Policy Brief Series

UNDERSTANDING SOUTHEAST ASIA IN ECONOMIC, POLITICAL-SECURITY AND SOCIO-CULTURAL

Vol. 1 Number 2, March-April 2020 **ISSN 2580-1139**

CSEAS
Center for Southeast Asian Studies

Member of:

NTS-Asia
CONSORTIUM OF NON-TRADITIONAL SECURITY STUDIES IN ASIA

SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK
A GLOBAL INITIATIVE FOR THE UNITED NATIONS

• POLICY BRIEF SERIES is a bimonthly publication providing policy analyses and views from policy makers in Southeast Asia •

Editor's Note

Policy Brief Series at a Glance

The purpose of the Policy Brief Series is to serve as a basis for discussions related to Economic, Political-Security and Socio-Cultural Issues in Southeast Asia. Our Policy Brief Series focus on Thematic Priority Issues including Maritime, Sustainable Development, and Regional Economic Cooperation. The Analytical Brief is used to identify potential policy can be used as a tool for substantive discussions with various key stakeholders. The Analytical Brief is bimonthly publication for relevant major events and will support discussions on emerging issues and provide short and informative analyses on southeast asia related issues.

www.cseasindonesia.com

cseas.information@gmail.com

CSEAS Indonesia

(+62-21) 7418835 / 7415969

(+62-21) 74706845

Center for Southeast Asian Studies
Jl. Ir. H. Juanda No. 50 Ciputat, Tangerang Selatan, Banten 15412
INDONESIA

CONTENTS

Image source : canva.com

Addressing Marine Plastic Litter at the Super-Priority Marine Tourism Destinations in Indonesia through the National Action Plan and Technological Interventions

By Kaisar Akhir*

Tourism is a rapidly growing sector in Indonesia before the COVID-19 outbreak. It is indicated by the total contribution of tourism and travel sector to gross domestic product (GDP) that significantly increased over the last decade and the significant foreign exchange from the tourism. The sector contribution is about 400 trillion IDR (29.4 billion USD) in 2007 but it was 787 trillion IDR (58.9 billion USD) or 5.8% of GDP in 2017, and is forecast to grow by 5.4% to 829.9 trillion IDR (62.1 billion USD) in 2018, and to rise by 6.4% per annum to 1,547.4 trillion IDR (115.8 billion USD) or 6.6% of GDP in 2028 (WTTC, 2018). The foreign exchange from the tourism sector reached 19.29 billion USD with the average spending per arrival of international tourists is approximately 1,440 USD from the nineteen main doors of immigration (Siregar, 2019).

As one of the potential tourism types, marine tourism contributed 24,846.6 million USD to GDP (Statistics Indonesia cited in Fahrudin, 2015). This contribution is supported by the value of marine ecosystems such as coral reefs and small islands which are promising in Indonesia. For example, a study revealed that the estimated total economic value of the coral reefs of Bangsring, East Java, Indonesia was 3 million USD per year or 234,000 USD per hectare per year with tourism contributing 60% or 1.8 million USD per year (Asadi & Andrimida, 2019). Triyono (2013) calculates the total economic value of marine tourism in Pari Island, Jakarta, Indonesia is approximately 192.3 million IDR per hectare/year.

Since the potency and facts of tourism are promising, especially marine tourism, the government of Republic of Indonesia has determined 88 national tourism strategic areas by the Governmental Regulation Number 50 of 2011. Among those strategic areas, 49 of which are the marine tourism destinations. These destinations have beautiful beaches, marine habitats and small islands. The beauty of Indonesia has been recognized by the global community through a vote conducted by Rough Guides in 2020 with the results of Indonesia being ranked 16th of the most beautiful countries in the world (Rough Guides, 2020).

***Kaisar Akhir** is Founder and Chairman, Indonesian Maritime Youths (Maritim Muda Nusantara); Researcher, CSEAS Indonesia; Lecturer, Department of Management, Indonesian College of Economics (STEI).

In Indonesia, the great natural potency of marine tourism due to geographical and ecological situations. Indonesia is the largest archipelagic state in the world with a waters area of 6.4 million km2, a long coastline of 108,000 km and 17,491 registered islands (CMMA, 2018; Irawan, 2020). Indonesia is located at a tropical region and a junction of Indian and Pacific Oceans as well as situated at the intersections of nine tectonic plates (Bird, 2003; Pasupuleti & Ramancharia, 2014). Therefore, Indonesia has various coastal and marine habitats from land to sea which are supportive for having many marine tourism destinations. Ecologically, the habitats are grounds for organisms to feed, grow and spawn or breed (Jaya et al., 2016; Huffard et al., 2012). In economic and social affairs, they become the sources of million Indonesian people's livelihoods (ADB, 2014; Estradivari et al., 2017).

Super-Priority Marine Tourism Destinations in Indonesia

President of Republic of Indonesia, Mr. Joko Widodo, has given an instruction to his cabinet to prioritize the tourism areas development on the five super-priority tourism destinations, including two terrestrial tourism destinations namely Lake Toba in North Sumatra and Borobudur Temple in Central Java as well as three marine tourism destinations namely Mandalika in West Nusa Tenggara, Labuan Bajo in East Nusa Tenggara and Likupang in North Sulawesi since July 2019.

For the development of the five super-priority destinations in 2020, the budget of approximately 10.1 trillion IDR has been allocated by the Indonesian government, the allocation of 7.56 trillion IDR from the Ministry of Public Works and Public Housing and the Ministry of Transportation at 2.5 trillion IDR (CNN Indonesia, 2019). The budget allocation for infrastructure development at the three super-priority marine tourism destinations consists of Mandalika at 2.1 trillion IDR, Labuan Bajo 979 billion IDR and Likupang 585 billion IDR (CNN Indonesia, 2019).

Marine Plastic Litter Issue at the Super-Priority Marine Tourism Destinations

Marine plastic litter is a persistent solid material which makes up most marine litter, contains polymers and fragments into micro-plastics, which are potentially hazardous to marine biota and human beings (Lachmann et al., 2017; Presidential Decree of Republic of Indonesia No. 83 of 2018 on Marine Litter Management). Marine litter is defined as any persistent solid material in the marine and coastal environment due to accidental inputs, littering, illegal dumping, and insufficient treatment capacity through drainage and sewage systems, as well as natural transport of these materials to the ocean by wind or rivers (Galgani et al., 2010; Gall & Thompson, 2015, Jambeck et al., 2015).

In order to understand the issue of marine plastic litter at the super-priority marine tourism destination, the interviews to some stakeholders in Labuan Bajo as one of the three destinations had been conducted in 2018. It is indicated that the main sources of marine plastic litter in Labuan Bajo are household waste, single-use packaging (e.g. styrofoam and water bottles) for food and drinks as well asthe use of plastic bags when shopping. In November 2020, the President again gave the directions to his cabinet during the limited meeting. However the directions not only for accelerating the development of super-priority tourism destinations includes the aspects of accessibility, infrastructure, events, promotion and human resources but also for addressing the litter especially plastics on the super-priority tourism destinations.

Image 1. Trash polluting beach in Labuan Bajo, Flores, Indonesia. Source : paulkennedy.photoshelter.com

Potential Impacts of Marine Plastic Litter at the Super-Priority Marine Tourism Destinations

The potential impacts of marine plastic litter on the super-priority marine tourism include on the ecological, social and economic aspects.

Ecological Impacts

The potential ecological impacts of marine plastic litter consist of marine habitat damage, ingestion of plastic by animals, marine biota entanglement, provision of transport substrate for marine organisms and global warming. Studies have reported that plastic litters in the marine environment can damage many habitats, for instance, coral reefs, mangroves, seagrasses and sandy beaches. Lamb et al. (2018) indicate that exposure to plastic intensifies the risk of diseases in corals from 4% to 89%. This is supported by researches that found corals ingest micro-plastics in the seawaters (Ter Halle et al., 2016; Allen et al., 2017). At the Goiana Estuary, Brazil and Mumbai, India, plastic litters entering the mangrove creeks get entangled among the roots and retained for long periods, in result, blocking the tidal flow, contaminating the feeding sites of many animals and disrupting the larval development of associated fauna (Ivar do Sul et al., 2014; Kantharajan et al., 2018). Uhrin et al. (2014) explain that plastic litter can damage seagrasses by breaking and corroding stems or denuding whole parts of seagrass beds. Amounts of plastic litter found on sandy beaches affect the physical properties alterations (i.e. increased permeability and lowered subsurface temperature) of sediments at Hawaiian beaches which lead to the changes of beach biota community structure (Carson et al., 2011).

Ingestion of plastic litter may be accidental, intentional or indirect (from lower trophic organisms that have ingested plastic) by seabirds and marine biota ranging in size from microorganism (such as planktonic invertebrates and corals) to megafauna (such as marine mammals and sea turtles) (Law et al., 2017; Allen et al., 2017). Chemical signature (odors) of plastic particles in the sea can induce foraging behavior in anchovy schools (Savoca et al., 2017) and procellariform seabirds (Savoca et al., 2016). Entanglement refers to litter twining, constricting, ensnaring and ghost fishing a marine fauna, in particular, by ALDFG, balloons and plastic bags (Law, 2017; FAO, 2016; Wilcox et al., 2016). Some studies have identified that marine animals, for instance, grey seals (Allen et al., 2012); invertebrates, fish, seabirds (Good et al., 2010); gorgonians (Pham et al., 2013); sea turtles (Duncan et al., 2017); and whales (Meÿer et al., 2011) entangled by ALDFG. Entanglement affecting marine animals to suffer constriction, dermal wound and death (Law, 2017). He & Suuronen (2018) identified that ALDFG does not only waste valuable marine resources but also harms some of the most endangered marine species.

Several studies have identified that marine plastic litters provide substrates for marine organisms, including invertebrates and bacteria (Widmer & Hennemann, 2010; Goldstein et al., 2012, Oberbeckmann et al., 2016). Marine plastic fragments can host diverse communities and some of them are alien and infectious species (Zettler et al. 2013; Baker-Austin et al., 2013). This is because of the creation of new habitats which may drift long distances and transport invasive species and bacteria in the ocean (Barnes et al. 2009; Oberbeckmann et al., 2016). In the smaller size range, micro-plastic in seawater develops a thin biofilm that includes a diverse microbe communities which encourages the attachment of larger organisms that use chemical and/or physical properties as a signal to settle (Zardus et al. 2008; Hadfield et al. 2014).

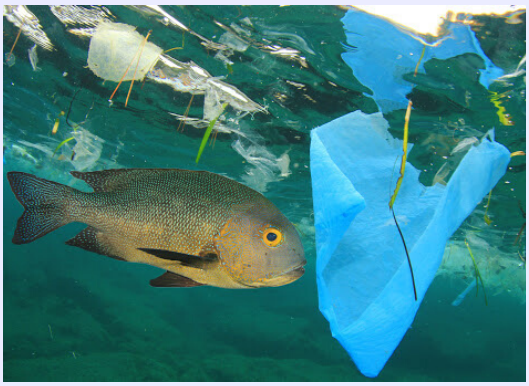

Image 2. Plastics in the Ocean
Source : savedolphins.eii.org

In addition to impacts of plastics to the environment, Royer et al. (2018) noted that plastics in seawater produce hydrocarbon gases, namely methane (CH4), ethylene (C2H4), ethane (C2H6) and propylene (C3H6). Although the production of hydrocarbon gases in air is much higher than in water, the production continues in the dark and may continue throughout the lifetime of plastic in the ocean (Royer et al., 2018). Methane is one of the most potent greenhouse gases which causes global warming (Saunois et al. 2016).

Social Impacts

The social impacts of marine plastic litter include human health and food safety reduction as well as loss of intrinsic value.

Micro-plastics are ingested by human have the potential impacts to health. Plastics contain many chemical additives and monomers such as Bisphenol-A (BPA), DBP, DEP, DEHP, HBCD, phthalates and PBDEs which are a serious risk factor for human health (Proshad et al., 2018). According to Hannon et al. (2015), the experiment to mouse indicated that Di(2ethylhexyl) phthalate has negative impacts such as oxidative stress, immune response changes, endocrine disruption, changes to the reproductive systems, hepatotoxicity and neurotoxicity (Hannon et al., 2015). Besides several health problems can be suffered by human if there are plastic particles enter body (via food and drinks) or contact to skin (via contaminated water during washing), for instance, eyes and skin irritation, respiratory problems, liver dysfunction and cancers (Proshad et al., 2018; Revel et al., 2018).

Wright & Kelly (2017) noted that plastics have contaminated seafood such as bivalves in China and mussels in Canada and Belgium with plastic types of PET, PS, PP and PE. Other studies also have identified some food commodities are contaminated by plastic, for instance, blue mussel in North Sea (Van Cauwenberghe & Jansen, 2014) and salts in China (Yang et al., 2015). Therefore, the food safety is reduced.

The loss of intrinsic value comprises people's behavior which is not responsive to a degradation of the environment (UNEP, 2016). For example, Keizer et al. (2008) noted that people are more probable to litter if the environmental setting is littered and/or if they watch someone littering easily.

Economic Impacts

Image 3. Estimation of lost tourism revenue in Geoje Island because of the large amount of marine litter on the beaches of Geoje Island in South Korea
Source : Sciencedirect.com

UNEP (2016) considers that loss of income as a social cost which directly affects individuals and communities. In the tourism sector, the presence of marine litter can discourage tourists to visit beach, which in turn leads to lost income and jobs in the tourism businesses (UNEP, 2016). For example, because of the large amount of marine litter on the beaches of Geoje Island in South Korea, following a period of heavy rainfall, the visitor number decreased from 890,435 in 2010 to 330,207 in 2011 caused the tourism revenue loss of the island was estimated to be US$29-37 million (Jang et al., 2014).

The presence of marine plastic litter has an impact on the aesthetic value of coastal tourism areas. This visual inconvenience can decrease some personal benefits from coastal environments, for instance, physical health enhancement, stress reduction and concentration improvement as well as might be a reason not to visit certain beaches (White et al. 2013). Van der Meulen et al. (2014) projected that total regional beach cleaning costs ranging between $188,735 and $2.5 million (GBP 100,000 and 1.5 million) every year in Devon and Norfolk, UK.

The National Action Plan for Marine Litter Management 2018-2025: A legal instrument for addressing marine plastic litter at the super-priority marine tourism destinations

Since September 2018, the National Action Plan for Marine Litter Management 2018-2025 has been established and promulgated. This National Action Plan is designed as an annex to the Presidential Decree Number 83 of 2018 on Marine Litter Management. The National Action Plan aims to address 70% of marine plastic litter by 2025. It contains three key aspects of interventions and five strategies of actions.

There are three key aspects of interventions have been identified on the National Action Plan, namely societal effort, technological application and institutional coordination (CMMA, 2017). The significant societal efforts are important to reduce, recycle and reuse plastic litter to be done since an early age, whereas technological interventions are necessary to control plastic litter, including the application of science-based management (CMMA, 2017).

The Presidential Decree regulates the National Action Plan should be also implemented by institutional coordination which involves human resources from various sectors and institutions. The national coordination for implementing the National Action Plan is led by a Coordinating Minister for Maritime Affairs whom assisted by a Minister for Environment and Forestry as the Person in Charge (PIC) of the National Coordinating Team. The National Coordination Team involves 14 Ministers, the Head of Maritime Security Agency and the Cabinet Secretary. The coordinating team is responsible to the Indonesian President.

The National Action Plan for Marine Litter Management 2018-2025 consists of five strategies of actions, namely
1) National Movement to raise awareness among stakeholders,
2) Land-based litter management,
3) Litter management at the sea and coasts,
4) Funding mechanism, institutional strengthening, monitoring and law enforcement, and
5) Research and development. Each strategy contains programs and goals to be implemented.

In total, this plan contains 13 programs and 56 goals of actions.

By an identification of programs and goals on the National Action Plan, there are five programs and seven goals are relevant for addressing marine plastic litter at the super-priority marine tourism destinations as shown in Table 1. Then, there are two targets and two goals which most need the technological interventions as shown in Table 2 by selecting those which are facilities, infrastructures and unit of management as the output.

Table 1. Identified relevant programs and goals to address marine plastic litter at the super-priority of marine tourism destinations

Program	Goal	Target
Strategy 2. Lane-Based Litter Management		
1. The control of plastic waste from the downstream industry sector	e. Formulation of distribution study of the plastic recycling industry to tourist destination	2 Studies
Strategy 3. Litter Management at Seas and Coasts	a. The issuance of regulation on operational standards for waste management procedures from activities in marine tourism destinations	1 Regulation of the Minister of Tourism
2. The management of plastic waste derived from activities in the marine tourism area	b. The implementation of Standards of Procedures for litter management from activities in marine tourism destinations	Implemented Standards of Procedures for litter management from activities in marine tourism destinations
	c. The availability of facilities and infrastructure for plastic waste management in the area of marine tourism destinations	Facilities and infrastucture in the 17 areas of marine tourism destination
Strategy 4. Funding mechanism, Institutional strengthening, monitoring and law enforcement	c. The establishment of a litter management unit in the area of marine tourism destinations.	Litter management units in 10 areas of national prioritized marine tourism destination
2. Strengthen institutions		
3. Effectiveness improvement of supervision and implementation of law enforcement	d. Increased adherence of local governments, managers and communities in maintaining the cleanliness of marine tourism destination	Rewards and punishment in the areas of national prioritized marine tourism destination
Strategy 5. Research and development		
1. Encouragement of management innovation and overcome waste pollution at sea through research and developtment	a. The studies of the distribution of the plastic recycling industry to tourism destinations	2 studies

Table 2. Selected programs and goals which most need technological interventions

Program	Goal	Target
Strategy 3. Litter Management at Seas and Coasts		
2. The Management of plastic waste derived from activities in the marine tourism area	c. The availability of facilities and infrastructure for plastic litter management in the area of marine tourism destinations	Facilities and infrastructure in the 17 areas of marine tourism destination
Strategy 4. Funding mechanism, Institutional strengthening, monitoring and law enforcement	c. The establishment of a litter management unit in the area of marine tourism destinations	Litter management units in 10 areas of national prioritized marine tourism destination
2. Strengthen institutions		

Technological Interventions for Addressing Marine Plastic Litter at the Super-Priority Marine Tourism Destinations

According to the National Action Plan, technological intervention is one of key aspects for addressing marine plastic litter. Technology is needed to increase the efficiency, productivity and competitiveness in managing marine plastic litter. By an identification of technological interventions around the world and Indonesia for addressing marine plastic litter, there are 19 kinds of technological interventions as shown in Table 3.

Table 3. Identified technological interventions around the world and in Indonesia

No	Technological Intervention	Global	Indonesia
	To raise awareness among stakeholders		
1	Educating through websites and social networks	V	V
2	Digital literature usage to provide information related to marine plastic litter	V	V
3	Mobile applications, electronic games and boards games on marine plastic litter	V	V
	To address land-based plastic litter		
1	Application on information technologyin collecting plastic litter from the urban	V	V
2	Robotic technology to collect plastic litter in the river	V	V
3	Eco-bricks	V	V
4	Conversion of plastic litter into fuel	V	V
5	Conversion of plastic litter into electricity	V	V
6	Conversion of plastic litter into road construction materials	V	V
7	Conversion of plastic litter into public transportation tickets	V	X
8	Production of bio-based and biodegredable plastics	V	V
9	Production of food containers and fashion products made from recycled plastic litter	V	V
10	Provision of water dispenser in public places	V	V
	To address plastic litter at seas and coasts		
1	Modified vehicles to collect plastic litter on beaches	V	V
2	Autonomous plastic litter collection at seas	V	V
3	Incineration of plastic litter on-board ships	V	V
4	Fishing gear marking	V	V
5	Microbes enzym	V	V
6	Ship recycling	V	V

Then, through a selection by scoring the technological interventions toward five criteria as follows:

1. Can be applied in coastal areas,
2. Increasing the income of coastal communities in the form of souvenirs and gifts,
3. Needed and used widely both by local people and tourists,
4. Have a direct impact in reducing the amount of plastic litter, and
5. Linkages with any target of National Action Plan, there are 12 kinds of technological interventions for addressing marine plastic litter at the super-priority marine tourism destinations as shown in Table 4.

Table 4. Selected most appropriate technological interventions to be implemented in marine tourism destinations

Program	Goal	Technological Interventions	
		Priority I	**Priority II**
Strategy 3. Litter Management at Seas and Coasts The Management of plastic waste derived from activities in the marine tourism area	c. The availability of facilities and infrastructure for plastic litter management in the area of marine tourism destinations	● Conversion of plastic litter into public transportation tickets ● Conversion of plastic litter into fuel ● Production of bio-based and biodegredable plastic ● Production of food containers and fashion products made from recycled plastic litter ● Provision of water dispenser in public places ● Modified vehicles to collect plastic litter on beaches	
Strategy 4. Funding mechanism, Institutional strengthening, monitoring and law enforcement Strengthen institutions	c. The establishment of a litter management unit in the area of marine tourism destinations	● Educating through websites and social networks ● Eco-bricks (trainer) ● Conversion of plastic litter into electricity (collector and porter) ● Conversion of plastic litter into road construction materials (collector and porter) ● Provision of water dispenser in public places ● Modified vehicles to collect plastic litter on beaches	● Digital literature usage to provide information related to marine plastic litter ● Mobile applications, electronic games and board games on marine plastic litter

CONCLUSION

Indonesia recently is developing three super-priority marine tourism destinations, namely Labuan Bajo, Mandalika and Likupang in order to increase the national income and make the multiplier economic effects. However, these marine tourism destinations are facing the issue of marine plastic litter which has the potential impacts to the ecological, social and economic aspects. Therefore, the solutions which are efficient, productive and competitive in managing marine plastic litter are needed, for instance through technological interventions as mentioned as one of key aspects on the National Action Plan for Marine Litter Management 2018-2025.

Nowadays, many countries have been making some efforts to address marine plastic litter with technological interventions. Some researches indicate that technological interventions are able to solve the problems of marine plastic litter. By identification and selection process of programs and goals on the National Action Plan and the technological interventions around the world and in Indonesia, there are 12 kinds of technological interventions for addressing marine plastic litter at the super-priority marine tourism destinations.

There are some recommendations to improve the technological interventions in supporting the implementation of the National Action Plan for addressing marine plastic litter at the super-priority marine tourism destinations as follows:

1. Conducting the development and researches on the ability of technological interventions to handle or process marine plastic litter based on the types of plastic.
2. Conducting the field studies on mapping the technological interventions on the specific location based on the available resources and plastic litter.
3. Strengthening the intergovernmental cooperation in the formulation of policies and regulations related to marine plastic litter in the region.
4. The problem solving of marine plastic waste is necessary to use a multiple approach, in particular, the economic, social, cultural and environmental aspects.
5. In order to ensure technological interventions will be sustainable for addressing marine plastic litter at the super-priority marine tourism destinations, the aspects of sustainable tourism and international partnerships are also recommended to be considered by Indonesian government and related stakeholders.

References

ADB. (2014). Economics of fisheries and aquaculture in the coral triangle. Mandaluyong: Asian Development Bank.

Allen, A. S., Seymour, A. C., & Rittschof, D. (2017). Chemoreception drives plastic consumption in a hard coral. Marine Pollution Bulletin, 124(1), 198–205.

Allen, R., Jarvis, D., Sayer, S., & Mills, C. (2012). Entanglement of grey seals Halichoerus grypus at a haul out site in Cornwall, UK. Marine Pollution Bulletin, 64(12), 2815–2819.

Asadi, M. A. & Andrimida, A. (2017). Economic valuation of coral reefs ecosystem of Bangsring, Banyuwangi, Indonesia. Economic and Social of Fisheries and Marine Journal, 4(2), 144-152.

Baker-Austin, C., Trinanes J. A, Taylor, N. G. H., Hartnell, R., Siitonen, A., & Martinez-Urtaza, J. (2013). Emerging Vibrio risk at high latitudes in response to ocean warming. Nature Climate Change, 3(1), 73-77.

Barnes, D. K. A., Galgani, F., Thompson, R. C., & Barlaz, M. (2009). Accumulation and fragmentation of plastic debris in global environments. Philosophical Transactions of the Royal Society B: Biological Sciences, 364(1526), 1985–1998.

Bird, P. (2003). An updated digital model of plate boundaries. Geochemistry, Geophysics, Geosystems, 4(3), 1027, doi:10.1029/2001GC000252

Carson, H. S., Colbert, S. L., Kaylor, M. J., & McDermid, K. J. (2011). Small plastic debris changes water movement and heat transfer through beach sediments. Marine Pollution Bulletin, 62(8), 1708–1713.

CMMA. (2017). Executive summary: Indonesia's Plan of Action on Marine Plastic Debris 2017-2025. Jakarta, Indonesia: Coordinating Ministry for Maritime Affairs.

CMMA. (2018). Coordinating Minister for Maritime Affairs launches Indonesian marine area reference data. Retrieved from https://maritim.go.id/menko-maritim-luncurkan-data-rujukan-wilayah-kelautan-indonesia/

CNN Indonesia. (2017). The development budget 'New Bali' rose almost fivefold. Retrieved from https://www.cnnindonesia.com/ekonomi/20191026183022-92-443143/anggaran-pembangunan-bali-baru-naik-nyaris-5-kali-lipat.

Duncan, E. M., Botterelli, Z. L. R., Broderick, A. C., Galloway, T. S., Lindeque, P. K., . . .Godley, B. J. (2017). A global review of marine turtle entanglement in anthropogenic debris: a baseline for further action. Endangered Species Research, 34, 431-446.

Estradivari, Handayani, C., Firmansyah, F., Yusuf M., & Santiadji, V. (2017). Marine conservation area: smart investment for protecting marine biodiversity and developing fisheries of Indonesia. Jakarta: WWF. FAO. 2016. Abandoned, lost or otherwise discarded gillnets and trammel nets: methods to estimate ghost fishing mortality, and the status of regional monitoring and management, by Eric Gilman, Francis Chopin, Petri Suuronen and Blaise Kuemlangan. FAO Fisheries and Aquaculture Technical Paper No. 600. Rome, Italy: FAO.

Fahrudin, A. (2015). Indonesian ocean economy and ocean health. Retrieved from http://eascongress.pemsea.org/sites/default/files/file_attach/PPT-S3W3-03-AchmadFahrudin.pdf.

Galgani, F., Fleet, D. J., Katsanevakis, S., Maes, T. J., Oosterbaan, M. L., Poitou, G. I., . . . Janssen, C. (2010). Marine strategy framework directive: task group 10 report marine litter (Report No. EUR 24340 EN – 2010). Retrieved from http://ec.europa.eu/environment/marine/pdf/9-Task-Group-10.pdf

Gall, S. C., & Thompson, R. C. (2015). The impact of debris on marine life. Marine Pollution Bulletin, 92(1-2), 170–179.

Goldstein, M. C., Rosenberg, M., & Cheng, L. (2012). Increased oceanic microplastic debris enhances oviposition in an endemic pelagic insect. Biology Letters, 8(5), 817–820.

Good, T. P., June J. A., Etnier M. A., & Broadhurst, G. (2010). Derelict fishing nets in Puget Sound and the Northwest Straits: patterns and threats to marine fauna. Marine Pollution Bulletin, 60, 39–50.

Hadfield, M. G., Nedved, B. T., Wilbur, S., & Koehl, M. A. R. (2014). Biofilm cue for larval settlement in Hydroides elegans (Polychaeta): is contact necessary? Marine Biology, 161(11), 2577-2587.

Hannon, P. R., Brannick, K. E., Wang, W., Gupta, R. K., & Flaws, J. A. (2015). Di(2-ethylhexyl) phthalate inhibits antral follicle growth, induces atresia, and inhibits steroid hormone production in cultured mouse antral follicles. Toxicology and Applied Pharmacology, 284(1), 42–53.

He, P., & Suuronen, P. (2018). Technologies for the marking of fishing gear to identify gear components entangled on marine animals and to reduce abandoned, lost or otherwise discarded fishing gear. Marine Pollution Bulletin, 129, 253-261.

Huffard, C. L., Erdmann, M. V., Gunawan, T. (Eds.). (2012). Geographic priorities for marine biodiversity conservation in Indonesia. Jakarta: MMAF and MPAG.

Irawan, F. (2020). Until December 2019, Indonesia has 17,491 islands. Retrieved from https://economy.okezone.com/read/2020/02/10/470/2166263/hingga-desember-2019-indonesia-miliki-17-491pulau

Ivar do Sul, J. A., Costa, M. F., Silva-Cavalcanti, J. S., & Araújo, M. C. B. (2014). Plastic debris retention and exportation by a mangrove forest patch. Marine Pollution Bulletin, 78(1-2), 252–257.

Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., . . . & Law, K. L. (2015). Plastic waste inputs from land into the ocean. Science, 347(6223), 768-770.

Jang, Y. C., Hong, S., Lee, J., Lee, M. J., & Shim, W. J. (2014). Estimation of lost tourism revenue in Geoje Island from the 2011 marine debris pollution event in South Korea. Marine Pollution Bulletin, 81(1), 49–54.

Jaya, I., Kawaroe, M., Retnoningtyas, H., Nugraha, A. H., & Kusumah, B. R. (2016). Maritime literacy. Bogor: IPB Press. Kantharajan, G., Pandey, P. K., Krishnan, P., Bharti, V. S., & Samuel, D. (2018). Plastics: a menace to the mangrove ecosystems of megacity Mumbai, India. ISME/GLOMIS Electronic Journal, 16(1), 1-5.

Keizer, K., Lindenberg, S., & Steg, L. (2008). The spreading of disorder. Science, 322(5908), 1681-1685.

Lachmann, F., Almroth, B. C., Baumann, H., Broström, G., Corvellec, H., Gipperth, L., . . . Nilsson, P. (2017). Marine plastic litter on Small Island Developing States (SIDS): impacts and measures (Report No. 2017:4, Swedish Institute for the Marine Environment). Retrieved from http://havsmiljoinstitutet.se/ digitalAssets/ 1641/1641336_sime-2017-4-marine-plastic-litter.pdf

Lamb, J. B., Willis, B. S., Fiorenza, E. A., Couch, C. S., Howard, R., Rader, D. N., ... Harvel, C. D. (2018). Plastic waste associated with disease on coral reefs. Science, 359, 460-462.

Law, K. L. (2017). Plastics in the marine environment. Annual Review of Marine Science, 9, 205-229.

Meÿer, M., Best, P., Anderson-Reade, M., Cliff, G., Dudley, S., & Kirkman, S. (2011). Trends and interventions in large whale entanglement along the South African coast. African Journal of Marine Science, 33(3), 429–439.

Oberbeckmann, S., Osborn, A. M., & Duhaime, M. B. (2016). Microbes on a Bottle: Substrate, Season and Geography Influence Community Composition of Microbes Colonizing Marine Plastic Debris. PLOS ONE, 11(8), e0159289.

Pasupuleti, V. D. K., & Ramancharia, P. K. (2014). Interactions and seismicity of Indian tectonic plate with its neighboring plates: An overview. International Journal of Advanced Earth Science and Engineering, 3(1), 151-170.

Pham, C. K., Gomes-Pereira, J. N., Isidro, E. J., Santos, R. S., & Morato, T. (2013). Abundance of litter on Condor seamount (Azores, Portugal, Northeast Atlantic). Deep Sea Research Part II: Topical Studies in Oceanography, 98, 204–208.

Proshad, R., Kormoker, T., Islam, Md, S., Haque, M. A., Rahman, Md., M., & Mithu, Md., M., R. (2018). Toxic effects of plastic on human health and environment: a consequences of health risk assessment in Bangladesh. International Journal of Health, 6(1), 1-5.

Revel, M., Châtel, A., & Mouneyrac, C. (2018). Micro(nano)plastics: A threat to human health? current opinion. Environmental Science & Health, 1, 17–23. Rough Guides. (2020). The most beautiful countries in the world – as voted by you. Retrieved from https://www.roughguides.com/gallery/most-beautiful-country-in-the-world/.

Royer, S. J., Ferrón, S., Wilson, S. T., & Karl, D. M. (2018). Production of methane and ethylene from plastic in the environment. PLOS ONE, 13(8), e0200574.

Saunois, M., Jackson, R. B., Bousquet, P., Poulter, B., Canadell, J.G. (2016). The growing role of methane in anthropogenic climate change. Environ Res Lett, 11, 1–5.

Savoca, M. S., Tyson, C. W., McGill, M., & Slager, C. J. (2017). Odours from marine plastic debris induce food search behaviours in a forage fish. Proceedings of the Royal Society B: Biological Sciences, 284(1860), 20171000.

Savoca, M. S., Wohlfeil, M. E., Ebeler, S. E., & Nevitt, G. A. (2016). Marine plastic debris emits a keystone infochemical for olfactory foraging seabirds. Science Advances, 2(11), e1600395–e1600395.

Siregar, B. P. (2019). Tourists visit up, tourism foreign exchange touches US $ 19.29 Billion. Retrieved from https://www.wartaekonomi.co.id/read242266/kunjungan-wisman-naik-devisa-pariwisata-sentuh-us1929-miliar.html.

Ter Halle, A., Ladirat, L., Gendre, X., Goudouneche, D., Pusineri, C., Routaboul, C., … Perez, E. (2016). Understanding the fragmentation pattern of marine plastic debris. Environmental Science & Technology, 50(11), 5668–5675.

Triyono. (2013). The economic assessment and carrying capacity of Pari Island marine tourism in Thousand Islands of DKI Jakarta Province (Master's Dissertation). Retrieved from http://file.pksdmo.lipi.go.id/id062-cb5e9-2650_311.pdf.

Uhrin, A. V., Matthews, T. R., & Lewis, C. (2014). Lobster trap debris in the Florida keys national marine sanctuary: distribution, abundance, density, and patterns of accumulation. Marine and Coastal Fisheries, 6(1), 20–32.

UNEP and GRID-Arendal. (2016). Marine litter vital graphics. Nairobi, Kenya and Arendal, Norway: United Nations Environment Programme. Van Cauwenberghe, L., & Janssen, C. R. (2014). Microplastics in bivalves cultured for human consumption. Environmental Pollution, 193, 65–70.

Van der Meulen, M. D., Devriese, L., Lee, J., Maes, T., Van Dalfsen, J. A., Huvet, A., Soudant, P., Robbens, J., Vethaak, A. D. (2014). Socio-economic impact of microplastics in the 2 seas, Channel and France Manche region: an initial risk assessment. Retrieved from https://www.ilvo.vlaanderen.be/Portals/74/Documents/Socioeconomic_impact_microplastics_2Seas_and_FranceMancheRegion.pdf

White, M. P., Pahl, S., Ashbullby, K., Herbert, S., & Depledge, M. H. (2013). Feelings of restoration from recent nature visits. Journal of Environmental Psychology, 35, 40-51.

Widmer, W. M., & Hennemann, M. C. (2010). Marine debris in the Island of Santa Catarina, South Brazil: spatial patterns, composition, and biological aspects. Journal of Coastal Research, 26, 993–1000.

Wilcox, C., Mallos, N. J., Leonard, G. H., Rodriguez, A., & Hardesty, B. D. (2016). Using expert elicitation to estimate the impacts of plastic pollution on marine wildlife. Marine Policy, 65, 107–114.

Wright, S. L., & Kelly, F. J. (2017). Plastic and human health: a micro issue? Environmental Science & Technology, 51(12), 6634–6647.

WTTC. (2017). Travel & tourism economic impact 2017: Indonesia. Retrieved from https://www.wttc.org/-/media/files/reports/economic-impact-research/countries-2017/ indonesia2017.pdf

WTTC. (2018). Travel & tourism economic impact 2018: Indonesia. Retreived from https://www.wttc.org/-/media/files/reports/economic-impact-research/countries-2018/indonesia2018.pdf

Yang, D., Shi, H., Li, L., Li, J., Jabeen, K., & Kolandhasamy, P. (2015). Microplastic pollution in table salts from China. Environmental Science & Technology, 49(22), 13622–13627.

Zardus, J. D., B. T. Nedved, Y. Huang, C. Tran and M. G. Hadfield (2008). Microbial biofilms facilitate adhesion in biofouling invertebrates. Biological Bulletin, 214(1), 91-98.

Zettler, E. R., Mincer, T. J., & Amaral-Zettler, L. A. (2013). Life in the “Plastisphere”: Microbial Communities on Plastic Marine Debris. Environmental Science & Technology, 47(13), 7137–7146.

Benefits and challenges of Indonesia's palm oil sector

By Veeramalla Anjaiah*

Palm oil, or 'the poor man's friend', is Indonesia's strategic commodity, a major ingredient used by big industries and a provider of millions of jobs. Palm oil, an edible vegetable oil that comes from the pulp of the palm tree fruit, is a super product that is abundant in Indonesia. It is not an exaggeration to say that we cannot live a single day without using palm oil. According to the Life Science website, palm oil is in everything [1]. The International Union for Conservation of Nature (IUCN) claims that you will find palm oil in 50 percent of all packaged items in your supermarket, ranging from cooking oil to cosmetics [2]. Now we are using palm oil as biofuel for our cars and power plants. According to Life Science, China, India and Indonesia, whose combined population totals to almost 3 billion people, contribute to 40 percent of global palm oil consumption. Every household in these three countries use palm oil as cooking oil. At the same time, according to the World Wildlife Fund (WWF), palm oil produces 35 percent of all global vegetable oil on less than 10 percent of the land allocated to oil producing crops [4]. Globally, more than four billion people use palm oil or its derivatives every day, both directly and indirectly.

History of palm oil

A few years back, one Belgian diplomat told this author that a Belgium company was the first to have brought palm trees, whose scientific name is Elaeis guineensis, and seeds to Sumatra Island from Africa in the 19th century. In the beginning, palm trees were brought to Southeast Asia as ornamental trees. Many people say that the palm tree, which originated from West Africa, has spread to all corners of the globe. Today, more than 40 countries, including Indonesia and Malaysia, produce palm oil. Indonesia and Malaysia produce 85 percent of the world's palm oil. According to the WWF, there are two types of palm oil. One is crude palm oil (CPO), which comes from squeezing the fleshy palm fruit, and the other is palm kernel oil (PKO), which comes from crushing the kernel, or the stone in the middle of the fruit [5].

***Veeramalla Anjaiah** is a senior journalist living in Jakarta. He received his M,Phil degree from Centre for South, Central, Southeast Asian and Southwest Pacific studies of the Jawaharlal Nehru University in New Delhi, India.

Benefits of palm oil

Many scientific studies by renowned research institutions have found that palm oil has high nutritional value. "Palm oil contains Vitamins A and E. It is one of the richest sources of antioxidants, such as carotenoids, tocopherols and tocotrienols, and is free of cholesterol and trans fatty acids," said Dr. Ahmad Parveez Ghulam Kadir, the director-general of the Malaysia Palm Oil Board, in his latest article in the New Straits Times [6].

Palm oil plantations need less land, and they have the highest yield per hectare compared to other oil-producing crops like rapeseed, soybean oil, sunflower and coconut oil. They need less energy, fertilizers and pesticides to produce palm fruits. That is why palm oil is 'the poor man's friend'. "Palm oil is known as the most efficient oil crop in terms of production and, therefore, offers a very competitive price in the global oils and fats market," Kadir said [7]. Indonesia grows palm trees on around 13 million hectares of land. The palm oil industry, according to the Indonesian Palm Oil Association (GAPKI), provides employment to around six million people and another 45 million people are dependent on the industry in Indonesia [8]. The following table shows the growth of the industry from 2008 to 2016:

Indonesian Palm Oil Production and Export Statistics (2008-2016) :

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Production (million tons)	19.2	19.4	21.8	23.5	26.5	30.0	31.5	32.5	32.0
Export (million tons)	15.1	17.1	17.1	17.6	18.2	22.4	21.7	26.4	27.0
Export (in USD billion)	15.6	10.0	16.4	20.2	21.6	20.6	21.1	18.6	18.6

Sources: Indonesian Palm Oil Producers Association (Gapki) & Indonesian Ministry of Agriculture

There has been an upsurge in Indonesia's palm oil production and volume of exports during the last three years, but the value of exports varied from year to year due to price and demand fluctuations during the same period. The following table shows a clear picture of the trend:

Indonesian Palm Oil Production and Export Statistics (2017-2019):

	2017	2018	2019
Production (million tons)	41.22	47.38	51.82
Export (million tons)	26.97	34.71	36.18
Export (in USD billion)	20.34	23.0	19.0

Sources: Indonesian Palm Oil Producers Association (Gapki) & Indonesian Ministry of Agriculture Note: Production includes both CPO and PKO

Indonesia controls more than 50 percent of the global palm oil market and exports more than 70 percent of its total palm oil output. During the last 10 years, palm oil production in Indonesia has more than doubled. It produced 19.4 million tons of palm oil in 2009, and it jumped to 51.82 million tons in 2019.

Presently, crude palm oil is used in the production of B30 biofuel with 30 percent of biomaterials. This will be increased to 40 percent this year and 50 percent in the year after. According to Indonesia's Energy and Mineral Resources Ministry, Indonesia has the potential of producing 200,000 barrels of biodiesel using palm oil [9].

Dangers of palm oil industry

Though palm oil has many benefits, it also creates many problems. Many nongovernmental organizations and countries in Europe raised their concerns against the rapid increase in palm oil production. Their concerns mainly focused on trees, animals, human beings and climate change. According to a study conducted by the Scientific Reports journal, industrial palm oil plantations have destroyed 56 percent of the forests on Borneo Island, including provinces in Indonesia's Kalimantan Island, since 2005 [10]. As a result of palm oil plantations in the Sumatra and Kalimantan islands, the WWF reported that the biodiversity in the affected forests has been gravely disturbed, and many endangered species like the orangutan, pygmy elephant and Sumatran rhino are facing extinction [11]. According to the IUCN Red List of Threatened Species, the palm oil farming and industry threatens the habitat of 193 species, including those that are endangered [12].

Image 4. Palm oil industry
Source : independent.co.uk

Forest burning, which normally occurs on peatlands, produce millions of tons of greenhouse gases, such as carbon dioxide and methane. These gases are then emitted into the atmosphere and contribute to climate change. Palm oil producers also contribute to pollution by throwing industrial waste into rivers, lakes and ponds. The Nature Climate Change journal recently published the results of a study on the pollution created by palm oil refineries [13]. According to this study, the methane produced by a single pond of palm refinery wastewater has the same annual climate impact as 22,000 cars. The WWF further says that many greedy palm oil companies exploit child workers and women [14].

There is certainly truth in these allegations but not on the scale the groups and countries allege. There has also been some bias against Indonesia's palm oil industry. Most of the allegations come from lobby groups from other vegetable oil producers. They feel that they cannot compete with the clean, highly efficient and cheap palm oil. They are encouraging NGOs and European countries to boycott palm oil and its derivatives.

The European Union (EU) says that palm oil farming destroys forests as farmers convert forests into land using the slash and burn method, creating forest fires and environmental disasters. Hence, the EU decided to impose 8 to 18 percent of tariffs on Indonesian palm oil.

Indonesia says that lobby groups of European producers of rapeseed, sunflower, soya, corn and other commodities who cannot compete with palm oil in terms of quality, efficiency and price, put forward fake information, rumours and deforestation issues to restrict Indonesian palm oil from entering the EU. Indonesia says that it cares about its forests more than the EU does and has strict regulations about sustainable palm oil production. Indonesia wants fair treatment. It took the EU to the World Trade Organization (WTO) for unequal treatment in market access.

Palm oil industry's challenges

Despite the huge benefits, Indonesia's palm oil industry has been facing a number of challenges. It is clear that there is no alternative to palm oil given its easy availability, high quality, efficiency, durability and cheap price. So how can we solve the environmental problems created by palm oil production? In 2004, all the stakeholders of the palm oil industry established an independent non-profit organization called Roundtable on Sustainable Palm Oil (RSPO) with an objective to develop and implement global standards to produce palm oil in a sustainable way. The RSPO currently has 4,706 members from 94 countries, including both Indonesia and Malaysia [14]. The RSPO has taken several measures to protect the interests of people, animals and the environment. It says on its website: "The RSPO has developed a set of environmental and social criteria which companies must comply with in order to produce Certified Sustainable Palm Oil (CSPO). When they are properly applied, these criteria can help to minimize the negative impact of palm oil cultivation on the environment and communities in palm oil-producing regions." [15].

Unfortunately, as of 2020, only 20 percent of the world's palm oil is produced in a sustainable way and in accordance to RSPO standards. Indonesia, as the world's biggest producer of palm oil, has been struggling to achieve RSPO standards in palm oil production. But Malaysia claims it is on track to achieve RSPO standards. "We are well on track to achieve 100 percent Malaysian Sustainable Palm Oil (MSPO) certification. As of last month, 4.68 million hectares, or 79.4 percent, of the 5.9 million hectares of oil palm plantations in Malaysia have attained the MSPO certification while 399 of the 452 palm oil mills have obtained it," says Kadir [16].

Image 5. Palm oil seed
Source : nationalgeographic.com

Kadin wrote an article in the New Straits Times on April 15 titled "There's no palm oil alternative" in reference to synthetic palm oil [17]. According to Kadir, a New York-based start-up company uses microbes to convert food waste and industrial by-products into synthetic palm oil through a fermentation process. The company received a US$20 million investment from Bill Gates' Breakthrough Energy Ventures Fund to produce synthetic palm oil as an alternative to natural palm oil. The company claims that it developed the new product to reduce deforestation created by the production of natural palm oil. But is synthetic palm oil a good alternative to natural palm oil?

Kadir believes that the new product lacks originality and does not have any nutritional value, unlike natural palm oil. It is also a fact that natural palm oil is efficient and cheap. None of the other vegetable oil crops are in a position to replace natural palm oil. Import duties, restrictions and market access will have a big impact on the price of palm oil. These problems, along with price fluctuations and fluctuations in the value of the US dollar, are the biggest challenges for producers and farmers.

Conclusion

Palm oil is a super product that brings billions of dollars to the coffers of Indonesia and provides bread and butter to millions of people. It provides cooking oil with nutritional value at the lowest cost to billions of people. That is why palm oil is 'a poor man's friend'. Big companies that produce packaged goods love palm oil as an efficient, high quality and cheap ingredient. Palm oil uses minimal land and less energy, fertilizers and pesticides. Palm oil is also becoming a major source of renewable energy. Biodiesel will reduce energy imports and save billions of dollars for Indonesia.

Image 6. Palm oil industry in indonesia
Source : korindo.co.id

Indonesia's palm oil industry faces big challenges and attacks from several sides. The issues of deforestation, endangered species, carbon emissions and river pollution are the main weapons of anti-palm oil groups. EU members are showing discrimination by restricting market access to Indonesian palm oil. The Indonesian government, palm oil producers, farmers, officials, activists, police and military must implement strict measures to prevent deforestation and forest fires as well as to save our environment and biodiversity. Indonesia must produce palm oil in a sustainable way by following RSPO global standards.

References

1. Grace Browne "What is palm oil", April 2, 2020, www.lifescience.com
2. See https://www.iucn.org/
3. Grace Browne "What is palm oil", Apri 2, 2020, www.lifescience.com
4. See https://www.wwf.id/
5 .Ibid
6. Ahmed Parveez Ghulam Kadir, "There's no palm oil alternative", April 15, 2020, New Straits Times.
7. Ibid
8. See https://gapki.id/
9. See https://www.esdm.go.id/
10. See https://www.nature.com/articles/s41467-020-14852-6
11. See https://www.wwf.id/
12. See https://www.iucnredlist.org/
13. See https://www.nature.com/articles/s41467-020-14852-6
14.See https://rspo.org/
15. Ibid
16. Ahmed Parveez Ghulam Kadir, "There's no palm oil alternative", April 15, 2020, New Straits Times.
17. Ibid

OUR READERS

ASEAN Secretariat – UNIDO – UNDP – FAO – KOICA- USAID – JICA – DANIDA – World Bank – CARI- GIZ - FES – UN Indonesia – UNODC- British Council– Hans Siedel Foundation- UN Information Centre - Asia Foundation - Permanent Representative of Indonesia to ASEAN- Permanent Representative of Malaysia to ASEAN - Permanent Representative of Thailand to ASEAN - Permanent Representative of Singapore to ASEAN - Permanent Representative of Vietnam to ASEAN - Permanent Representative of Myanmar to ASEAN - Permanent Representative of Brunei Darussalam to ASEAN - Permanent Representative of Cambodia to ASEAN - Permanent Representative of Laos to ASEAN - Permanent Representative of Phillipine to ASEAN – US Embassy – Embassy of Japan- Australian Mission to ASEAN – Embassy of India – Embassy of France – Germany Embassy – Canada Embassy- Embassy of Denmark – British Embassy- Embassy of Finland- Embassy of Slovak – Netherland Embassy – Russia Federation Embassy- Sweden Embassy- Norway Embassy – Switzerland Embassy – Austia Embassy- Mission of India to ASEAN- Embassy of the Republic of Turkey – Embassy of Myanmar- The Royal Thai Embassy – Mission of Japan to ASEAN- USA Mission to ASEAN- TETO – Embassy of Italy - Cambodia Embassy – Vietnam Embassy – Belgia Embassy – New Zealand Mission to ASEAN – Embassy of Spain _ Brazil Embassy – Phillipine Embassy – European Mission to ASEAN – Canada Mission to ASEAN- Korea Mission to ASEAN- Mexican Embassy- Coordinating Minister of Political, Legal, and Security Affairs of the Republic of Indonesia – Coordinating Minister of Economi Affairs of the Republic of Indonesia – Coordinating Minister of Maritime Affairs of the Republic of Indonesia - Coordinating Minister of Human Development and Culture of the Republic of Indonesia - Ministry of Defence of the Republic of Indoneia- Ministry of Trade of the Republic of Indonesia- Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia- Ministry of Foreign Affairs of the Republic of Indonesia – Ministry of Defense of the Republic of Indonesia – Ministry of Law and Human Rights of the Republic of Indonesia – Ministry of Energi and Mineral Resources of the Republic of Indonesia – Ministry of Agriculture of the Republic of Indonesia – Ministry of Environment and Foresty of the Republic of Indonesia – Ministry of Manpower of the Republic of Indonesia – Ministry of Public Works and Public Housing of the Republic of Indonesia - Ministry of Cooperation and Small and Medium Enterprises.

CSEAS
Center for Southeast Asian Studies

Address : Jl. Ir. H. Juanda No. 50 Ciputat,
Tangerang Selatan, Banten 15412
INDONESIA

Phone : (+62-21) 7418835 / 7415969
Fax : (+62-21) 74706845
Email : cseas.information@gmail.com

9 772580 113005