



Asia - Pacific Centre for Environmental Law

WORKSHOP

on

**URBAN AND INDUSTRIAL ENVIRONMENTAL MANAGEMENT:
THE SINGAPORE MODEL**

**Seminar Room 4-3
Blk B, Level 4
Faculty of Law
National University of Singapore**

9 -15 December 2009

Organised by

ASIA-PACIFIC CENTRE FOR ENVIRONMENTAL LAW (APCEL)

TENTATIVE PROGRAMME

**Emeritus Prof Koh Kheng Lian: Workshop Director
Director, Asia-Pacific Centre for Environmental Law
Email: [lawkohkl@nus.edu.g](mailto:lawkohkl@nus.edu.sg)**

**The programme is accurate at the time of printing, but APCEL reserves the right to amend
the programme as it deems fit**

Theme: Urban and Industrial Environmental Management (Cum Field Trips): The Singapore Model

Purpose

To build capacity in urban and industrial environmental management

Objectives

- To enable administrators and managers of urban and industrial environmental management to learn and exchange experiences and techniques in urban and industrial management with participants from various developing countries in the world
- To promote awareness and understanding of the issues in urban-industrial environmental management and to initiate a policy dialogue and formulate strategies on urban industrial environmental management, including issues in compliance and enforcement
- To enhance the capacity of participants to meet the challenges of continued growth and environment pressures, taking the experience of Singapore as a model in some areas such as land use planning, nature conservation, air pollution, waste management, wastewater, sewage and pollution management, and control of freshwater quality in an urban setting
- To develop networks and partnerships among participants
- To examine the ASEAN strategies and plans of action relating to urban and industrial environmental management as an example of sub-regional efforts

Participants

- The workshop is targeted at a defined group of participants with a proven need for such training
- Participants should be in a position to pass on their knowledge formally or informally after the course. In other words, there should be a multiplier effect to the course

Day 1, Wednesday, 9 December 2009

0815 hrs – 0830 hrs

Registration

0830 hrs – 0900 hrs

Opening Ceremony

Welcome: Prof Koh Kheng Lian (Director, APCEL)

Address by MFA:

Video Presentation on the Singapore Cooperation Programme

Group Photo-taking session

0900 hrs – 0915 hrs

Tea Break

0915 hrs – 0930 hrs

Introduction of Participants

0930 hrs – 1245 hrs

**Session 1: Singapore's Eco-City: City in the Garden,
Sustainable Living and the Ecological Footprint**

Singapore is unique in Southeast Asia in that it is the only fully urbanised country by virtue of its city-state status. Hence Singapore's environmental management is simultaneously national and urban. The Singapore government, a product of the longest serving ruling party (People's Action Party) since independence in 1965 has tackled urban issues and challenges over the decades through landscape modifications, maintenance of public hygiene, environmental adaptations and public civic behavioural programmes. The pillars of Singapore's urban success story lies in urban planning, pragmatic policies, legal enforcements and the tackling of brown issues. My contention is that cities are human engineered, built environments and hence should be governed by the laws of human society and not left to the laws of nature. Singapore's Garden City or City in the Garden mandate is testimony to a human contrived, constructed and manicured landscape which bears strong anthropocentric influences. Secondly, my thesis is that Singapore needs to accept the reality of dual urban systems: the firm centre or formal economy and the bazaar and informal economy which operate simultaneously and undergird environmental outcomes. The secret of Singapore's urban success story lies in its public housing programme that houses 83% of Singapore's population and hence provides clean water, efficient garbage disposal and modern sewerage systems that ensures a clean, hygienic and liveable environment. When Singapore's Ministry of the Environment was established in 1972 there were barely five countries in the world that had similar ministries, which demonstrates the far sighted vision of the government. However, unlike other environmental ministries that deal with green issues, Singapore's Ministry of the Environment effectively deals with the "clean and brown issues" of Singapore. It is quite another story if we were to measure Singapore's environmental success by looking at its green issues (preservation of biodiversity) and the ecological footprint. Given that the City-state has no natural resources and

produces barely 5% of its food, it is understandable that the sustainability of Singapore's 4.9 million population requires an ecological footprint possibly 30 to 40 times larger than its current 702 sq km of land area to maintain its current standards of living and quality of life. Hence the success of Singapore as an Eco-City lies in its effective and efficient intra-urban environmental management; but given its urban status, its affluent society, and export orientated economy, Singapore's extra-urban tract record will continue pose challenges for its development and its ecological footprint is unlikely to be easily reduced.

Resource Person: Assoc Prof Victor SAVAGE,
Department of Geography, Faculty of Arts &
Social Sciences, NUS

Chairperson: Prof KOH Kheng Lian

1245 hrs – 1345 hrs

Lunch

1345 hrs – 1500 hrs

Session 2: International Protection of the Atmosphere and Climate Change

Fossil fuels (coal, oil and gas) have been a source of energy to power machines since the beginning of the industrial age. As these fuels burn they emit a variety of gases which form a blanket of gases acting like greenhouse trapping the sun's heat and warming the planet earth.

Global warming is a great threat to the atmosphere and consequently to human life. Scientists warned the Kyoto global climate change conference in 1997 that if no actions are taken to curb greenhouse gas emissions, global temperatures and sea levels will rise, causing havoc to earth, particularly in developing countries which would be most susceptible to the effects of climate change in terms of human health, ecological systems, and socio-economic sectors.

Even though the international community has been concerned with global warming for over a century it was only in 1992, 154 countries signed the United Nations Framework Convention on Climate Change (FCCC) at the UN Conference on Environment and Development at Rio de Janeiro. In ratifying the FCCC the developed countries agreed to reduce greenhouse gas emissions to the 1990 levels by year 2000. Developing countries do not bear the same obligations. The FCCC, without setting any set specific emissions limitations, required the developing countries to report on their emissions. The Convention came into force in 1994.

In December 1997, 160 nations agreed on the Kyoto Protocol calling for emissions reductions relative to the 1990 levels, for carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). At the end of Kyoto meetings, industrial

countries had agreed to cut their CO2 emissions by 5% below levels by 2012.

The Protocol is now in force but expires in 2012. The Conference of Parties is meeting in Copenhagen, Denmark, 7-18 December 2009 to work out a treaty for emission reduction mechanism after 2012.

This presentation examines the international efforts in saving the atmosphere by mitigating global warming.

Resource Person: Penna LAKSHMIKANTH R,
Advocate & Solicitor, Associate Member,
APCEL, NUS

Chairperson: Emeritus Prof KOH Kheng Lian

1500 hrs – 1515 hrs

Tea Break

1515 hrs – 1615 hrs

Session 3: Addressing Environmental Issues through Land Use Planning

Urban Planning, as an activity of purposeful anticipation of and provision for the future, presents the best opportunity to address critical environmental concerns at the early stages of development programming. This presentation traces the principles and philosophies governing the key planning instruments in Singapore, namely, the strategic Concept Plan, and the statutory Master Plan, and considers how environmental concerns are addressed, in tandem with concerns such as economic growth and social development. Apart from examining spatial strategies, the presentation will include a discussion of major regulatory approaches to pre-empt incompatible, sub-optimal and environmentally harmful land uses, and as well as an exploration of supportive mechanisms that facilitate plan implementation in a market-driven economy.

Resource Person: Dr MALONE-LEE Lai Choo,
Director, Centre for Sustainable Asian Cities,
School of Design & Environment, NUS

Chairperson: Prof KOH Kheng Lian

1615hrs – 1730 hrs

Session 4: Singapore's Overall Environmental Strategy

- (a) Clean, Green and Blue - Singapore's Journey Towards Environmental and Water Sustainability
- (b) The Inter-Ministerial Committee for Sustainable Development (IMCSD) Blueprint for Singapore

Guest Speaker: Ms Diana Ng,
Policy Executive, Strategic Policy Division

Q & A

Chairperson: Prof KOH Kheng Lian

Day 2, Thursday, 10 December 2009

0900 hrs – 1045 hrs

Session 5: Waste Management

- Integrated waste management planning
- Waste management infrastructure
- Waste management policy, institutional aspects, and regulations

This session provides an overview of the solid waste management system in Singapore. Principles of sustainable urban waste management planning are defined, including the waste management hierarchy, integration of institutional matters and infrastructure, costs, and the importance of systems that are appropriate to the unique local situations. The key waste management facilities and infrastructure in Singapore are presented, including collection systems, incinerators, landfills, and recycling facilities, including issues such as capacity and cost. The latter half of the presentation is devoted to the institutional issues that are essential for a workable, cost effective waste management system. These include methods of private sector participation, regulations and enforcement, tariffs and charging, arrangements between the regulator and operator, and other issues.

Resource Person: Mr Richard C. REIDINGER,
Regional Director - Business Development,
AECOM Environment in Asia

Participants' Presentation on Waste Management

Q & A

Chairperson: Prof KOH Kheng Lian

1045 hrs – 1115 hrs

Tea Break

1115 hrs – 1300 hrs

**Session 6: Hazardous Waste Management (including
Bio-Hazardous Waste)**

Hazardous waste is a by-product of industrial processes (solvents, wastewater sludge, etchants, etc), commercial activities (vehicle oil changes), institutions (medical waste, R&D waste), and even households. A comprehensive regulatory, institutional, and

infrastructure framework is required to strictly manage these diverse and dangerous materials. Improper management of hazardous waste has resulted in serious environmental pollution, land contamination, and population health problems in many countries around Asia.

Singapore has one of the most advanced hazardous waste management systems in Asia. The government controls hazardous waste through a combination of regulation (Toxic Industrial Waste Regulations), administrative control, and strict enforcement. The entire value chain, including generation, transport, treatment, and final disposal, is managed. All hazardous waste infrastructure in the country is privately owned and operated, and a private market for hazardous waste services prevails which ensures efficient prices and services. Hazardous waste methods used in Singapore include incineration, solvent recycling, stabilization, oil recycling, and physical-chemical treatment.

Resource Person: Mr Richard C. REIDINGER

Participants' Presentation on Hazardous Waste Management

Q & A

Chairperson: Prof KOH Kheng Lian

1300 hrs – 1400 hrs

Lunch

1400 hrs – 1530 hrs

Session 7: Basel Convention on the Transboundary Movement of Toxic Wastes

We will examine how the international community has addressed the problem of the transboundary movement of hazardous waste through an examination of the 1989 Basel Convention on the Transboundary Movement of Hazardous Waste. We will examine why the Convention was necessary and how it attempts to regulate the transboundary movement of hazardous waste through principles such as “prior informed consent”. We will also examine the mechanisms and provisions in the Convention which are designed to encourage developing countries to ratify and implement the convention, and the mechanisms established in the Convention to keep it updated and to encourage states to effectively implement its provisions. We will also examine the steps taken by Singapore to implement the Convention and make it part of Singapore’s national law. Finally, we will examine the role played by international NGOs such as Greenpeace and the Basel Action Network in promoting the international regulation of hazardous wastes.

Our study of the Basel Convention provides an example of the major provisions and schemes that are found in many of the major international treaties on the environment, which are often referred to as Multilateral Environmental Agreements (MEAs).

Resource Person: Mr Richard C. REIDINGER

Participants' Presentation on Basel Convention

Q & A

Chairperson: Prof KOH Kheng Lian

1530 hrs – 1600 hrs

Tea Break

1600 hrs – 1730 hrs

Session 8: Greening the Urban Environment: National Parks Board (NParks)

Guest Speaker: Mr Simon LONGMAN,
Director/Streetscape, NParks

Chairperson: Prof KOH Kheng Lian

Day 3, Friday, 11 December 2009

0900 hrs – 1000 hrs

Session 9: Air Pollution Management – The Singapore Experience

- (a) Control of Air Pollution from Industrial Sources
- (b) Control of Air Pollution from Mobile Sources

Air pollution management – the Singapore Experience
This session discusses Singapore's management of air pollution – it gives an overview of the control of air pollution from industrial and mobile sources and the laws that apply.

Resource Person: Assoc Prof LYE Lin Heng,
Deputy Director, APCEL; Chair, MSc (Env Mgt) program, NUS

Q & A

Chairperson: Prof KOH Kheng Lian

1000 hrs – 1015 hrs

Tea Break

1015 hrs – 1115 hrs

Session 10: Transport-Based Air Pollution Management

- (a) Singapore's Experience – Traffic Planning
- (b) Experience of other Countries
(Participants' Inputs)

This session elaborates on Singapore's management of air pollution control via controls on vehicular traffic. It looks at the implementation of the "polluter pays" principle in the system of control of car sales via the certificate of entitlement (COE); in the imposition of charges for entry into the central business area, and for use of certain expressways during peak hours; and the imposition of taxation for use of the roads.

Resource Person: Assoc Prof LYE Lin Heng

Participants' Presentation on Air Pollution Management

Q & A

Chairperson: Prof KOH Kheng Lian

1115 hrs – 1245 hrs

Session 11: The Role of ASEAN in Urban and Industrial Environmental Management and Governance- Focus: "Adaptation to Climate Change in Cities What Role can ASEAN Play?"

ASEAN, the Association of South East Asian Nations, was established in 1967. Its five founder members are Indonesia, Malaysia, Philippines, Singapore and Thailand, subsequently joined by Brunei, Cambodia, Laos, Myanmar and Vietnam. This workshop will consider some ASEAN environmental instruments relating to urban and industrial environmental management and governance. It will focus ASEAN's current and potential role on adaptation to climate change.

Resource Person: Prof KOH Kheng Lian

Q & A

Chairperson: Prof KOH Kheng Lian

1245 hrs – 1330 hrs

Lunch

1330 hrs – 1410 hrs

Session 12: Singapore's Sustainable Energy Strategy

Guest Speaker: (to be confirmed)

1410 hrs – 1500 hrs

Participants' Presentation

1500 hrs – 1515 hrs

Tea break

1515 hrs – 1645 hrs

Session 13: Legal and Policy Aspects of Green Construction: Lessons from Singapore

The construction industry is considered to be one of the major causes for air, water, and noise pollution. Further, it is said that the emission of GHG by the construction sectors is one of the main

human-induced causes of climate change. Thus, with the ever increasing focus at all levels of policy and planning on climate change mitigation and adaptation, the construction sector has been identified as one of the key industries that should be pro-active in sustainable development. This presentation will provide an overview of the legislative and policy initiatives in Singapore to promote a sustainable construction industry.

Resource Person: Asst Prof Asanga GUNAWANSA, School of Design & Environment, NUS, Associate Member, APCEL, NUS

Chairperson: Prof KOH Kheng Lian

1646 hrs – 1530 hrs

Participants' Presentation

Day 4, Monday, 14 December 2009

0900 hrs – 0945 hrs

Session 14: Wastewater Management in South-East Asia

“An Overview”

This presentation will provide an overview of the issues facing South East Asia in wastewater management using data from international development agencies - UNEP, UNESCAP, ADB and the World Bank. The presentation discusses the significant achievements of countries within the region, with a focus on Singapore, the different approaches adopted by national governments in managing wastewater, and reasons for difficulties encountered in providing satisfactory facilities and services to meet the needs of the communities they serve. The review will also cover a number of cases of wastewater treatment facilities. The contribution of private enterprise in building and operating wastewater facilities will be assessed. Difficulties encountered by this approach will be considered. Based on experiences of countries within the region, the feasibility of community-based operated wastewater treatment facilities will also be discussed.

Resource Person: Dr KOG Yue Choong,
President, East West Engineering
Consultants; Adjunct Professor, Faculty of
Engineering, NUS

Participants' Presentation on Wastewater Management

Q & A

Chairperson: Prof KOH Kheng Lian

Session 15: Water Pollution Control in Urban Catchments: A Case Study in Singapore

The quality of runoff in any water resources project is largely influenced by the activities within the catchment areas and the direct pollution load the reservoir is being subjected to. As catchment areas tend to get progressively more urbanized in terms of industrialisation, the runoff quality tends to deteriorate. When such raw water is treated, there will be additional costs incurred for infrastructure development for anti-pollution measures to be taken within the catchment area and the reservoir and also for treatment of water. These additional expenditures will lead to an increase in the production cost of treated water. The main objectives of this paper are to define the impact of urbanization and industrialization on water catchments leading to poorer runoff quality and higher treatment costs. These concepts are illustrated in a real-life case study in Singapore where the sources of pollution in an urbanizing catchment were identified and quantified.

The pollution problem was analysed thoroughly and well-defined anti pollution measures were taken over a period of time and the results monitored. It has thus been shown that it is possible to accommodate industrialisation and urbanization in large tracts of land provided an appropriate infra structure is set up to identify the pollution problems and carry out extensive analysis. Anti-pollution measures should be recommended on the sound basis of analyses of field data clubbed with appropriate administrative support from all the relevant contributing sectors. Legislation should be promulgated or amended, if necessary and, most important of all, there should be the right political will to back the technical decision makers.

Participants' Presentation on Water Quality Management

Resource Person: Dr A APPAN, Technical Adviser,
LBW Consultants, Singapore; R J Crocker,
Singapore

Q & A

Tea Break

Participants' Presentation on Wastewater Management/ Management of Freshwater Resources

Freshwater resources are becoming increasingly scarce across the region. Pollution, overuse and harmful methods of exploitation of freshwater resources are rapidly reducing their provenance. Participants have been asked to prepare short presentations on how individual countries/regions/ municipalities identify, protect, and utilize available freshwater resources. They will be required to describe their system of administration and how they interface with various interest groups (stakeholders) including the question of

level of treatment of freshwater, costs involved, technologies utilized, method of delivery and pricing, Participants will be encouraged to share their concerns and difficulties encountered and how they have been able to overcome the problems. The presentations will be followed by a Q&A session and the facilitator will guide the discussion with the view to identify and highlight lessons learnt and good practices relevant to other countries/situations.

Resource Person: Dr KOG Yue Choong

Chairperson: Prof KOH Kheng Lian

1145 hrs – 1245 hrs

Lunch

1245 hrs – 1330 hrs

Departure for Tuas South Incineration Plant

1330 hrs – 1530 hrs

Tuas South Incineration Plant

(a) Briefing on the Operations and Maintenance of Incineration Plant

(b) Tour of Incineration Plant

Mr LIM Hock Ngam
Tuas South Incineration Plant
National Environment Agency

1530 hrs – 1630 hrs

Departure for Marina Barrage

1630 hrs – 1730 hrs

Visit to Marina Barrage

Name of Person-in-charge (to be confirmed)
Public Utilities Board

Day 5, Tuesday, 15 December 2009

0900 hrs – 1015 hrs

Session 16: Compliance and Enforcement

This session discusses the challenges relating to compliance and enforcement, and how these may be resolved.

Resource Person: Assoc Prof LYE Lin Heng

Participants' Presentation on Compliance and Enforcement

Q & A

Chairperson: Prof KOH Kheng Lian

1015 hrs – 1045 hrs

Tea Break

1045 hrs – 1215 hrs

Session 17: Environmental Impact Assessment

- (a) The Potential for Strategic Environmental Assessment in Asia
- (b) The Effectiveness of EIA in Asia

Any major new development, infrastructure, or facility has the potential to impact the surrounding environment and community. EIA is the planning tool that allows the identification, quantification, evaluation, and mitigation of impacts on the environment. Other related project planning tools include Social Impact Assessment (SIA) and Quantitative Risk Assessment (QRA). Strategic Environmental Assessment (SEA) meanwhile allows for evaluation of new programs and policies, before any specific physical projects are planned.

EIA is a requirement in most Asian countries. However, EIA scope, methodology, and effectiveness varies dramatically across the region. Singapore, Malaysia, and Hong Kong are good examples of very different approaches to EIA. World Bank standard EIA is the most accepted approach internationally. The basic methodology generally includes: defining the baseline environment; describing the project; regulatory review; project alternatives; identifying emissions and releases; evaluating impacts; mitigation measures; and environmental management plan. Scope of such assessments usually include: air; water, ecology; cultural resources; waste management; contaminated land; chemical management; noise; landscape and aesthetic impact.

Resource Person: Assoc Prof Jeff OBBARD,
Division of Environmental Science &
Engineering; Associate Director, Tropical
Marine Science Institute, NUS

Chairperson: Prof KOH Kheng Lian

1215 hrs – 1245 hrs

Closing Ceremony

Closing Remarks

~End of Workshop~

Koh Kheng Lian

Director, MFA/APCEL Workshop on Urban and Industrial Environmental Management