RSiS S. RAJARATNAM SCHOOL OF INTERNATIONAL STUDIES
Nanyang Technological University, Singapore

NTS INSIGHT

NTS Insight, no. IN20-02, May 2020

Water Security in Southeast Asia: Regional, National, and Sub-national Challenges

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Water is a fundamental element of survival and growth on Earth. As a prerequisite for life and an important economic resource, it supports all aspects of everyday activity. Ensuring that water is available, accessible and safe for current and future generations is among humanity's greatest challenge. One of the most important Non-Traditional Security (NTS) challenges facing Southeast Asia is water security. This NTS Insight explores water security issues in Southeast Asia and examines the ways it threatens states and societies. While water security challenges are not new in the region, the nature of issues are changing, making it important to assess how such threats are defined, negotiated, and managed. The NTS governance process begins with identifying and understanding NTS challenges, and ways they are securitised. By looking at case studies at the sub-national, national and regional level, this paper seeks to present some of the major water security issues in the region, how they affect states and societies, and why they merit urgent attention and resources. This Insight explains why addressing sub-national water security challenges require consultative and participatory approaches that facilitate open democratic dialogue and local collective action. It will also lay out how deliberate planning, careful implementation, and judicious monitoring of water management policies are needed at both the national and regional levels. Further, while it is not easy to reconcile developmental goals with environmental protection, the gravity of the situation requires more preventive diplomacy and subregional collaborative mechanisms which are geared towards averting water conflicts. Overall, it aims to help formal and informal NTS actors working through various channels to gain further understanding of emerging water security challenges in Southeast Asia.

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Recommended citation: Christopher Chen and Angelo Paolo L. Trias, 'Water Security in Southeast Asia: Regional, National, and Sub-national Challenges', NTS Insight, No. IN_20-02 (Singapore: RSIS Centre for Non-Traditional Security Studies (NTS Centre), Nanyang Technological University Singapore 2020).

Introduction

The economic, social, and political landscape of Southeast Asia is transforming, and so are its non-traditional security challenges. The region has one of the fastest economic growth in the world, continuing to average an annual increase of more than 5 percent.[1] This has led to the expansion of cities,[2] creation of markets,[3] and economic integration initiatives[4] that allow more Southeast Asians to access opportunities to advance in life. Supported by a burgeoning middle class driving up consumer demand,[5] and a large young population harnessing emerging technologies,[6] it appears that the region's economic prospect will remain bright.

However, Southeast Asia also encapsulates many problems that come with significant changes. For instance, critical infrastructure and basic services in several parts of the region are not adequately keeping up with rapid urbanisation and population growth. And the growing connectedness of ASEAN economies is making more populations sensitive to external shocks like currency fluctuations and trade disruptions. The socio-economic gains and political progress of Southeast Asia are constrained and increasingly at-risk in a region where NTS challenges abound.

NTS challenges are nonmilitary issues that threaten and undermine the security and well-being of states and its societies.[7] NTS issues in Southeast Asia include climate change, food shortages, infectious diseases, irregular migration, natural disasters, resource scarcity, and transnational crime.[8] The primacy of the state in managing these issues and the principle of non-interference are respected and upheld in the region. But states do not always have adequate capacity to deal with the frequency, magnitude, and transboundary nature of NTS threats they encounter. Insecurity cannot remain a concern of one state, and no state can stay fully isolated from regional problems.

Cooperation is needed to collectively address the increasing scope and complexity of NTS challenges. There exists a multi-actor/-level/-scale process that different stakeholders and institutional frameworks engage in to jointly govern NTS issues in Southeast Asia.[9] Caballero-Anthony outlines four dimensions of NTS Governance: identifying and understanding problems

[1] ASEAN, "Investing in ASEAN", 2019, Jakarta, Indonesia: ASEAN.
[2] ASEAN UP, "4 ASEAN infographics: demography, top cities, urbanization", 2018, https://aseanup.com/asean-infographics-demography-top-cities-urbanization/.
[3] ASEAN UP, "Overview of business in Southeast Asia", 2019, https://aseanup.com/business-southeast-asia/.
[4] ASEAN, "ASEAN Economic Integration Brief", 2017, Jakarta, Indonesia: ASEAN.
[5] ASEAN, "Investing in ASEAN".
[6] ASEAN, "First ASEAN Youth Development Index", 2017, Jakarta, Indonesia: ASEAN.
[7] Mely Caballero-Anthony and Alistair D.B. Cook (Eds.), "An Introduction to Non-Traditional Security Studies: A Transnational Approach", 2013, Singapore: ISEAS.
[8] Mely Caballero-Anthony, "An Introduction to Non-Traditional Security Studies: A Transnational Approach", 2016, London, UK: Sage Publications.
[9] Mely Caballero-Anthony. 2018. Negotiating governance on non-traditional security in Southeast Asia and beyond. New York, NY: Columbia University Press.

of common interest, setting goals and directions, formulating policies, and implementing policies.[10] This governance process facilitates coordination and builds on the contributions of various actors, structures, mechanisms, and arrangements. But it also drives competition among those seeking to shape the security agenda and influence how it is addressed by the regional community. This raises a critical question: What threats should NTS governance prioritise?

One of the most important NTS challenges facing Southeast Asia is water security. Water is essential for the survival and growth of life on earth. It keeps ecosystems properly functioning and supports all aspects of human activity. People are dependent on water to maintain health and acquire wealth. People also rely on water to drive the production and consumption of goods and services like animal meat and hydropower. As a vital resource, water can be an enabling or limiting factor to socio-economic development. No institution or nation can continuously function and flourish without achieving water security first.[11]

Water Security in Southeast Asia

According to the United Nations, water security entails safeguarding access to adequate quantities of acceptable quality water, ensuring protection against water-borne pollution and water-related disasters, and preserving ecosystems in a climate of peace and political stability.[12] Water can be both a scarce resource, destructive force, and a possible source of "welfare or misery, cooperation or conflict."[13] Securing water is a complex undertaking requiring a combination of adequate financing, good governance, peace and political stability, and transboundary cooperation.[14]

Water security is also necessary for sustaining social progress, economic growth, and political stability.[15] [16] At the time of this writing, no less than 33 countries around the world, including several in Southeast Asia, have experienced medium to high levels of water stress.[17] [18] Close to three billion people in the region lack either potable water, adequate sanitation services and water infrastructure, and sufficient protection from water shortage.[19] The most common issues of water insecurity are the incapacity to meet the growing demand for water, and uneven access and distribution of water.[20]

ASEAN Member States (AMS) have established the ASEAN Working Group on Water Resource Management (AWGWRM) to manage common issues affecting freshwater supply, demand, conservation, and quality.[21] Realizing the need for an integrated approach, the AWGWRM subsequently developed and adopted a Strategic Plan of Action on Water Resource Management in 2005.[22] The goal is to cooperate in implementing an Integrated Water Resources Management (IWRM)

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[10] Ibid.
[11] William J. Cosgrove and Daniel P. Loucks, "Water management: Current and future challenges and research directions", Water Resources, Volume. 51, Issue 6, 20 June 2015, doi: https://doi.org/10.1002/2014WR016869.
[12] UN Water, "Water Facts", 2019, https://www.unwater.org/water-facts/.
[13] UNESCO, "Water Security", 2019, https://en.unesco.org/themes/water-security.
[14] Ibid.
[15] Luis Santos Pereira, Ian Cordery, and Iacovos Iacovides, "Coping with Water Scarcity: Addressing the Challenges", 2009, Berlin, Germany: Springer Science & Business Media.
[16] Colin Chartres and Samyuktha Varma, "Out of Water: From Abundance to Scarcity and How to Solve the World's Water Problems", 2010, Upper Saddle River, New Jersey: FT Press.
[17] UN, "Sustainable Development Goal 6", 2019, https://sustainabledevelopment.un.org/sdg6.
[18] Water stress occurs when water supply cannot keep up with water demand. It can be caused by prolonged or unpredictable droughts, rapid population growth, and unsustainable water withdrawals. According to the UN, water stress starts when the water available in a country drops below 1 700 m3/year or 4 600 litres/day per person. A country experiences water scarcity when the 1 000 m3/year or about 2 700 litres/day per person threshold is crossed. A country with less than 500 m3/year or roughly 1 400 litres/day per person is considered to have absolute water scarcity. The World Resource Institute (WRI) notes that water stress can often lead to other consequences such as food insecurity, conflict and migration, and financial instability.
[19] WWAP (UNESCO World Water Assessment Programme), "World Water Development Report 2019 - Leaving No One Behind", 2019, Paris, France: UNESCO.
[20] UN Water, "Water Scarcity", https://www.unwater.org/water-facts/scarcity/.
[21] ASEAN, "Integrated Water Resources Management (IWRM)", https://aseaniwrm.water.gov.my/.
[22] ASEAN, "ASEAN Strategic Plan of Action on Water Resources Management", 2005, Jakarta, Indonesia: ASEAN.

approach. Considerable progress have been made in six key areas: (i) water supply management, (ii) irrigation management, (iii) stormwater management, (iv) flood management, (v) water pollution management, and (vi) sanitation management.[23]

The renewed commitment and support of AMS, as embodied in the Kuala Lumpur Declaration on 'ASEAN 2025: Forging Ahead Together', guarantees that efforts for securing water in Southeast Asia will receive sufficient attention and resources at least for the next five years.[24] However, the region faces developmental, environmental, and geographical pressures that limit collective efforts to promote "coordinated development and management of water", maximise "economic and social welfare in an equitable manner", and ensure the "sustainability of vital ecosystems" in the region.[25]

Sub-National Challenges: Water Insecurity and Disasters

Despite being home to some of the world's fastest expanding economies, inequalities in Southeast Asia are also widening making vulnerable and marginalised populations in one of the most natural hazard prone and climate-sensitive parts of the world even more susceptible to water-related disasters.[26] Consequently, water security and disaster risk management (DRM) agendas in the region are closely linked. Water insecurity can magnify natural disaster impacts, and natural disasters can worsen the effects of water insecurity in the region.[27] Understanding the interconnection between these two agendas is critical to overall resilience building efforts.

The extent and effects of water insecurity become more visible during natural disasters at the sub-national level because water insecurity often highlights existing inequalities in society. Water tends to be distributed unevenly in developing areas of Southeast Asia, and is still a commodity that many cannot always afford.[28] The inequitable allocation and access of water results to chronic stunting of health and productivity of socio-economically disadvantaged people. It also plays a role in lowering their capacity to cope with and bounce back after a disaster.[29]

Natural disasters, like water insecurity, tend to affect the vulnerable and marginalised segments of society the most. Natural disasters can destroy water infrastructure, disrupt sanitation services, shrink water reserves, and lower water quality.[30] Those with relatively fewer access to resources, like water, are less able to respond and recover from calamities. The deadly and destructive effects of too much water, too little water, or polluted water can trap people in vicious cycles of poverty.[31]

The growing intensity and variability of cyclones/typhoons, floods, storms, storm surges, and tsunamis brought about by global warming should be a concern for Southeast Asia because it further exposes populations at-risk, even those not

[23] ASEAN, "ASEAN Cooperation on Environment", 2020, https://environment.asean.org/awgwrm/.
[24] ASEAN, "ASEAN 2025: Forging Ahead Together", 2015, Jakarta, Indonesia: ASEAN.
[25] Global Water Partnership, The Need for an Integrated Approach, 2017, https://www.gwp.org/en/About/why/the-need-for-an-integrated-approach/.
[26] UNESCAP, "Asia and the Pacific SDG Progress Report 2019", 2019, Bangkok, Thailand: UNESCAP.
[27] Neil S. Grigg, "Water Security, Disasters, and Risk Assessment", Integrated Water Resource Management (pp 375-393), 2016, London, UK: Palgrave Macmillan.
[28] Lee Poh Onn, "Water Issues in Southeast Asia: Present Trends and Future Directions", 2013, Singapore: ISEAS.
[29] ASEAN-ROK Cooperation Fund, CGWF, and KICT, "Building Resilience for Sustainable ASEAN from Water-Related Disasters", 2017, Jakarata, Indonesia: ASEAN.
[30] UN High Level Programmes Committee Senior Managers Group on Disaster Risk Reduction for Resilience (HLCP/SMG), "Water and Disaster Risk", 2014, Geneva, Switzerland: UN.

previously affected.[32] Moreover, coastlines in the region have already started retreating and several densely populated cities will be submerged at high tide by 2050.[33] The work and livelihoods as well as properties and assets of communities are increasingly in danger from water insecurity and water-related disasters.

Cases: Effects of Tsunami and Typhoons on Water Security in Indonesia and the Philippines

An example of the widespread impact of disasters on water security in the region can be observed as far back as the 2004 Indian Ocean Earthquake and Tsunami. The tsunamis up to 30 meters high pushed salt water inland and infiltrated fresh water supplies and arable land in the Aceh province – making it non-potable and rendering it useless for agriculture.1 While this issue is often overlooked, it has increased the risk of affected communities from infectious disease, and resulted in large losses of primary livelihoods.2 3 As sea levels continue to rise and climate-induced hazards occur more regularly, Southeast Asian communities should enhance preparations for the cascading effects of future tsunamis as witnessed in Sulawesi in 2018.4

More recently, Typhoon Phanfone in December 2019, which traversed the same path as Super Typhoon Haiyan in 2013, caused water supply contamination and service disruption in Central Philippines.5 The storm surges it triggered reached and soiled water sources and the power blackout meant that water refilling stations were inoperable.6 Many survivors had to drink from dug wells and unprotected springs thus increasing their health risks. Extreme weather events are expected to be the new normal. This calls for increased vigilance and support for affected communities to protect them from post-disaster threats like water-borne diseases outbreaks that can limit their participation in socio-economic activities and slow down their long-term recovery.7

1 Hari Srinivas, "The Indian Ocean Tsunami and its Environmental Impacts", GDRC Case Study E-023, June 2015.
2 Shannon Doocy et al., "The Human Impact of Tsunamis: a Historical Review of Events 1900-2009 and Systematic Literature Review", PLOS Currents Disasters, Edition 1, 16 April 2013. doi: 10.1371/currents.dis.40f3c5cf61110a0fef2f9a25908cd795.
3 Havidan Rodriguez et al., "A snapshot of the 2004 Indian Ocean tsunami: societal impacts and consequences", Disaster Prevention and Management, Volume 15, Issue 1, pp. 163-177, 2006.
4 Angelo Paolo L. Trias and Alistair D.B. Cook, "Recalibrating Disaster Governance in ASEAN After the 2018 Central Sulawesi Earthquake and Tsunami", RSIS Policy Reports, 06 December 2019.
5 Oxfam, "Loss of critical facilities, water contamination, displacement increase health risks of Ursula survivors", 31 December 2019, https://reliefweb.int/report/philippines/loss-critical-facilities-water-contamination-displacement-increase-health-risks.
6 Oxfam, "Philippines Typhoon Phanfone", 27 December 2019, https://www.oxfam.org.uk/what-we-do/emergency-response/philippines-typhoon-phanfone.
7 Richard Damania et al., "Uncharted Waters: The New Economics of Water Scarcity and Variability", 2017, Washington D.C., USA: World Bank.

Millions living in megacities, like Jakarta and Manila, face multiple water-related risks like water pollution. Water pollution becomes unmanageable when water infrastructure and sanitation services cannot keep up with rapid urbanisation and population growth.[34] Human waste, industrial pollutants, and raw sewage are often discharged in natural waters without adequate treatment which in turn negatively affects the well-being of city dwellers.[35] This is further complicated by the fact that several megacities in the region are exposed and frequently subjected to natural hazards.[36] Natural disasters can compound water pollution. It can damage ecosystems that serve as protection buffers and water filters, and it can act as a medium for spreading contaminants that can cause disease outbreaks. For instance, flooding can widen the transmission

[32] UNESCO, "Global trends in water-related disasters: an insight for policy makers", 2009, Paris, France: UNESCO.
[33] Denise Lu and Christopher Flavelle, "Rising Seas Will Erase More Cities by 2050, New Research Shows", The New York Times, 29 October 2019, https://www.nytimes.com/interactive/2019/10/29/climate/coastal-cities-underwater.html.
[34] Theresa E. Lorenzo and Ann P. Kinzig, "Double Exposures: FutureWater Security across Urban Southeast Asia", Water, Volume 12, Issue 116, 2020, doi:10.3390/w12010116.
[35] UNDP, "Goal 6: Clean water and sanitation", https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-6-clean-water-and-sanitation.html.
[36] UNOCHA, "Major Natural Hazards in Asia and the Pacific", 2016, https://reliefweb.int/map/world/major-natural-hazards-asia-and-pacific.

of cholera, dengue, hepatitis A, leptospirosis, and malaria.[37] The added burden of extreme weather events brought about by climate change is likely to present a critical health and challenge to communities from developing economies in Southeast Asia.

Cases: Effects of Inadequate and Heavy Rainfall on Water Security in Indonesia and the Philippines

The Philippines is home to many water bodies but only 47 per cent of those retain good quality due to water pollution.1 This unresolved problem has left the country dependent on relatively few sources of water.2 In March 2019, tens of thousands of households across Manila loss water supply as the water level in dams hit below critical level.3 The water crisis resulted from a combination of water demand outstripping supply, insufficient water infrastructure, lack of alternative water sources, and very low rainfall due to the dry season.4 Beyond the economic opportunities lost by people queuing up and waiting around deep wells and water trucks, it has also disrupted services that affect public health. For instance, hospitals stopped supplying water to rooms and held-off on surgical operations, and essential businesses like drinking water refilling stations had to be shut down.5

Only one-third of the annual water needs of Jakarta is served by its water utility company, the rest is sourced from privately drilled wells.6 A large amount of water is being pumped out of the ground because of the lack of clean surface water.7 This in turn makes one of the fastest-sinking cities in the world submerge at a faster rate, intensifying the risks and impact of flooding in the capital. At the start of 2020, a record-breaking rainfall in Jakarta triggered massive floods displacing about 400,000 residents.8 There were roughly 60 reported deaths: some drowned or got electrocuted, others succumbed to hypothermia and other diseases.9 The rainfall caused landslides and river banks to burst, and inundated many areas not previously affected by floods.10 Sewage drains and rivers were clogged up by rubbish and stilts, and pumps supposed to carry floodwaters into Jakarta Bay were submerged by floodwater.11

Both cases highlight the ways severe water pollution can amplify existing disaster risks and create new ones. Both cases also emphasize how the poor and marginalized, those without adequate reliable water supply, are disproportionately affected. For instance, those in Manila who are able to afford privately-installed water tanks or are able to find alternative accommodation during the water crisis are able to continue their socio-economic activities with little disruption. Affluent neighborhoods and development projects in Jakarta are also often built several feet higher than street level, causing floodwaters to flow down to areas without the infrastructure to drain it.

1 Gabriella Andrews, "Resolving the Water Pollution Crisis in the Philippines: the Implications of Water Pollution on Public Health and the Economy", Pepperdine Policy Review, Volume 10, Article 2, 2 March 2018.
2 Rhonda Marrone, "Water Pollution in the Philippines: Causes and Solutions", The Borgen Project, 2 October 2016.
3 Cecilia Yap and Andreo Calonzo, "The Worst Water Crisis in Nearly a Decade Hits Manila. Here's Why", Bloomberg, 18 March 2019.
4 Philstar.com, "Manila's water shortage seen to persist amid blame game on supply woes", 12 December 2019, https://www.philstar.com/business/2019/12/12/1976483/manilas-water-shortage-seen-persist-amid-blame-game-supply-woes.
5 Raul Dancel, "Philippines turns to Singapore to ease water crisis in Metro Manila", The Straits Times, 20 March 2019, https://www.straitstimes.com/asia/se-asia/manila-water-woes-duterte-turns-to-spore-for-help.
6 Maizura Ismail, "Managing Jakarta's water-related risks", The ASEAN Post, 22 August 2018.
7 The Economist, "Flooding in Jakarta is the worst for over a decade", 11 January 2020.
8 Ibid.
9 Kharishar Kahfi, "'Not ordinary rain': Worst rainfall in over decade causes massive floods in Jakarta", The Jakarta Post, 01 January 2020, https://www.thejakartapost.com/news/2020/01/01/not-ordinary-rain-worst-rainfall-in-over-decade-causes-massive-floods-in-jakarta.html.
10 Hillary Leung, "66 People Have Died in Indonesia's Devastating Floods. Here's What to Know", Time, 08 January 2020.
11 Ibid.

Most policies and strategies to address water security and DRM challenges are crafted at the national and regional levels.[38] However, current high-level and large-scale approaches have proved insufficient to address water security and reduce disaster risks.[39] [40] For instance, excessive groundwater extraction through wells continue despite regulations because many

[37] WHO, "Flooding and communicable diseases fact sheet", https://www.who.int/hac/techguidance/ems/flood_cds/en/.
[38] ASEAN, "ASEAN Cooperation on Environment".
[39] UNDRR, "Global Assessment Report on Disaster Risk Reduction 2019", 2019, https://gar.unisdr.org/report-2019.
[40] Brian Richter, "Chasing Water: A Guide for Moving from Scarcity to Sustainability", Washington DC: Island Press.

Jakarta neighborhoods still do not have alternative water sources and supplies. Informal settlements in Manila still dump untreated human waste in waterways because of the lack of sanitation services. There is an urgent need to prevent the contamination, breakdown, and disruption of water supplies, infrastructure, and services at the local level. Solutions, if it is to be effective and sustainable, must be informed by the needs of affected communities.[41]

The previous cases show that initiatives addressing widening inequalities should be a critical component of water security and disaster risk management agendas in the region.[42] This can only happen through consultative and participatory approaches that facilitate open democratic dialogue and local collective action. Bottom-up processes can open up unique channels that can allow ASEAN IWRM policies and strategies to trickle down and apply to affected communities. Solving sub-national water security challenges begins with addressing people's behaviors that contribute to water scarcity. However, people only become invested and open to change if they think and feel they are being heard and their needs are being considered. Bottom-up processes enable communities to raise their concerns and have an idea of what to expect in terms of policies. Participatory approaches can generate more feedback, which may result in more informed policymaking, which then leads to more people-centred solutions that communities may be more willing to sustain.

A feasible way to do this is to further engage the region's middle class and young population with access to mobile devices and the internet. For instance, Indonesia and Philippines are home to the greatest number of poor in Southeast Asia,[43] but both countries are also home to millions of mobile device and internet users. Project Agos, launched in 2013, harnesses the power of social media and community engagement to facilitate "top-down decision making with bottom-up crowdsourcing" to better prepare, respond, and recover from disasters.[44] Similarly, the recently launched PetaBencana.id is an information sharing platform for collectively mitigating risk. It allows communities to crowd-source flood maps to "understand the flooding situation, avoid flooded areas, and make decisions about safety and response".[45]

Both solutions leverage technologies to create inclusive spaces that engage and empower communities to tackle water security-related issues in their locality. Linking tools like Project Agos and PetaBencana.id to regional platforms such as the ASEAN Water Data Management and Reporting System can strengthen the integration between sub-national level activities and regional-level decision making. Currently the use of the ASEAN system is limited to assessing the water quality of rivers across the region. Nevertheless, it is a proven framework for integrating different water-related monitoring systems. Since local NTS issues tend to have national and regional effects, it will also be beneficial for AMS to collect and analyze local data to further understand patterns and trends associated with the interaction of water insecurity and water-related disasters at the sub-national level. If successful, this may also be later expanded to cover surveillance of water-borne diseases which could result in more coherent public health emergency, climate change adaptation, and disaster management systems.

[41] Ibid.
[42] The ASEAN Post, "Southeast Asia's widening inequalities", 17 July 2018, https://theaseanpost.com/article/southeast-asias-widening-inequalities.
[43] ASEAN, "Financing the sustainable development goals in ASEAN: Strengthening integrated national financing frameworks to deliver the 2030 agenda", 2017, Jakarta, Indonesia: ASEAN.
[44] Project Agos, https://www.rappler.com/move-ph/issues/disasters.
[45] PetaBencana.id, https://info.petabencana.id/.

National Challenges: Drought and its Impact on Food and Economic Insecurity

Soaring temperatures and volatile weather conditions in recent years are putting more pressure on dwindling water supplies in almost all Southeast Asian countries. Long-term forecasts predict more severe droughts in the future. Droughts worsen water scarcity because it contributes in draining water sources needed for irrigation.[46] Over the past three decades, roughly 66 million people in Southeast Asia have been affected by droughts and water shortages.[47] This has a significant impact in the region because it is a major producer of agricultural products in the world. When impacts of slow-onset hazards are included in risk assessments, annual economic losses in the region amounts to nearly USD $675 billion. Drought-related agricultural losses make up about 60 percent of this figure.[48] While they might start slowly, droughts often have intensifying effects on agrarian communities, undermining their food security and diminishing their incomes. Given that a large percentage of people in the region rely on agricultural production for their livelihoods, this has implications on livelihoods and economic growth.

Case: Effect of Drought on Food and Economic Security in Thailand

Thailand is another country in the region that is susceptible to the effects of droughts and water shortages. In July 2019, a study by the Department of Agricultural Extension estimated that around 1,331 square kilometres of land had been damaged by drought, amounting to a cost of roughly US$320 million.1 Many of the country's reservoirs are drying up; nearly half of the major reservoirs are at less than 50 percent capacity.2 According to the Thai Meteorological Department, lower-than-average precipitation in 2020 will result in the country being hit by the worst drought ever in four decades.3

More recently, in January 2020, tap water in parts of Bangkok turned salty, as the water levels in one of Thailand's major rivers -the Chao Praya River – became too low to prevent saline intrusion.4 These will severely affect Thailand's agricultural and industrial sectors, which depend heavily on water for production. For instance, due to inadequate water supply, paddy production for the second crop is forecasted to fall by roughly 50 percent in the 2019-2020 season.5

The effects are further exacerbated by a myriad of factors, such as lack of investment in agricultural technologies and water mismanagement at the provincial level. Rice production makes up a significant proportion of Thailand's economy. Failure to manage water shortages and drought would be detrimental to the livelihoods of countless Thai rice farmers. This will have an adverse impact on both the food and economic security of Thailand.

1 Jack Board, "When the Rain Doesn't Come: Thailand in Grip of Severe Drought as Monsoon Season Fails to Deliver", *CNA*, 2019, https://www.channelnewsasia.com/news/asia/thailand-drought-monsoon-rains-agriculture-11848900.
2 Ibid.
3 Randy Thanthong-Knight, "The Worst Drought in 40 years has Turned Bangkok Tap Water Salty", *Bloomberg*, 2020, https://www.bloomberg.com/news/articles/2020-01-07/worst-drought-in-40-years-looms-over-the-struggling-thai-economy.
4 Ibid.
5 Phusadee Arunmas, Lamonphet Apisitniran, and Narumon Kasemsuk, "Falling Water Levels Deliver a Taste of Things to Come", *Bangkok Post*, 2020, https://www.bangkokpost.com/business/1834279/falling-water-levels-deliver-a-taste-of-things-to-come.

[46] UN Water, "Climate Change Adaptation: The Pivotal Role of Water", 2010, https://www.unwater.org/publications/climate-change-adaptation-pivotal-role-water/.
[47] UNESCAP and ASEAN, "Ready for the Dry Years: Building Resilience to Drought in South-East Asia", 2019, https://www.unescap.org/sites/default/files/publications/Ready%20for%20the%20Dry%20Years.pdf.
[48] UNESCAP, "The Disaster Riskscape Across Asia-Pacific: Pathways for Resilience, Inclusion and Empowerment", 2019, https://www.unescap.org/sites/default/files/publications/Asia-Pacific%20Disaster%20Report%202019_full%20version.pdf.

There is increasing pressure on countries in Asia to ensure that water supplies are able to match growing demands. As a World Bank study indicates, governments should endeavour to create more robust systems of water resource management. This includes implementing policies to incentivise more efficient water use, to minimise pollution, and to find alternative means to boost water supplies.[49] These policies and initiatives can be carried out in consultation with regional experts. One way of accomplishing this would be for governments to seek out best practices and strategies in the region and adapt them for their own use. Singapore's experience in water management can be a good point of reference for addressing water security. The Singapore Government's Four National Taps strategy (local catchment, imported water, Newater, desalinated water) has helped the country build a robust, diversified, and sustainable supply of water which takes on greater significance given its high population density and lack of natural water resources.[50] While Southeast Asian countries do have differing levels of capacities, learning and adapting proven solutions and strategies offer a simpler route towards sustainable water resource management. For instance, in response to the water crisis in metropolitan Manila in early 2019, President Rodrigo Duterte expressed interest in learning from Singapore's experience with desalination.[51] This is largely due to the Republic's expertise in water treatment and management, and history of providing technical assistance to countries all over the world.[52]

The economic impact of water insecurity also brings the importance of insurance to the fore. Crop-producing countries in the region such as Vietnam, Indonesia, and Thailand have already started implementing national agricultural insurance programmes that aim to provide coverage for local farmers.[53] They allow farmers to insure their crops against losses incurred during droughts and floods as well as against harvest failures. However, these initiatives face limitations in terms of both scale and accessibility. Many people residing in the rural areas are not aware of such schemes, and might not fully understand the importance of insurance.[54] Existing programmes also cover specific crops and thus might not be expansive enough.[55] Moreover, large scale implementation is often difficult due to limited capacity and experience. To expedite scaling-up efforts, national governments should work together with insurance providers and sub-national institutions to create more extensive policies and to help raise awareness among individuals at the rural level.

[49] World Bank Group, "Vietnam: Toward a Safe, Clean, and Resilient Water System", 2019, https://openknowledge.worldbank.org/handle/10986/31770.
[50] PUB, "Four National Taps", https://www.pub.gov.sg/watersupply/fournationaltaps.
[51] Raul Dancel, "Philippines turns to Singapore to ease water crisis in Metro Manila", *The Straits Times*, 2019, https://www.straitstimes.com/asia/se-asia/philippines-turns-to-spore-to-ease-water-crisis-in-metro-manila.
[52] Angela Teng, "S'pore firms make waves worldwide in water treatment", *Today*, 2016, https://www.todayonline.com/business/spore-firms-make-waves-worldwide-water-treatment.
[53] Gregor Vilturius and Michael Boyland, "Can insurance help Southeast Asia's farmers cope with climate change?", *Stockholm Environment Institute*, 2016, https://www.sei.org/perspectives/climate-insurance-southeast-asia/.
[54] Shweta Sinha and Nitin K. Tripathi, "Assessing the Challenges in Successful Implementation and Adoption of Crop Insurance in Thailand", *Sustainability* (2016) 8, p.1-20.
[55] Gabriel Olano, "Thailand to expand crop insurance programme", *Insurance Business Asia*, 2019, https://www.insurancebusinessmag.com/asia/news/breaking-news/thailand-to-expand-crop-insurance-programme-173328.aspx.

Regional Challenges: Geopolitical Implications of Dam-Building

Shared water bodies can have geopolitical implications that could potentially lead to inter-state conflict. This is particularly evident in the Southeast Asian region, where dam-building projects are giving rise to both environmental complications and political tensions. As sources of renewable energy, it is tough to argue against the utility of dams. Dams generate hydropower, which at face value, is renewable energy with a low-carbon footprint. However, in the process of generating hydropower, dams are also contributing to massive degradation of river systems, worsening droughts, and disrupting ecosystems. They are also potential triggers for conflict. Already, countries such as China have been accused of monopolising control of rivers and using this control as diplomatic leverage.[56]

Academics and policymakers alike are of the view that the Mekong is an "arena of contestation".[57] China dam-builders have been particularly active in the Mekong Region[58] and her dam-building exploits in the GMS have led to its terming as a "potential Mekong upstream hegemon".[59] Chinese officials and policymakers are quick to point out that these projects are part of the "China solution", which promotes economic development as a panacea for both traditional and non-traditional security issues.[60]

However, the situation becomes complicated when dam-building projects are perceived differently by different countries in Southeast Asia.[61] While countries like Laos and Cambodia view dams as essential instruments of economic growth, development, and poverty reduction[62], others such as Vietnam are more apprehensive of dam-building projects. As a country situated in the downstream portion of the Mekong, Vietnam has many reasons to be worried about the increasing number of dams being built upstream. Studies have found that water infrastructures on the Mekong River can adversely alter the water levels of the Tonle Sap Lake.[63] This is of great concern to Vietnamese authorities, as the Tonle Sap Lake acts as the connector between the Mekong River in Cambodia and the Vietnamese Mekong Delta. Hence, while Laos and Cambodia might be more welcoming and open to Chinese dam projects, Vietnam has reasons not to share their same enthusiasm. Moreover, dam-building also perpetuates existing social inequalities. As some scholars argue, local communities residing in rural areas bear the full brunt of the detrimental effects of the dams, while urban populations and industries tend to reap the most benefits.[64]

Given the transboundary nature of the Mekong River, countries downstream have very little recourse when countries upstream choose to dam river segments that lie in their territory. New data shows that, for six months in 2019, Chinese dams blocked an unprecedented amount of water from entering the Lower Mekong, resulting in some of the lowest river

[56] Eugene K Chow, "China is Weaponising Water", *The National Interest*, 2017, https://nationalinterest.org/blog/the-buzz/china-weaponizing-water-22053.
[57] Philip Hirsch, "The Shifting Regional Geopolitics of Mekong Dams", *Political Geography*, (2016) 51, p.63-74 (p.72).
[58] Frauke Urban, Giuseppina Siciliano and Johan Nordensvard, "China's Dam Builders: their Role in Transboundary River Management in South-east Asia", *International Journal of Water Resources Development*, (2018) 34, No. 5, p.747-770.
[59] Sebastian Biba, *China's Hydro-Politics in the Mekong: Conflict and Cooperation in Light of Securitisation Theory* (London and New York: Routledge, 2018), 88.
[60] Zhang Hongzhou, "China's 'Development Approach' to the Mekong Water Disputes", *The Diplomat*, 2020, https://thediplomat.com/2020/03/chinas-development-approach-to-the-mekong-water-disputes/.
[61] Frauke Urban, Giuseppina Siciliano and Johan Nordensvard, "China's Dam Builders: their Role in Transboundary River Management in South-east Asia", *International Journal of Water Resources Development*, (2018) 34, No. 5, p.747-770.
[62] Gabriele Giovannini, "Power and Geopolitics along the Mekong: The Laos-Vietnam Negotiation on the Xayaburi Dam", *Journal of Current Southeast Asian Affairs*, (2018) 37, No. 2, p.63-93 (p.66); Frauke Urban, Giuseppina Siciliano and Johan Nordensvard, "China's Dam Builders: their Role in Transboundary River Management in South-east Asia", *International Journal of Water Resources Development*, (2018) 34, No. 5, p.747-770 (p.747).
[63] Tom Cochrane, Mauricio Eduardo Arias and Thanapon Piman, "Historical Impact of Water Infrastructure on Water Levels of the Mekong River and the Tonle Sap System", *Hydrology and Earth System Sciences*, (2014) 18, p.4529-4541.
[64] Frauke Urban, Giuseppina Siciliano and Johan Nordensvard, "China's Dam Builders: their Role in Transboundary River Management in South-east Asia", *International Journal of Water Resources Development*, (2018) 34, No. 5, p.747-770 (p.759).

levels recorded throughout the year.[65] Unbridled appropriation of water resources risks fostering a culture of discord and competition in the region, which presents a serious threat to peace and stability in the region. Coupled with a myriad of differing interests of multiple stakeholders, dam-building in the Mekong is a tricky issue to negotiate and govern.

Case: Vietnam's Water Woes

Vietnam is ostensibly rich in water resources. With about 10,200 cubic meters of renewable freshwater per capita, water availability is relatively high by regional and global standards.1 However, this supply is unevenly distributed across the country and seasons. Precipitation and runoff levels are high during the short rainy season; this quickly declines as the dry season sets in.2 In addition, more than two-thirds of Vietnam's water comes from neighbouring countries upstream. This transboundary dynamic means that Vietnam's water sources are susceptible to any developments upstream.

Vietnam's main water body is the Mekong Delta. Spanning almost 40,000 square kilometres, the Delta is home to roughly 17 million people. It is also one of the largest rice production areas in the world.3 In 2019, a truncated monsoon season and dry conditions driven by the El Nino phenomenon resulted in water levels in the Mekong Delta decreasing rapidly.4 Damming on the upper parts of the Mekong also exacerbated the problem.5 Declining river flows and rising sea levels have led to saline intrusion, further depleting freshwater supplies. This is already starting to affect millions of local farmers and fishermen, who depend on the river for their livelihoods.

Agriculture and aquaculture account for 92 percent of Vietnam's water usage, much of which takes place in the Mekong Delta. As Vietnam continues to experience rapid economic growth, industrialization, and urbanisation, its demand for water will continue to increase. This risks jeopardising future growth if these water-related challenges are not effectively addressed.

1 World Bank Group, "Vietnam: Toward a Safe, Clean, and Resilient Water System", 2019, https://openknowledge.worldbank.org/handle/10986/31770.
2 Ibid.
3 Ibid.
4 Hoang Nam, "Mekong Delta Stays Alert for Severe Drought", *Vn Express*, 2020, https://e.vnexpress.net/news/news/mekong-delta-stays-alert-for-severe-drought-4037234.html.
5 Stefan Lovgren, "Mekong River at its Lowest in 100 years, Threatening Food Supply", *National Geographic*, 2019, https://www.nationalgeographic.com.au/nature/mekong-river-at-its-lowest-in-100-years-threatening-food-supply.aspx.

[65] Brian Eyler, "Science shows Chinese dams are devastating the Mekong", *Foreign Policy*, 2020, https://foreignpolicy.com/2020/04/22/science-shows-chinese-dams-devastating-mekong-river/.

Opportunities for Regional Cooperation on Water Security Issues

Water has evolved from just being an environmental issue to a strategic one.[66] It is not easy to reconcile developmental goals with environmental protection. There is a need for more preventive diplomacy and subregional collaborative mechanisms which are geared towards averting water conflicts.

Subregional mechanisms such as the Mekong River Commission and the Lancang-Mekong Cooperation could play fundamental roles in terms of facilitating cooperation on water-related issues. In terms of cooperation mechanisms, the Mekong River Commission exists as the main inter-governmental organisation to help manage the shared water resources in the Mekong River. However, the MRC has "no hard regulatory authority" which poses obvious challenges in terms of governance of the river basin.[67] Moreover, the effectiveness of these mechanisms is still hugely dependent on the participating members.

Individual countries need to work closely together to ensure that projects with a transboundary nature, such as dam-building, are carried out in a sustainable manner, and take into account the various "national development priorities, the needs of the local people, impacts on natural habitats, and cross-border impacts".[68] While it is still too soon to know, China's establishment of the Lancang-Mekong Cooperation mechanism in 2015 could potentially change the way transboundary water diplomacy in the Mekong is conducted.[69]

Apart from mechanisms to manage inter-state conflict over shared water bodies, regional cooperation can also take the form of initiatives designed to augment national efforts in the management and mitigation of the effects of slow on-set disasters such as drought. This might take the form of an array of options, ranging from data and technology sharing to the development of joint financing mechanisms. The ASEAN Committee on Disaster Management (ACDM) is already drafting a declaration on drought and aims to have it adopted by leaders at the ASEAN summit in November this year.[70] Hopefully, this would entail the inclusion of more initiatives in future ASEAN action plans, aimed at addressing water scarcity.

Efforts to address water insecurity at the regional level should also be integrated across all three ASEAN Community Pillars. Currently, water resource management is only mentioned as a line item in the *ASEAN Socio-Cultural Community Blueprint 2025*[71] and the *ASEAN Economic Community Blueprint 2025*[72]; there is a glaring absence in the *ASEAN Political-Security Community Blueprint*. As mentioned before, water insecurity is a transboundary threat that has serious political and 'hard' security repercussions. Further, tackling water security issues from a cross-sectoral and cross-disciplinary perspective can create a space for disaster management and environmental conservation bodies like the ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management (AHA Centre), ASEAN Centre for Biodiversity (ACB), and ASEAN Hydroinformatics Data Centre for Water and Disaster Risk Management (AHC) to cooperate on overlapping areas of interest.

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[66] Brahma Chellaney, 'Murky Hydropolitics', in *Water: Asia's New Battleground* (Washington DC: Georgetown University Press, 2011), 47-94.
[67] Philip Hirsch, "The Shifting Regional Geopolitics of Mekong Dams", *Political Geography*, (2016) 51, p.63-74 (p.71).
[68] Frauke Urban, Giuseppina Siciliano and Johan Nordensvard, "China's Dam Builders: their Role in Transboundary River Management in South-east Asia", *International Journal of Water Resources Development*, (2018) 34, No. 5, p.747-770 (p.766).
[69] Yanjun Guo, "The Evolution of China's Water Diplomacy in the Lancang-Mekong River Basin: Motivation and Policy Choices", in *China and Transboundary Water Politics in Asia*, ed. Hongzhou Zhang and Minjiang Li (London and New York: Routledge, 2018) p.73.
[70] Relief Web, "ASEAN to take immediate steps to combat drought in SE Asia", 2019, https://reliefweb.int/report/world/asean-take-immediate-steps-combat-drought-se-asia.
[71] ASEAN, "ASEAN Socio-Cultural Community Blueprint 2025", https://asean.org/storage/2016/01/ASCC-Blueprint-2025.pdf, pp 11; 12; 17.
[72] ASEAN, "ASEAN Economic Community Blueprint 2025", https://www.asean.org/storage/2016/03/AECBP_2025r_FINAL.pdf, pp 20.

Working with partners outside the region is also another potential way to tackle water insecurity. ASEAN can work towards fostering better ties with other regional blocs to build inter-regional networks of knowledge and expertise sharing on water security issues. To this end, there is room for sustained engagement with the Pacific Islands Forum (PIF) and its technical arm, the Pacific Community (SPC). Given their geographical locations and features as well as socio-economic vulnerabilities, Pacific Island States are exceedingly concerned with the effects of climate change and disasters. Agriculture is also the backbone of most PIS economies. Evidently, many Southeast Asian states and Pacific Island states share many commonalities in terms of geographical and economic vulnerabilities. They all have a vested interest in addressing water security issues. This makes ASEAN-PIS collaboration on such issues the logical next step.

Conclusion

In the Asia-Pacific, two-thirds of the countries are already water-insecure. Thailand, Cambodia, Philippines, Vietnam, and India, for example, are facing water shortages that are quickly reaching critical levels. This diminishing supply coupled with inefficient usage and widespread pollution of water in these countries are leading to serious health concerns, loss of livelihoods, and irregular migration. Persistent warming trends and dry weather in the region have also resulted in some of the most severe bouts of droughts in recent years. Being among the largest rice producing countries in the world, water scarcity and droughts will increasingly have significant impact on these economies. Apart from socio-economic implications, water scarcity can contribute to geopolitical stress in the regional and international arena. This might take the form of 'water wars' and using the control of water sources as diplomatic leverage. This NTS Insight has explored the non-traditional and traditional security implications of water insecurity in the region, drawing from sub-national, national, and regional experiences. Broadly, it has presented water insecurity at the intersection of sustainable development, climate change adaptation, disaster risk management, and conflict management issues. It has also examined water security challenges and pathways for cooperation, and provided some recommendations for better water management and governance. In order to ensure that their citizens are water-secure, governments need to formulate robust and sustainable water management policies. This can be achieved through deliberate planning, followed by careful implementation and judicious monitoring. Governments must safeguard access to water functions and services and manage water resources in an integrated and equitable manner. They should also mitigate the impacts of water-related hazards which include bolstering coastal protection, reengineering water systems, and scaling up crop insurance.

Acknowledgement

The authors express their sincere thanks to Dr Tamara Nair for generously sharing her time and ideas to help refine this paper to its present form.

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