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Climate Insecurities in Indonesia: Implications and Challenges for Defence Transformation

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Abstract

This paper seeks to identify and assess key climate insecurities in Indonesia and further explore how they could potentially influence the process of defence reform that has been ongoing in Indonesia since Suharto's downfall in 1998. Key climate insecurities in Indonesia are related to energy and food security, large-scale disasters, drought, changing climate patterns and rising sea levels. Furthermore, this paper argues that given these security implications, the Indonesian National Defence Forces (TNI) has yet to seriously assess and incorporate climate change into its force development plans. Finally, this paper outlines some of the key challenges and prospects for TNI's defence reform process, as it relates to climate change.

This Policy Series presents papers in a preliminary form and serves to stimulate comment and discussion. The views expressed are entirely the author's own and not that of the RSIS Centre for Non-Traditional Security (NTS) Studies. The paper is the result of research conducted under the Asia Security Initiative programme on internal challenges supported by the MacArthur Foundation. Visit www.asicluster3.com to find out more about this initiative. More information on the work of the RSIS Centre for NTS Studies can be found at www.rsis.edu.sg/nts.

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Biography

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Introduction

This paper seeks to accomplish three broad objectives. First, to identify and assess key climate insecurities and vulnerabilities in Indonesia. Second, to further explore the ramifications of these insecurities for the Indonesian National Defence Forces (TNI) at the strategic, institutional and operational levels. And finally, to assess how such climate insecurities could be considered and formulated to be one of many key driving forces for TNI's ongoing defence reform process by relating the institution's ongoing activities to the impacts of climate change.

Indonesia is important in the theoretical and policy debates on the security implications of climate change for several reasons. First, Indonesia has been cited as one of the countries most vulnerable to both climate and political risk.[1] This argument is elaborated in the following sections, but suffice it to say that given Indonesia's ecological, social, economic and political climate vulnerabilities, the country could provide an excellent model for determining how the various security implications of climate change could play out. Furthermore, Indonesia remains an underexplored case study when it comes to climate insecurities – as opposed to China, India, the United States and African countries.[2]

Second, Indonesia is considered highly valuable both geostrategically and geopolitically by many regional powerhouses, including China, Japan, India and the United States. Indonesia borders one of the world's most important and heavily used shipping lanes, namely the Strait of Malacca, with Singapore and Malaysia. Many Sea Lines of Communications (SLOCs) are available at the eastern periphery of Indonesia between Timor and New Guinea; three of these run North-South through the Timor, Banda, and Moluccas Seas. In addition to its abundant natural resources, such as oil, gas, coal and others, several straits running North-South mark the Indonesian Archipelago. As we shall see below, these conditions help reveal how the impacts of climate change shape a country's regional strategic environment as well as the manner in which these impacts collide with, for example, issues of maritime security, naval development, military reform, energy demands and resource scarcity.

Third, in Southeast Asia, climate change has by and large been argued to be one of the key factors that is driving the region's vulnerability to transnational threats, such as organised crime, terrorism, illicit trafficking, piracy, infectious diseases and illegal migration flows.[3]

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[1] Marc A. Levy, et al. *Assessment of Select Climate Change Impacts on U.S. National Security* (New York: Columbia University Center for International Earth Science Information Network, 2008), http://www.ciesin.columbia.edu/documents/Climate_Security_CIESIN_July_2008_v1_0.ed.pdf (accessed 29 September 2010).

[2] For studies on the security impacts of climate change for Western countries, see Kurt M. Campbell, ed., *Climatic Cataclysm: The Foreign Policy and National Security Implications of Climate Change* (Washington, DC: Brookings Institution Press, 2008); for Africa, see Oli Brown, Anne Hammill and Robert McLeman, 'Climate Change as the "New" Security Threat: Implications for Africa,' *International Affairs*, Vol. 83, No. 6 (2007), pp. 1141–54; for China, see Joanna I. Lewis, 'Climate Change and Security: Examining China's Challenges in a Warming World,' *International Affairs*, Vol. 85, No. 6 (2009), pp. 1195–213; a small exception is a three-page document produced on Indonesia by the United Nation's Division for Social Development titled 'Climate Change and Its Possible Security Implications: Indonesia.' Available at http://www.un.org/esa/dsd/resources/res_pdfs/ga-64/cc-inputs/Indonesia_CCIS.pdf

[3] Paul J. Smith, 'Climate Change, Weak States and the "War on Terrorism" in South and Southeast Asia,' *Contemporary Southeast Asia*, Vol. 29, No. 2 (2007), pp. 264–85; Christopher Jasparro and Jonathan Taylor,

These will become more pronounced as extreme weather events, rising sea levels, warming temperatures and other factors overlay a litany of preexisting domestic challenges in regional countries, which include unemployment, poverty, socio-ethnic fault lines, resource scarcity, corruption and urbanisation.

In the case of terrorism, for example, climate change could become "an overarching destabilising element that fosters the enabling environment for non-state actor terrorist groups,"[4] although not a direct cause for terrorist acts in itself. The case of Indonesia, as we shall see below, will highlight such correlation between climate change and domestic insecurities. Specifically, this paper will show how Indonesia provides an excellent example of how climate change, in the years to come, could act as a burden and threat multiplier for a country in both its regional and domestic forays.

In addition to these three reasons, this paper also attempts to draw attention to the significant, yet underexplored, role and position of the Indonesian military within the broader debate on the country's climate insecurities. Although TNI is not considered a significant carbon emitter (no official records are known to exist), and is therefore not yet a target of domestic criticism regarding its environmental practices, it has tried to remain at the forefront in addressing the various ramifications of climate insecurities in Indonesia – be it disasters, extreme weather events or environmental damage.

TNI has also recently been setting an example for other governmental agencies with their environmental initiatives through their Environmental Defence programme. Notwithstanding the above, a closer look at TNI's thinking and practices reveals that climate change as a variable is neither fully incorporated nor explicitly stated as a driving force in its defence planning yet. This is further elaborated in the following sections.

The following sections will first outline the extent to which Indonesia is vulnerable to the ecological and security impacts of climate change. Subsequently, the paper will assess briefly the progress of defence reform in Indonesia and how climate change fits into the overall picture, especially with regard to its security ramifications for TNI at the strategic, institutional and operational levels. Finally, the paper will outline some challenges that TNI is facing in its defence reforms, as it relates to its 'newfound missions' of environmental defence and disaster relief, as well as propose several policy options to adapt and, in some cases, help mitigate the impacts of climate change in the country.

Climate Insecurities and Vulnerabilities in Indonesia

Indonesia is the largest archipelagic state in the world, consisting of five major islands and 30 smaller groups of islands – totalling some 17,000 islands or more. The country consists of 3.1 million sq km of sea (62% of the area) and about 2 million sq km of land area, with a shoreline of 81,000 km. When the country's Exclusive Economic Zones (EEZs) are included as well, Indonesia's total jurisdiction is around 7.8 million sq km.

'Climate Change and Regional Vulnerability to Transnational Security Threats in Southeast Asia,' *Geopolitics*, Vol. 13, No. 2 (2008), pp. 232–46.

[4] Smith, 'Climate Change, Weak States and the "War on Terrorism" in South and Southeast Asia,' p. 271.

Even as this makes Indonesia the largest country in Southeast Asia, in terms of the potential impacts of climate change, the west and south of Sumatra and the west and east of Java emerge as areas most vulnerable to climate hazards in Indonesia. Indeed, parts of Java, especially those around Jakarta, are among those most vulnerable in all of Southeast Asia as they are exposed to most climate-related hazards and are also densely populated.[5] Most of Indonesia's islands are also vulnerable to high waves due to the country's location between the Sunda shelf (an extension of the Asian landmass) and the Arafura-Sahul shelf (part of the combined Australian and New Guinean land mass).

In addition, Indonesia is also part of the so-called Pacific Ring of Fire – a 40,000 km arc stretching from New Zealand, along the eastern edge of Asia, north across the Aleutian Islands of Alaska, and south along the coast of North and South America. This area is associated with a series of oceanic trenches, volcanic arcs and belts, and manifests itself in the over 400 volcanoes in the region that account for nearly three quarter of the world's active and dormant volcanoes. This makes Indonesia susceptible to earthquakes and volcanic eruptions.

Indeed, Southeast Asia is in general one of the regions most prone to natural disasters. Between 1900 and 2007, naturally occurring disasters have claimed the lives of 342,722 people in the region, with over 290 million others being affected by the phenomena and an estimated associated economic damage of around USD 46 billion.[6] These figures suggest that Indonesia, as many other parts of Southeast Asia, is at increased risk of bearing the brunt of climate change and its meteorological impacts, be it the rising sea levels or extreme weather events.

To further compound matters, Indonesia is home to dense urban population, fragile ecosystems and economic activities that are still exceedingly dependent on fossil fuels and agriculture. Indonesia's ecological and economic traits thus place the country at a disadvantage especially when it comes to climate change. The following sections will further elaborate the several key climate insecurities and vulnerabilities being faced by the nation.

Warmer Climate and Rising Sea Levels

Some aspects of climate change, such as its meteorological and ecological impacts, are arguably already in occurrence today. Where Indonesia is concerned, climate change is said to be changing the country's seasonal cycle itself. For example, Indonesia is already experiencing its warmest temperature in recent decades. The annual mean temperature has increased by about 0.3°C since 1900, with the 1990s being the warmest decade of the century and 1998 being the warmest year – almost 1°C above the 1961–1990 average.[7] This trend is expected to increase on average by another 0.36°C–0.47°C by 2020.[8]

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[5] Arief Anshory Yusuf and Herminia Francisco, *Climate Change Vulnerability Mapping for Southeast Asia* (Singapore: Economy and Environment Program for Southeast Asia, 2009), p. 13.
[6] 'Guest Editorial,' *Disaster Prevention and Management*, Vol. 17, No. 3 (2008), p. 345.
[7] Mike Hulme and Nicola Sheard, *Climate Change Scenarios for Indonesia* (Norwich: Climatic Research Unit, University of East Anglia, 1999), p. 1.
[8] Agus P. Sari, et al., *Executive Summary: Indonesia and Climate Change*, Working Paper on Current Status and Policies (Jakarta: PEACE, DFID, and World Bank, 2007), pp. 3–4.

Sea levels are also changing. Research conducted by the National Coordinating Agency for Survey and Mapping of Indonesia (BAKOSURTANAL) has shown that, in many places, the sea level has risen by 8 mm a year in Indonesia.[9] Meanwhile, according to the Ministry of Marine Affairs and Fisheries, Indonesia has lost 24 small islands in just two years (2005–2007). According to an estimate by the National Council on Climate Change (DNPI), Indonesia could witness the submergence of nearly 750–1,000 islands by 2050 as a result of rising sea levels.[10] Twelve of these islands are argued to be Indonesia's outermost islands, which could have long-term implications for the country's maritime boundaries and the ensuing security issues related to illegal fishing, arms trafficking and others.

Droughts and Food Security

Indonesia is at high risk of flooding and drought. Even as rainfall projections remain inconsistent and debatable, the rainy season is expected to be shorter, which increases the overall risk of flooding and drought. The Indonesian Ministry of Agriculture revealed that between 1993 and 2002, the average area of agricultural land that was affected by drought was already 220,380 hectares, with harvest failure being seen in over 43,434 hectares (equivalent to the loss of 190,000 tons of dried grain).

Meanwhile, the area impacted by flooding was 158,787 hectares (equivalent to around 174,000 tons of dried grain). Recent projections from Indonesia's Ministry of Environment also suggest that a one-metre rise in sea level due to climate change could cause a loss of nearly 346,808 acres of agricultural farming land and decrease the country's rice production by over 2 million tons.[11]

Then again, although Indonesia is yet to witness a cyclone-type disaster, the country remains vulnerable to the El Niño Southern Oscillation (ENSO) phenomenon, which is based in the tropical Pacific Ocean and extends from Ecuador to Indonesia.[12] Initial research further suggests that climate change may increase the amplitude and frequency of future ENSO-related environmental events.[13]

ENSO typically leads to delayed rainfall and decreased rice planting in Indonesia's main rice-growing regions – conditions that climate change will only exacerbate. One study showed a marked increase in the probability of a 30-day delay in monsoon onset by 2050 (as a result of the changes in the mean climate), from 9%–18% today (depending on the region) to 30%–40% at the upper tail of the distribution.[14]

In Indonesia, for instance, a devastating drought caused by ENSO struck about a decade ago – damaging over 400,000 hectares of rice – that helped exacerbate the country's 1996–1997 financial and food crises and eventually contributed to the downfall of President Suharto. The overall impact of the potential for increased ENSO-related droughts on the

[9] *National Action Plan to Addressing Climate Change* (Jakarta: State Ministry of Environment, 2007), p. 4.
[10] '346.808 Ha Sawah Terancam,' *Kompas*, 20 July 2010.
[11] Ibid.
[12] Robert Henson, 'The Rough Guide to Climate Change: Climate Change and El Niño,' *Weatherwise*, Vol. 60, No. 1 (2007), pp. 32–9.
[13] Sang-Wook Yeh and Ben P. Kirtman, 'ENSO Amplitude Changes due to Climate Change Projections in Different Coupled Models,' *Journal of Climate*, Vol. 20 (January 2007), pp. 203–4.
[14] Rosamond L. Naylor, et al., 'Assessing Risks of Climate Variability and Climate Change for Indonesian Rice Agriculture,' *Proceedings of the National Academy of Sciences*, Vol. 104, No. 19 (2007), pp. 7752–7.

domestic stability and security in Indonesia therefore has to be weighed in the light of such sombre precedents. Indeed, climate change and extreme weather events in general have been argued to have the potential to decrease Indonesia's food production by nearly 10%,[15] mainly due to their impacts on the agricultural harvesting seasons, the spread of various agricultural pests, and by causing prolonged droughts.[16]

This view was supported by the findings of a survey of 19 provinces earlier this year, which brought to light several disturbing signs of Indonesia's weakening overall food resilience.[17] It is, of course, possible that a confluence of domestic economic policies and other structural issues pertaining to national agricultural policies may have played a role in this regard. However, it is also apparent that the country's food demands are skyrocketing. In 2008, for example, Indonesia consumed the largest number of rice per capita by 139kg according to the Food and Agriculture Organization of the United Nations.[18]

The pressures of resource and water scarcity, rising domestic demand and urbanisation will further undermine Indonesia's food resilience. Understandably then, food insecurity has been cited to be among the greatest short-term risks of climate change for the country.[19] Though once self-sufficient in 1984, Indonesia has begun importing rice again in recent years. Such chronic food insecurity may stem not only from unavailability but also from barriers that prevent access to available resources, such as in the aftermath of natural disasters or due to social instability, unemployment and high prices. The impact of climate change on agriculture therefore could increase the risk and widen the already substantial gap between the rich and the poor.

ENSO-related events have also been known to aggravate forest fires, as witnessed in Indonesia during 1997–1998 when related economic damages were in the range of USD 2.3–3.2 billion.[20] Increased sea temperatures during the 1997 ENSO caused problems for Indonesia's coral reefs as well, which in turn further diminished Indonesia's marine and fisheries resources. ENSO has previously been cited to contribute to the spread of diseases, such as malaria, dengue fever, cholera and others. In Java, for example, dengue fever outbreaks in several big cities were seen during the La Nina years.

The country has experienced recurrent water shortages in recent years. During ENSO years, for instance, the water volume that was used to generate electricity from Indonesia's major reservoirs was significantly decreased. Then again, in 2005, Jakarta consumed six times more water than in 1990; estimates suggest that by 2025, around 40 million people would be residing in the capital, thus further straining the already stretched water supplies.[21] Flooding will also worsen conditions in the capital city. Jakarta today is a coastal conurbation of 20 million people located within a deltaic plain where 13 rivers empty into the Jakarta bay. This,

[15] Bustanul Arifin, 'Masa Depan Pertanian di Era Perubahan Iklim,' *Kompas*, 18 October 2010.
[16] 'Penyediaan Data Masih Belum Penuhi Kebutuhan,' *Kompas*, 20 July 2010.
[17] 'Pangan Mengkhawatirkan,' *Kompas*, 21 August 2010.
[18] Subejo, 'Food Security and Diversification,' *The Jakarta Post*, 24 June 2010.
[19] Jeffery Mazo, *Climate Conflict: How Global Warming Threatens Security and What To Do About It*, Adelphi Paper No. 409 (London: Routledge for IISS, 2010), p. 116.
[20] Smith, 'Climate Change, Weak States and the "War on Terrorism" in South and Southeast Asia,' p. 274.
[21] Alan Dupont, *The Environment and Security in Pacific Asia*, Adelphi Paper No. 319 (London: Oxford University Press for IISS, 1998), p. 64.

when combined with the fact that the monsoonal climate brings very intense rainfall every rainy season, makes Jakarta particularly prone to flooding.[22]

Energy Security and Urbanisation

The many risks to food and water security in Indonesia are compounded by the growing urbanisation of its population. A recent census by National Statistics Agency (*Badan Pusat Statistik* or BPS) suggested that Indonesia's population has grown by 3.5 million births per year.[23] By the end of this century, Indonesia's population might expand to 340 million people, most of which will still be residents of the Java Island. The island is already the most densely populated area and is suffering from many population pressures and coastal erosion. This will certainly further burden the society's land and resources, which as we discussed earlier, are already feeling the effects of climate change.

Urbanisation will also cause a further rise in the demand for electricity. From 1990 to 2006, Indonesia's energy demands have risen rapidly; the country's total primary energy demand has grown from 102.8 Million Tons of Oil Equivalent (MTOE) to 179.1 MTOE (an average annual growth of 3.5%).[24] This high demand, while indicative of the country's flourishing economy, might further worsen Indonesia's already substantial energy insecurity.

First off, although Indonesia joined the Organization of the Petroleum Exporting Countries (OPEC) in 1962, it became a net importer of oil in 2004. Indeed, Indonesia's oil consumption, at an estimated 1.16 million barrels per day (b/d), in 2009 was already above its indigenous production capacity. Also, while Indonesia's oil reserve was estimated to be around 4.3 billion barrels as of 2007, its production has steadily decreased since 1996.[25] Indonesia's crude oil sales have fallen short of its targets earlier this year due to both the effects of bad weather on commodity shipments and disruptions at the state-owned PT Pertamina refineries.[26]

Proven reserves are also steadily depleting. Indonesia held proven oil reserves of 3.75 billion barrels (bbl) at the end of 2008 (a decline of over 20% since 2000) and proven natural gas reserves of 3,185 billion cubic metres (bcm) – both of these are projected to further decline by 2014.[27] Simultaneously, by 2014, oil demand is projected to rise to 1.28 million b/d, while gas consumption is rising and forecasted to reach 45.6 bcm by the same year. A recent projection by the National Development Planning Agency (BAPPENAS) suggested that Indonesia's known oil reserves would be completely depleted within a short span of 18 years at current rates of production.[28] However, these very reserves would last the country 23 years if Indonesia limited its production to 350 million barrels of oil per year.[29]

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[22] Pauline Texier, 'Floods in Jakarta: When the Extreme Reveals Daily Structural Constraints and Mismanagement,' *Disaster Prevention and Management*, Vol. 17, No. 3 (2008), p. 358.
[23] 'Population Boom Spells Multi-sectoral Bust for RI,' *The Jakarta Post*, 28 August 2010.
[24] *Energy Outlook for Asia and the Pacific* (Manila: Asian Development Bank and APEC, 2009), p. 233.
[25] Bernard D. Cole, *Sea Lanes and Pipelines: Energy Security in Asia* (Westport, CT: Praeger Security International, 2008), p. 39.
[26] 'RI Oil Sales Fall Short Due to Weather, Refinery Shutdowns,' *The Jakarta Post*, 25 August 2010.
[27] *Indonesia Oil and Gas Report Q1 2010* (London: Business Monitor International, 2009), p. 34.
[28] 'Pemerintah Fokus ke Energi Nonfosil,' *Media Indonesia*, 9 November 2010.
[29] 'Cadangan Minyak Mentah Tinggal 8,2 Miliar Barrel,' *Kompas*, 24 June 2010.

It is interesting to note, in the face of these challenges, that the state-owned Pertamina is not the single largest producer of oil in Indonesia – multinational companies such as Chevron, British Petroleum, ConocoPhillips, ExxonMobil and Total hold this advantage.[30] Similarly, in the gas field, Pertamina only controls 2% of Indonesia's natural gas production; six international companies – Total (30%), ExxonMobil (17%), Vico (11%), ConocoPhillips (11%), BP (6%) and Chevron (4%) – dominate the industry.[31] This suggests that Indonesia's energy lifeline is not in the hands of its own people, but determined by the international companies and market.

Finally, a recent report by PriceWaterhouseCoopers suggests that executives from oil and gas companies are concerned about the uncertainty over the country's cost-recovery legislation, corruption, interference by government agencies, the sanctity of contracts, and the general regulatory structure of the upstream and downstream oil and gas industry.[32]

Should this trend continue, Indonesia's refinery capacity, and ultimately, the production of gas and oil sufficient to fulfil its rising demands would significantly diminish. Given these conditions, it is not surprising for a recent study to have found that Indonesia, along with China, had experienced the steepest increases in energy insecurity in recent years (based on the importance of oil to its economy, its dependence on imported oil, and especially its dependence on oil from the Middle East).[33]

Marine Resources

Marine and fisheries resources, another important component of Indonesia's diet, are also increasingly scarce. Indeed, as traditional fishing grounds are exhausted, competition for remaining stocks has intensified, potentially leading to more incidents or disputes at sea. The aquaculture industry in land has also taken a hit in recent years, though the reasons for this seem to be less connected to climate change *per se*. The recent volcanic eruption of Mount Merapi in late October 2010, for instance, killed millions of fish and their seeds in Central Java (costing over IDR 40 billion).[34]

That said, extreme weather events induced by climate change have not only killed at least 60 fishermen in 2010 but also forced major fishing boats to move beyond the country's EEZs to look for fishes.[35] Further moves into another country's EEZ could certainly ignite regional tensions and conflicts, especially in light of the fact that Indonesia shares maritime boundaries with 10 different countries, the majority of which have not been fully negotiated and finalised.

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[30] Benjamin K. Sovacool, 'The Political Economy of Oil and Gas in Southeast Asia: Heading towards the Natural Resource Curse?', *The Pacific Review*, Vol. 23, No. 2 (2010): p. 255.
[31] 'Indonesia Country Analysis Brief,' *U.S. Energy Information Administration*, http://www.eia.gov/countries/cab.cfm?fips=ID (accessed on 12 August 2010).
[32] 'Oil and Gas Bosses' Concerns Rising on Indonesia,' *The Jakarta Globe*, 30 April 2010.
[33] Kang Wu and Charles E. Morrison, 'Energy Insecurity Index,' in Kang Wu, Fereidun Fesharaki, eds., Asia's Energy Future: Regional Dynamics and Global Implications (Honolulu: The East-West Center, 2007), p. 110.
[34] 'Jutaan Ikan dan Benih Mati,' *Kompas*, 9 November 2010.
[35] 'Siap Berteman dengan Cuaca Ekstrem,' *Kompas*, 23 December 2010, p. 21.

Incidentally, damages to around 80% of the country's coral reefs and pressure from commercial trawlers and foreign poachers have reduced fish stocks, forcing fishermen and sailors into piracy.[36] Climate change is likely to further increase Indonesia's vulnerability to maritime piracy in two ways.[37] First, negative impacts on coastal fisheries will have an adverse impact on seafaring groups that have traditionally resorted to piracy under conditions of duress. Second, adverse economic impacts may increase the pool of potential pirate recruits while simultaneously weakening state capacity to conduct antipiracy operations. Overall, therefore, climate change could increase the risk of regional disputes sparked by illegal fishing and simultaneously increase the risk of maritime piracy, both of which are certainly a concern of the country's security forces and agencies.

Mass Migration

In terms of migration, climate-related changes could further stimulate significant and disruptive movements of people across Indonesia, which in some cases could involve different and antagonistic ethnic or religious groups. Historically, Indonesia's internal migration activities – whether initiated by the government or not – have tended to cause social turmoil in the long run, and occasionally violence.[38]

Therefore, climate change will increase the risk of social unrest and domestic violence in the long run should the government not outline a well thought-out comprehensive policy on migration and movement of people. This potential for conflict increases when the discrepancies in social, political and economic well being between the country's regions, following decentralisation in 2001, are factored in.

Natural Disasters

In terms of disaster, the National Coordinating Agency for Disaster Management (BNPB) in Indonesia reported that, as of 2007, there were 11 disasters most likely to occur – flooding, landslide, drought, forest fire, storm, tidal waves, earthquake, tsunami, volcanic eruption, technological failure and pandemic disease.[39] The 10 biggest disasters in Indonesia over the past 100 years, most of which were weather related, occurred in the past three decades and were mainly flooding, drought, forest fire and endemic diseases (Table 1). In total, there were 1,429 disasters between 2003 and 2005 and 53% of these were related to hydrometeorology effects – chiefly flooding (34%) and landslide (16%).[40]

[36] Tom McCawley, 'Sea of Trouble,' *Far Eastern Economic Review*, 27 May 2004, p. 50.
[37] Jasparro and Taylor, 'Climate Change and Regional Vulnerability to Transnational Security Threats in Southeast Asia', p. 243.
[38] Elizabeth Fuller Collins, 'Indonesia: A Violent Culture?' *Asian Survey*, Vol. 42, No. 4 (2002), pp. 582–604.
[39] Pelaksana Harian Bakornas PB, *Pengenalan Karakteristik Bencana dan Upaya Mitigasinya di Indonesia* (Jakarta: Badan Koordinasi Nasional Penanganan Bencana, 2007), p. 16.
[40] *National Action Plan to Addressing Climate Change*, p. 1.

Table 1: Top ten disasters in Indonesia (number of people affected).

Disaster	Year	Number of People Affected
Drought	1972	3,500,000
Earthquake (seismic activity)	2006	3,177,923
Wildfire	1994	3,000,000
Earthquake (seismic activity)	2009	2,501,250
Drought	1997	1,065,000
Flood	2006	618,486
Flood	1996	556,000
Earthquake (seismic activity)	2004	532,898
Flood	1966	524,100
Flood	2002	500,750

Source: EM-DAT: The OFDA/CRED International Disaster Database, www.emdat.be/; Université catholique de Louvain, Brussels, Belgium.

It is not surprising, therefore, that the UN Office for the Coordination of Humanitarian Affairs (OCHA) claims that Indonesia is one of the countries most vulnerable to climate-change related disasters. To further complicate matters, while there is technically a 'policy hub' in the form of BNPB in Indonesia, there are also over a dozen other agencies that are involved in the process of planning for and responding to disasters – with different agencies being assigned for different types of disasters (Table 2). This creates a bewildering and convoluted overlap among these authorities and their duties for each phase – before, during and after – of disaster management and relief operations, which makes it harder for Indonesia to cope with the unpredictable nature of climate-change related disasters.

Table 2: Indonesia's leading agencies for disasters.

Type of Disaster	Leading Sector Agencies or Ministries
Flooding	Ministry of Public Works, Ministry of Home Affairs, State Ministry for Research and Technology, Meteorology and Geophysics Agency
Landslide	Ministry of Energy and Mineral Resources, Meteorology and Geophysics Agency, Ministry of Public Works, Ministry of Home Affairs
Drought	Ministry of Agriculture, Ministry of Public Works, State Ministry for Research and Technology, Meteorology and Geophysics Agency, Ministry of Home Affairs
Forest fires	Ministry of Forestry, State Ministry for Environment, State Ministry for Research and Technology, Meteorology and Geophysics Agency, Ministry of Home Affairs, Centre for Remote Sensing Technology Research and Development
Hurricane or storm	Meteorology and Geophysics Agency, Centre for Remote Sensing Technology Research and Development, Ministry of Home Affairs
Earthquake	Meteorology and Geophysics Agency, Ministry of Energy and Mineral Resources, Ministry of Public Works, Ministry of Home Affairs, State Ministry for Research and Technology
Tsunami	State Ministry for Research and Technology, Centre for Remote Sensing Technology Research and Development, National Coordinating Agency for Survey and Mapping, Ministry of Energy and Mineral Resources, Agency for Applied Technology and Research, National Institute of Sciences, Ministry of Marine Resource and Fisheries, Ministry of Home Affairs
Tidal waves	Meteorology and Geophysics Agency, Ministry of Marine Resources and Fisheries, National Institute of Sciences, Ministry of Home Affairs
Volcanic eruption	Ministry of Energy and Mineral Resources, Ministry of Home Affairs
Technological failure	Ministry for Industry, Ministry of Transportation, Agency for Applied Technology and Research, Ministry of Environment, Nuclear Power Supervisory Agency, Ministry of Home Affairs
Pandemic disease	Ministry of Health, Ministry of Agriculture, Ministry of Home Affairs

Source: National Coordinating Agency for Disaster Management (2007).

As a consequence, the biggest challenge for emergency response and relief efforts in times of large-scale disasters in Indonesia has always been related to policy coordination and implementation at both the national and regional levels. Furthermore, at the provincial level, five provinces, out of a total of 33, have yet to establish a regional Disaster Management Agency (BPBD), in spite of 175 districts (from a total of 550 districts) being classified as 'high risk.'[41]

[41] Cited from 'Indonesia Tuan Rumah Simulasi Bencana,' *Kompas*, 4 October 2010.

This suggests a further lack of preparedness and awareness among the local governments and agencies regarding natural disasters, most of which are either climate-related or climate-induced. Importantly, observers and the international community have already begun questioning the country's existing competence when it comes to disaster awareness, preparedness and response.

To further compound matters, it was revealed following the recent 'triple disaster' in October–November 2010 – the volcanic eruption of Mount Merapi, the tsunami at Mentawai and the flooding of Wasior, Papua – that the government was yet to produce national Standard Operating Procedures (SOPs) for large-scale disaster relief and management.[42] As a consequence, the 'triple disaster' witnessed chaos and confusion, with Non-Governmental Organisations (NGOs), security officers and government officials all working independently.[43]

Interestingly, the government has not factored in large-scale national disasters even in the recently released National Logistic System (*Sislognas*), which was designed to map out the country's infrastructure blueprint.[44] This confusion and the apparent inability of the government to provide adequate response to national disasters could have wide-ranging security implications.

One observer has even speculated that, given Indonesia's fragile democracy, climate change could destabilise the country, and that should the government provide an inadequate response to some future disaster, it would not be difficult to envisage a scenario where radical groups, such as the Jemaah Islamiyah, were encouraged to further undermine the state or even 'attack Western interests' therein.[45]

Climate Insecurities and Defence Reform in Indonesia

The preceding assessment highlights six issues surrounding Indonesia's climate insecurities – warmer climate and rising sea levels, droughts and food insecurity, energy insecurity and urbanisation, marine resource scarcity, mass migration and internal conflict, and natural disasters. The impact of the abovementioned security implications of climate change on TNI would be at three inter-related levels.

First, at the strategic level, food insecurity, drought, mass migration, urbanisation and resource scarcity could likely aggravate domestic or internal instability and security issues by causing the possible breakout of riots, ethnic conflicts, food fights, rise in crime rates or even acts of terrorism. Simultaneously, the rise in sea levels, scarcity of marine resources and energy shortage might up the regional tension in areas surrounding Indonesia's archipelago, possibly leading to naval incidents at sea, or worse.

[42] 'Pemerintah Belum Miliki SOP Bencana,' *Kompas*, 9 November 2010.
[43] 'Penanganan Bencana Tak Jelas,' *Kompas*, 7 November 2010.
[44] The system focuses instead on land transportation infrastructure to facilitate inter-regional trade. See 'Perhitungkan Risiko Bencana,' *Kompas*, 8 November 2010.
[45] Joshua W. Busby, *Climate Change and National Security: An Agenda for Action* (New York: Council on Foreign Relations, 2007), pp. 7–8.

On similar lines, the associations between indicators of Indonesia's energy insecurity and climate change highlight concerns about future supplies of energy, and thus complicate energy options by adding to the costs of production and usage.[46] Two dimensions of energy security are particularly relevant: (1) the physical disruption of supplies due to infrastructure breakdown, natural disasters, social unrest, political action or terrorism; and (2) the deleterious effects on economic activity and people due to energy shortages, widely fluctuating prices or price shocks.[47]

Both these factors will have implications for Indonesia's domestic political stability – and consequently, the degree of internal security threats TNI might need to address – and the availability of defence energy resource to ensure the military's readiness and effectiveness in executing duties, which among others include patrolling and guarding the country's oil and gas refineries.

In this regard, the sustainability – and efficiency – of defence energy resource management can have near- and long-term implications for TNI's mission effectiveness. Employing more fuel-efficient aircrafts and patrol vessels, for example, could improve the endurance of Indonesia's Air Force and Navy while also reducing any logistical constraints. In the long term, such an approach could strengthen TNI's mission effectiveness by limiting the amount of Greenhouse Gas (GHG) emissions that contribute to climate change, which in turn could have strategic and operational implications due to possible changes in the physical, social and political environments of the country.[48]

Climate change will also have significant geopolitical impact on energy insecurity when the ramifications of the submergence of small atolls, rocks and low-lying islands due to rising sea levels are taken into consideration. Such submergence would shift the territorial boundaries and EEZs of neighbouring countries, and when this happens in disputed maritime domains, such as the South China Sea – bordering Indonesia's Natuna Islands that are home to the country's largest gas reserves – tensions at sea become more likely.

This problem is made worse by the fact that international law currently provides no specific solution to the question of sovereignty and EEZ claims should an island, or even a country, be submerged.[49] These geopolitical tensions overall might further increase the risk and incursion over Indonesia's territorial waters.

In essence therefore, climate insecurities could significantly heighten the level of instability surrounding Indonesia's strategic environment and, by implication, serve to complicate the future outlook, function and role of TNI.

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[46] Alan Dupont, 'The Strategic Implications of Climate Change,' *Survival: Global Politics and Strategy*, Vol. 50, No. 3 (2008), p. 34.

[47] In practice, of course, there are other dimensions of energy security, such as long-term physical availability of supplies and potential disruptions from acts of terrorism. See Economic Commission for Europe, *Emerging Global Energy Security Risks*, The ECE Energy Series No. 36 (New York: United Nations, Economic Commission for Europe, 2007), p. 8.

[48] Will Rogers, *Promoting the Dialogue: Climate Change and America's Air Forces* (Washington, DC: Center for a New American Security, 2010), p. 6.

[49] Dupont, 'The Strategic Implications of Climate Change,' p. 36.

Second, at the institutional level, the changing strategic environment, as explained above, suggests a different kind of mission – increased riot control, cooperation with police and law enforcement agencies, more naval and air presence, and increased Humanitarian Assistance and Disaster Relief (HADR) – for TNI. This suggests that TNI needs to significantly reconfigure its overall defence posture, Orders of Battle, education and training, and interagency cooperation, and this would require extensive planning and significant amounts of time, financial resources and political capital.[50] Failing to adapt could not only further undermine the overall military effectiveness of the institution but also lead to disastrous consequences for Indonesia.

Third, at the operational level, the possible implications of climate insecurities identified above would have significant implications for TNI's mission effectiveness and operational tempo. This is especially related to the issues surrounding defence energy resource management and the possibility that the military might be deployed more often for either domestic or external missions in the coming years – performing a 'full-spectrum' operation for HADR, blockade, riot control and so forth.

With these implications of climate change in mind for TNI, the following section will consider the process of defence reform – and later, transformation – and deliberate on where and how climate change could be a part of this process.

Climate Change and Defence Reform

Following the downfall of President Suharto in 1998, TNI underwent a series of reforms designed primarily to finally free the military of politics and business, while submitting them to the civilian control of a democratically elected government.

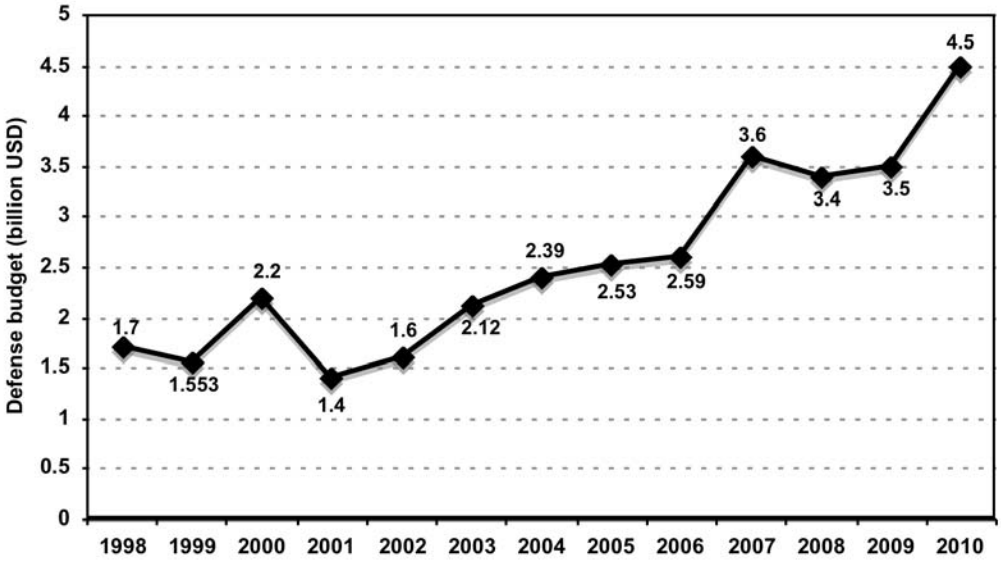
These policies included, among others, abolishment of various socio-political offices within TNI's institutional structure, issuing various laws and regulations forbidding the political activities of active duty officers, and reorienting the military's outlook as a defence force focusing on national defence and not internal security.[51] Although civil society groups have continued to hold that these reforms are yet to be fully 'genuine and comprehensive,' it is not easy to dispute defence officials who claim that, when measured against the 1998 democratisation agenda, a majority of the military's reform is nearly complete.

The Ministry of Defence subsequently felt that fulfilling the military's institutional needs, such as ensuring budgetary support, weapons systems and soldiers' welfare to name a few, was the next logical step to achieving a more professional 'transformed' defence forces. With this in view, Indonesia's defence budget was more than doubled in the past decade (Figure 1).

While a majority of the budget (roughly 60%–70%) goes towards personnel spending (salaries, benefits and so forth), TNI has also shown the intent, in the last few years and for the foreseeable future, to increase the percentage of its hardware procurements. In fact, recent policies suggest that the government intends to revitalise domestic strategic industries (defence related) next year with the passing of a new law.

[50] Evan A. Laksmana, 'The Indonesian Defence Forces and Disaster Relief: Potential Pitfalls and Challenges,' *RSIS Commentaries*, No. 160 (Singapore: S. Rajaratnam School of International Studies, 2010).
[51] A summary of these reform policies can be found in Alexandra Retno Wulan, ed., *Satu Dekade Reformasi Militer Indonesia* (Jakarta: PACIVIS UI, 2008).

Figure 1: Indonesia's defence budget (in billion USD).



Source: *The Military Balance* (London: Routledge, various issues 1999–2010).

There are several fundamental problems with this policy direction. First, while policies on improving TNI's military weapons systems are indeed important areas of reform, it is equally critical that more basic and fundamental issues, such as education, training and personnel management, are addressed first before leaping into technological modernisation.[52] Or else, it might become impossible to sustain high-tech equipment and complex weapons systems in the absence of a professional, merit-based promotion policy, a well-educated officer corps and an indigenous technological base.

Second, and of more relevance to the present discussion, many of TNI's force development programmes have yet to seriously and systematically factor in the latest key strategic trends, such as climate change. This was highlighted by former Defence Minister Juwono Sudarsono as well when he asserted that, while climate change and other environmental impacts were considered potential issues during his tenure, there existed other pressing matters at hand due to which no serious efforts were made to place the former at the front and centre of defence reform.[53]

That said, as far as strategic assessments go, the Ministry of Defence did identify climate change, resource scarcity, food and water crises, and global warming as part of Indonesia's actual and potential projected threats until 2029 (Table 3).

[52] Evan A. Laksmana, 'The Missing Nuts and Bolts of Defense Reform,' *The Jakarta Post*, 27 January 2010.
[53] Conversation with Juwono Sudarsono on 10 September 2010 in Jakarta.

Table 3: Indonesia's projected threats (until 2029).

Actual Threats	**Potential Threats**
Terrorism	Global warming
Separatism	Violations of sea lanes of communication
Border disputes and outer island managements	Environmental degradation
Natural disasters	Pandemics
Illegal smuggling	Financial crisis
Horizontal conflicts	Cyber crime
Energy scarcity	Foreign aggression
	Food and water crises

Source: Adapted from Ministry of Defence, *Minimum Essential Force* (Jakarta: Ministry of Defence, 2010).

In terms of overall force planning and development, however, climate change and its related effects (large-scale disaster, food and water crises, environmental degradation, etc.) have not been a serious driver for TNI's defence reform planning and policies. In fact, in the words of an official from TNI's Centre for Strategic Studies, which was designed to be the 'think tank' of the military, the centre has not "looked into the matter in great detail,"[54] in spite of acknowledging that "climate change and global warming" had a significant influence on Indonesia's overall defence strategy from "the highest (drowned parts of the country), middle (large-scale natural disasters), to the lowest level (small-scale disasters, weather impacts to troops and operational readiness)."

This perception confirms a pilot study of how climate change might influence TNI's capacity to execute humanitarian operations and disaster relief, change the domestic and strategic environment, and even forcefully alter its defence planning.[55]

Finally, focusing on military modernisation alone without paying sufficient attention to defence energy efficiency could prove to be counter productive in the long run. This is especially true when TNI intends to maintain its 'strategic parity' with neighbouring countries by procuring state-of-the-art but highly fuel-inefficient jet fighters and corvettes. TNI is estimated to require 810 million litres of fuel per year, at an overall annual cost of approximately USD 300 million.[56]

The figures at hand become more substantial in the light of poor financial management from the TNI and Ministry of Defence bureaucracy – the military is known to owe state-owned oil company PT Pertamina nearly IDR 7 trillion (USD 700 million) for fuel purchased between 2002 and 2009.[57] As studies have shown, ignoring defence energy issues could not only seriously hamper mission readiness and effectiveness of the military[58] but also have wide-

[54] Interview of BG. Junias Tobing, Center for Strategic Studies, Indonesian National Defense Forces (TNI), on 28 October 2010 in Jakarta.
[55] Evan A. Laksmana, 'Climate Change Is also a Defense and Security Problem,' *The Jakarta Post*, 2 November 2009.
[56] 'TNI Butuh 810 Juta Liter BBM Per Tahun,' *Kompas*, 3 December 2009
[57] 'Utang BBM TNI akan jadi PMN 2010,' *Kompas*, 11 December 2009
[58] Jerry Warner and P. W. Singer, *Fueling the 'Balance': A Defense Energy Strategy Primer*, Foreign Policy Paper No. 17 (Washington, DC: The Brookings Institution, 2009).

ranging economic, political and strategic ramifications arising from a weakened military in a country as large as Indonesia.

Therefore, it appears that while TNI realises that climate change is a long-term critical issue that needs to be assessed and considered seriously, they are yet to put this in practice. One obstacle could simply be that climate change is still seen as mainly an 'environmental' rather than a national security issue. Another possible reason could be the fact that the priority of the Yudhoyono administration is to simply 'appease' the officer corps by fulfilling their material needs (e.g. soldiers' welfare, new hardware and so forth). Finally, the weakness of the civilian defence community, which in theory should be providing critical inputs as the military's partner on strategic issues that the military might not consider, may have made it difficult for the officers themselves to seriously assess climate change and its various security implications for Indonesia.

Then again, despite the absence of a comprehensive strategy and policy guidance on climate change and security, TNI (when compared to other government institutions) has been relatively progressive when it comes to undertaking efforts to adapt and mitigate the impacts of climate change. This is particularly seen in the realms of: (1) disaster relief and management; (2) environmental protection and conservation; and, (3) health and military medicine. A brief overview of some of these initiatives is given below.

Disaster Relief and Management

According to Law No. 34 of 2004 on TNI, the military could play an active role in responding to natural disasters, humanitarian crises and other similar duties under the definition of Military Operations Other Than War (MOOTW). Doctrinally, the Army has also reportedly formulated, as part of their service doctrine *Kartika Eka Paksi*, guidelines for humanitarian operations and disaster relief.[59] Indeed, as part of BNPB, both at the national and local levels, military units have often been sent initially through service task forces as and when requested.

Subsequently, however, TNI issued the Commander-in-Chief Regulation (Perpang) No. 35/XI/2007 in November 2007 regarding its Disaster Relief Rapid Reaction Force (PRCPB), which is meant to assist the National and Regional Disaster Management Agency. Although initially meant to be an ad-hoc task force to be formed during disasters, the idea, as it evolves, looks to be to set up a national standing force under a PRCPB Commander who answers to the TNI Commander. The Combat Engineer Task Force is also part of PRCPB at the central level. It appears, therefore, that the military's role in disaster relief and management is increasingly becoming institutionalised.

While some members of the officer's corps have wanted a role larger than mere emergency response, the military's overall track record in disaster management has been quite commendable. During the 2009 earthquake in West Sumatra, for example, TNI's deployment force involved some 2,596 troops (including a few hundred medical officers and combat engineers) and several major excavation hardware.

[59] BG. Didik Prijanto, 'Optimalisasi Yonbanzi SATGASRAT PRCPB TNI Pada Operasi Penanggulangan Bencana Alam,' *Yudhagama*, No. 85 (December 2009), p. 48.

In more recent times, President Yudhoyono has ordered the dispatch of a brigade to help over 150,000 people who were displaced following the eruption of Mount Merapi.[60] TNI then deployed several battalion-sized units, which included one battalion from Army Strategic Reserve Command (Kostrad), two battalions each from Marines Health and Air Force Special Forces, and one from Infantry.[61] These battalions were tasked with search and rescue, victim evacuation, and building temporary public facilities and hospitals. The brigade was placed under the command of the Diponegoro Regional Military Command's Chief of Staff in coordination with the Head of BNPB, whose status was recently elevated to a ministerial level. Aside from deploying their Special Forces, the Air Force has also been sending its Hercules transport planes, along with several helicopters and Cassa aircrafts.[62]

These two examples are not without precedent. Throughout its history, in fact, TNI has played a part in every single natural disaster. This is the result of both its organisational preparedness and the fact that it has a wide-ranging territorial structure that spans the country from its highest to lowest levels of governance.

Although their overall record appears to be above board, the absence of solid verifiable and measurable data on the military's performance makes it difficult to provide an overall picture. What is observable meanwhile is the fact that the military has been and perhaps will increasingly be deployed in HADR operations and missions.

Environmental Defence

While not fully comprehending the full security impacts of climate change, the military has taken several initiatives to help mitigate its myriad effects and has specifically adopted various policies related to environmental protection. For example, TNI signed an agreement with the State Ministry for Environment in June 2010 that allows the two institutions to work together in accelerating numerous sustainable development projects related to the environment. TNI has also implemented its own environmental protection programmes, such as the planting of a million trees, conservation, rehabilitation, reconstruction of River Delta Areas (DAS) and several other projects under the Unified Soldiers in Villages (TMMD) across Indonesia scheme.[63] However, it should be noted that there is a lack of monitoring mechanisms for assessing the progress and challenges that TNI faces in implanting these various projects.

In cooperation with Urban Solutions Institute, TNI established in 2009 the 'National Environmental Resilience through Territorial Defence' programme, which is also known as TNI's Environmental Defence programme.[64] According to former TNI Commander Djoko Santoso, environmental degradation harms national security infrastructure and public order, and TNI, therefore, "has an obligation to save it."[65]

[60] 'SBY Returns to Yogya, Sends a Brigade for Refugees,' *The Jakarta Post*, 6 November 2010.
[61] 'TNI Berangkatkan Brigade Khusus,' *Harian Pelita*, 8 November 2010.
[62] 'TNI AU Kerahkan Paskhas ke Jateng dan Yogyakarta,' *Suara Karya*, 8 November 2010.
[63] 'TNI dan Kementerian Lingkungan Hidup Jalin Kerja Sama,' *Tempo Interaktif*, 10 June 2010.
[64] Tentara Nasional Indonesia, *National Environmental Resilience through Territorial Defense*. Available at www.urbansolit.com
[65] 'TNI: Selamatkan Lingkungan, Perkuat Pertahanan Bangsa,' *Kompas*, 24 March 2009.

The programme started off on the premise that climate change, global warming and environmental degradation are 'non-war crises' that may impact Indonesia's national integrity and socioeconomic sustainability. It further complements, and not supplants, existing governmental policies and regulations at the national and regional levels that pertain to environmental sustainability.

The TNI Environmental Defence programme is to be further implemented through the Defence Territory Para-Command (*Para Komando Wilayah Pertahanan*) by increasing TNI's civic missions (known as *Operasi Bakti TNI*). An Environmental Defence Technical Team has also been established under the TNI General Headquarters by the TNI Commander to oversee and execute the programme. This team will formulate programmes and simulations to provide solutions and explanations to the various policymakers and stakeholders involved. The Environmental Defence programme is, thus, part of not only TNI's MOOTW approach but also its 2005–2009 Strategic Plan.

Health and Military Medicine

In terms of health response and medicine, TNI has been increasingly proactive. Former TNI Commander Djoko Santoso has even said that military medical response was already one of TNI's main operations.[66] For instance, the military has conducted several joint trainings and simulations with the Ministry of Health for providing field assistance to victims of bird flu and H1N1 in several regions. The Ministry of Health has further signed an agreement with TNI in May 2010 to increase health care and service in Indonesia's outer regions and remote islands by using a floating naval hospital ship, as well as for other cooperation during disaster relief and management.

Conclusion

Potential Pitfalls and Challenges

The preceding analysis has identified and assessed the key climate insecurities in Indonesia and the manner in which they impact TNI at the strategic, institutional and operational levels. Key climate insecurities in Indonesia include warmer climate and rising sea levels, droughts and food insecurity, energy insecurity and urbanisation, marine resource scarcity, mass migration and internal conflict, and natural disasters.

Subsequent sections also revealed how climate change and its ramifications, though acknowledged to be a crucial long-term security issue for TNI, are yet to be fully, seriously, and systematically incorporated into the country's overall defence planning and reform policies. Nevertheless, it has also become evident that, in spite of the absence of comprehensive and clear policy guidelines on climate insecurities, TNI has been engaged in several activities aimed to adapt and possibly mitigate the impact of climate change, mainly in the realms of disaster management, environmental defence and health medicine. It is pertinent to note that, despite such activities, several challenges remain for TNI.

[66] 'TNI Seeks to Improve Medical Response,' *The Jakarta Post*, 5 April 2010.

First, not all military units are on stand-by for disaster, nor are all units well trained for disaster relief and humanitarian operations. In general, a cardinal rule for disaster response is to field personnel in positions requiring skills as close as possible to their normal jobs. This can be seen, for example, when dealing with cases of fire (fire and rescue) or public order (police).

When it comes to the military, however, often only a select few technical units (e.g. combat engineers, health battalions) have the specialised skills and training pertinent to a direct disaster response application, as is the case with TNI as well. Then again, TNI's overall Orders of Battle focus on internal security (territorial and intelligence officers make up 60%–70% of its forces while strike forces, such as the Marines, Strategic Army Reserve and Special Forces, contribute to its remaining 20%–25%), and such a structure is hardly suitable for HADR operations.

Second, a standing peacetime army in non-conflict zones is generally administrative with either symbolic operational manpower or a minimum number of soldiers required to hold defensive positions in the event of an attack.

In reality, therefore, when large-scale disasters, such as climate-induced hurricanes or earthquakes, suddenly strike, the military may not necessarily have the numbers or resources required to provide urgent assistance when most needed. In many cases, it is possible that the troops and military facilities are themselves hit by the disaster, which further hinders their ability to respond immediately and conduct large-scale HADR operations.

The latter was the case during the 2004 Aceh tsunami, when around 30,000 soldiers and 15,000 policemen were deployed to the province to combat the insurgency posed by the Free Aceh Movement (GAM) prior to the disaster. The tsunami quickly smashed the central military and police command structures, communications, training and other bases in the area as well as other military facilities located near the coast. It was estimated that nearly 8,000 police officers and hundreds of soldiers perished in the disaster.[67] Military facilities were similarly badly damaged during the 2009 Padang earthquake, which caused extensive damage to over 60% of housing facilities, military hospitals, district command offices and several other facilities.[68]

Third, with the requirement for maritime patrols, disaster relief, and humanitarian operations increasing – in other words, more operational tempo being needed – the defence's energy efficiency will become a critical issue in the coming years, as energy prices will likely either fluctuate or rise significantly.

This may further strain Indonesia's defence budget and exacerbate tradeoffs in funding for military operations, training, and assistance and maintenance, especially as extreme environmental conditions increase the requirement of maintenance for equipments but reduce their life cycle at the same time. A similar scenario is already being faced by the Indonesian Navy, which is only able to keep a fourth of its vessels at sea but needs about three times as many vessels to adequately cover areas vulnerable to piracy, human trafficking and smuggling.[69]

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[67] Matthew N. Davies, *Indonesia's War over Aceh: Last Stand on Mecca's Porch* (London: Routledge, 2006), pp. 231–2.
[68] 'TNI Peduli Gempa Sumbar,' *Palagan*, No. 42 (December 2009), p. 11.
[69] McCawley, 'Sea of Trouble,' *Far Eastern Economic Review*, p. 52.

TNI, too, needs to critically ponder its defence fuel efficiency. It has already spent around IDR 2.9 billion (USD 300 million) annually for fuel and lubricants – not counting the fluctuation of oil prices or the cost of storage and distribution – with the government often only paying half the cost incurred. Bureaucratic red tape has also raised various defence fuel inefficiencies. Regular reports from the Supreme Audit Agency (BPK) on military fuel management have continued to note excess usage, unaccounted distribution and other various irregularities. More importantly, since the government appropriates defence fuel funding based on a predetermined state budget, and not on the volume of actual fuel required, TNI's fuel budget is practically held hostage by the price of oil.

Finally, even as climate change and natural disasters present TNI with new challenges that it has not yet fully grasped, the present-day capabilities of the local and national civilian governments when it comes to HADR operations remain poor.

Indeed, as a former Chief of Territorial Affairs at TNI argued, "the biggest problem facing disaster management and relief facing the country today and in the future is the incapacity of the local governments as the first line of defence in preparing local communities, mobilising resources to respond, and marshalling financial support in the post-disaster period. These problems are further compounded by the chaotic regional autonomy that devolves more political authority and financial capacity to local elected officials and governments – most of whom are often less than qualified in governance issues."[70]

In conclusion, while initial studies do confirm that TNI will bear the brunt of the many security implications of climate change in the years to come, insufficient information and bureaucratic hurdles have prevented the present study from providing a thorough picture. Still, several interesting policy initiatives, such as TNI's Environmental Defence programme, deserve further study to analyse its full impact and effectiveness and also the prospect for emulation by other regional militaries.

The bottom line though is crystal clear – climate insecurities in Indonesia are real and are likely to persist for decades to come. As the full ramifications of these climate insecurities are yet to be properly understood by the country's many security institutions, including TNI, the time has come for the Ministry of Defence to stop regarding climate change as a purely environmental issue and to seriously assess and incorporate the phenomenon into its force development plans while considering all possible ramifications of climate change for TNI be it at the strategic, institutional or operational levels.

[70] Conversation with LG. (retd) Agus Widjojo on 4 September 2010 in Jakarta.