

THE U.S. ASIA-PACIFIC REBALANCE, NATIONAL SECURITY AND CLIMATE CHANGE

A Climate and Security Correlations Series

Edited by Caitlin E. Werrell and Francesco Femia

November 2015

THE CENTER FOR
CLIMATE AND
SECURITY

in
partnership
with

Carnegie Mellon University
Civil and Environmental Engineering



Center for a
New American
Security



CLIMATE CHANGE AND VIETNAMESE FISHERIES: OPPORTUNITIES FOR CONFLICT PREVENTION

Marcus DuBois King

Elliott School of International Affairs, George Washington University

Introduction

The fishing sector is vital to Vietnamese prosperity and important to all nations bordering the South China Sea. China, Thailand and Vietnam accounted for 80 percent of world fishery production in 2008 and 50 percent of fishery export value.¹ In 2009, Vietnamese fisheries accounted for 6 percent of gross domestic profit. In 2010, 7.4 percent of economically active people were engaged in fishing, the second highest percentage worldwide after Fiji.² Vietnam rose to the position of the fifth largest exporter of fish and related products between 1998 and 2008 when the catch was valued at nearly US \$5 billion. A flourishing aquaculture industry, rather than increases in offshore capture fisheries, explains much of its rise. In 2007, aquaculture production surpassed capture fisheries.³ Pangasius, a catfish species, and marine and freshwater prawns comprise the majority of exports in this sector.⁴

Vietnam's capture fishing grounds are vast. The UN Convention on the Law of the Sea (UNCLOS) grants nations the right to declare an Exclusive Economic Zone (EEZ) of 200 nautical miles from an established coastal baseline over which it has exploitation rights to all natural resources.⁵ Vietnam's EEZ encompasses more than 1 million square miles, including 3,000 islands and 2,000 species of fish: 130 of these species have high economic value.⁶

Eighty percent of the world's fish stocks are overfished or at maximum capacity.⁷ This situation is especially evident in the South China Sea where coastal fishing grounds have been depleted to between 5 percent and 30 percent of their unexploited stocks.⁸ Consistent with this trend, unsustainable fishing practices have been confirmed in local areas within the Vietnamese EEZ. A large amount of the over-withdrawal can be attributed to the incursion of foreign fishing vessels. Declining yields have been exacerbated by environmental destruction of many kinds including that

associated with tsunamis and cyclones.⁹ These stressors limit Vietnam's options for maintaining food security and could increase the likelihood of international clashes over fishing rights.



Teaeki luta, supervisor of the Milkfish Fishery, and a Pacific Partnership 2013 preventative medicine team inspect a screen used at the fishery for effectiveness. July 2013. DVIDSHUB / PETTY OFFICER 2ND CLASS LAURIE DEXTER

Climate Change: Physical Impacts

Vietnam is one of the developing countries most exposed to climate change by nature of its geography. Twenty-four percent of Vietnam's population lives in coastal districts.¹⁰ Storms and related damage from floods and tidal surges are among the most significant impacts.¹¹ Coastal mangroves, salt marshes and coral reefs – critical to breeding marine life – are all endangered. Warming ocean temperatures associated with climate change will also change migratory patterns of fish in the open sea.¹² Fish stock scarcity caused by altered migration patterns is compounded by over-fishing.

Worldwide, climate change-driven changes in the distribution of sea life are expected in every marine ecosystem.¹³ New scientific analytical approaches are improving our understanding of the magnitude and extent of these effects. A meta-analysis of studies on range shifts of ocean aquatic species in the *Journal Science* by I. Ching Chen et al. finds that more than 89 percent of 29,000 observational data series from 75 studies demonstrate the consistency of worldwide fish migratory patterns toward the north or south poles in response to warming temperatures.¹⁴ A 2013 study from the journal *Nature* confirms these results.¹⁵ New research in the journal *Science* in June 2015 amplifies these findings by demonstrating that lower oxygen caused by warming is putting too much physiological strain on marine animals living closest to the equator, also driving species toward the poles from tropical ocean waters. As temperatures rise, fish metabolisms speed up, increasing the demand for the scarce oxygen.¹⁶ Species in the South China Sea are migrating to colder waters in higher latitudes at a rate of approximately 17 kilometers per decade.¹⁷ All of these findings have significant negative implications for Vietnam. Northern migration of economically vital fish stocks into waters claimed by China is an emerging security concern.¹⁸

Climate change will also deplete aquaculture yields. Global aquaculture is concentrated in the world's tropical and subtropical regions, with Asia's inland freshwaters accounting for 65 percent of total production. In Vietnam, freshwater, coastal and offshore open water are all suitable environments for aquaculture. However, aquaculture production is concentrated in the Mekong River Delta where sea level rise and associated surges are causing harmful saline intrusion into brackish and freshwater hatcheries.¹⁹ Extreme weather events such as floods damage aquaculture farms by displacing water, spreading disease, and destroying infrastructure.

Major Physical Effects of Climate Change on Vietnamese Fisheries

Cyclones, Typhoons

Based on a range of models, it is *likely* that future tropical cyclones (typhoons and hurricanes) will become more intense, with larger peak wind speeds and heavier precipitation associated with increases of tropical sea-surface temperatures.

Flooding

Coastal areas, including heavily-populated Mekong mega delta region, will be at greatest risk due to tidal surges and sea level rise.

Ocean Acidification

Progressive acidification of ocean water destroys corals and their dependent species. Vietnam has a limited reef system but fish species migrate northward from the fragile Coral Triangle reef system.

Rising Temperatures

Shifts in ranges and changes in algal, plankton and fish abundance are associated with rising water temperatures, as well as related changes in salinity, oxygen levels and circulation.

Sources: IPCC (2014) (2007), T. Daw et al. (2009), I-Ching Chen et al. (2011)

Climate Change: Socioeconomic Impacts

While peer-reviewed physical science identifies likely fish stock migration in the South China Sea, the socioeconomic implications of these changes have not been examined. The Notre Dame Global Adaptation index (ND-GAIN) compares a country's level of vulnerability to climate change to its readiness to deal with these impacts. As the 77th most vulnerable country and the 63rd least ready of 177 countries in the index, Vietnam faces significant challenges; yet there is also room for optimism that Vietnam can increase its readiness.²⁰ Vietnam has moderate capacity to adapt to climate change given its status of economic development and relatively good governance, a part of which is some climate change adaptation planning at the federal level.²¹ However, continued reliance on declining fisheries may reduce Vietnam's moderate adaptive capacity with serious negative implications for economic development and food security.

It is hard to overstate Vietnamese reliance on fisheries. A comprehensive study by Malone et al. of the importance of fisheries to national economic and food security ranks Vietnam as the most sensitive country in the world.²² This study ranks Vietnam as 24th in the world in terms of relative national economic vulnerability specifically to climate change-driven impacts on capture fisheries.²³

²⁴

These findings alone should send a resounding warning to Vietnamese policymakers about the need to rapidly develop adaptive measures to maintain the viability of fisheries. However, fishers who already live in conditions of poverty are facing an evolving political system where economic reform is removing social safety nets associated with the formerly centrally-planned economy. This economic adjustment suggests that conditions will likely worsen for the rural poor, including subsistence-level farmers and fishers, before they get better.²⁵

It is reasonable to conclude that shifts in the distribution of species associated with warming of the oceans will have the greatest impact on the food security of poor (or artisanal) fishermen. These fishermen use boats, often without motors or navigational technology, which have a range of only a few miles offshore. The waters closer to the Vietnamese coastline are warming at a higher rate so that fish stocks are moving further out to sea, possibly beyond the range of artisanal fishermen. Another concern is that every major typhoon destroys an increasing number of small fishing boats and homes faster than they can be replaced.

Depletion of the fisheries and resulting economic damage may be a "push factor" for migration. For Vietnamese people, expected income differentials and the anticipation of better public services are contributing factors to inter-provincial migration from rural to urban areas.²⁶ For example, poor fishers in Ca Mau Province are reacting to loss of income resulting from a decline in off-shore fisheries by migrating to other provinces.²⁷

The proportion of overall migration to urban centers is quite large. Population concentrations in urban areas are more susceptible to natural disasters such as typhoons. Vietnamese migration

policies and practices, such as credit and lending policies that favor members of the Kinh ethnic majority over other ethnic minority groups, have created tensions that could lead to internal conflict.²⁸

As noted, aquaculture has become an increasingly important source of livelihood for ethnic minorities, particularly the Thai, Tay, and Sedang, three of the 54 distinct ethnic groups recognized by the Vietnamese government. Households belonging to ethnic minorities are generally poorer than those of ethnic majorities.²⁹ A 2011 survey found that reliance on aquaculture was a significant factor in Vietnamese minorities' vulnerability to poverty.³⁰

Potential for Conflict

The Southeast Asian region's open sea fisheries are located amidst a complex security architecture featuring several overlapping maritime territorial claims. Vietnamese fishing vessels following the northward fish migration or reacting to fisheries depletion within the EEZ are likely to be intercepted by Chinese patrol vessels, fanning the flames of existing maritime territorial disputes. A handful of disputes such as that surrounding the Spratly Islands cause Vietnam to be in conflict with neighboring states, but China is the most strategically significant. The map below illustrates the claim of each littoral country of the South China Seas to an EEZ under UNCLOS, relative to China's claim.

Vietnam's relationship with China is arguably the most complicated and conflict-prone in the region. China is a former colonial power and the last all-out war between the nations was only 35 years ago in 1979. Since that time Vietnamese-Chinese bilateral security relations, while cordial in some respects, have been dominated by three challenging territorial issues: demarcation of the mutual land boundary; delineation of the Gulf of Tonkin; and overlapping sovereignty claims in the South China Sea.³¹ Vietnam's economic dependence on China complicates the existing security relationship: China is Vietnam's largest trade partner and the latter runs a significant trade deficit with the former.

Chinese Territorial Claims Relative to UNCLOS EEZs

In 2004, China and Vietnam ratified the Agreement on Fishing Cooperation in the Gulf of Tonkin located between Hainan Island and the Vietnamese mainland (see map). The agreement delineated exclusive and common fishing areas, in an attempt to reduce the potential for conflict. However, China instituted a ban on fishing during peak fishing (spawning) season from May to June below the agreed-upon Chinese area of control. Incursions into this zone by Vietnamese trawlers have been met with violence, seizures of vessels and heavy fines. The most deadly incident took place



Source: BBC News <http://www.bbc.co.uk/news/world-asia-pacific-11152948>

in January 2005 when Chinese patrol boats opened fire on Vietnamese fishing trawlers, killing nine crewmen. China has accused Vietnamese fishermen of attacking their trawlers in the Gulf of Tonkin.³² Elsewhere, in March 2013, a

Chinese patrol craft fired warning flares that set fire to a Vietnamese fishing boat near the disputed Parcel Islands.³³

Violent incidents are more common further south in the disputed Spratly Archipelago. In April 2007, China patrols detained four Vietnamese fishing boats for an extended period and later that year rammed a Vietnamese vessel, resulting in one death. While a formal declaration of war over fishing stocks is unlikely, there is precedent for small confrontations involving fishing vessels to escalate into wider international conflicts.

The Cod War of 1975 between Britain and Iceland and the Turbot War of 1995 between Canada and Spain were very limited in scale. However, they illustrate that disputes over natural resources can quickly spiral out of control even among member of security alliances such as NATO.

Volatile socioeconomic conditions on the Vietnamese mainland have already been noted. Climate change impacts such as flooding and typhoons can cause significant population displacement. Confrontations between existing landowners and displaced people have the potential to exacerbate existing tensions between majority and minority ethnic groups. Land disputes are prevalent in Vietnam. Over one million complaints concerning land were estimated to have been lodged between 2009 and 2014 and some have led to violent outcomes.³⁴

Thomas Homer-Dixon, a leading scholar, identifies three conditions under which environmental scarcity can be a driver for violent conflict. They can be summarized as 1.) A decrease in supply of a controllable resource leads to simple scarcity conflict 2.) Environmental scarcity causes economic deprivation which in turn disrupts key social institutions causing civil strife and 3.) Large population movements caused by environmental stress exacerbate group identity conflicts.³⁵ This research suggests these climate change's impacts on Vietnam may trigger these conditions.

U.S. Strategic Interests and Opportunities for Engagement

Maintaining an advantageous balance of power in the South China Sea is a primary U.S. strategic goal. In February 2014, the U.S. officially rejected China's maritime claims – including those adjacent to Vietnamese waters – on the basis that they are contrary to international law. The horseshoe-shaped territorial lines demarking the Chinese EEZ were not drawn based on land features as required by the UNCLOS, a treaty the U.S. has not signed but observes at least in this case.³⁶

Vietnam is a natural ally in the region because its ability to project power acts as a check against Chinese hegemony in the South China Seas and cooperation between the countries is growing on several levels. However, it is essential that the United States avoid a situation where conflict such as a minor maritime dispute evolves into a larger conflagration where Vietnam is at a profound disadvantage and may request U.S. military assistance. Confrontation on any level based on depleted natural resources sets a dangerous precedent in the region. It is therefore in the interest of the U.S. to take active measures and develop plans for conflict prevention.

Open sea capture fisheries management is an opportunity for the U.S. Coast Guard (USCG), the organization with primary responsibility for maritime law enforcement, to engage with Vietnam and possibly China. Sporadic U.S.-Vietnamese cooperation already exists. In 2009, the USCG conducted a joint course on maritime boarding techniques. This was followed by more action in 2012, where the USS *Waesche*, one of the USCG's three "National Security Cutters" capable of global deployment, conducted a 161-day mission to Southeast Asia and the Pacific region. This mission also included tactical training and fisheries restoration management.³⁷

Coast Guard capacity building around enforcement is important because the Association of Southeast Asian Nations (ASEAN) has developed an international regime to regulate fishing in the South China Sea. However, much like the Tonkin Agreement between China and Vietnam, it lacks an effective enforcement mechanism, partially due to lack of capacity. An increased USCG presence could help build this capacity and minimize the potential for conflict. In March 2013, China announced plans to merge five agencies, with law enforcement power over waters that China claims, into a unified Coast Guard called the State Oceanic Administration.³⁸ The existence of this unified organization could facilitate cooperation with the U.S. and Vietnam and lead to a more coherent Chinese posture.

Reduction in societal resilience exacerbated by climate change impacts and natural disasters will increase the demand signal for U.S. humanitarian operations and disaster relief and recovery efforts. The U.S. military, led by the Navy, has a record of responding to every regional disaster at some level. For example, despite frosty relations, U.S. forces provided assistance to Myanmar after tropical cyclone Nargis in 2009, although the bulk of this assistance was refused.³⁹

The U.S. military is cooperating with regional military organizations on risk reduction activities to prepare for and adapt to the worst effects of climate change. Military-to-military cooperation is facilitated by epistemic factors. These include common characteristics such as terminologies, strategic planning cultures and common capabilities including rapid deployment and heavy lift capacity. Trust built by cooperation around these issues can carry over into discussions over other more intractable issues. For example, cooperation between the U.S. and South East Asian nations on counternarcotics have been problematic but maritime cooperation in other areas could form the basis of more productive discussions.

Disaster risk reduction and emergency response preparation arguably fit more clearly into the mission set of a civilian agency. The U.S. Federal Emergency Management Agency (FEMA) has established bilateral agreements with some countries in the region. Currently, these activities are limited to technical exchanges because FEMA lacks the authority to actually conduct ground operations overseas. Expanding these authorities would be a step in the right direction.

Conclusion

The physical and economic impacts of climate change on Vietnam's fisheries are significant and consequential. These impacts may have second-order implications for conflict at the international and local levels.

It is in the strategic interest of the U.S. to forestall such conflict and build resilience of this key regional ally. Accordingly, under a broad a broad strategy, U.S. military presence in South East Asia should be complemented by financial support for current and prospective allies. In 2009 the U.S. committed to mobilize US \$100 billion by 2020 along with private-sector partners. Less than half of this funding, referred to as "climate finance", is obligated for climate adaptation and risk reduction activities, as opposed to mitigation projects. U.S. emphasis on adaptation and risk reduction in the Asia-Pacific could stimulate greater financial commitments from other donor countries and leverage existing Vietnamese funding. In partnership with Vietnamese authorities, the U.S. has several means at its disposal to successfully address the impacts of climate change on capture and aquaculture fisheries.

Marcus D. King is the John O. Rankin Associate Professor of International Affairs and Director of the Master of Arts Program in International Affairs at George Washington University's Elliott School of International Affairs.

Notes

- 1 United Nations Food and Agriculture Organization (FAO), "The State of World Fisheries and Aquaculture 2010," Fisheries and Aquaculture Department, 2010.
- 2 Edward H. Allison et al., "Vulnerability of National Economies to the Impacts of Climate Change on Fisheries," *Fish and Fisheries*, 10, 2009.
- 3 Cao Le Quyen, "Country Report Vietnam: National Policies and Actions to Mitigate and Adapt to Climate Change in the Aquaculture Sector," paper presented at the Asian Pacific Fisheries Commission, May 31, 2011.
- 4 FAO, "The State of World Fisheries and Aquaculture 2010".
- 5 United Nations Convention on the Law of the Sea, "Agreement Relating to the Implementation of Part XI of the Convention," available at http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindx.htm
- 6 Cao Le Quyen, "Country Report Vietnam: National Policies and Actions to Mitigate and Adapt to Climate Change in the Aquaculture Sector".
- 7 FAO, "The State of World Fisheries and Aquaculture 2010".
- 8 Alan Dupont and Christopher G. Baker, "East Asia's Maritime Disputes: Fishing in Troubled Waters," *The Washington Quarterly*, 37:1(2014) 81.
- 9 Ibid.
- 10 Tran Duc Thanh et al., "Regimes of human and climate impacts on coastal changes in Vietnam," *Regional Environmental Change*, 4: 1, 2004
- 11 Marcus D. King and Ralph H. Espach, "Global Climate Change and State Stability," CNA, August 2009; or The Notre Dame Global Adaptation Index (ND-GAIN) 2013, available at www.gain.index.org
- 12 Intergovernmental Panel on Climate Change (IPCC), "Summary for Policymakers, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change," ed. M.L. Parry, et al. (Cambridge, United Kingdom and New York: Cambridge University Press, 2007).
- 13 M.A. MacNeil, N.A.J. Graham, J.E. Cinner, N.K. Dulvy, P.A. Loring, S. Jennings, N.V.C. Polunin, A.T. Fisk, and T.R. McClanahan, "Transitional states in marine fisheries: adapting to predicted global change," *Philosophical Transactions of the Royal Society B*, 365(1558), 2010, 3753-3763.
- 14 Ibid.
- 15 William L. Cheung et al., "Signature of Ocean Warming in Global Fisheries Catch," *Nature* 497, 2013.
- 16 Curtis Deutsch et al., "Climate change tightens a metabolic constraint on marine habitats," *Science*, Vol. 348, 2015.
- 17 Ibid.
- 18 I-Ching Chen et al., "Rapid Shifts of Species Associated with High levels of Climate Warming" *Science*, Vol 333, 2011.
- 19 Tim Daw et al., "Climate Change and Capture Fisheries: Potential Impacts, Adaptation and Mitigation," FAO Fisheries and Aquaculture Technical Paper No. 530. Rome, Italy.
- 20 The Notre Dame Global Adaptation Index (ND-GAIN) 2013, available at www.gain.index.org
- 21 Elizabeth L. Malone and Antoinette Brenkert, "Vulnerability, Sensitivity and Coping Adaptive Capacity Worldwide," *The Distributional Effects of Climate Change: Social and Economic Implications*, ed. Mattias Ruth, Maria Ibarraran, Edward Elgar Press, April 2008.
- 22 Sensitivity is the sum of fishers as a proportion of the economically active population, fisheries landings, the export value of fisheries products, and domestic fish consumption as a proportion of total animal protein.
- 23 Edward H. Allison et al., "Vulnerability of National Economies to the Impacts of Climate Change on Fisheries," *Fish and Fisheries*, Blackwell, 2009.
- 24 Vulnerability is defined according to exposure to climate change, systemic natural resource resilience, degree of dependence of the national economy upon social or economic returns from fisheries, and the extent to which adaptive capacity offsets.
- 25 Peter Chaudhry and Greet Ruyschaert, "Human Development Report: Fighting Climate Change Draft Working Paper, Climate Change and Human Development in Vietnam," available at http://hdr.undp.org/en/reports/global/hdr2007-8/papers/Chaudhry_Peter%20and%20Ruyschaert_Greet.pdf
- 26 Phuong Nguyen-Hoang and John G. McPeak, "Leaving or Staying: Interprovincial Migration in Vietnam," *Asian and Pacific Migration Journal*, Vol. 19, 2010.
- 27 United Nations Viet Nam, *Migration, Resettlement and Climate Change in Viet Nam: Reducing Exposure and Vulnerabilities to Climatic Extremes and Stresses through Spontaneous and Guided Migration*, March 2014.
- 28 Ibid.
- 29 Imai S. Katsushi et al., "Poverty, Inequality, and Ethnic Minorities in Vietnam," *International Review of Applied Economics* 25, 2011.
- 30 Ibid.
- 31 Ian Storey, "Trouble and Strife in the South China Sea: Vietnam and China," *China Brief*, Volume 8, The Jamestown Foundation, April 16 2008, available at http://www.jamestown.org/single/?no_cache=1&tx_tnews%5btt_news%5d=4854
- 32 Ed Wong, "Chinese Civilian Boats Roil Disputed Waters," *The New York Times*, October 2, 2010.
- 33 Marianne Brown, "Fire-Gutted Vessel Highlights Vietnam-China Maritime Dispute," *Voice of America*, March 27, 2013, available at <http://www.voanews.com/content/maritime-incident-highlights-vietnam-china-beijing-hanoi-dispute/1629617.html>
- 34 Phillip Taylor, "Introduction to the Special Issue: Contests over Land in Rural Vietnam," *Journal of Vietnamese Studies*, 9:3, 2014.
- 35 Thomas A Homer-Dixon, "Environmental Scarcities and Violent Conflict: Evidence from the Cases," *International Security*, 19:1, 1994.
- 36 Ponnudurai Parameswaran, "U.S. Draws Line Over South China Sea Dispute," *East Asia Beat*, February 9, 2014. Available at <http://www.rfa.org/english/commentaries/east-asia-beat/claim-02092014205453.html>
- 37 United States Coast Guard website, "USCGS Waesche," available at <http://www.uscg.mil/pacarea/CGCWaesche/default.asp>
- 38 *The Economist*, "Maritime Security, Dragons Unite," March 16, 2013.
- 39 Foster Klug, "Bush Says World Should Condemn Myanmar," *Associated Press*, available at <http://www.thejakartapost.com/news/2008/05/12/bush-says-world-should-condemn-myanmar.html>