



THAILAND COUNTRY REPORT

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SUMMARY

Over the last 25 years, Thailand has industrialised and successfully achieved the status of Newly Industrialised Country. While urbanisation is dominated by Bangkok, which accounts for nearly 80% of the country's total urban area, urban centres in secondary cities are growing at a much faster rate. Issues of drastic land use change, inadequate urban systems and critical infrastructure, pollution and contamination, and inequality and poverty are manifested much of Thailand. The interaction of urbanisation and climate change create new forms and magnitudes of risks and compound vulnerabilities. Urban governments and communities must deal with increasingly complex challenges in response to shocks and crises.

Most urban centres are geographically located in low-lying, floodplain, riverine, delta or coastal areas. In the past, these areas provided easy access for transportation for commerce and trades. As urban areas continue to expand, they grow into naturally hazardous space. Rice fields and farmlands are converted into built environment for housing, industries and urban infrastructure. Rapid urban and economic growth has resulted in significant losses of terrestrial, freshwater and marine resources and habitats across the country. Urbanisation is largely driven by business investment and economic development. Urban land use plans are not enforced and urban planning is ineffective.

Historical events, such as the 2011 flood crisis, provide illustration of the interaction and implications of urbanisation and climate change. The 2011 flood disaster, the worst crisis in 70 years, affected more than 13 million people in 66 provinces and resulted in 680 deaths. The largest flood disaster caused damages and losses amounted to 1.43 trillion Baht (USD 45.7million). Although the economic impacts were largely on the manufacturing sector as seven industrial estates in Central Thailand were flooded, through the global supply chains automotive and electronic factories across the world were also disrupted.

The 2011 floods were caused partly by reaction to a severe drought in the previous year. Dams were kept full throughout early rainy season of 2011. After months of unexpected heavy rainfall, spill over and emergency discharge increased water levels to already saturated low-lying, floodplains, exacerbating flooding in the Central Plain. Following the 2011 flood disaster, water supply shortages hit many parts of Thailand in 2012. This was caused partly by reaction to the major flood in the previous year as dams were emptied out to allow more room for rainwater storage to prevent flooding.

Policy and planning processes in Thailand present complex challenges. Advice and recommendations from experts and academics are often ignored. Public participation is almost entirely lacking. Influencing consideration of ecosystems and ecosystem services in

urban development planning can be done through bottom-up approaches. Environmental public policy developed by community leaders and members to protect and manage natural resources and ecosystems is likely to be more successfully implemented and followed through. Reports show local communities depending on natural resources for their livelihoods will identify issues, such as environmental degradation, participate as networks to protect and manage ecosystems, and seek academic and expert advice to develop and enforce regulations.

To influence and contribute to informed decision making process, the Shared Learning Dialogue approach is a useful tool in engaging with multiple stakeholders and in capacity building. The government structure and policy planning processes are not flexible, but involving provincial governor and elected government officials who are decision makers with cross-sectoral government agencies and departments, as well as representatives of the civil society and academia in dialogues is an effective way to influence change. This is an iterative process that requires building working relationship and trust over time.

BACKGROUND

This paper discusses policy planning and decision-making processes in relation to the development of secondary cities in Thailand and illustrates some of key factors that contribute to issues of sustainability and urban resilience. Focusing on secondary cities, the discussion draws on key learning emerging from past weather-related issues and disasters, particularly around how responses and decisions of governments are made at the time of disasters. It is also important to reflect on root causes and governance challenges that contribute to disasters and increasing vulnerabilities, highlighting little considerations of ecosystem services and expert advice in planning.

Over the last 25 years, Thailand has industrialised and successfully achieved the status of Newly Industrialised Country (NIC). As one of the fastest growing economies, Thailand has transformed from an agricultural based to urban-centred, industrial based economies [1]. Thailand, like other countries in Southeast Asia, is rapidly urbanising [2]. While urbanisation is dominated by Bangkok, which accounts for nearly 80% of the country's total urban area, urban centres in secondary cities are growing at a much faster rate [3]. Urbanisation process has transformed much of the country's social dimension and ecological landscapes. While urbanisation is a complex process, driven by many forces, similar urbanisation patterns and trends are emerging across the Thai cities. Issues of drastic land use change, inadequate urban systems and critical infrastructure, pollution and contamination, and inequality and poverty are manifested much of Thailand. Similar social, environmental and economic implications of urbanisation are also evident across urban centres. The interaction of urbanisation and climate change create new forms and magnitudes of risks and compound vulnerabilities [4]. Urban governments and communities must deal with increasingly complex challenges in response to shocks and crises.

URBANIZATION TRENDS

The implementation of the economic policy introduced by the government will have serious short- and long-term implications on social and environmental issues. The government has removed and/or revoked many environmental regulations and social safeguards. The process of conducting Environmental Impact Assessments has been cut short from 22 months to 9 months to speed up construction of mega infrastructure projects [23]. Building regulations have been removed to allow fast establishment and the construction of SEZs. This also includes regulations under the Town and City Planning Act for construction of power plants, water treatment plants, garbage disposal and collection plants, recycling plants and gas processing plants.

Land speculation and land grabbing are driving land use changes, which are mostly unregulated, and are occurring at a significant extent and pace. Land grabbing leads to dispossession of people and is carried out by domestic and transnational companies, often with support from central and local governments. Land speculation leads to unaffordable land prices and urban sprawl. Land prices in 2016-2017, estimated by the Treasury Department, have markedly increased across the country at an average of 27.72% [7]. The highest land price in Bangkok is at around one million Baht per square Wa (or approximately 7,500 US dollars per square metre). Secondary cities are experiencing higher land prices because of land speculation. Land prices have increased by an average of 37.31% and 33.5% in the North and Northeast regions, respectively. Land in the urban centre of Chiang Mai is reported at 250,000 Baht per square Wa (or approximately 1,900 US dollars per square metre). The minimum daily wage in Thailand is set at 300 Baht (or about 9 US dollars).

URBAN HAZARD PROFILE

Historical events, such as the 2011 flood crisis, provide illustration of the interaction and implications of urbanisation and climate change. The 2011 flood disaster, the worst crisis in 70 years, affected more than 13 million people in 66 provinces and resulted in 680 deaths. The largest flood disaster caused damages and losses amounted to 1.43 trillion Baht (USD 45.7million). Although the economic impacts were largely on the manufacturing sector as seven industrial estates in Central Thailand were flooded, through the global supply chains automotive and electronic factories across the world were also disrupted [8].

The magnitude and extent of floods in 2011 were enormous. The crisis, although unique, its reflection on water mismanagement and failures in urban land use planning is like other flood disasters across the country. The seven industrial estates are geographically located in low-lying floodplain areas of Central Thailand [9]. Drastic changes in land use, ecological landscapes and waterways, coupling with a lack of scientific data, resulted in unknown hydrological patterns and inability to prepare for changing courses of floods. Variable heavy rainfall and unexpected storms led to inability to plan and prepare for large volume of water.

The 2011 floods were caused partly by reaction to a severe drought in the previous year. Dams were kept full throughout early rainy season of 2011. After months of unexpected heavy rainfall, spill over and emergency discharge increased water levels to already saturated low-lying, floodplains, exacerbating flooding in the Central Plain [10]. Following the 2011 flood disaster, water supply shortages hit many parts of Thailand in 2012. This

was caused partly by reaction to the major flood in the previous year as dams were emptied out to allow more room for rainwater storage to prevent flooding [11].

In local context, the combining social, environmental, economic and political settings create complex challenges for government and communities to respond to shocks and crises. Flooding during the 2011 disaster was dealt with in different ways across the impacted areas, depending on local political influence and community pressure on local authorities. This also created cross-boundary conflicts and transfer of risks, such as keeping urban centres dry by pumping floodwater into nearby villages. The response to the 2011 flood crisis from the government focuses on infrastructure solutions, including building floodwalls to protect certain areas and assets, ignoring natural ecosystems, urban planning, and climate change, further creating new risks.

Case study examples

HAT YAI CITY

Positioned as a southern economic hub and gateway to Malaysia and Singapore, Hat Yai city is highly urbanised. The urban centre is geographically located in between mountain ranges and the Lake of Songkhla with linkage to the sea. Urban sprawl has expanded the city into low-lying floodplain and naturally it is situated in a flood prone area. Hat Yai has experienced severe flood crises over the last two decades [12].

- In 1988, 95% of the area of City Municipality was flooded with floodwater as high as 2 metres. Four billion Baht of flood damage and loss was estimated (USD 133 million). To protect the city centre from the next flood disaster, the Royal Irrigation Department (RID) responded by dredging four canals that flow through the city to increase drainage.
- In 2000, the city was flooded with floodwater as high as 2.5 metres in some areas. Eighteen billion Baht of flood damage and loss was estimated (USD 521 million). The national government responded with the development of flood risk map for the whole river basin area including the city. RID increased dredging of the existing canals and constructed additional drainage canals to increase flood drainage flow away from the city. The construction was invested by the government with a total cost of 4.7 billion Baht (USD 157 million).
- In 2010, the city experienced another major flood disaster, with floodwater as high as 3 metres in some areas, despite the investment and construction of drainage canals. Fifteen billion Baht of flood damage and loss was estimated. The national government responded by increasing budget for more construction of drainage canals, water pump stations, and sluice gates to control flood and protect the city centre. An estimate of 6.5 billion Baht was budgeted for the construction.

The past flood disasters in Hat Yai City show changing flood patterns with increasing flood depth, longer duration and new areas being flooded. This reflects drastic changes in land use, failure in urban land use planning, ineffective infrastructure of the drainage system, and little consideration of maintaining ecosystem services in urban areas. Natural canals and waterways have been altered (cemented), while city expansion in floodways is causing blockage of natural drainage and flow. Increased sedimentation of the Songkhla Lake also impedes the flow of floodwater into the sea. Furthermore, mangrove forests around the Lake have been cleared for prawn farming. Increased coastal erosion and less protection during high tides also reduce flood drainage. The government would invest in construction of canals and drainage system but ignore natural ecosystems that could serve as flood impact mitigation and protection for the city centre.

UDON THANI CITY

Udon Thani city, located in the Upper Northeast of Thailand, is one of the fastest growing cities in the country. It is positioned as an important economic hub and gateway to Laos PDR. Despite being surrounded by wetlands and water bodies, the city relies heavily on one source of water supply from the Huay Luang dam. Constructed over sixty years ago for irrigation and agriculture purposes, the Huay Luang dam is in the Huay Luang river basin connecting to Mekong River. Urbanisation has led to increasing population and water demand, and filling in of wetlands and water bodies for land for construction of housing and roads. Water management of the Huay Luang dam for the city in the face of climate change is challenging and is part of a complex urban water system and infrastructure [13]. Like other cities in Thailand, Udon Thani suffers from both droughts and floods, sometimes within the same year and in consecutive years.

- In two consecutive years, 2000 and 2001, Udon Thani experienced one of the worst flood disasters in history. A record of 192 mm of rainfall in one day led to 80 per cent of the city submerged and the inundation lasted almost a month. Flood damage and losses were estimated at 2.5 billion Baht in each year. The government responded to the flood disaster by construction of drainage canals, increasing flow to the Mekong river
- In 2012 and 2013, Udon Thani experienced worst drought in sixty years. Unusually low rainfall during the rainy season in 2012 led to record low water level in the Huay Luang dam. Farming of rice crops was banned as existing water was allocated for the city for consumption. Approximately 227,261 Rai (363 sq km) of farms were affected. The government provided 137.72 million Baht in compensation.
- In 2017, an industrial estate is planned in Udon Thani covering an area of 2,213 Rai (3.54 sq km) for 'green industries' with an estimate of 3.5 billion Baht in investment. This will have significant implication on the water supply demand and

allocation. The number of water users has already increased at an average of 3,300 users per year.

Udon Thani province has over 1,500 wetlands and receives an average annual rainfall of 1,390 millimetres. The combining water bodies and rainfall provide plenty of water for agriculture and consumption, while wetlands serve as water retention to mitigate floods. Local governments have little interest in maintaining ecosystem services and little understanding of ecological significance of wetlands. Local communities wrongly believe that wetlands are wasteland and have no commercial values and conversion of wetlands would increase land price. Water from natural water bodies is perceived as less clean and unusable. Like other cities across the country, responses to floods and droughts focus on engineering and infrastructure solutions. As the city continues to grow, more wetlands and water bodies will be filled in for land and new infrastructure such as ring roads, and will further block natural drainage. There will be less natural water retention and storage areas, but increasing water demand from industries and factories. With increasing unpredictable rainfall variability because of climate change, the city will experience more floods and droughts.

2016 DROUGHT DISASTER – KHON KAEN CITY

Khon Kaen city was positioned as a Secondary Urban Centre by the national government over fifty years ago to ease congestion of Bangkok. Regional government offices, university and health services were set up, driving much of the city's development and expansion. Similarly, urbanisation has transformed rural, agricultural areas into urbanised, built environment. Khon Kaen is geographically located in one of the largest river basins, a part of the Mekong River and depends on a vast ecological watershed for its water supply and drainage, and a similarly complex network of large, medium and small-sized dams across the Chi-Mun basin. The largest of these is the Ubolrattana Dam located at the upstream part of Loei province. The city experiences both floods and droughts and exemplifies one of many of the climate-related challenges cities in Southeast Asia face. The uncertainty of water availability coupled with growing demand for water across different uses and locations creates enormous challenges for the agencies responsible for making decision on water storage and distribution.

- In 2016, Khon Kaen experienced worst drought in two decades. Low rainfall in 2014 and 2015 resulted in drying up of major reservoirs. By March 2016, there was less than 1 per cent of water in the Ubonratana Dam, the main source of water supply for Khon Kaen city. Farmers have suffered from drought over three consecutive years as farming was completely banned to allow more water to be diverted to the city [14].

The city relies on complex infrastructure for water supply. This already poses challenges for water management. But in response to drought and erratic rainfall, agencies responsible for water management focus on infrastructure solutions and increasing capacity of dams and reservoirs for water storage.

2017 FLOOD DISASTER – SOUTHERN THAILAND

In January 2017, strong northeast monsoon caused widespread flooding in 12 southern provinces of Thailand. The flood disaster killed 96 people and displaced 1.8 million people. Flood damage and losses were estimated by the Chamber of Commerce at 2.23 billion Baht. Rubber plantations and production were impacted by the floods. Nearly 40 percent of the world's natural rubber comes from Thailand and the south accounts for two-thirds of the country's production. This could have a cascading effect on the global supply chain [15]. Although the southern part of Thailand normally experiences heavy rainfall and flooding this time of year, some places received extreme rainfall of more than 300 millimetres in one day. However, severe flooding was caused by land use changes [16]. Similarly, cities in the south have urbanised. Changes in land use and ecological landscapes have altered drainage and hydrological patterns. In addition, mining is widespread. Forests in upstream areas have been clear for mining, causing more flash floods and landslides. Existing reservoirs and dams, built over fifty years ago, are out dated and cannot cope with variably large volume of water [17]. The government and responsible agencies, such as the Royal Irrigation Department (RID), are using this opportunity to push forward plans for construction of new dams against advice and recommendation from environmental scientists and experts. Like other responses to past flood and drought disasters, infrastructure solutions do not address root causes and will create new risks.

OVERVIEW OF URBAN LAND USE PLANNING INSTITUTIONS

The local government of Thailand is made up of Provincial Administration Organisation (PAO), Municipality and Tambon Administration Organisation (TAO). There are three tiers of municipalities. The City Municipality (*Nakorn Tessaban*), the largest type of municipalities, and Town Municipality (*Muang Tessaban*) are considered 'urban'. Tambon Municipality and TAO are usually considered 'rural'. The classification is based on the number of population. Urban centres are usually located within administrative boundaries of the City Municipality. To qualify for city status a municipality needs a minimum population of 50,000. City municipalities in Thailand have population smaller than 200,000 (with an exception of Nonthaburi). However, with population growth and rapid urban development, urbanised areas of many cities across the country do not correspond

to administrative boundaries and often extend over several administrative units. This has several significant implications. It is challenging to estimate actual urban population, not only in Thailand, but also across Southeast Asia [18]. Urban population figures are usually smaller and do not represent actual number of people living in cities. This is because only registered residents living in City Municipality are included or a proportion of population is unaccounted for because they are unregistered residents as domestic migrants for work and education or international labourers.

A report shows, the average urban population grew by 1.4% between 2000 and 2010, but urbanisation is dominated by Bangkok [19]. The projection says that by 2050, 72% of the country would become urbanised [20]. Increasing population and economic development activities equate to increased demands in water, food, energy and natural resources. Urban environmental management becomes cross-boundary issues and challenges for local governments to deal with, such as solid waste landfills, wastewater treatment, pollution and contamination. Local governments, particularly the smaller tiers of municipalities and TAO, have limited resources and capacity. To protect the city centre, landfills, wastewater treatment plants are often located in nearby administrative, peri-urban and rural areas.

Municipalities have mandates in urban management and service provision to communities, but with little technical skills and knowledge, environmental issues can be challenging to deal with. Coordination and communication between municipalities can be limited due to political and resource conflicts. Larger municipalities have higher revenues and get higher funding from the national government and are expected to cover expenses for smaller administrative units. In addition, municipalities are expected to coordinate and collaborate with government agencies and departments, such as Provincial Natural Resource and Environmental Management, Urban Planning, and Disaster Prevention and Mitigation, for social, environmental and urban system management, that is beyond the remit of municipalities.

Governance challenges – local government structure

The local government of Thailand is made up of Provincial Administration Organisation (PAO), Municipality and Tambon Administration Organisation (TAO). There are three tiers of municipalities. The City Municipality (*Nakorn Tessaban*), the largest type of municipalities, and Town Municipality (*Muang Tessaban*) are considered 'urban'. Tambon Municipality and TAO are usually considered 'rural'. The classification is based on the number of population. Urban centres are usually located within administrative boundaries of the City Municipality. To qualify for city status a municipality needs a minimum population of 50,000. City municipalities in Thailand have population smaller than 200,000 (with an exception of Nonthaburi). However, with population growth and rapid urban development, urbanised areas of many cities across the country do not correspond

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In 2016, the rural population increased by 66%, while the urban population increased by 34%. The overall urban population grew by 1.6%. The projection says that by 2050, 72% of the country would become urbanised. Increasing population and economic development activities equate to increased demands in water, food, energy and natural resources. Urban environmental management becomes cross-boundary issues and challenges for local governments to deal with, such as solid waste landfills, wastewater treatment, pollution and contamination. Local governments, particularly the smaller tiers of municipalities and TAO, have limited resources and capacity. To protect the city centre, landfills, wastewater treatment plants are often located in nearby administrative, peri-urban and rural areas. Municipalities have mandates in urban management and service provision to communities, but with little technical skills and knowledge, environmental issues can be challenging to deal with. Coordination and communication between municipalities can be limited due to political and resource conflicts. Larger municipalities have higher revenues and get higher funding from the national government and are expected to cover expenses for smaller administrative units. In addition, municipalities are expected to coordinate and collaborate with government agencies and departments, such as Provincial Natural Resource and Environmental Management, Urban Planning, and Disaster Prevention and Mitigation, for social, environmental and urban system management, that is beyond the remit of municipalities.

INFORMATION DEMAND

Policy and planning processes in Thailand present complex challenges. Recent policy planning and decision making processes illustrate and reaffirm that urban development is largely driven by political and economic interests with little consideration of ecosystems. Advice and recommendations from experts and academics are often ignored [21]. Public participation is almost lacking [22]. Thailand is currently implementing the 12th National Economic and Social Development Plan (2017-2021) in line with the 20-year National Strategy introduced by the military government. To transition to a high-income nation as defined by the World Bank, the 12th Plan aims to achieve an average of 5-6% GDP growth a year and average personal income from the current USD 6,000 to 13,000 by 2036. The military government aims to achieve the status of developed country by 2026, by

focusing on strengthening Thailand's Global Competitiveness through promoting the Cluster-based Special Economic Development Zones Policy and the development of Special Economic Zones in smaller, border towns.

The implementation of the economic policy introduced by the government will have serious short- and long-term implications on social and environmental issues. The government has removed and/or revoked many environmental regulations and social safeguards. The process of conducting Environmental Impact Assessments has been cut short from 22 months to 9 months to speed up construction of mega infrastructure projects [23]. Building regulations have been removed to allow fast establishment and the construction of SEZs. This also includes regulations under the Town and City Planning Act for construction of power plants, water treatment plants, garbage disposal and collection plants, recycling plants and gas processing plants.

Planning processes and budgeting are also influenced by recent past flood and drought disasters. The governments react and respond to isolated events with little consideration of addressing root causes, longer term planning and recommendations from experts. Changes in the governments would lead to changes in plans and budgeting. The national water and flood management plan for the Central Plain is a good example. Soon after the 2011 flood disaster, the national government set up a new Office of the National Water and Flood Management Policy and approved a budget of Thai Baht 350 billion for construction projects (The Nation, 2014). To control and prevent flooding the budget would be for constructions of dams, reservoirs, water retention, city protection and flood diversion channels. This mega water management and flood protection scheme bypassed environmental and health impact assessments and lacked public participation. Construction projects scattered across the Central Plain would be stand-alone projects addressing localised issues. Changes in the national government due to the military coup in 2014 led to cancellation of the projects and reallocation the budget.

RECOMMENDATIONS

Both national and local governments are driving for better economies through industrialisation, but there is little evidence of integrating and maintaining ecosystem services in development plans despite heavy dependence on natural resources to generate economic growth. Globalisation and regionalisation play a significant role in influencing national development policies. Secondary cities and border towns are positioned to be economic hub and gateway for trade, logistics and transport within the region. Flood and drought disasters are perceived as threats to the economies in urban centres and are quantified in economic losses and damages to assets and revenues. Responses to disasters, such as floods and droughts, are infrastructure solutions, with little consideration of scientific data and long-term impacts or consequences, especially

when coupled with the implications of urbanisation and climate change [24]. As an institutionalised process for achieving environmental objectives in the planning and approval of major projects, EIA faced substantial resistance and limited support from public and private sector. The absence of urban land use and environmental planning and management strategies has resulted in greater concern for future urban development that is sustainable and just.

Influencing consideration of ecosystems and ecosystem services in urban development planning can be done through bottom-up approaches. Environmental public policy developed by community leaders and members to protect and manage natural resources and ecosystems is likely to be more successfully implemented and followed through. Reports show local communities depending on natural resources for their livelihoods will identify issues, such as environmental degradation, participate as networks to protect and manage ecosystems, and seek academic and expert advice to develop and enforce regulations [25].

From our experience, to influence and contribute to informed decision making process, the Shared Learning Dialogue approach is a useful tool in engaging with multiple stakeholders and in capacity building [26]. The government structure and policy planning processes are not flexible, but involving provincial governor and elected government officials who are decision makers with cross-sectoral government agencies and departments, as well as representatives of the civil society and academia in dialogues is an effective way to influence change. This is an iterative process that requires building working relationship and trust over time. Scientific information needs to be interpreted and user friendly and presented in simple formats, such as 4-6 pages of photo stories, infographics (www.thaicity-climate.org). Local stakeholders identify, prioritise, and assess key problems and challenges themselves. Scientific information needs are identified and driven by local stakeholders. The shared learning dialogue process is to influence collaborative and participatory measures to address those problems. Lastly, national, local, mainstream, and social media play an important role in influencing change, through communication and getting information to the public domain. Capacity building of media reporters is also crucial. Scientific concepts like climate change are not easily understood and stories are perceived as less urgent and are not reported.

REFERENCES

1. Dowrick, S., *The East Asian miracle: Economic growth and public policy*. Economic Record, 1994. **70**(211): p. 469.
2. Satterthwaite, D., *The scale of urban change worldwide 1950-2000 and its underpinnings*. 2005: IIED.
3. SCB, E.I.C. *Looking beyond Bangkok: the urban consumer and urbanisation in Thailand 2011*; Available from: http://www.scb.co.th/eic/en/scb_eic_insight_past.shtml.
4. Friend, R., et al., *Urbanising Thailand: Implications for climate vulnerability assessment*. 2016.
5. Trisurat, Y., *Applying gap analysis and a comparison index to evaluate protected areas in Thailand*. Environmental management, 2007. **39**(2): p. 235-245.
6. ACHR. *Understanding Asian Cities*. 2005; Available from: <http://www.achr.net>.
7. TerraBKK. 2016; Available from: <http://research.terrabkk.com/th/article/detail/138548>.
8. World Bank, *Thai flood 2011: Rapid assessment for resilient recovery and reconstruction planning*. 2012, World Bank.
9. Rigg, J., et al., *Reconfiguring rural spaces and remaking rural lives in central Thailand*. Journal of Southeast Asian Studies, 2008. **39**(03): p. 355-381.
10. Benfield, A., *2011 Thailand floods event recap report*. 2012, Aon Benfield: Chicago, USA.
11. Asian Correspondent. *Thailand: Breaking the cycle of flooding and drought*. 2016; Available from: <https://asiancorrespondent.com/2016/10/thailand-breaking-cycle-flooding-drought/#E4kHAtg8GxISkJDX.97>.
12. ACCCRN. *Hat Yai city Climate Resilience Strategy*. 2014; Available from: <http://www.thaicity-climate.org>.
13. M-Brace, *Udon Thani*. 2014, Institute for Social and Environmental Transition-International, Thailand Environment Institute, Vietnam National Institute for Science and Technology Policy and Strategy Studies: Bangkok, Thailand: Institute for Social and Environmental Transition-International.
14. Regan, H., *Thailand is suffering from the worst drought in decades*, in *Time*. 2015, Time.
15. Boonthanom, S. *Thai floods harm key region for world's rubber*. 2017; Available from: <http://www.reuters.com/article/us-thailand-floods-rubber-idUSKBN1540YI>.
16. Thansettakij. *Southern floods analysis*. 2017; Available from: <http://www.thansettakij.com/content/124832>.
17. Manager. 2017; Available from: <http://www.manager.co.th/local/viewnews.aspx?NewsID=9600000004407>.

18. EIU. *Asean Cities: Stirring the melting pot*. 2016; Available from: https://www.eiu.com/public/topical_report.aspx?campaignid=ASEANCities2016.
19. World Bank. *Urbanisation in Thailand is dominated by the Bangkok urban area*. 2015; Available from: <http://www.worldbank.org/en/news/feature/2015/01/26/urbanization-in-thailand-is-dominated-by-the-bangkok-urban-area>.
20. United Nations, *World urbanization prospects: The 2014 revision highlights*. 2014, United Nations Department of Economic and Social Affairs, Population Division.
21. Matichon. 2017; Available from: <http://www.matichon.co.th/news/543772>.
22. Isranews. 2017; Available from: <https://www.isranews.org/isranews/55749-ee-55749.html>.
23. Prachatai. *Thai government to cut short EIAs for mega projects*. 2015; Available from: <https://prachatai.com/english/node/5585>.
24. Komchadluek. 2017; Available from: <http://www.komchadluek.net/news/agricultural/273964>.
25. Suwanich, P., *Development Process of Community-Based Environmental Public Policy in People Sector*. University of the Thai Chamber of Commerce Journal, 2009. **29**(4).
26. Reed, S.O., et al., *"Shared learning" for building urban climate resilience—experiences from Asian cities*. *Environment and Urbanization*, 2013. **25**(2): p. 393-412.