



# THE APCEL GUIDE TO SINGAPORE AND ASEAN ENVIRONMENTAL LAW

## POLLUTION CONTROL

The APCEL Guide to Singapore and ASEAN Environmental Law is a multi-year research project that commenced in late 2017. It aims to publish a series of annotated bibliographies on important areas of environmental law in Singapore and ASEAN over the next five years. Each annotated bibliography represents the latest overview of the secondary and primary literature to date, and will be updated annually. Please cite as Bea Jian Wei Eric, Mandy Meng Fang, Jamie Lee Ying Feng & Tan Zhi Rui, APCEL Guide to Singapore and ASEAN Environmental Law: Pollution (APCEL, Singapore, 2019).

**Authors: Bea Jian Wei Eric, Mandy Meng Fang, Jamie Lee Ying Feng, Tan Zhi Rui**

**Mr. Bea is a Research Assistant at APCEL, NUS Law. Dr Fang is a Post-Doctoral Fellow at APCEL, NUS Law. Ms. Lee is a student in the Double Degree Programme with Law and Liberal Arts at Yale-NUS College. Ms. Tan is a NUS Law student in the LLB Programme.**

**Publication date: 30/07/2019**

## ANNOTATED BIBLIOGRAPHY:

### POLLUTION LAWS AND POLICY OF SINGAPORE AND THE ASEAN REGION

- I. INTRODUCTION
- II. COMMONLY USED ACRONYMS
- III. SINGAPORE: LEGISLATION, GOVERNMENT POLICIES AND PUBLICATIONS
  - A. LEGISLATION

#### **Environmental Protection and Management Act (Chapter 94A, Revised Edition 2002)**

The Environmental Protection and Management Act (EPMA) is the primary legislation in Singapore dealing with the issue of environmental pollution control in the areas of air, water, and noise pollution. It also establishes a licensing scheme for the importation, manufacture, and sale of hazardous substances, and the requirement for impact analysis at sites where hazardous substances are stored, handled, or used. Additionally, it provides for the general control of pollution in construction sites, as well as the appointment of environmental control officers, and the requirement for pollution control studies at construction sites.

The specific rules are made as subsidiary legislation, in the following Regulations:

- ***Environmental Protection and Management (Air Impurities) Regulations (Rg 8)***  
(For industrial air pollution - sets out maximum permissible concentration of air impurities emitted from industrial plants)
- ***Environmental Protection and Management (Boundary Noise Limits for Factory Premises) Regulations (Rg 1)***  
(For noise pollution from factories - sets out maximum permissible noise levels emitted from factories, with further restrictions on factories facing commercial, residential, or noise-sensitive places such as hospitals and schools)
- ***Environmental Protection and Management (Control of Noise At Construction Sites) Regulations (Rg 2)***  
(For noise pollution from construction sites - sets out maximum permissible noise levels emitted from construction sites, with further restrictions on factories facing residential and noise-sensitive places such as hospitals and schools, as well as no-work periods on weekends)
- ***Environmental Protection and Management (Hazardous Substances) Regulations (Rg 4)***  
(Sets out the approval procedure for the transport, or consignment for transport of any hazardous substance as listed in its Schedule, as well as import licensing and storage permit procedure for these hazardous substances)
- ***Environmental Protection and Management (Off-Road Diesel Engine Emissions) Regulations 2012 (S 299/2012)***

(Licensing of the import and use of off-road diesel engines that are industrial plants, or are installed in an industrial plant, and also sets out standards for exhaust emission for such engines)

- ***Environmental Protection and Management (Ozone Depleting Substances) Regulations (Rg 9)***  
(Prohibition of the import and export of ozone-depleting substances to and from countries which have not ratified the Montreal Protocol 1987; or the London Amendment 1990 / Copenhagen Amendment 1992)
- ***Environmental Protection and Management (Trade Effluent) Regulations (Rg 5)***  
(Provides for control over treatment and discharge of trade effluent into watercourses, or over land, and sets out the maximum permissible concentrations of certain substances in such effluent)
- ***Environmental Protection and Management (Vehicular Emissions) Regulations (Rg 6)***  
(Provides for maximum permissible exhaust and noise emissions from petrol and/or diesel motor vehicles, including motorcycles and scooters)

### **Environmental Public Health Act (Chapter 95, Revised Edition 2002)**

The Environmental Public Health Act is the primary legislation for the management of waste, including the provision of street cleaning, refuse removal for residences, businesses, and industries, and the punishment of litterbugs by corrective work orders. It is also the controlling act for the control of water purity.

- ***Environmental Public Health (Burning of Joss Sticks and Candles) Regulations (Rg 1)***  
(Provides for control of the size of joss sticks and candles which can be burned, as well as a limit of the number of joss sticks / candles which can be burned.)
- ***Environmental Public Health (Cemeteries) Regulations (Rg 9)***  
(Provides for the regulation of both private and public (National Environment Agency (NEA) -maintained) cemeteries, including their location and grave dimensions, as well as the permitting process for burial of human corpses.)
- ***Environmental Public Health (Cooling Towers and Water Fountains) Regulations (Rg 7)***  
(Provides for the regulation of cooling tower and water fountains to ensure that they do not harbour excessive bacteria and other contaminants; as well as requirement for inspection, test, and maintenance.)
- ***Environmental Public Health (Corrective Work Order) Regulations (Rg 15)***  
(Provides for the establishment of the Corrective Work Order (CWO) scheme of punishment for persons convicted of littering offences in sections 17 and 19 of the main Act, and sets out the obligations of the person serving out a CWO.)

- ***Environmental Public Health (Crematoria) Regulations (Rg 6)***  
(Provides for the regulation of both private and public (National Environment Agency (NEA) -maintained) crematoria, including the design of the crematoria, restricting its use to the cremation of human corpses and sets out the requirement that all waste water be discharged into a sewer/sewage treatment plant.)
- ***Environmental Public Health (Employment of Environmental Control Officers) Order (O 1)***  
(Provides that construction projects exceeding \$50 million requires a full-time Environmental Control Officer (ECO) on-site, and that those exceeding \$10 million but below \$50 million will require a part-time ECO. Their duties are more specifically outlined in the NEA's ***Code of Practice for Environmental Control Officers***, which is given legislative force by the ***Environmental Public Health (Registration of Environmental Control Officers) Regulations (Rg 2)***.)
- ***Environmental Public Health (General Waste Collection) Regulations (Rg 12)***  
(Provides for the licensing of waste collectors, as well as regulations on the transportation and disposal of wastes, and the cleansing and maintenance of vehicle, equipment, and facilities used for waste collection. It also lists what is considered to be "recyclable" waste in Singapore's context in the First and Fourth Schedules. Their duties are more specifically outlined in the NEA's ***Code of Practice for Licensed General Waste Collectors***.)
- ***Environmental Public Health (Public Cleansing) Regulations (Rg 3)***  
(Regulations on the provision of refuse bins, prohibition on open burning, littering, the release of noxious and offensive substances in watercourses, and the disposal of dead animals in any street, open ground, or water bodies.)
- ***Environmental Public Health (Toxic Industrial Waste) Regulations (Rg 11)***  
(Restrictions on the generation of toxic industrial wastes as listed in the Schedule, as well as regulations on the import, transport, and storage of such waste.)

### **Radiation Protection Act (Chapter 262, Revised Edition 2008)**

This Act implements the Convention of the Physical Protection of Nuclear Material in Singapore, which it acceded to in 2014. Amongst other things, it provides for legislation for the prevention of radioactive/nuclear (land) pollution through the improper disposal of radioactive waste.

- ***Radiation Protection (Ionising Radiation) Regulations (Rg 2)***  
(Provides for the licensing for the use of irradiating apparatus or to use, handle and transport radioactive materials, and regulates the storage of radioactive materials.)

- ***Radiation Protection (Non-Ionising Radiation) Regulations (Rg 1)***  
(Provides for the regulation of ultraviolet sunlamps; microwave ovens; medical and industrial ultrasound apparatus; magnetic resonance imaging (MRI) apparatus; entertainment lasers; and high power lasers.)
- ***Radiation Protection (Transport of Radioactive Materials) Regulations (Rg 3)***  
(Provides for the regulation of the transport of radioactive materials, including the marking, labelling and placarding of packages and freight containers.)

### **Transboundary Haze Pollution Act (No 24 of 2014)**

The Transboundary Haze Pollution Act is Singapore's responses to the near-annual haze in Southeast Asia. The Act makes it an offence to engage in conduct (both within and outside Singapore) which causes or contributes to haze in pollution in Singapore. Additionally, it also provides for civil liability for the same.

This Act was controversial in some quarters as it would be an extension of the jurisdiction of Singapore's civil and criminal laws to outside its territory. However, the application of the Act is based on the objective territoriality principle. This principle allows for the application of a country's law to foreign nationals who are outside the jurisdiction on the basis that the effects of that foreign person are felt in Singapore.

### **Prevention of Pollution of the Sea Act (Chapter 243, Revised Edition 1999)**

The Prevention of Pollution of the Sea Act (PPSA) implements the following International Maritime Organisation (IMO) conventions:

International Convention for the Prevention of Pollution from Ships (MARPOL 73/78), and its six Annexes:

- Annex I – Prevention of pollution by oil & oily water  
***This is implemented as subsidiary legislation under the PPSA as the Pollution of the Sea (Oil) Regulations 2006 (S 685/2006)***
- Annex II – Control of pollution by noxious liquid substances in bulk  
***This is implemented as subsidiary legislation under the PPSA as the Prevention of Pollution of the Sea (Noxious Liquid Substances in Bulk) Regulations (S 686/2006)***
- Annex III – Prevention of pollution by harmful substances carried by sea in packaged form
- Annex IV – Pollution by sewage from ships  
***This is implemented as subsidiary legislation under the PPSA as the Prevention of Pollution of the Sea (Sewage) Regulations 2005 (S 135/2005)***
- Annex V – Pollution by garbage from ships

***This is implemented as subsidiary legislation under the PPSA as the Prevention of Pollution of the Sea (Reception Facilities and Garbage Facilities) Regulations (Rg 4)***

- Annex VI – Prevention of air pollution from ships  
***This is implemented as subsidiary legislation under the PPSA as the Prevention of Pollution of the Sea (Air) Regulations 2005 (S 134/2005)***

International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC)

***This is implemented as subsidiary legislation under the PPSA as the Prevention of Pollution of the Sea (Oil Pollution Preparedness, Response and Co-operation) Regulations (Rg 5)***

- and its protocol dealing with hazardous and noxious substances (OPRC-HNS),  
***This is implemented as subsidiary legislation under the PPSA as the Prevention of Pollution of the Sea (Hazardous and Noxious Substances Pollution Preparedness, Response and Co-operation) Regulations 2004 (S 120/2004)***

Ballast Water Management Convention (BWMC)

***This is implemented as subsidiary legislation under the PPSA as the Prevention of Pollution of the Sea (Ballast Water Management) Regulations 2017 (S 504/2017)***

International Convention on the Control of Harmful Anti-fouling Systems on Ships (AFS).

***This is implemented as subsidiary legislation under the PPSA as the Prevention of Pollution of the Sea (Harmful Anti-Fouling Systems) Regulations 2010 (S 198/2010)***

These conventions all have the protection of the marine environment from man-made pollution (except the BWMC which relates to the introduction of alien species into marine habitats thru ballast water discharge).

### **Sewerage and Drainage Act (Chapter 294, Revised Edition 2001)**

The Sewerage and Drainage Act is the primary legislation for the regulation and provision of sewerage and drainage systems. This is particularly important in Singapore's context in the protection of water resources as Singapore has a near-closed water loop model of water management; it is thus important to ensure that rainwater drainage is kept separate from sewage and trade effluent.

Amongst other things, it provides for the promulgation of Codes of Practice for sewerage and drainage systems and facilities, as well as surface water drainage. This is currently available on the PUB website as the "Code of Practice on Sewerage and Sanitary Works", and the "Code of Practice on Surface Water Drainage" (see the next subsection on Codes of Practice). Codes of Practice have the force of law through this Act.

- ***Sewerage and Drainage (Sanitary Works and Sewerage Works) Regulations (Rg 2)***  
(Regulates the separation of rainwater drainage from greywater/blackwater drainage, amongst other things. The former is to drain into the storm water drainage system, and the latter into the sewerage system. This Regulation makes reference to the ***Code of Practice on Sewerage and Sanitary Works*** as well.)
- ***Sewerage and Drainage (Surface Water Drainage) Regulations (Rg 4)***  
(Provides for the maximum allowable amount of total suspended solids in surface water drained into the storm water drainage system. This Regulation makes reference to the ***Code of Practice on Surface Water Drainage*** as well.)
- ***Sewerage and Drainage (Trade Effluent) Regulations (Rg 5)***  
(Regulates the discharge of trade effluent into the sewerage system, including the prohibition of certain substances, and maximum allowable concentrations of certain other substances.)

### **Hazardous Waste (Control of Export, Import and Transit) Act (Chapter 122A, Revised Edition 1998)**

This Act implements the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, which Singapore acceded to in 1996. The Act sets up a system of permits for the import and export of hazardous waste pursuant to the Basel Convention. It also allows the Singapore government to recognise the extended definitions of hazardous waste in other jurisdictions, as it has for Indonesia, Malaysia, Philippines, and Thailand (see Notifications S 838/2005, S 839/2005, S 840/2005, and S 841/2005). This results in the Singapore authorities not allowing the export of hazardous waste to these jurisdictions according to their extended definitions.

## **B. CODES OF PRACTICE (COP)**

### **Code of practice on pollution control (Singapore Standard - SS 593: 2013)**

This COP specifies the pollution control requirements to be complied with for industrial plant works. It includes siting requirements for various types of developments, management of hazardous substances and toxic industrial wastes, and land contamination and remediation.

### **Code of practice for noise control on construction and demolition sites (Singapore Standard - SS 602: 2014)**

This COP specifies the methods in which noise is to be measured, and can be controlled, on construction and demolition sites. There is also guidance provided on how to carry out a noise impact assessment and noise management plan.



### **Code of practice for hazardous waste management (Singapore Standard - SS603: 2014)**

This COP sets out the procedures and practices for safe management and handling of hazardous wastes generated from industrial, institutional and other work activities. It also sets out the requirements for collection, transportation, storage, treatment and disposal of hazardous wastes, and further deals with bio-hazardous waste, radioactive waste, and other specialised types of waste.

### **Code of Practice on Environmental Health**

([https://www.nea.gov.sg/docs/default-source/resource/practices-/copeh---2017-\(aug\).pdf](https://www.nea.gov.sg/docs/default-source/resource/practices-/copeh---2017-(aug).pdf))

This COP provides the guidelines to address environmental health concerns in the design of buildings. It specifically addresses the design of various requirements in the design of public facilities such as refuse storage and collection, public toilets, food retail and catering outlets, markets and supermarket, swimming pools, and dormitories.

### **Code of Practice on Sewerage and Sanitary Works**

(<https://www.pub.gov.sg/Documents/COPSSW.pdf>)

This COP provides the guidelines to address sewerage and sanitary concerns in the design of buildings, including the proper planning and design of the sanitary and sewerage system.

### **Code of Practice on Surface Water Drainage**

([https://www.pub.gov.sg/Documents/COP\\_Final.pdf](https://www.pub.gov.sg/Documents/COP_Final.pdf))

This COP provides the guidelines to address surface water drainage concerns in the design of buildings, including basic planning, design and procedural requirements for surface water drainage. It specifies the minimum engineering requirements for the provision of functional facilities for surface water drainage.

## **C. GOVERNMENT POLICY PLANS**

- **Singapore Green Plan (1992 edn)**
- **Singapore Green Plan 2012 (2002 edn)**
- **Singapore Green Plan 2012 (2006 edn)**
- **Sustainable Singapore Blueprint (2009 edn)**
- **Sustainable Singapore Blueprint 2015 (2015 edn)**
- **Sustainable Singapore Blueprint 2015 (2016 edn)**

These have been covered previously in the Biodiversity section of this Series. Focusing on the Government's policies on environmental pollution, the more notable highlights of the recent Sustainable Singapore Blueprint 2015 (2016 edn) are the setting of air quality targets for 2020, as well as in the long term, for PM2.5, PM10, ozone, sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), and carbon monoxide. Additionally, there are 2030 targets for domestic and non-domestic recycling rates. This will be supported by the upcoming Year

Towards Zero Waste movement with will be spearheaded by the National Environment Agency in 2019.

#### **IV. ASEAN: OFFICIAL INSTRUMENTS AND PUBLICATIONS**

##### **A. AGREEMENTS AND COOPERATIVE PLANS/POLICIES**

###### **1995 ASEAN Cooperation Plan on Transboundary Pollution**

The question of transboundary pollution was discussed by the Informal ASEAN Ministerial Meeting on the Environment in 1994, and resulted in the 1995 Meeting on the Management of Transboundary Pollution in Kuala Lumpur. This Cooperation Plan was the result. It focuses on three areas of transboundary pollution: transboundary haze, ship-borne pollution, and movement of hazardous wastes.

###### **2002 ASEAN Agreement on Transboundary Haze Pollution**

In 2002, ASEAN member states agreed to the Agreement on Transboundary Haze Pollution. This came as a response to the 1997 Southeast Asian haze, which caused an estimated US\$9 billion of damage.

Unlike most ASEAN agreements, this Agreement is legally binding. Parties are to “take precautionary measures to anticipate, prevent and monitor transboundary haze pollution as a result of land and/or forest fires” in their territories and to implement national legislation required to execute it. However, the soft and open ended nature of its principles and obligations, with no enforcement measures to ensure compliance, means that there is little improvement in the haze situation in practice. Indonesia may have acceded in 2014, but it did not stop the record-breaking haze in 2015.

On an institutional level, the Agreement established the ASEAN Coordinating Centre for Transboundary Haze Pollution Control to facilitate regional anti-haze efforts and resource distribution and serve as a central focal point for emergency response efforts, as well as the ASEAN Transboundary Haze Pollution Control Fund to allow Parties to make voluntary contributions to provide money for implementation of Agreement.

###### **2017 ASEAN Joint Declaration on Hazardous Chemicals and Wastes Management**

In 2017, environment ministers of ASEAN member states made this declaration, calling for enhanced coordination and collaboration in implementing the Basel, Rotterdam and Stockholm Conventions (BRS Conventions); and encouraged ASEAN member states to ratify the Minamata Convention and Basel Ban Amendment.

##### **B. ENVIRONMENTAL PLANS AND PROGRAMMES, AND SOCIO-CULTURAL COMMUNITY BLUEPRINTS**

- **ASEAN Sub-Regional Environment Programme (ASEP) Phase I (1978-1982)**
- **ASEP Phase II (1983-1987)**
- **ASEP Phase III (1988-1992)**
- **ASEAN Strategic Plan of Action on the Environment (ASP AE) 1994-1998**
- **Hanoi Plan of Action 1999-2004**

- **Vientiane Action Programme 2004-2010**
- **ASEAN Socio-Cultural Community (ASCC) Blueprint 2009-2015**
- **ASCC Blueprint 2025**
- **ASEAN Strategic Plan on Environment (ASPEN) 2016-2025**

With the assistance of the United Nations Environment Programme (UNEP), ASEAN, under the aegis of the ASEAN Experts Group on the Environment, produced the first ASEP in 1978, which set out, *inter alia*, the “enhancement of regional capability in pollution control” and “establishment of adequate urban air and water quality monitoring systems to serve as an indicator of the status of environmental quality” as its goals. ASEP Phase I was endorsed by the First ASEAN Ministerial Meeting on the Environment in the ***Manila Declaration on the ASEAN Environment 1981***. These were accompanied by the “establishment of proper management programmes for the control of hazardous substances” in ASEP Phase II.

In ASEP Phase III, these goals were further expanded into two headings -- “Industry and Environment” and “Urban Environment”. In the “Urban Environment” heading, the concept of an “integrated approach” to the management of the urban environment to deal with “noise, water, and air pollution” was introduced.

In ASPAE, the ASEAN Experts Group on the Environment was replaced by the ASEAN Senior Officials on the Environment (ASOEN) and its working groups. The most relevant one here is the Transboundary Pollution Working Group, which would deal with the transboundary movement of hazardous wastes.

Haze was introduced as an issue in the Hanoi Plan of Action; and environmental sustainability issues ranging from haze to “zero-waste” found themselves tucked under the ASEAN Socio-Cultural Community pillar in the Vientiane Action Programme, where they have remained ever since. The ASCC Blueprints have since significantly expanded the scope of environmental concerns in its “Ensuring Environmental Sustainability” / “Sustainable” heading, with a renewed focus on transboundary pollution issues of haze and hazardous waste movements. The specific details and plan of actions to achieve the goals in the ASCC Blueprint 2025 are contained in the ASPEN. Notably, haze has now been rolled into the climate change section in ASPEN.

### **C. STATE OF THE ENVIRONMENT REPORTS**

- **1st ASEAN State of the Environment Report 1997 (SOER1)**
- **2nd ASEAN State of the Environment Report 2000 (SOER2)**
- **3rd ASEAN State of the Environment Report 2006 (SOER3)**
- **4th ASEAN State of the Environment Report 2009 (SOER4)**
- **5th ASEAN State of the Environment Report 2017 (SOER5)**

The SOER takes stock of environmental conditions and their impact and interrelationship with other sectoral areas in ASEAN. They also offer an update of the prospects and challenges facing the region and highlight what ASEAN has done to protect the environment and promote sustainable development. The latest SOER5 (2017) includes measures that ASEAN and its individual member states are taking to address air, land, and marine pollution (amongst other environmental issues), as well as propose policy recommendations.

## V. SINGAPORE: SECONDARY MATERIALS ON LAW AND POLICY

### A. GENERAL

**Tan Yong Soon , Lee Tung Jean and Tan Karen, *Clean, Green and Blue: Singapore's Journey Towards Environmental and Water Sustainability* (ISEAS Publishing 2009)**

This book seeks to go beyond providing a historical account of Singapore's environmental journey and aims to provide insight into the policy considerations, constraints and trade-offs in each environmental aspect as well as explain how decisions were made and identify key learning points. Part II of the book discusses Singapore's approach to pollution in general (Chapter 2, 3 and 4 focus on clean air quality, clean land and rivers and integrated solid waste management, respectively).

**Chan Philip and Ofori George, 'Impact of the Environmental Pollution Control Act 1999 on the Singapore Construction Industry' (2000) 5 *Asia Pacific Journal of Environmental Law* 75**

In this article, the authors analyse the general objectives and framework of the Environmental Pollution Control Act 1999, which consolidates the regulation of air, water, land, noise and other types of pollution, and consider specifically its impact on the construction industry. The article briefly explores the relationship between construction and the environment, and illustrates this with examples from Singapore. The authors suggest that the Environmental Pollution Control Act 1999 is likely to impact the construction industry in three broad ways. First, the manufacturer of building materials may be regulated by the prescribed licensing scheme and controls relating to air pollution, water pollution and noise creation. Secondly, building materials may be classified as hazardous materials which are within the ambit of controls imposed by Part VII of the Act. Thirdly, the Act also prescribes measures controlling various forms of pollution to be expected in preparing the land for construction.

**Foo Kim Boon, 'Control of Pollution in Singapore' (1993) 5 *Singapore Academy of Law Journal* 81**

The article studies Singapore's approach to pollution control, observing that the approach has been both legislative and administrative in nature. The article largely focuses on the main pieces of legislation and regulations that pertain to pollution control. These are organised by reference to the main types/sources of pollution – noise pollution, pollution of inland waters, air pollution, vehicular emissions, hazardous substances and toxic wastes, and marine pollution. The author also briefly examines Singapore's infrastructure for managing and protecting the environment by looking at two areas: (a) solid waste management and (b) waste water management.

**Foo Kim Boon, 'Environmental Criminal Law in Singapore' (1997) 9 *Singapore Academy of Law Journal* 294**

This journal article explores the enforcement of environmental laws in Singapore, noting an intermarriage of three types of measures – criminal sanctions, administrative guidelines and civil sanctions – in these laws. These three types are individually evaluated and compared against each other. More specifically to the topic of pollution, the section on "Legislation Administered by the Ministry of the Environment" discusses the prevention, enforcement and monitoring elements of the Pollution Control Department. The section also includes discussion of the Clean Air Act and the relevant provisions and subsidiary legislation of the Environmental Public Health Act.

**Lye Lin-Heng, 'Singapore's New Environmental Law – The Environmental Pollution Control Act, 1999' (2000) Singapore Journal of Legal Studies 1**

This article seeks to evaluate the Environmental Pollution Control Act 1999 (EPCA) in the context of Singapore's environment then, to ascertain the extent to which it addresses concerns prevailing at the time and evaluate the overall impact of the legislation which had only been recently enacted at the time of writing the article. It is useful to note that the Introduction neatly summarises the shortcomings of Singapore's laws concerning environmental pollution, prior to the passing of the EPCA. The author considers whether the EPCA is a true "consolidation" of environmental pollution laws, and evaluates the framework and content of the EPCA. She concludes by suggesting that while the new EPCA is an improvement to the general laws on pollution in several respects, there are still areas of criticism – in particular, the author notes the disappointing absence of provisions imposing greater transparency on corporations and obligations of due diligence on officers of a corporation as well as an absence of provisions for environmental impact assessments.

**Lye Lin-Heng, 'A Fine City in a Garden – Environmental Law and Governance in Singapore' (2008) 1 Singapore Journal of Legal Studies 68**

In this paper, the author examines Singapore's system of environmental management and governance and discusses the relevant laws and their implementation, with a focus on pollution control, water conservation and nature conservation. The author highlights the inadequacies in these laws, and, moving forward, she emphasises the need for enhanced land stewardship, greater public participation and laws providing for mandatory environmental impact assessments. Focusing on the area of pollution control for the purpose of this bibliography, the article provides a helpful introduction to the organisation of the main government institutions and agencies in charge of pollution, public health and water management (Ministry of Environment and Water Resources and its agencies, the National Environment Agency and the Public Utilities Board) (See Section II, A). The article also delves into Singapore's environmental management system in relation to pollution control, which the author describes as comprising four integrated strategies – prevention, monitoring, enforcement and public education. Each of these aspects are discussed comprehensively in Section III. In particular, Section III, B, considers Singapore's efforts in monitoring and enforcement in various aspects, namely: air pollution control, (both inland and marine) water pollution control, hazardous substances and toxic waste management, land contamination, solid waste management and noise management.

**Lye Lin-Heng, 'The Judiciary and Environmental Governance in Singapore' (2010) 33(1) Journal of Court Innovation 133**

Noting (in its Introduction) that Singapore has made full utilisation of the law as a means to control unsociable behaviour, the article explores the role of the judiciary in environmental governance in Singapore. It is observed that Singapore's courts have not been faced with legal challenges which push for an interpretation of fundamental principles (e.g. the right to a healthy life, free from pollution, as being a part of the right to life), rather, the cases which come before Singapore courts relate mainly to littering and illegal dumping of wastes; the cleansing of public toilets; noise pollution; pollution of the marine environment; and trade in endangered species. Hence, with regards to pollution control, the paper discusses legislation and case law pertaining to littering, the corrective work order (introduced in lieu of a fine for littering in 1992), the imposition of fines or forfeiture of vehicle used as punishment for illegal dumping, noise pollution, trade in hazardous substances and pollution of the marine environment. The author suggests that it is clear that Singapore's judiciary is aware of

environmental concerns and mindful of responsibilities even beyond our national territory, though our courts have yet to be challenged by the environmental tensions that have plagued larger countries with substantial natural resources.

### **Soon Choo Hock, 'Pollution Control in Singapore' (1982) *Malaya Law Review* 213**

This article focuses on the legal and administrative means of pollution control, and evaluates the relevant legislation and regulations in light of the following criteria: (1) whether the laws provide for enforceable sanctions and realistic penalties; (2) whether the laws set out clear standards to be met; (3) whether the laws are being enforced; (4) whether the laws are coherent; (4) whether the prevailing pollution control strategy is practically sensible i.e. whether the standards are too lenient/strict; and whether the legislature has the capacity to change the law so as to adapt to changing circumstances. The article is organised according to the types of pollution addressed, and hence comprises of the following sections: air pollution, noise pollution, solid waste pollution, pollution of inland waters and pollution of the sea (both within and outside the territorial waters of Singapore). The article also considers briefly the various cost-allocation principles at play in local pollution control legislation prevailing at the time, evaluating the strengths and weaknesses of these various principles in deciding how the cost of control should be distributed.

## **B. AIR**

### **Chin Anthony TH, 'Containing air pollution and traffic congestion: transport policy and the environment in Singapore' (1996) 30 *Atmospheric Environment* 787**

The paper reviews and analyses the effectiveness of the road pricing and vehicle quota scheme (VQS) in curbing air pollution in Singapore. Chin outlined Singapore's novel road traffic control policies that were introduced in the 1970s. He included the area license scheme (ALS), carpooling, and other complementary measures. As a result of these policies, the levels of pollutants like carbon monoxide, oxides of nitrogen, and smoke had marginal decreases in the year 1975. The paper also considers the VQS as a basis of pollution permits among automobile owners, and recognizes that the VQS does not account for usage. He concludes that the traffic regulations and schemes have efficiently controlled traffic problems and brought about positive impacts on air quality.

### **Quah Euston and Boon Tay Liam, 'The economic cost of particulate air pollution on health in Singapore' (2003) 14 *Journal of Asian Economics* 73**

Quah and Boon attempt to address the concern of economic development and economic management by estimating the economic cost of particulate air pollution on health in Singapore. At the time that the paper was written, Singapore was considered to have exceptional air quality compared to other polluted Asian capitals. The paper unpacks the valuation relationships of particulate air pollution in Singapore. The authors first determined the concentration of the pollutant, then estimated the health impacts of air pollution and finally assigned economic values to the increase in mortality. From their results, they concluded that the total estimated economic cost of health damage attributable to particulate air pollution in Singapore is US \$3662 million. It supports the conclusion that Singapore should go beyond the international standards in controlling air pollution.

### C. INLAND WATER

**Tan Yong Soon , Lee Tung Jean and Tan Karen, *Clean, Green and Blue: Singapore's Journey Towards Environmental and Water Sustainability* (ISEAS Publishing 2009)**

Apart from discussing pollution in general (see annotation of the same book above), Chapter 5 (concerning the development of sustainable sources of water) examines how pollution control measures have allowed Singapore to tap on urban water catchments, whereas Chapter 7 considers Singapore's management of used water, including a discussion of the legislation and regulations enacted to ensure industrial activity does not adversely affect water quality.

**Chou Loke Ming, 'The Cleaning of Singapore River and the Kallang Basin: Approaches, Methods, Investments and Benefits' (1998) 38 *Ocean & Coastal Management* 133**

The article is an informative introduction to the 10-year programme to clean up the Singapore River and the Kallang Basin. It describes the concerns that triggered the cleaning programme, the main sources of pollution at the time, the overall strategy of the action plan and the process of executing this plan. It also describes the main achievements of the cleaning programme, including the improvements in water quality and biological diversity since its completion, plans for long-term management and sustainability, the economic costs involved and the benefits and opportunities arising from the clean-up. Complementary to this article is "*Cleaning of the Singapore River and Kallang Basin in Singapore Human and Environmental Dimensions*,"<sup>1</sup> which is also referred to in this annotated bibliography.

**Joshi Yugal Kishore, Tortajada Cecilia and Biswas Asit K., 'Cleaning of the Singapore River and Kallang Basin in Singapore Human and Environmental Dimensions' (2012) 28(4) *International Journal of Water Resources Development* 1**

This brief journal article is a detailed account of the clean-up of Singapore's heavily polluted river systems. It discusses the challenges and contributory factors to pollution that had to be surmounted, including the varied nature of polluting activities, the absence of pollution control facilities at the time and dense population. The authors also examine the achievements (in terms of the impact on the population, industries and the provision of water supply) and lessons learnt from the overall clean-up in terms of how delays or insufficient actions could exponentially increase the costs of the clean-up, and the importance of political will in realising any long-term vision. Complement this article with "*Clean, Green and Blue: Singapore's Journey Towards Environmental and Water Sustainability*"<sup>2</sup> and "*The Cleaning of Singapore River and the Kallang Basin: Approaches, Methods, Investments and Benefits*"<sup>3</sup>, which have been referred to above.

**Tortajada Cecilia, 'Water Management in Singapore' (2006) 22(2) *Water Resources Development* 227**

---

<sup>1</sup> Joshi YK, Tortajada C and Biswas AK, 'Cleaning of the Singapore River and Kallang Basin in Singapore Human and Environmental Dimensions' (2012) 28(4) *International Journal of Water Resources Development* 1

<sup>2</sup> Tan YS, Lee TJ and Tan K, *Clean, Green and Blue: Singapore's Journey Towards Environmental and Water Sustainability* (ISEAS Publishing 2009)

<sup>3</sup> Chou L, 'The Cleaning of Singapore River and the Kallang Basin: Approaches, Methods, Investments and Benefits' (1998) 38 *Ocean & Coastal Management* 133

In this article, the author examines Singapore's approach to water scarcity and discusses the reasons for its success as found in the overall approach taken and in the overall governance of Singapore's water supply and wastewater management systems. Relevant to pollution is the discussion on managing Singapore's supply of clean water – in particular, how Singapore has effectively protected the quality of its water via certain regulations and legislation, and how Singapore's adoption of wastewater recycling has enabled her to sustainably supply water of high purity and quality.

#### **D. MARINE**

##### **Chan Leng Sun, 'Singapore Legislation on Oil Pollution' (2005) 9 Singapore Year Book of International Law 147**

This paper provides a brief outline of the key Singapore legislation concerning marine pollution, namely the Merchant Shipping (Civil Liability and Compensation for Oil Pollution) Act (Cap 180, 1999 Rev Ed) (Part I) and the Prevention of Pollution of the Sea Act (Cap 243, 1999 Rev Ed). It is noted that though the Merchant Shipping (Civil Liability and Compensation for Oil Pollution) Act gives effect to the International Convention on Civil Liability for Oil Pollution Damage 1992 and the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage 1992 (“the 1992 Fund Convention”), it follows the wording of the Merchant Shipping Act (UK) 1995 rather closely and compares the local legislation with its UK counterpart with regards to how it deals with liability. The paper also describes how the Merchant Shipping (Civil Liability and Compensation for Oil Pollution) Act provides for contribution to and claims on the Fund established under the 1992 Fund Convention. Finally, there is discussion of the main features of the Prevention of Pollution of the Sea Act and how the two pieces of local legislation complement each other, as well as some description of how the Prevention of Pollution of the Sea Act has been amended to give effect to the International Convention on Oil Pollution Preparedness, Response and Co-operation.

##### **Lim Charles Aeng Cheng, 'Environmental Protection of the Seas in Singapore' (1994) Singapore Journal of Legal Studies 52**

The journal article provides a useful introduction into the legal framework governing environmental protection of Singapore's waters and the relevant case law. Among other things, the author discusses the MARPOL 73/78 Convention (Part IV) which aims to eliminate international pollution of the marine environment and provides a comprehensive guide to understanding the local Prevention of Pollution of the Sea Act (Cap 243, 1999 Rev Ed) that gives effect to Singapore's obligations under the MARPOL 73/78 Convention (Part V). These two parts form the bulk of the discussion. Additionally, noting that many persons suffering pollution damage may wish to claim compensation, the author discusses the position under the common law in relation to civil compensation and the Merchant Shipping (Oil Pollution) Act (Cap 180, 1985 Rev Ed) which implements the International Convention on Civil Liability for Oil Pollution Damage 1969. There is also discussion of the Merchant Shipping (Safety Convention) Regulations (Cap 179, Reg 11 of the 1990 Rev Ed) that implements Chapter VII of the International Convention for Safety of Life at Sea 1974 which regulates the carriage of dangerous goods (Part VII), and the relevant Singapore Port Regulations (Part VIII).



## VI. ASEAN: SECONDARY MATERIALS ON LAW AND POLICY

### A. GENERAL

**Asian Development Bank, *Emerging Asia: Changes and Challenges* (Asian Development Bank 1997)**

Most relevant to this annotated bibliography is Chapter 4, "Environment and Natural Resources" (pages 199-266), which presents the state of Asia's Environment as at 1997 in terms of various aspects, including air pollution, water pollution, as well as solid and hazardous waste. It is noted, with regards to pollution, that emission rates for most pollutants are rising, and pollution and resource degradation levels are building up. The chapter also includes discussion of the contributing factors and costs of Asia's environmental degradation. This book aims to adopt a forward-looking and broad view of the development process. Hence, looking ahead, the Chapter outlines components of a policy model that would help to improve the general state of the environment, and makes certain projections with regard to the next 30 years (from 1997).

**Bedner Adriaan and Niessen Nicole, *Towards Integrated Environmental Law in Indonesia?* (CNWS Publications, Research School CNWS, School of Asian, African, and Amerindian Studies 2003)**

The book provides an overview of Indonesian environmental policy-making, and key environmental legislation, some of which deal with pollution. Chapter 5, "Towards Integrated Environmental Policy-Making in Indonesia?" by Julia Arnscheidt, explores the framework for environmental policy-making in Indonesia on a national scale and assesses its potential for integrated policy-making. Chapter 7, "The Environmental Management Act of 1997: Comprehensive and Integrated?" by Nicole Niessen, discusses the structure and content of the Environmental Management Act (EMA) 1997, which among other things, aims to combat pollution, and the impact of general principles of international environment law contained within the Act. On this note, readers might also be interested in the Chapter 8, "From the Old to the New EMA: Integration or Disintegration of the Legal Potential for Enforcement?" written by Adriaan Bedner, which compares the EMA 1997 to its pre-decessor (EMA 1982) and examines the extent to which the EMA 1997 has introduced new opportunities for both administrative and criminal enforcement. Finally, in Chapter 9, "The Legal Framework for Environmental Public Interest Litigation in Indonesia" by David Nicholson, Nicholson considers the significance of civil enforcement of environmental laws in a nation's environmental management system as well as the legal framework for such litigation in Indonesia. Several recent cases that have considered provision of the EMA 1997 are discussed, some of which concern harm or damage suffered as a result of pollution.

**Brookfield Harold and Byron Yvonne, *South-East Asia's Environmental Future: The Search for Sustainability* (Oxford University Press 1993)**

This book is based on an international conference ("Toward a Sustainable Environmental Future for the Southeast Asian Region") organised by the United Nations University, held at Yogyakarta, Indonesia, and based on the papers commissioned for the conference. The chapters which are most relevant to the issue of pollution are Chapter 12 ("Coastal, Inshore and Marine Problems" by Edgardo D Gomez) and Chapter 13 ("Threatened Places", by Joseph Morgan and Jefferson Fox, specifically pages 290-295) which addresses the issue of marine pollution, as well as Chapter 15, "Urban Environmental Issues in South-

East Asian Cities: An Overview” by Sham Sani, which discusses a wide range of pollution issues including air quality and pollution, water quality and sanitation, solid-waste disposal as well as noise pollution.

**Jayakumar S., Koh Tommy, Beckman Robert and Hao Duy Phan, *Transboundary Pollution: Evolving Issues of International Law and Policy* (NUS Centre for International Law, Edward Elgar Publishing Ltd 2015)**

This book provides its readers with a comprehensive overview of the international legal framework and principles which govern transboundary pollution and examines the practical applications of the State responsibility doctrine in the context of transboundary pollution. To illustrate the evolution and application of international law and policy within the region, the book also includes Asian and Southeast Asian case studies. It is organised into 3 parts as follows – “General Principles and State Responsibility”, “Problems and Prospects” and “Cooperative Mechanisms for Addressing Transboundary Pollution”. As a whole, the chapters cover the major types of transboundary pollution, including transboundary pollution of freshwater resources, transboundary marine pollution, as well as transboundary haze pollution.

**Cribb R, 'The Politics of Pollution Control in Indonesia' (1990) 30(12) Asian Survey 1123**

At the time the article was written, pollution was a rather recent issue on the Indonesian political agenda. The author believes that its novelty would create opportunities for possible realignments of social and political forces in Indonesia. The article examines the scope of the problem of pollution, highlighting that water pollution caused by industries and air pollution were major problems at the time. The article also provides historical insight as to how the Indonesian government has responded to pollution since the 1970s, as well as changes in the social dimension – in particular, the dramatic growth of non-governmental organisations, some of which have fought for their cause by way of litigation. Finally, the author suggests that the pollution issue highlights the growing strength and capacity of the Indonesian civil bureaucracy and the emergence of some democratic space in a previously stifling system.

**Elliott Lorraine, 'ASEAN and Environmental Governance: Strategies of Regionalism in Southeast Asia' (2012) 12(3) Global Environmental Politics 38**

This article seeks to achieve two main purposes. Firstly, it examines how Southeast Asian governments have “governed” environmental issues at a regional scale under the auspices of ASEAN. Hence, it begins with a brief overview of the environmental challenges that have encouraged cooperation in the region, and moves on to explore the trajectory of such regional cooperation. This discussion is organised into 3 phases – “Phase I: Environmental Assets and Regional Resilience”, “Phase II: Responsibility and Stewardship”, “Phase III: Formalism and Community”. The article’s second purpose is to locate the dynamic of regional environmental governance in the context of conceptual debates about the political topography of Southeast Asian regionalism. Among other things, the region’s policies and approaches towards tackling pollution are discussed. Key regional instruments discussed include the Agreement on the Conservation of Nature and Natural Resources (under Phase I), the 1995 Cooperation Plan on Transboundary Pollution and the ASEAN Strategic Plan on the Environment (under Phase II), and the Declaration on Environmental Sustainability (under Phase III).

**Etsy Daniel C, 'Sustaining the Asia Pacific Miracle' (1998) 3 Asia Pacific Journal of Environmental Law 307**

In this article, the author outlines the environmental challenges experienced by the countries of the Asia Pacific Economic Cooperation (APEC) forum which, in his view, poses a serious policy challenge to the Asia Pacific region and threatens planned economic integration through APEC. Some of the environmental problems outlined include water and air pollution. Further, the article seeks to establish the need for an APEC environmental initiative. The author suggests that as the pollution control and resource management challenges faced detract from the gains offered by economic growth and hamper economic integration, an APEC level environmental programme is justified. Such a programme would be essential in a multi-tier structure of governance, in responding effectively to the environmental challenges faced in this region. For this purpose, the author also proposes the establishment of several institutional bodies, such as an Environment Committee within APEC to serve as the institutional home for the organisation's environmental initiatives and ensure steady focus on pollution control and resource management issue, and an APEC Environmental Advisory Group which will review APEC's environmental efforts, suggest future directions and strategies, and provide a "check" on APEC's performance.

**Hezri A. A. and Hasan Mohd. Nordin, 'Towards Sustainable Development? The Evolution of Environmental Policy in Malaysia' (2006) 30 Natural Resources Forum 37**

Accompanying the continuing pursuit of socio-economic progress, Malaysia is experiencing an unprecedented rate of change in the natural environment. This includes pollution from rubber and palm oil mills and air pollution from various sources. This article provides an overview of Malaysia's evolving policy response to development needs and environmental change, to show how governmental responses have adapted over the course of recent history so as to address emerging environmental situations. This development is broken down into four distinct stages – (1) federal policy formulation (1971-1976), (2) crises and consolidation (1977-1988), (3) embracing sustainable development (1989-2000), and (4) implementing sustainable development (2001-2006). Among other developments, relevant to pollution and discussed in this article are the developments in the Environmental Quality Act. The article also explores the future of sustainable development in Malaysia.

**Kititasnasorchai Vipon and Tasneeyanond Panat, 'Thai Environment Law' (2000) 4 Singapore Journal of International & Comparative Law 1**

The article provides a wide-ranging survey of the legal and institutional framework, established since the 1970s, to protect Thailand's environment. This includes outlining the framework of the Enhancement and Conservation of National Environmental Quality Act, the primary legislation for natural resource management and pollution control, the roles and functions of the relevant government agencies (such as the National Environmental Board, the Pollution Control Committee and the Pollution Control Department), and pollution control measures under this framework, including setting pollution control standards and the adoption of strict civil liability theory. The article also goes into detail with regards to environmental laws on specific areas, including air pollution control, water pollution control, marine pollution control, solid waste and hazardous waste management, and the control of hazardous substances. Towards the end, the authors discuss issues in pollution control and make certain recommendations to resolve them. Ultimately, it is suggested that notwithstanding such an

elaborate legal framework of protection, pollution prevails in parts of Thailand due to challenges in the implementation and enforcement of Thai legislation.

**Sharom Azmi, 'Malaysian Environmental Law: Ten Years After Rio ' (2002) 6 Singapore Journal of International & Comparative Law 855**

Through this article, the author aims to take stock of developments in Malaysia since its participation in the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil. It describes the type of environmental problems, the relevant constitutional and legal issues, faced by Malaysia. It also provides an overview of the developments of environmental law, both domestic and international, between 1992 and 2002. The discussion is organised by issue, and covers topics such as air pollution and toxic wastes. The article also examines the impact of certain judicial decisions on environmental matters, such as whether the constitutional right to life includes a right to a clean environment and the applicability of the Environmental Quality Act 1974. It is ultimately suggested that while Malaysia does not experience a lack of laws, greater political will to put these laws into effect and changing the nation's attitude towards the environment would bring about a great improvement.

**Tan Alan Khee-Jin, 'Recent Institutional Developments Relating to the Environment in South East Asia – A Report Card on the Region' (2002) 6 Singapore Journal of International & Comparative Law 891**

This article provides a broad overview of the institutional developments in environmental law and protection across a wide range of Southeast Asian countries, including Brunei, Cambodia, Indonesia, the Philippines, Thailand and Vietnam. The author briefly outlines enacted legislation, regulations and sub-decrees relevant to pollution control. For instance, the author mentions legislation which Indonesia had only recently enacted at the time, including regulations on the Management of Air Quality and Air Pollution, Hazardous Wastes and Marine Pollution and Damage. He notes the work done by Cambodia's Ministry of Environment with respect to Water Pollution Control. He also describes the state of legislation for environmental protection and management in Brunei at the time, noting that regulations governing pollution in Brunei are inadequate.

**B. AIR**

**Forsyth Tim, 'Public concerns about transboundary haze: A comparison of Indonesia, Singapore, and Malaysia' (2014) 25 Global Environmental Change 76**

This article presents an analysis of public concerns about transboundary haze during three major crises experienced in 1997, 2005 and 2013. The author conducts a content analysis of 2231 articles from Indonesia, Singapore and Malaysia, in order to evaluate the trends in media reporting about haze. In explaining the results, the author emphasizes the environmental narratives help to identify political agency attributed to ASEAN, national governments, and non-state actors. Finally, the author concludes that public debates published in newspapers indicate a growing dissatisfaction towards ASEAN's non-confrontational model of dealing with the transboundary haze issue.

**Jones David Seth, 'ASEAN and transboundary haze pollution in Southeast Asia' (2006)  
4 Asia Europe Journal 431**

This article assesses the causes and effects of forest burning in Indonesia. It cites the shared responsibility amongst traditional cultivators, small scale investors and large scale timber and palm oil plantation companies. It also maps out the developments of ASEAN initiatives to combat forest burning and transboundary haze pollution, focusing on the 1997 Regional Haze Action Plan and 2002 ASEAN Agreement on Transboundary Haze Pollution. The lack of institutional capacity, coordination and effective deterrence in Indonesia hinders the effective implementation of ASEAN initiatives. The author argues that the Agreement must have detailed requirements in relation to monitoring, preventing, deterring and mitigating forest fires to encourage higher standards of governance in Indonesia.

**Nazeer Nazia and Furuoka Fumitaka, 'Overview of ASEAN Environment, Transboundary Haze Pollution Agreement and Public Health' (2017) 13 International Journal of Asia-Pacific Studies 73**

Nazeer and Furuoka study the status of environmental degradation and severe effect on public health in ASEAN. The article details the effects of air pollution on human health, emphasising the public health crisis caused by transboundary haze. The authors emphasise Indonesia's domestic political reasons behind the non-ratification of the Agreement and the growth of the palm oil industry as the principal causes of the ambivalence towards the ASEAN Agreement on Transboundary Haze Pollution. This paper includes the latest developments of Indonesia's ratification in September 2014 and its obligations to collaborate on the transboundary haze issues. Finally, the authors conclude with domestic measures that could be undertaken by Indonesia. They further encourage regional capacity-building from fellow ASEAN states in order to minimize impacts of transboundary haze in the future.

**Nguitragool Paruedee, 'Negotiating the Haze Treaty Rationality and Institutions in the Negotiations for the ASEAN Agreement on Transboundary Haze Pollution (2002)' (2011)  
51 Asian Survey 356**

This article refutes the scholarly critique of the ASEAN Way of resolving with the transboundary haze pollution issue. It provides a theoretical framework that utilizes rational institutional design and multilateral negotiation to explain why member states eventually adopted the ASEAN Agreement on Transboundary Haze Pollution. It further asserts that the legally binding international treaty is an example of a shift away from the traditional ASEAN non-interference approach to regional conflict. The author attributes the shortcomings of the Agreement to the entrenched normative structures and power dynamics of member states, with a special focus on Indonesia's role in the negotiations. The article calls for the incorporation of a two-level negotiation perspective that factors the domestic political factors within regional negotiations. Finally, the author suggests that ASEAN and the Indonesian government should work towards becoming more "rational" and convince domestic audiences of their intentions to cooperate regionally.

**Nurhidayah Laely, Alam Shawkat and Lipman Zada, 'The influence of international law upon ASEAN approaches in addressing transboundary haze pollution in Southeast**

**Asia' (2015) 37 Contemporary Southeast Asia: A Journal of International and Strategic Affairs 183**

The authors explore how international legal frameworks influence ASEAN approaches in addressing transboundary haze pollution. Firstly, they examine how the state responsibility principle in customary international law is interpreted in the context of the “ASEAN Way”. They posit that ASEAN prefers soft law over hard law and liability regimes to protect the environment. Secondly, the article considers how the ASEAN way interacts with existing multilateral environment agreements (MEAs) on the atmosphere and biodiversity. Since Indonesia has been the main source of haze pollution, the authors also allude to Indonesia’s reactive approach to mitigate land and forest fires. Finally, the article asserts that the ideal solution would be to modify the ASEAN Way so that it is more compatible with the evolving principles of state responsibility. Building on Indonesia’s experience, the authors support local community-based fire management and revitalizing *adat* (customary) institutions.

**Oanh Nguyen Thi Kim, *Integrated Air Quality Management: Asian Case Studies* (CRC Press, Taylor & Francis Group 2013)**

This book presents the methodological development for integrated air quality management which employs both technical and policy tools to achieve air quality goals, and illustrates the use of such tools with the experience of certain Asian case studies. Chapter 1 presents an overview of major issues of air quality management practices in Asian developing countries, including Thailand, Indonesia, Philippines and Vietnam, and their air quality status at the time. Section I (Chapters 2-4) discusses different types of monitoring techniques, whereas Section II (Chapters 5-7) discusses a range of modelling tools for air quality management. Section III (Chapters 8-12) highlights a number of innovative air pollution control techniques. In addition, section IV (Chapters 13-16) illustrates integrated air quality management with certain case studies, including agricultural residue field burning in Asian rice-exporting countries, vehicle emissions in Bandung City (Indonesia) and brick kilns in Vietnam.

**Qadri S Tahir, *Fire, smoke, and haze: The ASEAN response strategy* (Asian Development Bank 2001)**

This report was published in collaboration between the Asian Development Bank (ADB) and ASEAN, outlining the context, causes, impacts and responses to forest fires in the tropical Southeast Asian region. Chapters 1 and 2 discuss the increasing incidence and intensity of forest fires and haze pollution, as a result of various causes and constraints. Chapter 3 describes the varied responses from national, technical and international perspectives in relation to the 1997-1998 fire and haze. Chapter 4 recounts the ADB’s technical assistance to Indonesia and ASEAN, and then analyses the outcomes of these programmes. Chapter 5 focuses on the Operationalized Regional Haze Action Plan (ORHAP) and its three programme components of protection, mitigation and monitoring. Finally, Chapter 6 predicts the important actions required to consolidate existing initiatives to manage transboundary haze caused by forest fire mismanagement such that it supports rational land use and development. The appendices compile all of the regulatory frameworks and guidelines utilized by the ADB and ASEAN. There is a glossary of terms to understand the regional haze problem in greater technical detail.

**Quah Euston and Tan Tsiat Siong, *Pollution Across Borders: Transboundary Fire, Smoke and Haze in Southeast Asia* (World Scientific Publishing Co. Pte. Ltd. 2018)**

This book is a collection of articles with the aim of providing a holistic set of perspectives to aid the understanding of the complexity and magnitude of the transboundary haze problem, as well as realise the possibility of resolving Indonesian forest fires and transboundary haze. Together, the articles discuss and analyse the transboundary haze problem from various perspectives, including game theory, the Polluter-Pay-Principle and Victim-Pay-Principle, international law and cooperation, the ASEAN Agreement on Transboundary Haze, the role of government and environmental governance, environmental economic valuation and damage assessments and forestry management. In particular, Chapter 8, "A New Thinking to Cooperation in Tackling the Indonesian Haze?", is written by Emeritus Professor Koh Kheng Lian, who recommends re-framing the haze issue as "disaster management" so as to avoid the perceived derogation of sovereignty on the part of Indonesia. Chapter 19, "Singapore's New Transboundary Haze Pollution Act: Can It Really Work to Prevent Smoke Pollution from Indonesia?", written by Professor Alan Khee-Jin Tan, discusses the efficacy of Singapore's Transboundary Haze Pollution Act.

**Quah Euston and Varkkey Helena, 'The political economy of transboundary pollution: mitigation of forest fires and haze in Southeast Asia' in Sei Hayashi Hana (ed), *The Asian Community: Its Concepts and Prospects* (Soso Sha, Tokyo 2013)**

This report evaluates the "stakeholders' responsibility" approach to transboundary haze pollution, based off the framework proposed by Quah in an article he published in 2002. The concept of stakeholders' responsibility envisages a sharing of costs amongst government systems, corporate enterprises and the civil society sector. Using this idea, the report focuses on Malaysia and Singapore's governmental measures to mitigate transboundary haze in Indonesia. For the Malaysian case study, they focused on the Malaysia-Riau collaboration. Likewise for Singapore, the authors evaluated the successes of Singapore's partnership in the Jambi province. The authors advocate for more contributions from all categories of stakeholders, especially from culprit and victim industries, to contribute to haze mitigation efforts.

**Rusli Hazmi, Mustafa M and Dremluga R, 'Transboundary Haze Pollution: Balancing the ASEAN Way and Malaysian Approach' (2017) 10 *Journal of East Asia and International Law* 561**

This legal digest considers the legal options available to Malaysia to overcome the transboundary haze pollution problem. It considers the use of various international law principles developed from the seminal *Train Smelter Dispute* and *Corfu Channel* cases. The authors then contrast the international law approach to the success of ASEAN cooperation on the pirate activities and humanitarian assistance. Ultimately, the authors encourage Malaysia and other ASEAN countries enforce the provisions of the Agreement on Transboundary Haze Pollution, instead of instituting legal action.

**Schwela Dieter, Haq Gary, Huizenga Cornie, Han Wha-Jin, Fabian Herbert and Ajero May, *Urban Air Pollution in Asian Cities: Status, Challenges and Management* (Routledge 2016)**

This book provides the results of an exercise to benchmark and determine the current status of air quality management in Asian cities initiated by the Air Pollution in the Megacities of Asia (APMA) project, which involved the Stockholm Environment Institute (SEI), the Korea Environment Institute (KEI), the United Nations Environment Programme (UNEP) and the World Health Organisation (WHO). It assessed the current status, challenges and management in urban air pollution in 20 mega- and major Asian cities, including the following Southeast Asian cities: Bangkok, Hanoi, Ho Chi Minh City, Jakarta, Metro Manila, Singapore and Surabaya. It determines the air quality management capability of each city and identifies the current trends and challenges which they face in managing urban air quality.

**Tacconi Luca, Jotzo Frank and Grafton R. Quentin, 'Local causes, regional co-operation and global financing for environmental problems: the case of Southeast Asian Haze pollution' (2008) 8 *International Environmental Agreements: Politics, Law and Economics* 1**

This article uses the case of the Southeast Asian haze pollution problem to explore the challenges posed by environmental problems linked to local development and livelihoods. The authors emphasise that ASEAN countries should seek to prevent peat fires because it is the main source of haze pollution relevant to the Agreement. Furthermore, they propose to provide international financing through avenues such as the Global Environment Facility (GEF) and wealthier countries in Southeast Asia. The authors further posit that the aid needs to be backed by conflict resolution mechanisms for the financing of environmental programmes. The funding is one avenue to incentivize states like Indonesia to implement sustainable forest management practices and other regulatory reform.

**Tan Alan Khee-Jin, 'The ASEAN agreement on transboundary haze pollution: Prospects for compliance and effectiveness in post-Suharto Indonesia' (2005) 13 *New York University Environmental Law Journal* 647**

This article seeks to assess the effectiveness of the 2002 ASEAN Agreement on Transboundary Haze Pollution and the prospects of compliance, in light of prevailing theories on treaty enforcement, compliance and effectiveness. Tan locates the Agreement within the geopolitical context of Southeast Asia, and points out the weak substantive provisions that impede the resolution of the haze pollution problem. The ASEAN Way of non-interference impinges greatly upon the efficacy of the regional transboundary environmental governance. On the basis that Indonesia was not a party to the Agreement at the time, Tan further argues that reforms in forest resource management and improving internal conditions within Indonesia would significantly influence the success of the Agreement. The article concludes that the Agreement is a hopeful attempt to legalize the expectation among ASEAN member states for effective action to be taken to combat forest and land fires that cause air pollution.

### **C. INLAND WATER**

**Lee Poh Onn, *Water Issues in Southeast Asia: Present Trends and Future Directions* (Institute of Southeast Asian Studies 2014)**



This publication is a compilation of studies from around the region, with an aim to provide to the reader with an understanding of the political and socio-economic aspects of water and water management issues. Several chapters discuss the issue of water pollution. Chapter 5, "Indonesia's Water Management Reform" by Budhi Santoso, notes the problem of pollution in Indonesia's river basins, whereas Chapter 11, "Thailand's Water Sector: Overview and Implications", written by Sukontha Aekaraj, includes a section on "Water Quality and Investment in Wastewater Treatment", which discusses water pollution, Thailand's masterplans for water quality management and Thailand's water pollution control practices. Chapter 8, "Troubled Waters: Rehabilitating the Pasig River, the Philippines", by Donovan Storey, examines chronic water pollution in Manila, and provides an outline and critique of the Pasig River Rehabilitation Project (PRRP), which aimed to clean the Pasig River. Lastly, in Chapter 12, "Water Resources and Issues Concerning Sustainable Watershed Management Practices in Vietnam", the author Le Dinh Thanh discusses surface water pollution and, in particular, water pollution in the estuaries of coastal Central Vietnam.

**Renaud Fabrice G. and Kuenzer Claudia, *The Mekong Delta system: Interdisciplinary Analyses of a River Delta* (Springer Environmental Science and Engineering, Springer 2012)**

This is a compilation of papers on the Mekong Delta in Vietnam, most of which were generated within the framework of the Water related Information System for the Sustainable Development of the Mekong Delta research project (WISDOM), funded by both the German Federal Ministry of Education and Research and the Vietnamese Ministry of Science and Technology. In particular, Chapter 6, "Water Governance Under Renovation? Concepts and Practices of IWRM in the Mekong Delta, Vietnam", identifies agriculture-related industries and aquaculture as the main water polluters and discusses some pressing problems and temporary solutions in water quality management. Chapter 13, "Agriculture and Water Quality in the Vietnamese Mekong Delta", deals more comprehensively with agricultural related sources of water pollution. The chapter reviews their impact on water quality, ecosystem services and agricultural production, and discusses current and possible pollution mitigation measures in this regard.

**Bedner Adriaan, 'Consequences of Decentralisation: Environmental Impact Assessment and Water Pollution Control in Indonesia' (2010) 32 Law and Policy 38**

Through this article, the author seeks to explore how the decentralisation of government authority has affected Environmental Impact Assessment (EIA) and enforcement of water pollution law. The article begins by looking at the general division of authority in environmental management, providing an overview of the legal structure underpinning EIA and water pollution law enforcement in Indonesia, pre-decentralisation. This is followed by a discussion of the legal consequences of the Regional Autonomy Act (no. 22 of 1999, now replaced by Act no. 32 of 2004; RAA) and how law at provincial and district levels may have changed. With regards to water pollution, it is suggested that water pollution enforcement has mainly continued within the scheme of the Clean River Program, started at the provincial level in the pre-decentralisation era. At the time of writing the article, there were still few initiatives at the district level and the enhancement of powers at the district level brought about by decentralisation were underused. In sum, despite the existence of potentially significant changes, decentralisation has not resulted in drastic changes to the practice of water pollution control.

**Low Kwai Sim and Balamurugan G, 'Urbanization and Urban Water Problems in Southeast Asia: A Case of Unsustainable Development' (1991) 32 Journal of Environmental Management 195**

The authors regard Southeast Asia's urban water problems as being the consequence of rapid and uncontrolled urbanisation and unsustainable development. The article identifies key issues underlying Southeast Asia's urban water problems, with a focus on four Southeast Asian countries, namely Indonesia, Malaysia, Philippines and Thailand. According to them, urban water problems may be classified into two categories – problems caused by underdevelopment of available resources and problems caused by urban activities. Water pollution is classified under this latter category. The paper discusses the main sources of water pollution such as improper sewage disposal, industrial effluent, sediments and improper garbage disposal. The paper is also well illustrated with various case studies from the region. In their conclusion, the authors suggest that without serious planning and management, water pollution will remain a persistent problem for Southeast Asia which can only worsen over time.

**Whitney Heather, 'Vietnam: Water Pollution and Mining in an Emerging Economy' (2014) 15 Asian-Pacific Law & Policy Journal 25**

This journal article is a study of water pollution from mining operations. The main body of the article is divided into three parts. Part I provides the political and economic context to the discussion and explores the relevant legislation (such as Vietnam's Law on Environmental Protection, Mineral Law of 2010 and Law on Water Resources) and ancillary programs relevant to addressing the environmental consequences of unregulated mining pollution. In Part II, the author discusses conflicts within Vietnam's environmental laws which undermine regulatory implementation, and the tension between economic development and environmental protection. Finally, the author suggests numerous remedies to address conflicts in the law, including conducting a thorough review of water protection management policies, legislation and regulations, implementing a zoning plan to protect socially and ecologically important rivers, and sustained financial and administrative support for programs that target severely polluted areas.

**Water Environment Partnership in Asia, *Outlook of Water Environmental Management Strategies in Asia*, 2009)**

The primary aim of the Water Environment Partnership in Asia (WEPA) is to strengthen water environmental governance in Asia. Apart from developing a database containing information on policies, technologies and efforts of the non-governmental organisations or the community to conserve and protect the water environment (which may be accessed at: <http://www.wepa-db.net/>), the WEPA has also published this series with the same objective of consolidating and providing knowledge by providing basic information on the status and management of the water environment in each WEPA partner country, including legislative frameworks and existing and future management challenges. WEPA partner countries from ASEAN which were featured in this first edition of WEPA's flagship publication included Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Thailand and Vietnam.

**Water Environment Partnership in Asia, *WEPA Outlook on Water Environmental Management in Asia*, 2012)**

This is the second edition of the "WEPA Outlook on Water Environmental Management" series. The second edition is divided into three main chapters. Chapter 3 provides updated country profiles on water environmental management in the WEPA partner countries. The

WEPA partner countries from ASEAN featured in the first edition (published in 2009, cited above) are featured again here. Based on the country profiles in Chapter 3, Chapter 1 summarises the state of water environmental management in WEPA partner countries, including developments in water environmental management over the past decade, and identifies overall trends and common challenges experienced by WEPA partner countries. On the other hand, Chapter 2 summarises discussions and studies conducted in the region relating to two priority issues (identified by the WEPA), namely “domestic wastewater treatment” and “climate change and the water environment”.

**Water Environment Partnership in Asia, *WEPA Outlook on Water Environmental Management in Asia*, 2015)**

The third edition of the “WEPA Outlook on Water Environmental Management” series is divided into two main chapter. Chapter 1 provides the reader with an overview of the water environmental management frameworks in the WEPA partner countries from 3 different vantage points, namely “objectives of water environmental management” (which includes legal frameworks and ambient water quality standards), “monitoring of water environment” and “measures to ensure implementation and compliance”, especially with regards to wastewater management. In Chapter 2, the country profiles on water environmental management in the WEPA countries are updated. The WEPA partner countries from ASEAN featured in this third edition are the same as before (see the 2012 and 2009 editions, cited above).

**D. MARINE**

**Chua Thia-Eng and Garces Len R., *Waste Management in the Coastal Areas of the ASEAN Region: Roles of Governments, Banking Institutions, Donor Agencies, Private Sector and Communities* (Ministry of the Environment and Canada-ASEAN Centre and Asian Development Bank and International Center for Living Aquatic Resources Management on behalf of the Association of Southeast Asian Nations/United States Coastal Resources Management Project, Philippines, 1992)**

This book is a compilation of the proceedings of the Conference on Waste Management in the Coastal Areas of the ASEAN Region held in Singapore on 28-30 June 1991, which culminated in the adoption of the Singapore Resolution on Waste Management in the Coastal Areas of the ASEAN Region. Session 1 involved a discussion into the status, trends and problems of waste management in the ASEAN Region, Session 2 concerned waste management options. Session 3 analysed the economic implications and the role of political leadership and government in waste management. Session 4 addressed the role of international agencies, international banking institutions and privatisation of waste management. The final session discussed the role of non-governmental organisation and the topic of public awareness and participation in waste management.

**Lyons Youna, 'Transboundary Pollution from Offshore Oil and Gas Activities in the Seas of Southeast Asia', *Transboundary Environmental Governance: Inland, Coastal and Marine Perspectives* (Ashgate Publishing, 2012)**

The book, edited by Robin Warner and Simon Marsden, traverses key aspects of transboundary environmental law and policy and analyses their implementation in Asia, Australasia and areas beyond national jurisdiction, including Antarctica. The chapter (Chapter 7) by Youna Lyons is a study of the environmental governance framework that manages transboundary pollution from offshore oil and gas activities in the seas of Southeast Asia – including the South China Sea, the Gulf of Thailand, the Indonesian Sea and the Sulu-Celebes

Sea (corresponding to four Large Marine Ecosystems of Southeast Asia and hosting over 1390 offshore platforms for hydrocarbon production). The specific pollution risks which it addresses are: oil spills, drilling wastes, platform abandonment and invasive species through ballast water and biofouling. The chapter reviews the location and extent of potential transboundary pollution risk in these areas, before exploring the application of the United Nations Convention on the Law of the Sea (UNCLOS), the relevant international shipping and conservation treaties, and the impact of the fragmentation in the legal and institutional regional policy framework on the management of transboundary pollution. It should be noted that the chapter focuses on the law and institutional organisation that flows from the relevant international and regional instruments, as opposed to customary international law.

**Abdulrzaq Abdulkadir O. and Sharifah Zubaidah Syed Abdul Kader, 'Vessel-Sourced Pollution: A Security Threat in Malaysian Waters' (2014) 3(1) Journal of Sustainable Development Law and Policy 22**

Vessel-sourced pollution is identified as a major source of marine pollution, encompassing, among other things, accidental and intentional discharge of oil, chemicals and dumping. The paper examines the implications of vessel-sourced pollution, as well as how it constitutes a security threat in Malaysian waters (Part 3). The paper also examines the legal framework in Malaysia preventing discharge of oil by foreign ships, with the major enactment on pollution control being the Environmental Quality Act 1974, and highlights of the legal framework on the license for dumping oil. It demonstrates that the general scheme of the Malaysian Environmental Quality Act is control oriented, rather than geared towards preventing environmental pollution. Despite enormous regulations on marine pollution in Malaysia, the authors indicate that it is still a growing problem and that some of the legal regulation appears inadequate. To amp up enforcement, the authors recommend making knowledge of port, pollution and maritime security a requisite condition before a person may be appointed as the Director General of the Malaysian Maritime Enforcement Agency and a stiffer penalty for wanton discharge of oil in Malaysian waters.

**Effanie Nadia, 'International Law on Marine Pollution from Ballast Water' (2011) 8 Indonesian J Int'l L 249**

Marine pollution caused by ballast water, by way of introducing non-indigenous species, is one of the greatest threats to marine ecosystems. In its discussion, the paper examines policies regarding marine pollution from ballast water in some countries (Part IV), such as Singapore and the Philippines, and contains a discussion of legal and regulatory arrangements in Indonesia with respect to preventing pollution caused by ballast water (Part V). The article is also useful for readers looking for a general understanding of pollution caused by ballast water and the customary international law relating to marine pollution.

**Forrest Craig, 'State Cooperation in Combating Transboundary Marine Pollution in South East Asia' (2016) 30 Australian and New Zealand Maritime Law Journal 78**

This article outlines the major International Maritime Organisation (IMO) conventions relating to marine pollution prevention, response and compensation and examines the participation of Southeast Asian nations in these conventions. It is observed that a number of major IMO conventions have poor traction in Southeast Asia – the author focuses, in particular, on the poor participation in the Oil Preparedness, Response and Co-operation (OPRC) Convention, the Intervention Convention, the Salvage Convention and the Bunker Convention. Additionally, the author also examines how the international legal framework, including the

framework provided by United Nations Convention on the Law of the Sea (UNCLOS) facilitates and supports the conclusion of agreements in the region, with varying degrees of success. Further, the author also explores recent developments which head in the direction of providing an oil pollution preparedness and response regime, such as the regional project on Prevention and Management of Marine Pollution in the East Asian Seas (PEMSEA) and the launch of the Global Initiative for Southeast Asia (GISEA) in 2013 within which, the ASEAN Oil Spill Response Action Plan (OSRAP) had been revitalised. The author concludes by suggesting that increased reference to broader internationally agreed frameworks could help provide a minimum level of state cooperation and that Southeast Asian states should more fully embrace the IMO's conventions that address transboundary marine pollution.

**George Mary, 'Adequacy of Strait States Laws for the Control of Marine Pollution in the Straits of Malacca and Singapore' (2001) 6 Asia Pacific Journal of Environmental Law 239**

In addressing marine pollution, States are to implement rules of international law into their national legal systems – hence, in the Straits of Malacca and Singapore, the application and enforcement of these international conventions rest on their being ratified and implemented nationally by the strait States (Malaysia, Indonesia and Singapore). The author comprehensively discusses a wide range of marine pollution conventions, both of the International Maritime Organisation (IMO) and the United Nations (UN), which the strait States are required to implement. She also examines key pieces of legislation (as at July 2001) from Malaysia, Singapore and Indonesia, observing varying levels of implementation of international law rules on marine pollution, though noting also that all three States appear to be proactive in their own distinct way. This article is also helpful for readers looking for detailed exploration of the strategic, economic and environmental significance, as well as the environmental threats faced by, the Straits of Malacca and Singapore.

**Ramli Juita, 'Dumping in Malaysia Seas: An Assessment of the Present Situation vis-a-vis International Legal Regimes' (1998) 3 Asia Pacific Journal of Environmental Law 23**

The article reviews the occurrence of, as well as surveillance and enforcement measures against, marine pollution via dumping – the intentional act of disposing waste (of any form, whether generated on land or at sea) into the sea. It also discusses existing national legislation which governs the protection and preservation of the marine environment, namely the Environmental Quality Act 1974, Merchant Shipping Ordinance 1952, Exclusive Economic Act 1984 and Continental Shelf Act 1966, observing inadequacies in Malaysian law pertaining to the prevention of dumping. Notwithstanding an enhancement in surveillance and enforcement measures, the author suggests that it will be challenging to put an end to indiscriminate dumping without firm legislation to address marine pollution beyond territorial waters. Hence, the author recommends that national legislation should be supplemented by provisions of international law governing indiscriminate dumping into Malaysia's marine environment.

**Tiquio Ma. Gregoria Joanne P, Marmier Nicolas and Francour Patrice, 'Management Frameworks for Coastal and Marine Pollution in the European and South East Asian Regions' (2017) 135 Ocean & Coastal Management 65**

This paper provides a descriptive and comparative analysis of the coastal and marine pollution management frameworks in the European and Southeast Asian regions, with a focus on actions taken by France and the Philippines as parties to these regional management

frameworks. It briefly examines the drivers and pressures on the coastal and marine ecosystems of the two regions, as well as their current state. The authors highlight that in both regions, the management frameworks have been developed through regional projects and programs supported by various international and regional institutions (for instance, in the context of Southeast Asia, the UNEP, ASEAN and PEMSEA) and that these frameworks take a holistic and functional management approach, though it has been challenging for countries in the Southeast Asian region to adopt a common and legally binding policy because of the varied geographical, political, social and economic settings of these countries. In its study of the Philippines, the authors further observe that while the Philippines had been an active participant to various regional projects and programs, its ability to comply to the tasks and obligations of the relevant regional conventions has been limited by pressing domestic problems. Finally, the authors recommend that there is a need for Southeast Asian countries to move towards adopting and implementing a region-wide and legal framework for effective management of coastal and marine pollution issues.

**Tan Alan Khee-Jin, 'The Regulation of Vessel-Source Marine Pollution: Reconciling the Maritime and Coastal State Interests' (1997) 1 Singapore Journal of International & Comparative Law 355**

In this article, the author provides an overview of the regulation and control of marine pollution caused by operational discharges of oil and oily ballast. Further, it explores the relationship between such vessel-source marine pollution and the jurisdiction exercised over vessels by the flag, coastal and port states, and assesses the competing interests of the maritime states in promoting freedom of navigation on the oceans and of the coastal states in securing marine environmental protection. The author argues that while flag state jurisdiction remains highly relevant in regulating vessel-source pollution (in the international regulatory regime), demands by coastal states for greater competence should be accommodated as far as they do not unduly inhibit maritime commerce. The role of the port state control mechanism is then explored as an alternative to flag and coastal state enforcement. In particular, there is some discussion of the Memorandum of Understanding on Port State Control in the Asia Pacific Region in December 1993, signed by 17 nations including Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam.

**Valencia Mark J and Jaafar Abu Bakar, 'Environmental Management of the Malacca/Singapore Straits: Legal and Institutional Issues' (1985) 25 Natural Resources Journal 195**

This article explores the transnational institutional and legal issues hampering cooperation in environmental management and hence, the effectiveness of management strategies employed in the region. There is detailed exploration of the environmental policies and regulations existing within the three nations at the time, as well as national and regional contingency plans (in the event of an oil spill). With regards to legal issues, the authors also discuss the failure to harmonise legal regimes, differing coastal state perspectives, and legal issues that might arise from a proliferation of individual national regimes (as opposed to the adoption of a regional scheme). Additionally, the authors make several institutional suggestions, including that the Straits states should implement the relevant provisions of the Law of the Sea Convention, harmonise their practices and pollution control regulations, develop a joint contingency plan and establish a Compensation Fund. They also consider the formation of a tripartite, regional organisation committed to managing the activities and uses of the Straits and making recommendations to the three governments for further action.

**Valencia Mark J., *Marine Pollution Management in the Malacca/Singapore Straits: Lessons Learned*, 1998)**

This report was prepared by Dr Mark J Valencia and published by the Global Environment Facility, the United Nations Development Programme, the International Maritime Organisation (“GEF/UNDP/IMO”) Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas, as part of the Malacca Straits Demonstration Project. The main focus of the report is on the cooperation between Indonesia, Malaysia and Singapore (collectively referred to as the “Straits States”) and the extra-regional user States, though it includes discussion on the lessons learned and needs for policy coordination amongst the three Straits States. It is divided into six sections, covering “Institutional Arrangements” (which analyses national, regional and international arrangements; their mode of operation and effectiveness of such arrangements), “Legislation and Agreements”, “Financial Mechanisms” (which reviews the economic instruments and practices established and implemented locally, nationally and regionally), and “Facilities and Services” (which identifies the relevant collaborative arrangements between the Straits States on issues such as standards, guidelines, regulations and controls for both navigational safety and marine pollution measures). It examines prospective accomplishments, as well as obstacles or issues to be resolved, for instance the absence of internationally agreed frameworks or principles to promote cooperation in the control of land-based pollutants as well as the philosophical dilemma between the principles of freedom of navigation and polluter pays, among many others. The report also proposes, in its conclusion, several recommendations for improved programs and a coordinating framework for pollution risk management for the Malacca/Singapore Straits.

### **E. LAND**

**Li Ping, Feng Xinbin, Qiu Guangle, Shang Lihai and Li Zhonggen, 'Mercury pollution in Asia: a review of the contaminated sites' (2009) 168 *Journal of Hazardous Materials* 591**

This review article describes the mercury contaminated sites in Asia, and highlights the contributions to anthropogenic mercury. Mercury has various emission source categories including, *inter alia*, mining, coal combustion and the chemical industry. While the study focuses on data throughout Asia, it includes mercury contaminated sites in Philippines and Indonesia in Sections 2.3 and 2.6 respectively. The example of the Philippines raises the alarming finding of mercury pollution in rice paddy fields in the Naboc area. The authors advocate for better estimates of mercury pollution, as well as feasible control and remedial techniques, so that Asia can reduce its mercury emission and pollution.

**Manaf Latifah Abd, Samah Mohd Armi Abu and Zukki Nur Ilyana Mohd, 'Municipal Solid Waste Management in Malaysia: Practices and Challenges' (2009) 29 *Waste Management* 2902**

The study aims to evaluate the generation, characteristics and management of solid waste in Malaysia. Describing the management of municipal solid waste as one of Malaysia’s most critical environmental issues, the paper provides an overview of the solid waste management practices at the time, with an overt focus on municipal solid waste management, and discusses prospective challenges. Among other things, the authors note the efforts to improve environmental protection and integrate the existing solid waste management system as part of “Vision 2020”, as well as identify challenges such as the problem of uncontrolled dumping, as well as the need to improve the design, location, size and management of disposal sites.

**Shekdar Ashok V, 'Sustainable Solid Waste Management: An Integrated Approach for Asian Countries' (2009) 29 Waste Management 1438**

This paper examines the state of solid waste management across different Asian countries (including Japan, China, Malaysia, Thailand, Indonesia and Singapore), evaluates issues connected to the sustainability of solid waste management and discusses future trends. The author also proposes a framework, comprising of a multi-pronged integrated approach and action plan, so as to achieve sustainable solid waste management. In relation to this framework, the author makes various recommendations with respect to national policy and the necessary legal framework, the appropriate institutional arrangements, appropriate technology, operational and financial management, as well as public awareness and participation.

**Spoann Vin, Fujiwara Takeshi, Seng Bandith and Lay Chanthy, 'Municipal Solid Waste Management: Constraints and Opportunities to Improve Capacity of Local Government Authorities of Phnom Penh Capital' (2018) 36(10) Waste Management & Research 985**

This article examines the state of solid waste management in Phnom Penh city and evaluate the capacity and performance of local government authorities, revealing the main challenges and constraints in this regard. The technical, environmental, organisational, economic, socio-cultural and policy and legal dimensions of municipal solid waste management are explored by the authors. The article also discusses the factors affecting the performance of local government authorities, and proposes various possible mechanisms and strategies in order to improve the prevailing system. It is suggested that solid waste management is a severe issue in Cambodia, concluding (among other things) that the existing institutional capacity and operational performance is deficient, and that the prevailing system of municipal solid waste management lacks environmental as well as financial sustainability.

**Tran Chung Duc and Salhofer Stefan Petrus, 'Analysis of Recycling Structures for E-waste in Vietnam' (2018) 20 Journal of Material Cycles and Waste Management 110**

This study provides a broad picture of the current situation of waste of electronic and electrical equipment (e-waste) management. It begins by outlining the challenges faced in e-waste management, such as challenges arising from Vietnam's geographical location, lack of specific e-waste legislation and the dominant role of the informal sector in e-waste collection, transportation and treatment. Combining data obtained (from sources such as published journals and reports from institutes and the government) and interviews, the authors provides insights into the sources, collection and treatment of e-waste in Vietnam. Further, the authors provide a broad comparative analysis of e-waste recycling activities, comparing Vietnam's legal framework, generation of e-waste and e-waste treatment activities with that of industrialised economies and emerging countries in Asia.

**Zarcinas Bernhard A., Ishak Che Fauziah, McLaughlin Mike J. and Cozens Gill, 'Heavy metals in soils and crops in Southeast Asia 1. Peninsular Malaysia' (2004) 26 Environmental Geochemistry and Health 343, and**

See below.



**Zarcinas Bernhard A., Pongsakul Pichit, McLaughlin Mike J and Cozens Gill, 'Heavy metals in soils and crops in Southeast Asia 2. Thailand' (2004) 26 Environmental Geochemistry and Health 359**

Zarcinas et al. made two empirical scientific studies on heavy metal uptake by major crops in Peninsular Malaysia and Thailand respectively. The two papers analysed crop samples for elements including arsenic, copper, mercury and lead. They explain the prevalence of heavy metals as a result of industrialization and as a result of agricultural fertiliser and pesticide use. With the results, the authors suggest that the 95th percentile heavy metal concentrations can be used as 'investigation levels' for metals in soils in both Malaysia and Thailand. Soils with element concentrations above investigation concentrations are likely to have been contaminated due to addition of metals in fertilizers. The papers advocate for further assessments to potential risks to humans or the environment if the contamination continues.

**Zhao Shuqing, Peng Changhui, Jiang Hong, Tian Dalun, Lei Xiangdong and Zhou Xiaolu, 'Land use change in Asia and the ecological consequences' (2006) 21(6) Ecological Research 890**

This paper reviews the pervasive land use changes in Asia due to agricultural intensification, deforestation, freshwater habitat degradation and urbanization. Furthermore, the authors evaluate the role of land use changes and their ecological consequences. One finding was that the expansion of agricultural land use resulted in a serious degradation of soil on 27% of the total land in South and Southeast Asia, as well as pollution of groundwater due to use of fertilizers and pesticides. The paper captures land use changes throughout Asia, it does not provide quantitative details on land pollution specific to ASEAN. Nevertheless, the authors lend direction to greater research on sustainable land use planning for further study.

**Van Lynden GWJ and Oldeman LR, *The Assessment of The Status of Human-induced Soil Degradation in South and Southeast Asia*, 1997**

This 1994-1997 study summarizes the findings on human-induced soil degradation in South and Southeast Asia. Chapter 2 outlines study methodology and causative factors of soil degradation, including, inter alia, agricultural and industrial activities. The results and discussion, in Chapters 3 and 4 respectively, contend that chemical degradation is nearly a result of improper management of cultivated land. However, the authors recognize the limitations of the data collected on the subject matter. Overall, the report concludes in Chapter 5 that loss of productive function due to urbanization, industrialization, and infrastructure development are underrated in considering all forms of degradation.

## VII. POLLUTION-RELATED CONVENTIONS AND THEIR STATUS IN SINGAPORE AND THE ASEAN REGION

*The below is a table showing the conventions relevant to environmental pollution and the status of ratification / accession by each ASEAN member state. The conventions are briefly described below:*

### A. INTERNATIONAL AGREEMENTS ON TRANSBOUNDARY POLLUTION

#### **Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal 1989 (Basel 1989)**

The Basel Convention regulates and restricts the movement of hazardous waste between States. Based on the concept of prior informed consent, it requires that, before the export of any hazardous waste takes place, the authorities of the State of export notify the authorities of the prospective States of import and transit. The movement may only proceed if and when all States concerned have given their written consent.

- **Basel Ban Amendment 1995 (Basel Ban Amd 1995) - *not in force yet*.** This amendment bans the export of any hazardous waste from Liechtenstein, member states of the Organisation for Economic Co-operation and Development (OECD) and member states of the European Community (EC, now the European Union (EU)) countries to non-OECD countries.

#### **Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade 1998 (Rotterdam 1998)**

The Rotterdam Convention creates a system in which a chemical can be surfaced for inclusion on a list in Annex III. One notification from each of two specified regions triggers consideration of addition of a chemical to Annex III of the Convention. Severely hazardous pesticide formulations that present a risk under conditions of use in developing countries or countries with economies in transition may also be proposed for inclusion in Annex III. Once a chemical is included in Annex III, a "decision guidance document" (DGD) containing information concerning the chemical and the regulatory decisions to ban or severely restrict the chemical for health or environmental reasons, is circulated to all States parties. States parties can decide whether to allow, restrict, or ban the importation of chemicals listed in the treaty, and exporting countries are obliged to make sure that producers within their jurisdiction comply with the decision of the destination country.

#### **Convention on Persistent Organic Pollutants 2001 (Stockholm 2001)**

The Stockholm Convention creates a system in which a persistent organic pollutant (POPs) can be surfaced for inclusion on a list. These POPs are then classified into Annex A (for elimination); Annex B (for restriction of production, use, import and export); or Annex C (for the

reduction or elimination of releases from unintentionally produced Annex C POPs). States parties are required to take steps to eliminate Annex A and C POPs; as well as to restrict Annex B POPs to the specific conditions provided.

### **Minamata Convention on Mercury (Minamata 2013)**

The Minamata Convention on Mercury is a global treaty to protect human health and the environment from the adverse effects of mercury. This includes provisions banning new mercury mines and the phase-out of existing ones, the phase out and phase down of mercury use in a number of products and processes, control measures on emissions to air and on releases to land and water, and the regulation of the informal sector of artisanal and small-scale gold mining. The Convention also addresses interim storage of mercury and its disposal once it becomes waste, sites contaminated by mercury as well as health issues.

## **B. INTERNATIONAL AGREEMENTS ON THE PROTECTION OF THE OZONE LAYER**

### **Convention for the Protection of the Ozone Layer 1985 (Vienna 1985)**

This convention formed the framework for the reduction and eventual elimination of substances which deplete the ozone layer. The **Montreal Protocol 1987** to this convention set out the first group controlled chlorofluorocarbons (CFC) substances. These were to be phased out from consumption by State Parties. That list also formed the nucleus for the phase-out list of substances.

- The **London Amendment 1990** introduced a second group of CFCs, as well as adding carbon tetrachloride (CCl<sub>4</sub>) and methyl chloroform (C<sub>2</sub>H<sub>3</sub>Cl<sub>3</sub>) to the phase-out list. A financial mechanism (the Multilateral Fund) was also set up here to provide financial and technical co-operation, to developing countries.
- The **Copenhagen Amendment 1992** introduced certain hydrochlorofluorocarbons (HCFCs), hydrobromofluorocarbons (HBFCs), and methyl bromide (CH<sub>3</sub>Br) into the phase-out list.
- The **Montreal Amendment 1997** required States to establish and implement a system for licensing the import and export of new, used, recycled and reclaimed substances listed in the Protocol. This also includes the ban of all trade between States after the phase-out date for each substance, except for destruction.

- The **Beijing Amendment 1997** introduced bromochloromethane (CH<sub>2</sub>BrCl) to the phase-out list.
- The **Kigali Amendment 2016** introduced certain hydrofluorocarbons (HFCs) to the phase-out list, and revised the CFCs and HCFCs on the phase-out list as well. The phase-out of the HFCs in the Kigali Amendment is expected to reduce global warming by 0.4 deg C.

### **C. INTERNATIONAL AGREEMENTS ON MARINE POLLUTION**

#### **International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978 (MARPOL 73/78)**

The MARPOL Convention was adopted on 2 November 1973 at IMO. The Protocol of 1978 was adopted in response to a spate of tanker accidents in 1976-1977. As the 1973 MARPOL Convention had not yet entered into force, the 1978 MARPOL Protocol absorbed the parent Convention. The combined instrument entered into force on 2 October 1983.

The MARPOL Convention covers most forms of marine pollution by ships caused by their operation by preventing and eliminate the pollution of the seas from the following shipborne sources. MARPOL takes a modular approach to ship-source marine pollution, with separate annexes for each type of pollution. Save for Annexes I and II, which are mandatory, Annexes are added to the Convention by way of Amendments, which allows State parties some flexibility in which Annexes they ratify. However, the ratification of the Annex by a State party binds it to technical adjustments within each Annex as they come onboard.

- Annex I: Prevention of pollution by oil & oily water
- Annex II: Control of pollution by noxious liquid substances in bulk
- Annex III: Prevention of pollution by harmful substances carried by sea in packaged form
- Annex IV: Pollution by sewage from ships
- Annex V: Pollution by garbage from ships
- Annex VI: Prevention of air pollution from ships

#### **Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London 1972)**

To prevent and eliminate the pollution of the seas by deliberate disposal at sea of waste from vessels, aircraft, and platforms. The Convention creates two lists: a black list for waste materials which dumping is prohibited (Annex 1); and a grey list for those waste materials are allowed under restricted circumstances (Annex 2).

- **London Protocol 1996:** This protocol reverses the Convention's approach by creating a white list (in Annex 1 to the Protocol) which can be dumped in the ocean, subject to a waste assessment (Annex 2 to the Protocol). It also bans incineration at sea except in cases of emergency.

#### **International Convention on Civil Liability for Oil Pollution Damage 1992 (CLC 1992)**

The convention introduces strict liability for owners of oil tankers. This amount is capped based on the gross tonnage of the tanker. This is supported by the mutual insurance funds created by State Parties (**FUND 1992, and FUND Protocol 2003**) and financed by levies on certain types of oil carried by sea. The levies are paid by entities which receive the oil, and not by State governments.

#### **International Convention on Oil Pollution Preparedness, Response and Co-operation 1990 (OPRC 1990)**

This convention establishes measures for dealing with oil pollution incidents at sea on a national and international level.

- The **OPRC-HNS Protocol 2000** extends the applicability of the convention to Hazardous and Noxious Substances (HNS).

#### **International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea 1996 (HNS 1996) - *not in force yet***

This convention establishes compensation for damages caused by HNS pollution (whether in bulk or in packaged form) at sea. This, like the CLC model, comes in two parts: shipowner's strict liability, and a Fund which is financed by contributions from receivers of HNS transported by sea. The **HNS Protocol 2010** abolishes contributions to the Fund for packaged HNS goods, and increases the strict liability compensation amount paid by the shipowner for packaged HNS goods.

#### **International Convention on Civil Liability for Bunker Oil Pollution Damage 2001 (Bunker 2001)**

This convention provides for compensation for bunker oil spills (ie. fuel used to power the ship, and not transported as cargo). Unlike the CLC 1992, there is no supporting mutual fund.

#### **International Convention on the Control of Harmful Anti-fouling Systems in Ships 2001 (AFS 2001)**

This convention prohibits the use of certain anti-fouling paints and systems on ships which contain substances harmful to marine life.

#### **ASEAN Agreement on Transboundary Haze Pollution 2002 (See section IV-A above)**

### **Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin 1995 (Mekong Agreement 1995)**

This Agreement relates to the sustainable use of the lower half of Mekong River (the section flowing through, Laos, Thailand, Cambodia, and Vietnam). As such, the contracting states are limited to these four ASEAN nations. The Mekong Agreement forms the framework for co-operation between the States parties for issues relating to the Mekong River, including the use of the water for navigation, irrigation/consumption, and hydropower. It also provides a platform for co-operation with China and Myanmar, where the upper half of the river is situated. The Agreement included the establishment of the Mekong River Commission (MRC). The MRC is a technical body which advises the State parties on the sustainable use and development of the river.

From there, the States parties further adopted “procedures” (ie procedural rules) to facilitate co-operation and monitor the health of the river:

- Procedures for Data and Information Exchange and Sharing (2003)
- Procedures for Water Use Monitoring (2003)
- Procedures for Notification, Prior Consultation and Agreement (2003)
- Procedures for Water Quality (PWQ) (2011)

The latter is of significance to the water pollution aspect of the Mekong River – it establishes a cooperative framework for the maintenance of acceptable water quality to promote the sustainable development of the Mekong River Basin. The PWQ envisages the development and adoption of a set of Technical Guidelines for Implementation of the Procedures for Water Quality. These are reflected in the MRC Water Quality Indices (as reported in the MRC’s 2016 Lower Mekong Regional Water Quality Monitoring Report) which combine the results of several parameters (as measured from monthly samples at various sites along the Mekong River) into one overall value describing the water quality, which were adopted in 2013:

- Water Quality Index for the Protection of Aquatic Life (WQIal)  
Parameters measured: pH (acidity/alkalinity) level, electrical conductivity, ammonium concentration, dissolved oxygen concentration levels, nitrite and nitrate concentration levels, and phosphorus concentration levels.
- Water Quality Index for the Protection of Human Health (WQIhh)  
Parameters measured: same as WQIal, but with the addition of more tests for organic compounds in water, as measured by chemical oxygen demand levels, and biochemical oxygen demand levels. Phosphorus concentration levels are omitted here.







Protocol 2010*										
OPRC-HNS 2000	N	N	N	N	Y	N	N	Y	N	N
Bunker 2001	N	N	Y	N	Y	Y	N	Y	N	Y
AFS 2001	N	N	Y	N	Y	N	Y	Y	N	Y
Regional / Sub-regional agreements amongst ASEAN members										
ASEAN Haze 2002	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mekong Agreement 1995	Not relevant	Y	Not relevant	Y	Not relevant	N (but is a "Dialogue Partner)	Not relevant	Not relevant	Y	Y

\* = not in force yet

