage data between two organizations reduce likelihood of conflict. The reason for this is that managing the task between two institutions can foster trust that the information is factual. Consequently, this reduces disagreement between states over technical information, and thus avoids conflict escalation.

Allocation rights

In theory, establishing a minimum or maximum allocation of water in a treaty can reduce contention and conflict because it decreases uncertainty.[210] As members benefit from knowing that exceeding an amount set in a treaty may have negative implications for downstream nations, as well as the ability for the river to rejuvenate, it could reduce the incentive to overconsume. Furthermore, having the knowledge that other countries are sustainably withdrawing water reduces the uncertainty over the impact of other countries' consumption on the river. That being said,

[209] MRC, 1995
[210] Drieschov, 8

treaty provisions that have rigid and specific allocation rights can also be a source of contention. This is because they fail to take into account changes in river flow.[211] In contrast, variable allocations provide water use rights based on a percentage of the annual flow, which takes into account wet and dry years.[212] Therefore, variable allocations help reduce the potential rise of conflict when the hydrology inevitably changes, as well as the demands for water.

While it is apparent that the Indus treaty provides allocation rights by dividing up the basin's rivers for exclusive use by each country, it also has allocation rights based on agriculture and hydropower development. Under the Annexures, the IWT provides fixed allocations for India in regards to withdrawals from the Western Rivers, which are designated to Pakistan.[213] As previously mentioned, the Indus Water Treaty permits India to use the Western River for non-consumptive, domestic consumption, and irrigation. In the Annexures, the treaty provides specifically rigid guidelines on building dams, withdrawing water for agriculture, and building canals or storage facilities.[214] This has provided mixed results. While the provisions provide a level of certainty over the rules and requirements for India on the management of the Western Rivers, thus avoiding needless contention over treaty interpretation, there has been conflict over whether projects are meeting their requirements under the treaty. In many of the instances where Pakistan brought India into a dispute settlement process, it was over allocation requirements for hydroelectric development on the Western Rivers. Therefore, because India and Pakistan have frequently disagreed over whether one or the other are following the fixed allocation requirements

[211] Drieschov, 12
[212] Ibid, 15
[213] IWT, 1960
[214] IWT, 1960

within the IWT, it is likely that the provision has played a role in sprouting conflict between the two countries.

The Mekong treaty does not include either variable or fixed allocations.[215] Under the treaty, the Mekong River Commission is required to restrict member states' allocations when there is data indicating low flow.[216] Essentially, members are required to report their withdrawals and plans to develop hydropower to the MRC, which consults or notifies member states should potential harm be found.[217] This is quintessentially different than the IWT, as it gives the MRC the discretion on allocation limits. Since the Mekong River reported lower instances of conflict than the Indus, it is a possibility that treaty provisions that require fixed allocations could be more prone to conflict. This is because parties may disagree over whether the amounts are being followed, and therefore enter into a dispute. Furthermore, fixed allocations do not necessarily take into account changes in river flow or technology, as compared to variable allocations, which the Mekong uses depending on annual hydrology.

7-Conclusion

As the results have shown, it would seem that my hypothesis was incorrect in a sense that water-sharing treaties do not necessarily have any influence on reducing conflict as a whole. That being said, it would seem that they do have an influence on reducing the degree of conflict, as we compared the cases to the Nile. Since the Nile basin countries did not have a formal treaty governing the river, the degree of conflict and cooperation has been more sporadic in different years. While conflict in both the Indus and Mekong occurred for more instances after the treaty

[215] MRC, 1995
[216] Ibid
[217] Ibid

was implemented, the degree of conflict was never that high. In contrast, the Nile showed very high degrees of conflict from 1950-2008. This may demonstrate that while treaties did not reduce conflict between nations, likely due to raising issues through proper dispute systems, conflict escalated far less than it would without a treaty, such as case in the Nile.

That being said, research did show that water scarcity and withdrawals that are beyond rejuvenation did have an influence on more instances of conflict. This was seen in both the Nile and the Indus cases, which had high degrees of water stress and rampant overconsumption. However, more research will be needed to determine if it had a larger influence than other factors. Finally, it was seen that the Mekong treaty could have had less instances of conflict partially because it did not include established water allocations and a legal dispute settlement system, but included provisions that established a high institutional capacity and effective data collection and dissemination, unlike the IWT. That being said, as other factors may have been at play in influencing conflict, we are unable to fully determine if aspects in the treaty truly had an influence on conflict. However, this paper has shown that while treaties did not necessarily have a large influence in reducing transboundary basin conflict, it did demonstrate that treaties may play a role in preventing conflict from escalating, as they provide a mechanism to avoid issues, or at least address them in a constructive and productive manner.

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