



1. Status of plastic pollution and waste leakage

Leakage assessment

Thailand is the world's sixth biggest contributor of marine plastic litter. Due to the current waste disposal practices, there is an abundant leakage of plastic waste in water, waste water and drainage system in the country.

Data from the Ministry of Natural Resources and Environment (MONRE) indicates that out of 2.83 million tons per year of uncollected and improperly disposed municipal solid waste (MSW) from 23 coastal provinces, plastic waste is about 339,000 tons per year (12%).

About 51,000 tons per year (15%) of the uncollected and improperly disposed plastic waste gets washed into the sea. An evidence of this leakage is found in beach clean-up efforts described in Table 1.

Reports indicate that the composition of coastal litter in Thailand is 16% plastic bags, 10% plastic caps, 8% rope, 7% straws, 6% paper, 5% cigarette butts, 5% glass bottles, 4% plastic plates / spoons / knives, 4% food waste, and 35% other garbage.

Table 1: Voluntary beach clean-up efforts and items found in Thailand

Country/location						People	Kilograms	Kilometers of coast	Total items collected
Thailand						3,641	12,504	104.2	57,811
Cigarette Butts (No.)	Plastic Beverage Bottles (No.)	Plastic Bottle Caps (No.)	Food Wrappers (Candy, etc) (No.)	Plastic Grocery Bags (No.)	Plastic Lids (No.)	Straws, Stirrers (No.)	Glass Beverage Bottles (No.)	Other Plastic Bags (No.)	Foam Take-Away Containers (No.)
359	7,198	1,703	2,940	1,566	427	6,083	5,024	704	593

Coastal and marine ecosystems and impact from plastic pollution

The marine environment along the 3219 km coastline of Thailand is very rich in coastal and marine biodiversity. Plastic pollution (macro and micro) is creating a major impact on the beaches, coral zone and mangrove ecosystem in Thailand. For example a patch of plastic trash almost 10 kilometres long was seen floating off the coast of the Gulf of Thailand in Chumpon province in February 2017. There is no clear pattern of marine distribution of plastics.

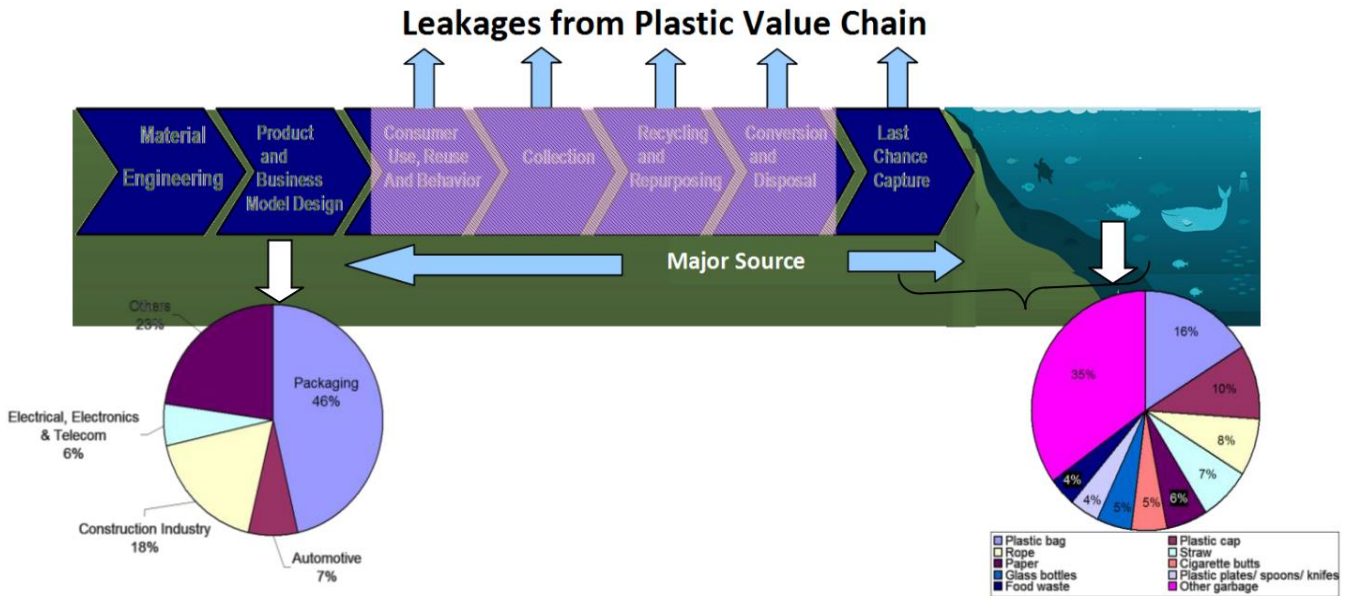
However, mass of marine debris are usually found piled on the beaches during monsoon, when the debris were flushed into the rivers and finally washed ashore. A study on microplastic indicated microplastic contamination of three most abundant sessile and intertidal invertebrates (rock oyster: *saccostrea forskalii*, striped barnacle: *balanus amphitrite*, periwinkle: *littoraria* sp.) in three beaches of the eastern coasts of Thailand. The results showed a significant accumulation of microplastics in the invertebrates at rates of 0.2-0.6 counts/g indicating higher pollution levels along the coastline.

Material flow analysis

The root cause analysis indicates that economic growth with enhanced production and consumption is leading to higher waste generation in Thailand. A conceptual material flow analysis in Thailand is shown in Figure 1. It indicates that waste generation starts from the point of consumption, collection and extends to its disposal. The total amount of waste generated in Thailand is about 27.37 million tons per year (2017).

The average waste generated per capita at the city level is about 1.13 kg/person/day. As per 2016 data on an average 64% of the MSW in the country is organic waste, followed by Plastic (18%), Paper (8%), Textile (3%), Glass (2%), Metal (1%), Rubber (1%) and others (1%). The unmanaged plastic waste component of MSW during its collection, transportation and disposal gets leaked into the sea & ocean as shown in Figure 1.

Figure 1: Material flow analysis of plastic waste



2. Driving forces

Plastic and packaging: Production, consumption and trade, use, collection, recycling and disposal

Plastic production in Thailand is growing at 2.9% annually and increased from 7.5 million tons in 2013 to 8.5 million tons in 2017. Plastic consumption is also growing at 4% annually and increased from 4 million tons in 2013 to 4.4 million tons in 2017. Currently per capita plastic consumption is about 64 kg (2017). As per 2014 estimates, Thailand packaging industry value is about 13.05 billion US\$. Packaging industry's Compound annual growth rate (CAGR) is about 8.21% (2007-2011). Composition of packaging industry (by value in 2014) consists of paper and board packaging (largest), plastic packaging (2nd largest), metal packaging (3rd largest). As per 2016 estimates Thailand packaging material production consists of plastic: 1.714 million t, paper: 2.130 million t and glass: 0.826 million t metal: 0.418 million t.

Thailand occupies the 2nd place in ASEAN for the flexible packaging market. Figure 1 indicates that plastic consumption by packaging sector is 46.5%. Further, packaging consumption by sector includes: 41% food industry, 30% beverage industry, 18% cigarette, 4% cosmetic & health, 7% others. Usage of packaging (by material type, 2015) includes: 31.2% paper and board, 21.8% flexible packaging, 21.8% rigid plastic, 21.4% metal packaging, 7.2% glass, 4.6% others. Plastic bag usage is 8 plastic bags per day/capita.

As noted by Thailand's Pollution Control Department (PCD), plastic waste in the country continues to increase, and at the annual rate of 12%, or around 2 million tonnes. Table 1 also indicates that plastic packaging waste is one of the major component of waste found on the beaches in Thailand.

Municipal Solid Waste Management: Including info on major landfill and dumpsites

MSW collection rate in Thailand for municipal area is average (58%) though in major metro cities, it is high. e.g. MSW collection and disposal in Bangkok has reached 99%. The total amount of properly treated MSW increased to 11.69 million tons (43%), while MSW recycling increased to 8.51 million tons (31%) in 2017. There are 3,101 disposal sites for MSW, out of which 677 site are functioning. About 21% of the collected MSW is delivered to the waste management facilities. The most common methods used for treatment & disposal of MSW in Thailand are sanitary landfill (109), control dumps less than 50 tons / day (465), incinerators with air pollution control system (2), incinerators with waste to energy technology of less than 10 tons per day (9), small incinerators less than 10 tpd (34), separation facility / compost (35) and integrated system (12) and mechanical biological system (23). Recycling process consists of separation and recovery of recyclable waste including glass, paper, plastic, steel and aluminium from junk shops, community recycling centers, waste banks and packaging buyback / return systems. Currently the local administration consists of 2,233 municipalities and 5,333 Tambon (sub-district) administration organizations. Waste collection services cover 5169 localities or (66%), while the remaining have no collection system. Open dumpsites outnumber sanitary landfill.

Open dumping is the most commonly used method of MSW disposal, due to the unavailable waste collection especially in non municipal areas. Only 0.5 million tonnes of the plastic waste can be reused, while the remaining 1.5 million tonnes, (80% of which are single-use plastic bags) accumulate in official dumping sites or elsewhere.

Socio-economic trends: Including data on riverside and coastal populations

Thailand is located at the centre of the Indo-Chinese peninsula in mainland South-East Asia. It has a total area of 513,120 sq. km. with a population of 69.03 million. Its urban population is 50.04% with an annual growth rate of 3%, which is much higher than an annual rural growth rate of -2%. It has a 3219 km long coastline along 23 provinces with approximately 12 million population. Thailand became an upper-middle income economy in 2011. GDP of Thailand is \$455.2 billion with a modest growth rate of 3.9% in 2017. Its economy grew at an average annual rate of 7.5% in the late 1980s and early 1990s, creating millions of jobs that helped reduce poverty rate. Thailand's economy is export dependent contributing about 60% to GDP. Agriculture and tourism are the other sectors which contribute to the economy of the country. The tourism and hospitality sector is one of the major contributors to the income of the coastal population.

3. National policy and legal framework to reduce plastic pollution

Strategy and regulations

Waste management is part of the 20-year national strategy of the government of Thailand. Thailand has a basic Act on Environment, "Environment and Conservation of National Environmental Quality Act B.E. 2535 AD 1992" as well as regulations on air, water and waste management. Regulations on waste management includes Public Health Act 1992, chapter III and Hazardous Waste and Substances B.E. 2546 (2003), B.E. 2549 (2006), and B.E. 2548 (2005). Further, the Act on the Maintenance of the Cleanliness and Orderliness of the Country Public Sanitary and Order, Act B.E. 2535 (1992) & B.E. 2560 (updated in 2017) Ch. III/1 have updated provisions for MSW management. Law for Promotion of Source Segregation of household waste into general waste, recyclable waste and household hazardous waste has been introduced to be effective by 2020.

The Ministerial Regulation on Service Fees for Solid Waste Management (prepared by the Ministry of Public Health, and approved by the Cabinet on April 20, 2015) is at draft stage. Thailand has enacted the Marine and Coastal Resources Management Act, which aims to protect Marine & Coastal resources. Thailand is the only COBSEA participating country has not ratified the Annex V of the MARPOL Convention and the London convention and its Protocol (besides Cambodia, Indonesia, Malaysia, Singapore and Vietnam).

Action plan

The National Economic and Social Development Plan (2017–2021) aims to utilize more than 75% of MSW by the end of 2021. The 10-year (2012–2021) Alternative Energy Development Plan promotes energy generation from waste. The National Master Plan on Waste Management (2016–2021) promotes the concept of 3R.

Thailand Zero Waste (2016–2017) Action Plan includes a target to reduce the amount of MSW disposed by 5% compared to a 2016 baseline. Environmental quality management planning (2017–2021) aims at controlling plastic consumption through appropriate tax mechanism, promoting the use of bioplastic and other alternatives to plastics. Thailand has drafted Plastic Debris Management Plan (2017–2021) which targets to increase plastic waste recycling to at least 60%. Thailand has also National Roadmap for the development of Bio-plastic industry (2008).

Investment

The waste generation sector in Thailand suffers from lack of resources. As per 2014–15 estimates, the per capita expenditure for managing MSW was US\$ 1–2. In 2011, managing 15 million t of garbage incurred a cost of US\$ 370 million. Act on the Maintenance of the Cleanliness and orderliness of the Country (2017) proposes US\$ 4.5 /month/households as waste collection service fee. The PPP Act (introduced in 1992, and revised in 2013, under second review) guides PPP in the waste sector. The National Waste Management Master plan 2016–2021 encourages private investors in waste to energy (WtE) Sector. Some of the major WtE projects include Phuket (700 tpd, 12 MW), Bangkok (500 tpd, 7–9 MW), Hatyai (250 tpd, 4–5 MW), TPI – Saraburi (3,000 tpd, 70 MW), Eastern Energy – Samet Prakarn (500 tpd, 10 MW) & Khon Kain (600 tpd, 5–6 MW).

4. Key stakeholders and their initiatives

Government

The Ministry of Natural Resources and Environment (MONRE) with its Office of Environmental Policy and Planning (ONEP), Pollution Control Department (PCD), and the Department of Environmental Quality Promotion (DEQP) are responsible for policy, plans, regulation, guidance, technical recommendations, programs and standards, monitoring and control for MSW, industrial and hazardous waste and emerging waste stream including plastic waste.

The Department of Local Administration (DLA) of the Ministry of Interior provides overall guidance to local authorities on waste handling as well as makes approval of the budget. Other line agencies like; Ministry of Interior, Ministry of Public Health, Ministry of Industry, Municipalities, Sub-district Administration Organizations (SAO), Provincial Administrative Organization (PAO), and Special Administrative Areas (Bangkok and Pattaya City) are responsible for the collection and management of MSW within their governed areas.

The Department of Marine and Coastal Resources (DMCR), Ministry of Natural Resources and Environment; (Director General / Foreign Affairs Sub division / Marine and Ecosystem Coastal Resources) acts as COBSEA focal point. DMCR works in cooperation with Marine Pollution Control Department, Environmental Quality Promotion Department, and Department of National Park, Wildlife and Plant Conservation. DMCR has signed an MOU with the governmental authorities in 15 provinces to promote free smoking beaches. The Department of Medical Services of the Ministry of Public Health announced to completely phasing out the usage of plastic bags in its 30 hospitals from 1 October 2018, aiming to reduce the usage of 9 million bags per year. ULBs are involved at project level specifically for plastic waste. Thailand introduced a temporary ban on the import of plastic waste in June 2018, and is now preparing a set of policies that include banning plastic waste imports permanently within the next two years.

Private sector

Private sector (formal) is involved in recycling and disposal of plastic MSW, industrial and hazardous waste. MONRE made a Memorandum of Understanding with 16 business organizations to not distribute plastic bags to their customers on the 15th and 30th of each month. Private sector is not only involved in waste to energy projects but also plastic recycling projects. Informal sector is also involved in MSW collection, sorting, transportation and disposal. About 30 plastic recycling companies are operating in Thailand.

NGOs

Many non profit / civil society organizations have undertaken a number of initiatives to address marine litter & plastic pollution. These include: Cooperation of PCD with Plastic Institute, FTI, Thai Plastic Industry Association and Chulalongkorn University, to improve the data base on the flow of plastic material in Thailand; Campaigns to axe plastic cap seals of drinking water bottles (effective from 1 April 2018); Prohibition of plastic bags and Styrofoam containers in national parks (announced by the Department of National Parks, Wildlife and Plant Conservation, Thailand on 8 June 2018).

DMCR, (MONRE) has the regular coastal clean-up all year round with public participation, in 24 coastal provinces. The initiative was made for 20 tourist beaches. DMCR encourages the fishers, especially the trawlers, to gather the marine debris which had got into the trawl net, and bring to shore.

The Sustainable University Network (SUN) with 27 universities nationwide has organized a campaign to reduce single-use plastic on all campuses by 80-90 % over the year 2018. "Public-Private Partnership for Sustainable Plastic and Waste Management" initiative, launched in June 2018 and led by the Plastic Industry Club, aims to halve the amount of ocean waste Thailand produces by 2027. .

5. Baseline indicators

Six indicators have been identified along with their targets & institutional responsibilities. These include:

1. Reduction in single use plastic production and sale, e.g. plastic shopping bags TBD; Target: 15-25% reduction; Data collection by: national plastic associations
2. Increase in PET bottle collection and segregation (by tonnage) TBD; Target: 50% increase; Data collection by: Coca-Cola ASEAN
3. Increase in national plastic recycling rate, tons of material recycled *
TBD; Target: 5% increase; Data collection by: national entities linked to ISWA (e.g. WMAM, SWAT), UN Environment and UNSD
* Linked to SDG indicator 12.5.1 National recycling rate, tons of material recycled
4. Variety of alternative packaging (item)
TBD; Target: 50; Data collection by: all project executing partners
5. Increased consumer awareness on marine litter and plastic pollution TBD; Target: 25% increase; Data collection by: FIA and UN Environment
6. Number of companies publishing sustainability reports with information on plastic footprint
**TBD; Target: 25% increase; Data collection by: UN Environment and UNSD **Linked to SDG indicator 12.6.1 Number of companies publishing sustainability reports

6. Conclusions

Thailand has basic and emerging environmental regulatory framework to address emerging plastic waste stream.

Thailand has successfully demonstrated pilot level demonstration projects related to 3Rs / waste minimization / cleaner technology / cleaner production resource efficiency / waste exchange. It intends to scale up its experience across plastic waste management. In this context, it has embarked on preparation of marine litter and plastic waste master plan. It has committed to address marine litter and plastic pollution and achieve SDG 14, target 14.1.

Though Thailand has policy, regulatory framework, programs and plans in place, projects have not evolved to improve plastic waste segregation, recycling and recovery rate. Most of the plastic recycling is dependent on scrap import. Draft policies, regulations and plans / strategies need to be approved for implementation e.g. EPR based regulations.

Further, programs and projects lack new financial instruments to support EPR. At technology level, overall MSW collection rate including plastic waste except for Metro cities is average. Open dump sites still outnumber sanitary landfill sites.

There is lack of updated data on plastic waste inventory, recovery by informal collectors and recycling. There is a lack of financial and technical support / resources. Financing waste management is still inadequate. Revenue from waste collection fee does not cover full expenses needed for sustainable waste management.

Challenges exist in coordination of multi-stakeholder co-operations. Lack of participation of private investors exists due to constraints in understanding of waste management by financial sector. Challenges in investment for modern recycling facilities e.g. private sector participation needs to be significant. There is lack of technically and financially sustainable institutional model for plastic waste management. Plastic waste monitoring and reporting strengthening is required in the country.

Opportunities exist to develop comprehensive program, plan & projects under regulatory, institutional & technology transfer/ development for plastic waste management. Opportunities for technology transfer and assimilation exist in plastic waste management. For example opportunities for pilot testing and scaling up of EPR based institutional mechanism at policy, program, plan / strategy and projects exist in the country. Opportunities for private sector participation considering emerging regulatory framework including financial instruments are also emerging in the country.

References

1. UN Environment Programme / COBSEA; Reducing marine litter by addressing the management of the plastic value chain in Southeast Asia; July 2018
2. https://www.giz.de/de/downloads/giz2018_Thailand-Country-Profile_web.pdf
3. UN Environment / East China Normal University; Draft 2 Methodology for Marine Debris Hotspot Assessment; December 2018
4. MSW related information was compiled from various sources for the year 2016), including (i) PCD, 2017. Thailand State of Pollution Report 2016. Pollution Control Department. <http://infofile.pcd.go.th/mgt/Pollution%20Report%202016%20.pdf?CFID=180470&CFTOKEN=98992030> (ii) Country assessment report, presentation, country 3R Profile submitted to the 8th regional 3R Forum, 9-12 April, 2018, Indore, India. [http://www.uncrd.or.jp/content/documents/5695 \[Nov%202017\] %20Thailand.pdf](http://www.uncrd.or.jp/content/documents/5695%20Thailand.pdf)
5. United Nations University (UNU) South East Asia E-Waste Monitor. http://collections.unu.edu/eserv/UNU:6348/Regional_E-waste_Monitor_Easr_Southeast_Asia_low.pdf
6. Recyclable waste such as glass, paper, plastic, iron and aluminium are often sold at junk shops and sent back to a manufacturing process or reused as material.
7. Pollution Control Department, Ministry of Environment and Resources (2016) National Solid Waste Master Plan (2016-2021) <http://infofile.pcd.go.th/waste/WasteMasterPlan.pdf?CFID=1804176&CFTOKEN=44874907>
8. UNCRD (2018) Country 3R Progress Report Kingdom of Thailand, 2018. Eight Regional 3R Forum in Asia and the Pacific, 9-12 April, 2018. Indore, Madhya Pradesh, India. United Nations Centre for Regional Development. <http://www.uncrd.or.jp/content/documents/5857ThailandCountry%20Report.pdf>
9. Voice TV (2011). Thailand to spend 12 billion Baht for waste management. <https://www.voicetv.co.th/read/6341>
10. In absence of published reports, information on packaging waste related was compiled from various sources, mainly market research (sample) reports, packaging industries and associations, blogs, newspaper articles. The majority of information available in the public domain is on plastic packaging; very few to none is available on other packaging materials.
11. Global Data (2015) 'Latest Trends and Key Issues in the Thailand Retail Packaging Market : The outlook for primary packaging and outers to 2018'. Website. <https://www.globaldata.com/store/report/pk1144mr--latest-trends-and-key-issues-in-the-thailand-retail-packaging-market-the-outlook-for-primary-packaging-and-outers-to-2018/>
12. Naylor Network (undated) 'Thailand packaging industry to continue strong growth through 2016'. Website. <http://www.naylornetwork.com/ppi-otw/articles/?aid=187744&issueID=27418>
13. Global Data (2015) 'Latest Trends and Key Issues in the Thailand Retail Packaging Market : The outlook for primary packaging and outers to 2018'. Website. <https://www.globaldata.com/store/report/pk1144mr--latest-trends-and-key-issues-in-the-thailand-retail-packaging-market-the-outlook-for-primary-packaging-and-outers-to-2018/>
14. Asian Packaging Federation (2017). Thailand Packaging Industry Report 2017. 67th Board of Administration Meeting of the Asian Packaging Federation (APF), 11-14 Dec 2017, Colombo, Sri Lanka. Courtesy Dr. Pattra Maneesin (Email Communication)
15. Transparency Market Research (2017) 'ASEAN flexible packaging market: snapshot'. Website. <https://www.transparencymarketresearch.com/asean-flexible-packaging-market.html>
16. Asian Packaging Federation (2017). Thailand Packaging Industry Report 2017. 67th Board of Administration Meeting of the Asian Packaging Federation (APF), 11-14 Dec 2017, Colombo, Sri Lanka. Courtesy Dr. Pattra Maneesin (Email Communication)
17. Department of Industrial Works (DIW) (2013) Industrial Waste management: Plastic industry in 2006-2012. PCD (2004) http://infofile.pcd.go.th/waste/Waste_Plastic.pdf?CFID=9779590&CFTOKEN=297
18. Wongpromrat, Kriengsak (20013) ASEAN 'Plastic End-user Market Trend'. Presentation. <http://www.ftiplastic.com/images/download/177/5.1ASEAN%20Plastics%20End-use%20Market%20Trend%20AFPL.pdf>
19. Chulalongkorn University (2004) Packaging industry development for supporting solid waste management and recyclables project. Bangkok, Thailand: Chulalongkorn University Press
20. Corben, Ron (2017) 'Asia's Booming Plastics Industry Prompts Ocean Pollution Fears'. Website, Voice of America (VOA). <https://www.voanews.com/a/asia-plastics-industry/3911586.html>
21. Nikkei Asian Review (2018) 'Thailand falling behind in global battle with plastic waste'. Website. <https://asia.nikkei.com/Economy/Thailand-falling-behind-in-global-battle-with-plastic-waste>
22. Wongruang, Piyaporn (2018) Thailand's drowning in a sea of plastic'. Website, The Thaiger. <https://thethaiger.com/news/thailands-drowning-in-a-sea-of-plastic>
23. Jambeck, J.R., Geyer, R., Wilcox, C., Siegler, T.R., Perryman, M., Andrady, A., Narayan, R., Law, K.L. et al. (2015) 'Plastic waste inputs from land into the ocean'. Science, vol. 347, issue 6223, p. 768-771.
24. Simachaya, Wijarn (2017) 'National Policies, Initiatives and Best Practices for Solid Waste Management in Thailand'. Presentation, ASEAN Conference on Reducing Marine Debris in ASEAN region. <https://www.dmcr.go.th/dmcr/fckupload/upload/147/file/ppt1/ms2-01.pdf>
25. Simachaya, Wijarn (2017) 'National Policies, Initiatives and Best Practices for Solid Waste Management in Thailand'. Presentation, ASEAN Conference on Reducing Marine Debris in ASEAN region. <https://www.dmcr.go.th/dmcr/fckupload/upload/147/file/ppt1/ms2-01.pdf>
26. Fleishman, Hillard (undated) 'Public, private, and civil society partner for sustainable plastic and waste management'. Website, Thai PR.Net. <https://www.thaipr.net/government/864760>
27. <http://www.nationmultimedia.com/detail/national/30344702>