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Enhancing Global Stability through Fresh Water Security

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On October 13th, 2014, Defense Secretary Chuck Hagel described climate change as a "threat multiplier" that had the potential to exacerbate many current challenges.[1] His comments followed on the heels of the Pentagon's release of the 2014 Climate Change Adaptation Roadmap that classifies climate change as a national security threat. The report highlights that climate change may limit access to food, water, energy, and healthcare which could undermine both fragile and stable governments.[2] On February 2nd, 2012, the Director of National Intelligence released an intelligence community assessment called *Global Water Security*. The report describes how water specifically will be a threat multiplier that increases the risk of instability, state failure, and

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regional tensions.[3] Because of this risk, the United States must lead the international community to increase water security and minimize the threat of water-triggered conflict.

A recent example of extreme drought explains how water can increase tensions and instability throughout the world. In 2010, a once in a hundred years drought in the wheat growing region of China forced that nation to import large quantities of wheat. The demand pressure caused a doubling of the grain price in an already stressed world market. Nearly 5000 miles west of China sits the biggest wheat importer in the world, Egypt, where households spend nearly 35 % of their income on food. The price spike significantly impacted Egypt's food supply between late 2010 and early 2011 which closely coincided with that country's January 2011 revolution. In fact, some experts have concluded that skyrocketing wheat prices, a ripple effect of the Chinese drought, acted as a "stressor that contributed to previously quiescent people becoming violent" and overthrowing the Mubarak regime.[4]

Under the cover of Egypt's internal turmoil, Ethiopia initiated the construction of a dam on the Blue Nile River in April 2011. This dam has the potential to control 80% of the Nile River flow on which Egypt's agricultural livelihood is dependent. Previously, in 1980, Egyptian President Anwar Sadat made it clear that his country would use force if Ethiopia were to take any action to block the flow of the Nile.[5] In 2013, then Egyptian President Morsi did the same, threatening Ethiopia with war if it continued construction of the dam.[6] Egypt's new regime recently accepted that the construction had become a "fait accompli" and that its strategic focus had to shift to safeguarding mutual interests.[7]

That same 2010 drought in China also energized its domestic dam building projects on major rivers originating in the Tibetan plateau glaciers and snowpack that flow through most South and Southeastern Asian countries.[8] Like Egypt, these downstream countries are concerned about upstream dam projects since they depend on the river's flow for their fresh water supply and ecological system. Since 1997, China has refused to sign the United Nations water sharing convention or consult its downstream neighbors on its dam projects.[9] Chinese attitudes on the matter mirror the primacy position taken by former Turkish Prime Minister Suleyman Demiral, who responded to Syrian and Iraqi anxiety over Tigris and Euphrates river flow with a blunt declaration: "This is a matter of sovereignty. Water resources are Turkey's and oil theirs. They cannot lay claim to what's ours. These cross-border rivers are ours to the very point they cross the border."[10]

In other words, a single devastating drought in China contributed to a revolution in the Middle East, remade the geopolitical balance along the Nile River, and exacerbated tensions throughout South and Southeastern Asia. Although history offers few examples that so clearly link a correlation between freshwater scarcity and war as this one, evidence suggests there will be more clashes between water haves and have-nots in the future. Additionally, the probability of 100-year shocks to the system is increasing due to climate change. A large group of retired senior officers from the Department of Defense believe that climate change will be more than a threat multiplier, that "the impacts will serve as *catalysts* for instability and conflict."[11] Freshwater might already serve as that catalyst in dangerous regions of the world.

Strategic Background

Freshwater comprises about 3% of the earth's total water. Of that amount, about three-quarters is trapped in ice with the rest mostly comprised of freshwater lakes and underground aquifers. A much smaller portion of this water is in rivers, wetlands, and the atmosphere. There are 263 international river basins that generate 60% of the earth's freshwater flow. This irrigated territory is within 145 countries covering half of the earth's land mass and home to 40% of the world's population.[12]

Agriculture consumes about 70 % of the world's freshwater while industry and households account for 20 and 10 %, respectively.[13]

Many of the great river basins have origins in mountain glaciers or snowpack. About half of the world's population lives in watersheds that originate in glaciers and snow.[14] These natural water towers collect precipitation during the winter and release it during the spring and summer when it is most needed for agriculture, hydroelectric, ecological, and recreational demands.[15] There is agreement that "the greatest threat to the world's water comes from the mountains and their disappearing glaciers."[16] Estimates show that a 2.0˚C (CK) increase in global temperatures may cause most of the mountain glaciers to disappear.[17] This natural system has regulated a vast amount of the world's water effectively for much of history. If it disappears, many regions may experience volatile water events like significant flooding, as well as extreme water scarcity.[18]

Population growth, global warming, and extreme weather patterns are increasingly challenging the balance of these natural systems. Intelligence assessments forecast that population and wealth growth will result in demands for 35% more food, 40% more freshwater, and 50% more energy by 2030.[19] These projections highlight the increasing stressors on the water-food-energy nexus, where water is a common denominator providing irrigation for crops and power for turbines.[20] To produce the food necessary for this population growth requires high yield crops that use extensive water. For example, it takes 110 gallons of water to grow a pound of wheat and 100 gallons for a pound of potatoes. It takes about 4000 gallons of water to create a 1/3 pound hamburger. One thousand gallons of water are required to produce one gallon of fresh milk.[21] The amount of food grown today is twice as big as a generation ago but the quantity of water needed to do it is three times as large.[22]

Increased demand for water corresponds to a rise in global temperatures. Both the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA) assess that 2014 was the warmest year on record and project that the trend will continue.[23] NASA reports that with the exception of 1998, 10 of the warmest years on the 134-year record occurred after 2000 with a 1.4˚ F increase in global temperatures over the past 100 years.[24] Government projections are that temperatures will rise another 2˚ to 11.5˚ F over the next century.[25] Higher global temperatures will increase the volume of water vapor and create more volatile and intense climate events. Dry areas will be dryer while wet areas will get wetter. Glaciers and snowpack will disappear while drought frequency will rise significantly.[26] The increased probabilities of extreme weather events are similar to adding an ace to a deck of cards for every degree of temperature increase. The chances of getting aces high full house (extreme droughts) become more frequent as you add aces.[27]

Strategic Challenge

China controls Tibet and what is known as the world's third pole, so named because it contains the biggest ice fields outside of the Arctic and Antarctic.[28] This area is the source of the earth's largest river systems and provides life for nearly half the world's population–about 1.3 billion people stretching from Pakistan to Vietnam.[29] Chinese actions in Tibet, then, come as no surprise as they mitigate and adapt to this changing environment. The construction of hundreds of dams and reservoirs effectively create strategic water reserves that partially mitigate the loss of natural glaciers and snowpack. The ability to moderate the flow of the rivers protects against destructive flooding. Diverting water to agricultural regions mitigates the impact of drought and helps to feed a growing population. Cheap hydroelectric power reduces Chinese dependence on oil from the volatile Middle East being transported through sea-lanes dominated by the United States. China's regional leverage over its neighbors will increase significantly if it controls the water supply.

China is not the only state with significant leverage. India controls Pakistan's "jugular vein," the Indus River, and its headwaters in Kashmir. Some in Pakistan have threatened India with nuclear war if it does anything to impede the flow of Pakistan's only significant source of fresh-water.[30] The border tensions in Kashmir are in no small way a function of water security. Likewise, in northern Africa, Ethiopia now has significant leverage over Egypt and Sudan as it gains operational control over the headwaters of the Blue Nile. Turkey is dominant as it controls the climate change threatened headwaters of the Euphrates and Tigris rivers that supply both Syria and Iraq.[31]

The same forces were at play in the region nearly 50 years ago, during the Six-Day War of 1967. At the conclusion of that conflict, Israel had seized the Golan Heights from Syria. One of the prime strategic advantages of occupying the Heights is that it offers Israel control over the waters of the Jordan River and Lake Tiberias (Sea of Galilee). These are important sources of water for not only Israel, but for Jordan, and to a lesser degree, the Palestinian territories in the West Bank. When writing about the Six-Day War in his memoirs, former Israeli Prime Minister Ariel Sharon said that the matter of Arab water diversion that contributed to the war was a "stark issue of life and death."[32] Even on a smaller scale, water insecurity can play a key role in inflaming conflicts. Last summer, the radical group ISIS seized control of the Mosul Dam in northern Iraq. The capture offered ISIS the chance to wield water as a literal weapon.[33]

States also exert strategic control through the virtual trade of water. The water involved in the production of agriculture and manufacturing goods is called "virtual water." When a country exports water-intensive products, they are exporting water in virtual form. The United States is the largest net exporter of virtual water, exporting approximately one third of its extracted water. Academic studies estimate that global virtual water trade is the equivalent of twenty Nile Rivers per year.[34] Water rich states that maintain a sustainable, freshwater supply will increase their relative power over water poor states and those water rich states that do not enhance their efficiencies. With greater water control, nations such as China, Ethiopia, Turkey, Israel and even America can exploit their ability to grow the world's food in an increasingly constrained agricultural environment.

History indicates that these water disparity challenges are more likely to lead to cooperation than conflict.[35] For example, the United States has maintained friendly relations with both Mexico and Canada on the Rio Grande and Columbia rivers. Of the 507 international disputes over water that have occurred in the last 50 years, only 37 have contributed to violence.[36] But, a Columbia University study examined two hundred conflicts from 1950 to 2004 and found that climate swings doubled the risk of conflict.[37] The 2012 Intelligence Assessment on Global Water Security argues that many of our partners will experience water problems that may lead to state failure and regional tensions.[38] Water may become a weapon of coercion against countries that depend on an external source of water for food, energy, and sanitary health. Governments that are unable to manage or respond to shortages in any of these areas are more at risk for destabilization.[39]

Strategic Opportunity

This challenge is an opportunity for the United States to strengthen and empower international systems, prevent regional power imbalances, and increase American relative power. A government wide conference on water security in 2013 called for a broad based response to "elevate water security into the three dimensions of U.S. foreign policy: development, diplomacy and defense."[40] The findings from the Intelligence Community Assessment concurred; the world will look to the United States to lead water management improvement and that doing so will enhance American influence and relative

power.[41] And there are a few concrete steps the U.S. can take in the short term to demonstrate this leadership.

First, the United States should negotiate, ratify, and support the United Nation's 1997 Convention on the Law of the Non-Navigational Uses of International Watercourses. The U.S. can show leadership by having the political will to ratify and support a common set of enforceable rules and then employ our diplomatic power to negotiate and support global norms for water management. There is a universal consensus among experts that water agreements need solidification, enforcement, and resolution mechanisms clarified.[42] The convention codifies fundamental principles of international watercourse law developed by the International Law Commission from 1970 to 1994.

Despite broad support for the convention in 1997, few significant riparian states have ratified this convention that sets forth international rules governing the use, management, protection, and conflict resolution standards for freshwater river basins.[43] Of 193 member states, only 35 have ratified the convention. In a positive step, the thirty-fifth ratification by Vietnam in 2014 brought the 1997 Convention in force in that same year. Ratification within the United States will prove difficult given legal requirements that require a two-thirds majority of the Senate. That should not deter, however, our efforts to build support for the convention over the long term. The United States is in a relatively healthy partnership with our northern and southern neighbors over water management and we will gain international leverage with a ratified convention.

The U.N. water convention's most contentious issue is the "relationship between the principle of equitable and reasonable utilization and the obligation against causing significant harm to lower riparian states."[44] The principle of equitable and reasonable use is favored by most upper riparian states and the doctrine of no significant harm that is preferred by most lower riparian states. The no harm rule is subjugated to the equitable use rule and this causes significant concern to down-river states. Differing perspectives on these rules contribute to limited ratification. In most cases, the upper and lower riparian states have not ratified the convention because each views the other as getting an upper hand. China, as an upper riparian state, for example, believes certain rules violate their sovereignty. Pakistan, a lower riparian state, does not think the convention contains sufficient safeguards against abuse of water management by upper riparian states.[45]

Further, the United States can encourage the opening of global markets to efficiently balance agricultural production which accounts for a large portion of freshwater consumption. Open markets encourage the efficient production of agriculture in the regions where inputs such as water are least expensive. Global stability and trust are essential to sustaining this open market where one state may sacrifice monopolized production of a critical staple. The United States will have to remain decisively engaged globally to sustain this environment. Continuing to assure global security and press for free trade agreements facilitates increased water efficiencies. The economic effort to open markets and exploit efficiencies is an indirect but essential element to better managing the world's water supply

Free trade agreements that include agricultural elements are contentious and difficult to achieve based on highly emotional special interests. Protection of domestic agriculture production is an important interest for all countries. However, the eventual ratification of the Trans-Pacific Partnership (TPP) and the Trans-Atlantic Trade and Investment Partnership (TTIP) will enhance opportunities to more efficiently manage water resource requirements. They also present opportunities to expand domestic production given the relative strength of our water resources. A report by the U.S. Department of Agriculture estimates that the "United States will supply about 33% of the expansion in intraregional

agricultural exports."[46] These agreements provide direct economic and global water resource benefits to the United States.

With or without global rules and open markets, the United States can provide governance, financial, and technical support to high-risk states vital to American interests. USAID released its 5-year Water Development strategy in 2013. It laid out a water-focused plan to improve global health and food security by building local capacity, strengthening partnerships, leveraging new technologies, and supporting innovative financing.[47] The strategic objectives are essential but limited in both scope and duration. The U.S. Corps of Engineers, the Agriculture Department, and the Department of Defense can take a broader role in building resilience to water shocks in critical states. Tangible areas might include supporting irrigation efficiencies, construction of desalination plants, providing hydrographic technical support, and construction of essential water storage infrastructure.

James Ligh of the U.S. Corp of Engineers in the Pacific Ocean Division who has worked extensively on the Mekong River challenges explains that most high risk Pacific states require extensive management training. Many of their systems are antiquated and based on debunked Soviet styles. Focusing soft support on management skills, inter-governmental and inter-national cooperation, ethical governance, decision-making processes, contract management, and technical skills are long term efforts that build water resiliency. Building infrastructure, he says, is often just throwing money at the problem and ineffective in the long-term. Their efforts in the Pacific are synchronized closely with Pacific Ocean Command and U.S. Army Pacific Theater shaping operations. They also work closely with the Department of State to gain synergies between diplomatic and soft military engagements.[48] Expanding these whole of government and relatively inexpensive efforts to regions beyond the Mekong and South Pacific are effective methods of applying American soft power.

While building foreign capacity, the United States must invest heavily in domestic water infrastructure to maintain water primacy. The United States is a net exporter of virtual water in the form of agricultural products due in part to extensive waterway management and irrigation infrastructure. But, the United States Corps of Engineers (USACE), which provides much of the nation's water resource management, has seen a steady reduction in the civil works budget since 1980 and it has been clear that this is unsustainable.[49] Steve Stockton, USACE Director of Civil Works, explains that our infrastructure is deteriorating and underperforming. We are under-investing and we lag behind other developed nation's infrastructure investments. He states that we risk "U.S. economic prosperity, quality of life and environmental health."[50]

The total forward investment required is enormous according to the U.S. Corps of Engineers. In current dollars the United States was investing $70 per American in 1936 and $56 per American in 1966 on U.S. water resource infrastructure. By 2010, that figured had dropped to $18 per American based on that year's census. Much of the infrastructure constructed in 1936 and 1966 remains in service and has either met, passed or is nearing its effective service life. To sustain the capital stock value of our water infrastructure will require $7 billion annually additional capital investment through 2045. These investment challenges create what the Corps of Engineers calls a "Perfect Storm" where the nexus of food, water, energy, transportation, environment, and other interests all create a demand on a resource that is not funded in a sustainable manner.[51] These issues show that water is a source of American power though often only in the shadows vis-à-vis other natural sources of power. Our ability to sustain this advantage in the long term is vital to our national interests and sustaining relative global power.

Water security appears to be a narrative that Americans will rally behind. Recently, California easily passed a $7.12 billion water bond to fund statewide water supply infrastructure projects. This bill

reflects the forward investment the country requires to sustain a water advantage and ensure no degradation of national power. In a global security survey conducted in 2012, international access to clean water was listed just behind terrorism as most concerning to Americas.[52] This past December the President signed the Water for the World Act, a bipartisan piece of legislation that calls for the creation of a Global Water Coordinator in USAID and a Special Advisor for Water Resources to coordinate water objectives. The law directs the Secretary of State to develop a Global Water Resources Strategy relating to U.S. foreign policy.[53] This law reinforces the Department of State's establishment of the U.S. Water Partnership in 2012 that helps "mobilize U.S. expertise, resources and ingenuity to address global water challenges."[54] These nascent efforts are a solid foundation if supported with appropriate funding, focus, and priorities.

Strategic Counter-arguments

Despite the evidence of domestic and political support for strategic planning around water security, some would argue that it does not make sense to invest against the assumed impact of future climate change during periods of fiscal belt-tightening. Despite these doubts, all the recent evidence suggests that water insecurity could pose a major threat to global security and, thus, our nation's stability and prosperity. Retired General Gordon Sullivan said of climate change probabilities, "If you wait until you have 100 % certainty, something bad is going to happen."[55] At that point, states are more likely to respond to water suffocation based on fear rather than reason, lashing out either internally or externally. The United States can both pre-empt and alleviate those future fears through leadership today.

Still, if the United States leads, many water-powerful states will not follow. They will not agree to global standards that impose extra-national control over what they see as wholly sovereign resources. For this reason, the United States must ensure its own primacy and enhance balance or deterrence regionally. Building a state's resilience to the coercive use of water is critical to maintaining regional stability. A comprehensive approach must either mitigate a state's relative water disadvantages or increase other comparative advantages. For example, a high-risk, water poor state could be made more water independent through USAID investment in desalination infrastructure. Or, the U.S. could facilitate other leverage that keeps the water flowing, like a bilateral agreement between neighboring states that codifies the reciprocal flow of water with another resource like oil or natural gas.

These transactional approaches are a natural first step to achieving water parity. But in the long term, it is more important to frame water rights as a human rights issue. In the future, states that deny legitimate water rights to downriver riparian states could be charged with violating human rights and subject to sanction in international criminal court. If water security does eventually achieve this status there may even come a time when the legitimate use of international force is required to protect the water rights of a particular population.

Conclusions

The purpose, of course, is to prevent water challenges from triggering military intervention. Developing a well-defined protocol now is the best approach toward constructing a resilient global agreement and heading off future water-triggered geopolitical shocks. Water insecurity is likely an unfamiliar phenomenon for an American to understand given our water abundance. However, a villager in the desert of Iraq who struggles daily to provide water for his or her family, crops, and animals grasps this problem much more clearly. A fisherman who depends on Mekong River floods to force the Tonle

Sap River in Cambodia to reverse flow and activate a magical ecological system knows this risk. A Palestinian who survives on one-seventh of the water available to an Israeli knows this challenge.

These people would agree that water is not only a threat multiplier, it's also a catalyst for conflict. Humans can survive about three days without water, but they can turn violent far before that point to ensure their survival. States that feel threatened will likewise respond in the same manner. Significant water concerns already exist in tense regions such as South and Southeast Asia, Northern Africa, and the Middle East. The United States must employ a whole of government approach to minimize the probability of water insecurity triggering war in these regions. Leading the international community, building resilience in high-risk states, and maintaining our own primacy is critical to achieving these objectives. This approach supports both state and human survival and is in keeping with the goals of American strategy.

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