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How California's Drought Exacerbates the Terrorism Threat

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Scott Somers, Ph.D.
Senior Fellow
GW Center for Cyber & Homeland Security

Center for Cyber & Homeland Security
THE GEORGE WASHINGTON UNIVERSITY

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Terrorist organizations including ISIS, Hezbollah, and al-Qa'ida have openly promulgated a strategy of ecological jihad. In contrast to other methods employed by terrorists, environmental tactics, such as contaminating water supplies or starting fires, can be quickly planned, require little technical expertise to execute, and have lower risk of detection. Water shortages due to drought increase vulnerability to these terror methods with significant consequences for people, infrastructure, and the economy.

California is on the verge of an epic drought and many western States are not far behind. Nearly 60 percent of the state is under extreme drought conditions. The Colorado River Basin, which supplies water to 40 million people in seven states, has lost about 65 cubic kilometers of fresh water over the past nine years. The key water reservoirs of Lake Powell and Lake Mead are at 45 and 41 percent capacity, respectively. Hydrologists warn that California could run out of water within a year and 17 rural communities are at risk of consuming their water supply within 60 days. The crisis prompted Governor Jerry Brown to order 400 local water agencies to reduce consumption by 25 percent over the coming year.

Severe drought in the western United States raises vulnerability to water terrorism as reservoirs continue to dry up. Water is the lifeblood of human and economic welfare and, as a consequence, has been exploited as a weapon of war for centuries. As global water supplies become increasingly scarce due to drought, terrorist groups are stepping up attacks and manipulating supply as a strategic tactic of coercion. ISIS gained a significant portion of their influence in the Middle East through water terrorism.[1] Militants seized control of key rivers and dams cutting off supply to Christian, Kurd, and Shiite minority districts and leveraging water supply as a means to extort money to finance their operations.

Water terrorism has also yielded results for al-Shabaab in Somalia.[2] As UN-backed government forces squeezed al-Shabaab fighters out of key cities, militants shifted tactics and attacked the water infrastructure supplying newly liberated areas. It was a means for al-Shabaab to continue exerting control even without an occupying presence in a city.

International terrorist groups, including al-Qa'ida, have expressed interest in contaminating drinking water in the United States. A report by the New Jersey Office

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[1] Strozier, C.B. & Berkell, K.A. (2014, November 29). How climate change helped ISIS [Web log comment]. Retrieved from http://www.huffingtonpost.com/charles-b-strozier/how-climate-change-helped_b_5903170.html

[2] PRI (2014, August 12). Al-Shabaab's 'water terrorism' is yielding results and tragedy in Somalia's civil war. Retrieved from http://www.pri.org/stories/2014-08-08/how-al-shabaab-using-water-tool-terrorism

of Homeland Security and Preparedness identified 26 specific open-source threats of water contamination in the U.S. between 1968 and 2008. Their remote location, lack of security, and easy access makes reservoirs particularly attractive targets; and raw water sources have been a point of access for past attacks, though with limited success. Most analysts suggest that, since water itself would dilute any toxin or pathogen, the quantity of material needed to sufficiently contaminate supply makes such an attack technically difficult. But, as the level of water in reservoirs continues to fall due to drought, this tactic becomes increasingly feasible.

Drought information from the National Resources Defense Council warns that shrinking water reserves have already created health risks by concentrating contaminants such as heavy metals, industrial chemicals, and pesticides.[3] Low water levels also make supplies susceptible to biological contamination from algae and other microorganisms. There is a history of naturally occurring microbiological organisms contaminating water sources in the U.S., which demonstrates the potential consequences of domestic water terrorism against depleted lakes and reservoirs.

The 1992 Cryptosporidium outbreak in Milwaukee sickened over 400,000 people in a five-county metropolitan area and resulted in over $96 million in combined healthcare costs and productivity losses.[4] Although rarely lethal, 69 deaths were attributed to the outbreak, mostly among the elderly, infants, and those with immunodeficiency disorders. A 2013 article in the Journal of the Royal Army Medical Corps confirmed the feasibility of Cryptosporidium transmission for terrorist purposes under certain environmental conditions.[5] Cryptosporidium does not need to infiltrate drinking water to threaten health or the economy. California's reservoirs contribute to an $85 billion outdoor recreation industry. Low water levels due to drought are already impacting tourism revenue, and contamination of recreational waters infecting swimmers could further undermine eco-tourism.

Toxins from species of cyanobacteria are another potential agent in water terrorism. Cyanobacteria are naturally occurring in lakes, ponds, and slow-moving streams. People become exposed by drinking or immersing in contaminated water. In 2014, a cyanobacteria algae bloom contaminated fresh water supplies for nearly half-a-million people in northeastern Ohio.[6] The news touched off a run on stores for bottled water and bags of ice. While the contamination was the result of a natural ecological event, the water crisis nevertheless prompted the mayor of Toledo to

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[3] National Resource Defense Council, Drought: Threats to water and food security [Web log comment]. Retrieved from http://www.nrdc.org/health/climate/drought.asp

[4] Coroso, P.S., Kramer, M.H, Blair, K.A., Addiss, D.G. Davis, J.P., & Haddix, A.C. (2003). Cost of Illness in the 1993 Waterborne *Cryptosporidium* Outbreak, Milwaukee, Wisconsin. *EID Journal,* 9(4), Retrieved from http://wwwnc.cdc.gov/eid/article/9/4/02-0417_article

[5] Hagen, R.M., Loderstaedt, U., & Frickmann, H. (2014). An evaluation of the potential use of *Cryptosporidium* species as agents for deliberate release. *Journal of the Royal Army Medical Corps,*160(4): 289-294. doi:10.1136/jramc-2013-000186

[6] Jervis, R. (2014, August 3). Ohio's 4th largest city has no drinking water. *USA Today*. Retrieved from http://www.usatoday.com/story/news/nation/2014/08/02/toledo-ohio-water/13505697/

compare it to a terrorist attack.[7] The Ohio outbreak demonstrates that a water terrorism event need not produce massive casualties to cause panic, societal disruptions, and even overreaction on the part of government officials and the public.

The drought has also created tinderbox conditions increasing the potential for a terrorist to set severe wildland fires near populated areas and critical infrastructure. Fire as a tool of warfare is well documented. While there is no direct evidence of a terrorist group having employed wildfire as a weapon, fire has been promoted as a simple and potentially effective way to inflict fear and cause considerable damage. In 2012, an issue of *Inspire* magazine surfaced on jihadi Internet forums detailing how to construct an "ember bomb" to target forested areas of the U.S. This spurred the DHS Office of Intelligence and Analysis and eight state or local agencies to issue a joint report raising awareness of terrorist interests in utilizing wildfire as a tactic against the Homeland to cause casualties, economic damage, and resource depletion.[8]

The Lebanese militant group, Hezbollah, used wildfire as a military strategy – as well as economic and psychological attack – during its 2006 conflict with Israel. Militants fired Katyusha rockets igniting numerous fires in the Naftali mountain range. The wildfires were part of a diversionary tactic to draw resources away from battles in south Lebanon. More than 10,000 acres were burned causing considerable damage to forests and grazing fields. Four years later, during the Mount Carmel Fire, a wave of suspicious fires struck Israel and the West Bank. The motivation for these attacks was not determined, but they caused confusion and drew scarce resources away from fire suppression efforts. The Jewish National Fund estimates that it will take 50 years to restore the forests.[9] [10]

Only about 7 percent of Israel is forested, yet fire has been used as an effective terror tactic against the Israeli people. By comparison, the Carlton Complex Fire in Washington State in 2014 destroyed 322 homes and consumed 256,000 acres, an area larger than the 247,000 acres comprising all Israeli forests. In 2012 alone, wildfires burned 9.3 million acres of land in the U.S., more acreage than the entire State of Israel itself. The National Association of State Foresters claims that some 72,000 U.S. communities are exposed to wildfire. The *2015 Wildfire Hazard Risk Report* by CoreLogic estimates that 1.1 million homes fall into the highest wildfire risk category with a reconstruction value of more than $268 billion.[11]

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[7] Brush, M. (2014, August 19). *Toledo Mayor compares water crisis to a terrorist attack*. Retrieved from http://michiganradio.org/post/toledo-mayor-compares-water-crisis-terrorist-attack

[8] U.S. Department of Homeland Security. (2012, May 31). *Terrorist Interests in Using Fire As a Weapon*. Retrieved from https://info.publicintelligence.net/DHS-TerroristFireWeapon.pdf

[9] Bodner, J. (2007, January 3). The recovery of Northern Israel through a forest's eyes. Retrieved from https://secure2.convio.net/jnf/site/SPageServer/;jsessionid=64CC81C444F970947C217A63353047FA.app207a?pagename=Recovery

[10] Bodner, J. (2010, June 30). Forest fires rage across Israel. Retrieved from http://www.jnf.org/about-jnf/news/press-releases/2010/forest-fires-rage-across.html

[11] Botts, H., Jeffery, T., McCabe, S., Stueck, B., & Suhr, L. (2015). *Wildfire Hazard Risk Report: Residential Wildfire Exposure Estimates for the Western United States*. Retrieved from http://www.corelogic.com/research/wildfire-risk-report/2015-wildfire-hazard-risk-report.pdf

The exposure of U.S. communities to wildfire makes pyro-terrorism a potentially potent weapon for economic warfare and mass destruction. One military officer wrote in his 2005 thesis: "An opportunistic terrorist can unleash multiple fires creating a conflagration potentially equal to a multi-megaton nuclear weapon."[12] William Scott, a former National Security Agency official, called pyro-terrorism "an extremely high-leverage weapon of mass effect."[13] Armed with a rudimentary understanding of fire behavior, weather, and topography, a pyro-terrorist can set fires that inflict significant damage.

Dry vegetation from the lack of rain is increasing the frequency, severity, and damage caused by wildfires. The drought is also depleting natural water supplies used for firefighting. In San Diego County, which has a history of severe wildfires, Bartlett Lake is down to less than 6 percent capacity from its 2006 level of 96 percent. Sutherland has dropped to 8.4 percent and Morena is nearly dry at 3.2 percent.[14]

The negative economic effect of wildfire has often been underestimated. Damage assessments tend to focus on the direct costs of fire suppression and property loss. A study by San Diego State University reassessed the economic impact of the 2003 San Diego wildfires and concluded the fire cost $2 billion more than originally estimated.[15] Additional losses included $365 million in lost business, $10 million in medical costs, $47 million in watershed mitigation, and $147.3 million in infrastructure damage. Lost economic activity was conservatively estimated at 10 percent regional gross productivity. This was based on the destruction of 24 commercial buildings, a $32.5 million drop in tourism, and 5,000 affected jobs.

Wildfire can threaten critical infrastructure, especially the electrical grid, causing damage to poles, transmission lines, and generating stations. Direct flame impingement is not necessary to disrupt power systems. Dense smoke and particulate matter from fires can ionize the air creating an electrical pathway between lines tripping circuits and threatening wide-scale outages.

The threat to the electrical grid has a cascading effect on other infrastructure. On September 8, 2011, a transmission line tripped due to high temperatures, starting a chain of events that cut power to portions of Arizona, California, and Mexico. All of San Diego lost power. The outage snarled traffic during rush hour; flights and public transportation were disrupted; schools and businesses closed; water and sewage pumping stations lost power resulting in contaminated beaches and unsafe drinking

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[12] Baird, R.A. (2005). *Pyro-Terrorism – The Threat of Arson Induced Forest Fires as a Future Weapon of Mass Destruction*. Retrieved from http://www.dtic.mil/dtic/tr/fulltext/u2/a509220.pdf

[13] Washington Examiner Editorial. (2013, June 17). Examiner Editorial: Only you can prevent terrorists from starting forest fires. Retrieved from http://www.washingtonexaminer.com/only-you-can-prevent-terrorists-from-starting-forest-fires/article/2532034

[14] Reservoir levels for San Diego County retrieved April 21, 2015 from http://www.sdcwa.org/reservoirs

[15] Rahn, M. (2009). *Wildfire Impact Analysis*. Retrieved from http://newscenter.sdsu.edu/sdsu_newscenter/images/rahn2009fireanalysis.pdf

water. The National University System Institute for Policy Research conservatively estimated losses to the local economy of $97 to $118 million as a result of the blackout.[16] While not caused by a fire, this incident foretells pyro-terrorism's potential for large-scale social disruption and economic damage.

Sustainability practices and ecosystem management are integral to a cohesive strategy to protect critical infrastructure and key resources. The U.S. has long recognized the need to protect its water resources against the terrorism threat. But, current initiatives tend to focus – somewhat myopically – on building "robust, comprehensive, and fully coordinated surveillance and monitoring systems…" to provide early detection of agents.[17] A more holistic approach to domestic water security would include the following:

1. **Recognize the connection between the natural environment and terrorism vulnerability in homeland security strategy**. The U.S. military recognizes that global competition for finite natural resources is a national security concern and has embraced sustainability as a vital strategic security element and mission enabler.[18] Integrating sustainable principles and practices into the national homeland security strategy not only protects valuable natural resources; it reduces the potential for the environment to be exploited as a tool of terror.

2. **Facilitate investments in smaller-scale, distributed infrastructure systems**. Centralized utilities with large, complex distribution systems are more vulnerable to targeted disruptions with the consequences of failure spread across a larger population. The concept of distributed infrastructure refers to technologies installed at the neighborhood or individual site scale. Distributed power systems – such as on-site photovoltaics or micro-grid generation – not only reduce the risk of widespread power failures, but the cascading effects and economic damage that results. Similarly, new sustainable water technologies are emerging that integrate decentralized systems with traditional, centralized conveyance and treatment networks. Integrating principles and technologies of distributed infrastructure might enhance the EPA Water Security Initiative.

3. **Restore ecosystems as a means to reduce risk and protect natural resources**. Foresters and fire protection experts are increasingly realizing that a century of aggressive federal fire suppression policy has led to uncharacteristically dense forests. Such conditions generate more intense conflagrations, prevent more water from reaching underground aquifers, and reduce the health of the forests. Exploring the relationship between healthy forests and water supply through the lens of homeland security could help bolster burgeoning efforts to restore ecosystems.

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[16] National University System Institute for Policy Research. (2011, September 9). Economic impact of September 9th Power Outage: Conservatively estimated at $97 to $118 Million. Retrieved from http://www.nusinstitute.org/assets/resources/pageResources/PrelimReportSDBlackoutEconImpact.pdf

[17] Homeland Security Presidential Directive 9

[18] Hartman, J., Butts, K., & Bankus, B. (2012). *Sustainability and National Security*. Carlisle Barracks, PA: US Army War College.

About the Author

Scott Somers is a Senior Fellow with the GW Center for Cyber and Homeland Security. He served two terms as District 6 Councilmember and was Vice Mayor in Mesa, Arizona. He chaired the National League of Cities steering committee on Public Safety and Crime Prevention, where he led the development and advocacy of national municipal policy involving homeland security and domestic preparedness. Dr. Somers is actively involved in national domestic preparedness efforts. He has served on the National Homeland Security Consortium, the SAFECOM Executive Committee, the FirstNet Public Safety Advisory Council, and the National EMS Advisory Council. He currently volunteers on the American Red Cross Scientific Advisory Council, Preparedness and Disaster Health sub-council, and is a public safety issue advisor for Representative Matt Salmon (AZ-CD5).

Dr. Somers received a Ph.D. in public administration from Arizona State University. His work focuses on the organizational structures and processes that lead to resilience in unstable operational environments. Several of his homeland security-related refereed journal articles have appeared in Public Administration Review, the Journal of Contingencies and Crisis Management, and Public Works Management and Policy. Papers he has written on the healthcare system's response to WMD events are published as book chapters in the Homeland Security Handbook (CRC Press) and 21st Century Management (Sage). Dr. Somers lectures regularly and has worked with international organizations on promoting continuity planning among small to mid-sized businesses for better global supply chains.

In addition to his political and academic background, Somers has nearly 20 years of operational experience with the Phoenix Fire Department serving as a hazardous materials specialist for FEMA Arizona Task Force 1, responding to domestic natural disasters and national security events.

About the GW Center for Cyber and Homeland Security

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