

## 出國報告（出國類別：開會）

### 亞太地區發展與水管理研討會與展覽

(7<sup>th</sup> IWA-ASPIRE Conference 2017 & Water Malaysia Exhibitions 2017)

服務機關：經濟部水利署

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# 摘 要

本次出國係經濟部水利署「106 年度水資源作業基金出國計畫」項下之「亞太地區發展與水管理研討會與展覽」。經由經濟部核定 2 人共同赴馬來西亞參與本研討會與展覽，會議核心在於打破國界-為亞洲創造更美好的水未來，本會議著重於水革新理念、供水管理、氣候變遷對水環境的影響及最新水處理技術等，藉由專題講座、會議、研討會及論壇等安排，提供與會人員豐富交流機會，借此學習各國對於水環境、水處理與水利工程經驗，作為日後推動國內相關水利業務的參考。



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# 第壹章 目的

## 一、緣起

國際水協會(the International water association, 以下簡稱 IWA)是目前世界最主要的水務協會，屬於非營利組織，IWA 前身是國際供水協會(IWSA),成立於 1947 年；1999 年與國際水質協會(IAWQ)合併為 IWA。該機構總部位於倫敦，其他地區如北京、布加勒斯特、奈洛比、新加坡和華盛頓特區等地都設有辦事處。該工作組織的任務是將水資源專家集結成網絡，進而推進水資源的永續管理。

而本次會議「第七屆亞太地區發展與水管理研討會與展覽 (7th IWA-ASPIRE Conference 2017 & Water Malaysia Exhibitions 2017)」屬於國際水協會(IWA)於亞太地區舉行規模最大的水領域會議，每兩年舉辦一次，恰與另一國際水協會(IWA)舉行的「國際水年會」隔年召開。

台灣地狹人稠，土地開發利用率相當高，加以近年氣候變遷，旱澇不均的情況加劇，可利用之水資源將是未來面臨的重大挑戰；除此之外，如何以當前的社會發展為基礎，透過科技及管理的手段，優化水質、創造更優質的水環境，也是臺灣刻正努力的方向。透過第七屆亞太地區發展及水管理研討會與展覽匯集了來自全球的水專家，各國皆展現其所長，分享、討論驗證相關議題，希能透過本次會議掌握國際關注及面臨之重要課題，對於水事務發展趨勢有深刻之探討及瞭解，同時推廣及分享我國水利技術成果，對於業務推展及拓展國際視野具極大正面助益。

## 二、會議目標

本次會議主題訂為「打破疆界-為亞太地區發展更美好的未來(Breaking Boundaries-Developing a Better Water Future for Asia Pacific Regions)」。透過深度交流的機會，尋求國內水資源創新、革新的契機，亞太地區國家水產業及國情與我國相近，相關作法值得學期，且配合政府新南向政策，期藉此次參加研討會與展覽之機會，促進我與馬來西亞等亞太地區各國之水利交流合作，並拓展水利產業商機。

## 第貳章 行程與內容

本次行程係以參加國際水協會(IWA)於馬來西亞吉隆坡舉辦 4 天(9 月 11 日至 9 月 14 日)之「7th IWA-ASPIRE Conference 2017 & Water Malaysia Exhibitions 2017)」（第七屆亞太地區發展與水管理研討會與展覽）會議，本次行程由曹副署長率隊，於 106 年 9 月 10 日由桃園機場啟程前往吉隆坡。本次會議內容以高峰會、論壇、研討會、專家會議、觀摩導覽及商業展覽等方式進行，並且為了能更深化與馬來西亞之交流，特別規劃於第 2 天前往拜訪駐馬來西亞臺北經濟文化辦事處，以加深對馬來西亞水環境之認識，進而促進雙邊交流之機會。另安排於第 4 天前往參訪獲選聯合國最佳人民居住環境榮譽獎章並獲國家地理頻道選為偉大建築工程巡禮節目專題之一的「精明隧道系統 Stormwater Management and Road Tunnel (SMART)」，就現在及未來署內可能推動或營運之隧道工程包含施工方式、水、車同道之營運模式、維護方法...等交換意見，本次合計七天行程(如表 貳-2)。第七屆亞太地區發展與水管理研討會與展覽議程表 貳-1~4，大會現場位置圖詳圖 貳-1。

表 貳-2 第七屆亞太地區發展與水管理研討會與展覽行程表

日期	內容
9/10(日)	路程(桃園-吉隆坡)
9/11(一)	開幕式、專題演講、水庫管理研討
9/12(二)	拜訪駐馬來西亞臺北經濟文化辦事處、獲邀參與水論壇
9/13(三)	參與產業對談、展覽、專題演講、閉幕式
9/14(四)	現地參訪- 精明隧道系統 Stormwater Management and Road Tunnel (SMART)
9/15(五)	路程(吉隆坡-桃園)

本行程任務：

- (一) 參與主題研討，深入了解世界各國水資源最新技術
- (二) 與專家學者交流並與產業對談
- (三) 參訪精明隧道系統，進行業務交流

表 貳-3 第七屆亞太地區發展與水管理研討會與展覽第 1 天議程

7<sup>th</sup> IWA-ASPIRE CONFERENCE 2017 & WATER MALAYSIA EXHIBITION 2017

## Programme

(Monday) Day 1 - 11<sup>th</sup> September 2017

Time	Programme	Venue
0800-1700	Conference Registration Opening Hours	Centre Core Registration, Level 3, KLCC
0900-1000	<b>Welcome Address</b> by <b>Datuk Ir Abdul Kadir Mohd Din</b> , <i>MWA President</i> <b>Ms Diane D'arras</b> , <i>IWA President</i>  Special Address & Official Opening of 7th IWA-ASPIRE Conference 2017 <b>YB Datuk Seri Panglima Dr Maximus Johnity Ongkili</b> <i>Minister of Energy, Green Technology and Water (KeTTHA)</i> Launch of Borneo Water & Wastewater Exhibition (BWWWE) 2018, Sarawak	Banquet Hall, Level 3, KLCC
1000-1700	Water Malaysia Exhibition 2017 Opening Hours	Grand Ballroom, Level 3, KLCC
1000-1030	AM Coffee Break	Foyer, East Wing, Level 3, KLCC
1030-1045	Press Conference	Press Centre, Level 3, KLCC
1100-1145	<b>Keynote 1</b> <b>Water Sustainability 2050: From Affordability to Value Appreciation</b>  <b>YBhg Dato' Seri Ir Dr Zaini Ujang</b> <i>Secretary General, Ministry of Energy, Green Technology &amp; Water, Malaysia (KeTTHA)</i>	Banquet Hall, Level 3, KLCC
1145-1245	Session 1 ( <i>please refer to page 14</i> )	( <i>please refer to page 14</i> )
1245-1430	Networking Lunch	Conference Hall 2, Level 3, KLCC
1430-1500	<b>Keynote 2</b> <b>Water and Energy</b>  <b>Professor Gustaf Olsson</b> <i>Professor Emeritus of Lund University Sweden</i>	Banquet Hall, Level 3, KLCC
1430-1630	KeTTHA – MEWR Joint Committee Meeting (Bilateral Meeting) ( <i>By invitation only</i> )	MR 305, Level 3, KLCC
1430-1730	SPAN CEO Meeting ( <i>By invitation only</i> )	Conference Hall 3, Level 3, KLCC
1500-1615	Session 2 ( <i>please refer to page 15</i> )	( <i>please refer to page 15</i> )
1615-1730	PM Coffee Break Poster Evaluation	Foyer, East Wing, Level 3, KLCC
1730-End	Networking Reception	Foyer, East Wing, Level 3, KLCC

\*Programme is accurate at the time of printing. Organiser reserves the right to change.

表 貳-4 第七屆亞太地區發展與水管理研討會與展覽第 2 天議程

7<sup>th</sup> IWA-ASPIRE CONFERENCE 2017 & WATER MALAYSIA EXHIBITION 2017

## Programme

### (Tuesday) Day 2 - 12<sup>th</sup> September 2017

Time	Programme	Venue
0800-1700	Conference Registration Opening Hours	Centre Core Registration, Level 3, KLCC
0900-1245	Water Leaders Forum Hosted by Ministry of Energy, Green Technology and Water, Malaysia (KeTTHA) <i>(By invitation only)</i>	Conference Hall 3, Level 3, KLCC
0900-0930	<b>Keynote 3</b> <i>A Paradigm Shift of Urban Water Management for Asia Pacific Regions</i>  Professor Emeritus Saburo Matsui <i>Professor Emeritus of Kyoto University, Japan</i>	Banquet Hall, Level 3, KLCC
0930 -0945	Presentation by Japan Water Works Association (JWWA) on IWA World Water Congress 2018 Tokyo	Banquet Hall, Level 3, KLCC
0945-1000	AM Coffee Break	Foyer, East Wing, Level 3, KLCC
1000-1700	Water Malaysia Exhibition 2017 Opening Hours	Grand Ballroom, Level 3, KLCC
1000-1130	Session 3 <i>(please refer to page 18)</i>	<i>(please refer to page 18)</i>
1130-1245	Session 4 <i>(please refer to page 19)</i>	<i>(please refer to page 19)</i>
1245-1430	Networking Lunch	Conference Hall 2, Level 3, KLCC
1430-1500	<b>Keynote 4</b> <i>Kuala Lumpur Initiatives Towards Sustainable Development</i>  Datuk Hj Mohd Najib bin Hj Mohd <i>Executive Director (Planning) of City Hall Kuala Lumpur (DBKL)</i>	Banquet Hall, Level 3, KLCC
1430-1700	Water Regulators' Forum Hosted by National Water Services Commission (SPAN) <i>(By invitation only)</i>	Conference Hall 3, Level 3, KLCC
1500-1615	Session 5 <i>(please refer to page 20)</i>	<i>(please refer to page 20)</i>
1615-2000	PM Coffee Break Poster Evaluation	Foyer, East Wing, Level 3, KLCC
2000-2230	<b>Gala Dinner</b> Welcome Address by Dato' Dr Tan Yew Chong, <i>Steering Committee Chairman, Deputy Secretary General of Ministry of Energy, Green Technology and Water, Malaysia (KeTTHA)</i>  Guest of Honour: Dato' Seri Dr Ahmad Zahid bin Hamidi <i>Deputy Prime Minister of Malaysia</i>	Conference Hall 2, Level 3, KLCC

\*Programme is accurate at the time of printing. Organiser reserves the right to change.

表 貳-5 第七屆亞太地區發展與水管理研討會與展覽第 3 天議程

7<sup>th</sup> IWA-ASPIRE CONFERENCE 2017 & WATER MALAYSIA EXHIBITION 2017

## Programme

(Wednesday) Day 3 - 13<sup>th</sup> September 2017

Time	Programme	Venue
0800-1700	Conference Registration Opening Hours	Centre Core Registration, Level 3, KLCC
0900-0930	<b>Keynote 5</b> <i>Water Policy and Governance</i>  Dr Petra Pana <i>Deputy State Secretary for Foreign Economic Affairs</i> <i>Ministry of Foreign Affairs and Trade of Hungary</i>	Banquet Hall, Level 3, KLCC
0930-1000	AM Coffee Break	Foyer, East Wing, Level 3, KLCC
1000-1200	Hungary-Malaysia Innovation and Networking Forum	MR 302, Level 3, KLCC
1000-1115	Session 6 (please refer to page 22)	(please refer to page 22)
1115-1230	Session 7 (please refer to page 23)	(please refer to page 23)
1230-1430	Networking Lunch	Conference Hall 2, Level 3, KLCC
1430-1500	<b>Keynote 6</b> <i>Water Resilient Development in Hong Kong</i>  Ir Enoch TS Lam <i>Director of Water Supplies, Hong Kong</i>	Banquet Hall, Level 3, KLCC
1500-1630	<b>CLOSING CEREMONY</b> Graced by Dato' Dr Tan Yew Chong, <i>Steering Committee Chairman, Deputy Secretary General of Ministry of Energy, Green Technology and Water, Malaysia (KeTTHA)</i>  Expert Plenary Discussion Water Façade: Face to Face with the Future of Global Water  Award Presentation  Handover to 8th IWA-ASPIRE Conference 2019 Host	Banquet Hall, Level 3, KLCC
1630-1700	PM Coffee Break	Foyer, East Wing, Level 3, KLCC

\*Programme is accurate at the time of printing. Organiser reserves the right to change.

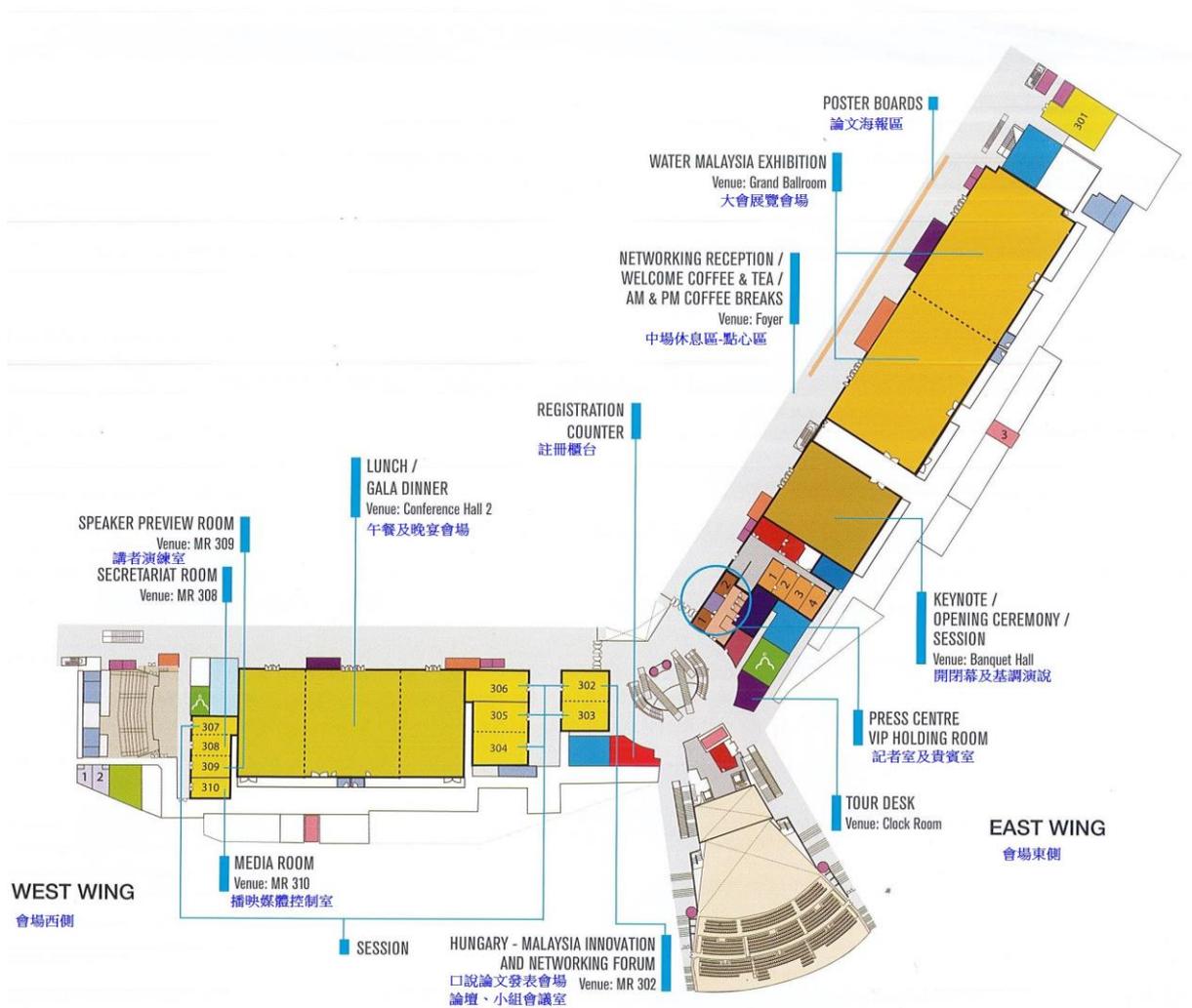


圖 貳-2 大會現場位置圖

## 一、國際水協會(IWA)簡介

國際水協會是目前全球最主要的水務協會，會員位橫跨全球 130 個國家及地區，形成了最大的國際水網絡，致力於國際重要水議題發展，其組織主要目標包含：

- (一) 以創新、解決方案為導向，領導有助於全球水管理進程之領域
- (二) 制定水及廢水處理解決方案及研究計畫
- (三) 將最新科學及技術帶入水領域並實踐
- (四) 致力於水之全球議題，發揮監管及政策制定之最佳化作法

## 二、2017 年亞太地區發展與水管理研討會與展覽

本(第 7)屆亞太地區發展與水管理研討會及展覽於 2017 年 9 月 11 日~14 日在馬來西亞吉隆坡舉行，吉隆坡為馬來西亞之首都及聯邦政府所在地，氣候屬於熱帶雨林型氣候，是馬來西亞人口最密集且最繁榮的區域，本次會議會場位於吉隆坡會展中心(Kuala Lumpur Convention Center)，是吉隆坡最著名且大型的會展中心，具有 6 個大型展覽廳、議會廳、會議室、宴會廳等，館內其他設施還包含城中城水族館、通往大型商場之地下通道以及聯外之空橋系統，所有設備皆具備國際級展覽會場之水準，本次會議將重點聚焦於亞太地區，關注不同國家所面臨之水挑戰，並尋找對應之水資源問題解決方案。



圖 貳-3 大會主題及主視覺展示

本次會議主題願景訂為「打破疆界-為亞太地區發展更美好的未來(Breaking Boundaries-Developing a Better Water Future for Asia Pacific Regions)」，會議之開幕式由馬來西亞水協會(Malaysian Water Association, MWA)主席 Datuk Ir AbdulKadir Mohd Din 與 IWA 主席 Ms Diane D'arras 致歡迎詞，並由馬來西亞能源、綠色科技及水務部部長(Minister of Energy, Green Technology and Water) YB Datuk Seri Panglima Dr Maximus Johnity Ongkili 主持開幕儀式。部長於開幕式中表示，做為負責水資源任務的首長，該機關不斷考慮長期發展之目標及策略，尋求變革及創新之方案，以提供民眾乾淨安全的飲用水，國際間良好的互動，有助於解決當局面臨之水挑戰；MWA 主席於歡迎各界蒞臨之歡迎詞中表

示亞太地區正面臨一系列之水挑戰，如何克服水管理之艱鉅挑戰，並在未來擬定調適策略，是本會議的重點，各代表們將以最新的技術及應用展示及分享，本會議為專業人士創造了寶貴且令人興奮的交流機會；IWA 主席亦表示本會議屬於亞太地區水行業之領導者，匯集政府、學術、產業等專家，因應全球不斷擴大之經濟體系及公民的健康福祉，一個安全且永續的水資源至關重要，水沒有邊界，世界之水產業也應該打破邊界進行合作，共創可持續之水未來。

為能達成本次會議重要科技交流之目的，令會議主題更為聚焦，主辦單位特別邀請 6 位來自不同國家之專家，進行專題演講(Keynote Speech)，講題與講者分別為「至 2050 年水永續發展」(YBhg Dato' Seri Ir Fr Zaini Ujang)、 「水與能源」(Professor Gustaf Olsson)、 「亞太地區城市水管理之轉變」(Professor Emeritus Saburo Matsui)、 「水政策及政府扮演之角色」(Dr Petra Pana)、 「香港水的彈性發展」(Ir Enoch TS Lam)、 「吉隆坡之永續發展」(Datuk Hj Mohd Najib bin Hj Mohd)。

整體會議以專題演講、論文發表、海報展示、研討會、專家會議、觀摩導覽以及商業展覽等方式進行，臺灣團體除本署由曹副署長華平率隊外，亦有臺北自來水事業處由陳副處長曼莉率隊等 4 人、臺灣大學駱教授尚廉、成功大學林教授財富、黃主任良銘及中華民國自來水協會胡理事長南澤及吳秘書長陽龍等單位共襄盛舉。



圖 貳-4 臺灣與會人員(本署、臺北自來水事業處、中華民國自來水協會、台灣大學及成功大學)



圖 貳-5 IWA 主席 Ms Diane D'arras 致歡迎詞



圖 貳-6 開幕典禮後與各國專家學者交流

### 三、水論壇(Water Regulators' Forum)

本署於會前特別接獲馬來西亞國家水務委員會(National Water Services Commission, SPAN)及能源、綠色科技及水務部(Ministry of Energy, Green Technology and Water, KeTTHA)邀約，於2017年9月12日參與Water Regulators' Forum；本次會議主題為「朝向彈性水服務發展」，會中匯集了政府、產業、學術等各界專家，針對水產業鏈當中經濟、科技、社會、消費者等面向，分享各國之主要政策與挑戰目標，共同討論水之永續發展與穩定水資源供給。

會中討論了10年內的水產業經濟發展計畫，應包含社會意願、經濟可行性、消費者接受度並結合最新科技發展。馬來西亞代表於討論中分享水服務產業之經驗及挑戰，未來馬國將朝向更彈性的水服務發展，透過更有效率的管理有效提升水質及水量，並發展綠能產業，同步達成環境保育之目標；澳洲學者分享在旱澇加劇的情況下，透過氣候變遷調適科技及多樣化的都市水資源發展，能夠達成安全永續之水目標並擬訂長遠水政策；菲律賓學者則是分享私營水公司失敗、轉型、成功之經驗，及如何於經濟利益及公眾利益之間取得平衡，發揮最大的社會效益。

本次會議綜合討論由水務委員會第一屆主席 Y. Bhg Dato' Teo Yen Hua 主持，以及其餘 5 位各國專家學者一同與談，為全球水事務共同擘畫出更彈性、更公眾、更以環境永續為本的服務目標。

表 貳-6 受邀參加水論壇議程

## Water Regulators' Forum

Hosted by the National Water Services Commission (SPAN)

### Theme: Towards Resilient Water Services

TIME	PROGRAMME
1430	<b>Opening Plenary &amp; Introduction</b> <i>Moderator: Y. Bhg Dato' Teo Yen Hua</i>
1440	<b>Keynote:</b> Water Sector Reforms and Effective Regulations towards Service Excellence and Water Services Resilience <i>Y.Bhg Dato' Mohd Ridhuan Ismail, CEO SPAN</i>
1500	<b>Session 1:</b> Water Services Industry in Malaysia – Experiences and Challenges <i>Y.Bhg Tan Sri Dato' Ir. Syed Muhammad Shahabudin</i>
1520	<b>Session 2:</b> The regulatory journey shaping the service providers of the future <i>Mr. Darryl Day, Managing Director of ICE WaRM (The International Centre of Excellence in Water Resources Management, Australia)</i>
1540	<b>Session 3:</b> Public-Private Partnership in the Philippine Water Sector: Lessons in Regulation <i>Dr. Joel C Yu, Chief Regulator, Metropolitan Waterworks and Sewerage System (MWSS) Regulatory Office</i>
1600	<b>Session 4:</b> The Case for Objectivity in Governance <i>Dr. Chin Yoong Kheong</i>
1620	Q&A <i>Moderator: Y. Bhg Dato' Teo Yen Hua</i> Panel: 1.Y.Bhg Dato' Mohd Ridhuan Ismail, CEO SPAN 2.Y.Bhg Tan Sri Dato' Ir. Syed Muhammad Shahabudin 3.Mr. Darryl Day 4.Dr. Joel C Yu 5.Dr. Chin Yoong Kheong
1700	Closing



圖 貳-7 各國於水論壇中分享寶貴經驗與座談

#### 四、拜訪駐馬來西亞臺北經濟文化辦事處

為能深化對馬來西亞了解，以尋求並增進未來交流之機會，特別安排於 2017 年 9 月 12 日，由本署曹副署長華平帶領本署北區水資源局、中華民國自來水協會、臺北自來水事業處、國立臺灣大學等專家學者組團前往拜會經濟文化辦事處，並配合政府新南向政策，透過強化對馬來西亞當地水文、水質、用水條件、地區差異、文化等認識，可有效促進我與馬來西亞水利交流合作並拓展水利商機。

我國近年與馬來西亞多有水利技術輸出及學術交流合作，包含臺灣水文資訊學會(淡江水資源及環工系主任張麗秋與台大生物環境系統工程學系教授張斐章合作)配合政府新南向政策，結合台灣優勢科技成果及東南亞國家防災需求，協助馬來西亞建置東部甘馬挽流域之洪水預警及防災系統，本合作案前期經費 10 萬美元已獲馬國核定，於 2016 年 8 月與馬國政府簽約，馬來西亞水資源與氣候變遷研究中心 Ir. Mohd Zaki bin Mat Amin 並曾於 2017 年 3 月至本署第十河川局參訪交流，了解淡水河流域水情中心與洪水預報資訊系統建置與運作情形。

本次拜會由經濟文化辦事處副代表尹新垣、經濟組組長張明及經濟秘書林翠

意接待，談參內容包含馬來西亞之水文、地文、地理條件(降雨量多、環境資源豐富)，惟因政治因素導致目前之供水系統不佳(如：淨水池工程延宕)，易有分區供水之現象，另水質條件亦欠佳，自來水濁度高導致目視水色明顯，水無法生飲，家家戶戶皆須使用淨水器處理飲用水。且土地利用上有大量種植單一經濟作物(如：棕梠樹)造成水土保持不佳之情況，顯示馬來西亞雖具備高度天然資源，惟其水資源管理技術及水土環境保育意識尚有提升空間；故除了目前臺灣大量輸出馬國之服務及醫療產業具有的相當之輸出潛力外，可看出於未來水利工程、防災預警、水土保持...等臺灣先進之精緻化管理技術，皆有南向馬來西亞發展之實力。

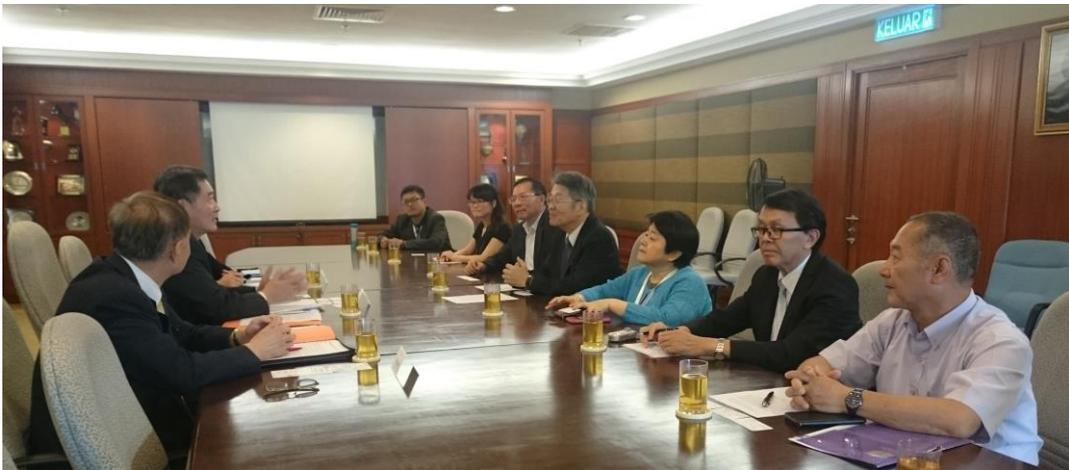


圖 貳-8 本署曹副署長華平帶領台灣團隊前往拜訪駐馬來西亞臺北經濟文化辦事處



圖 貳-9 本署致贈國內推動重要水資源工程宣傳摺頁及宣導品

## 五、研討會議 (Sessions)

本次研討會於 2017 年 9 月 11 日~13 日期間舉辦，在 7 個會議室進行，共分為 6 個議題，各議題又區分 6~7 個子題如表貳-7~12；其中與本署業務相關之主題為 9 月 11 日之水的革新、沿海水庫管理、氣候變遷及調適、水需求管理、災害風險管理；9 月 12 日非營業用水損失管理、水及社區參與、洪水預測及減災、節水及雨水儲留、水價及金融；9 月 13 日水資源管理及城市供水、用水安全等議題。

本次會中廣為討論的議題之一為 Coastal Reservoir Management (沿海水庫之管理)，其理念係將傳統之「導洪入海」轉變為「蓄洪於海」，於海裡建設堤壩，可解決陸域水庫用地問題，並於水資源鹹化前再次利用；本次會議與此相關之主要講題包含研究沿海水庫可行性-以水文與流域管理之視角、沿海水庫於馬來西亞發展之潛在應用、沿海水庫在中國大陸之應用及可行性、阿拉伯海創造沿海水庫之可行性等。一般陸域水庫的概念係高於海平面以上，而沿海水庫則是屬於低於海平面的水庫，於沿海河口地區設置水庫是為了能夠於淡水出海前，再次攔蓄使用，增加淡水的利用效率，可適用於多數逕流直接入海的國家，目前於大陸、香港、南韓、澳洲皆有設置沿海水庫的成功案例；使用沿海水庫的優點有降低環境衝擊、具有最大集水面積、降低水損失等。以長江上之青草沙水庫為例，其為上海市之主要取水口之一，2010 年完工，水庫面積 70 平方公里，是中國最大型之避鹹續淡型河口江心水庫，設計容量為 4.35 億立方公尺。但沿海水庫面臨最大的挑戰為水資源在近出海口處，通常水質表現較差，故亦有實例是取用上游水質較佳之水資源，以陸域水庫方式提供民生飲用水源，而在水質較差的河段，則使用沿岸水庫提供工業、灌溉、漁業用水。沿岸水庫可作為多元化水資源規劃之參考，惟於臺灣目前之適用性尚須考量區域供水需求、水質及沿海生態問題。

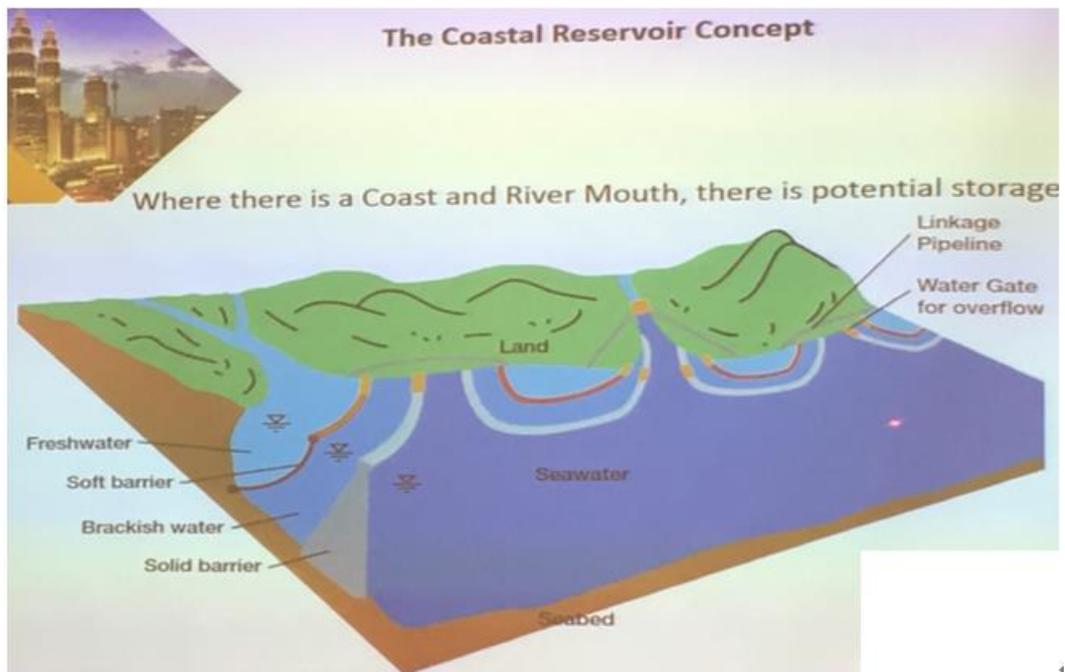


圖 貳-10 沿岸水庫概念圖



圖 貳-11 研討會分享現場

## 表 貳-8 研討會第 1 天(Session1)講題

7<sup>th</sup> IWA-ASPIRE CONFERENCE 2017 & WATER MALAYSIA EXHIBITION 2017

### Scientific Programme: (Monday) Day 1 - 11<sup>th</sup> September 2017

#### SESSION 1

##### Session 1.1 – Water Reform

Session Chair: Mr Daryl Day

Venue: Banquet Hall, Level 3, KLCC

Time	Topic
1145-1200	<b>Featured Speaker</b> Water Management – The SEWA Way By HE Dr Rashid Aleem Chairman Sharjah Electricity and Water Authority
1200-1215	Tracking the Water Reforms in Malaysia By Chin Yoon Kheong
1215-1230	Sustainable Water Supply in Developing Countries: How Public Works Style Reformed into Autonomous Utility Style By Yoji Matsui
1230-1245	Sapporo Waterworks Bureau's Efforts to Reduce Environmental Load By Jun Kato

##### Session 1.2 – Water Treatment

Session Chair: Mdm Fadzillah Abd Kadir

Venue: MR 302, Level 3, KLCC

Time	Topic
1145-1200	Coagulation Condition and Coagulant Production for Efficient Removal of Super-Fine Powdered Activated Carbon By Yoshifumi Nakazawa
1200-1215	Treatment of Flocculation Disturbance Water for Potable Use By Liew Wai Loan
1215-1230	Preparation and Application of Chitosan - Polyethersulfone Composite Ultrafiltration Membrane for Humic Acid Removal By Tianshi Wang
1230-1245	Analysis of Heavy Metal Content in Sediments and Water in Ex-Mining Lake (Tsaik Puteri, Bukit Besi) By Sarifah Fauziah Syed Draman

##### Session 1.3 – Coastal Reservoir Management

Session Chair: Prof Zulkifli Yusop

Venue: MR 303, Level 3, KLCC

Time	Topic
1145-1200	Feasibility Study on Formation of Fresh Water Reservoir and Impounding the Surface Runoff for Urban Water Survival in a Coastal Brackish Water Region - A Hydrological and Watershed Management Perspective By T.G. Siffarum
1200-1215	Coastal Reservoir and Its Potential Application in Malaysia By Lim Sin Poh
1215-1230	Coastal Reservoir - Its Application in China and Feasibility By Shu-Cing Yang
1230-1245	Feasibility of Creating a Fresh Water Reservoir in The Arabian Sea Impounding The Flood Waters of Netravathi River: Hydrological and Geotechnical Perspectives By Sreevatsa Kolathayar

##### Session 1.4 – Water Demand Management

Session Chair: Tan Sri Dato' Ir Syed Muhammad Shahabudin

Venue: MR 304, Level 3, KLCC

Time	Topic
1145-1200	<b>Featured Speaker</b> Water Demand Management in Penang, Malaysia By Dato' Ir Jaseni Maidina Chief Executive Officer Perbadanan Bekalan Air Pulau Pinang Sdn Bhd (PBAPP)
1200-1215	Valuing Water By Tom Mollenkop
1215-1230	Waterworks Management in Tokyo - Realization of Public Nature and Efficiency By Kazuya Naito
1230-1245	Achieve Efficient Management of Your Water Distribution Network By Amit Thakare

##### Session 1.5 – Microalgae

Session Chair: Dr Aznah Nor Anuar

Venue: MR 305, Level 3, KLCC

Time	Topic
1145-1200	Isolation and Characterization of Sulfolane Degrading Bacteria By Chu Fang Yang
1200-1215	Biomolecular Monitoring of Toxin and Odorant - Producing Cyanobacteria in Drinking Water Reservoirs By Tsair-Fuh Lin
1215-1230	Effect of Microalga-Bacteria Interaction on Microalga Biomass Production By Tadashi Toyama
1230-1245	Biosorption Characteristics of Europium by Microalgae <i>Acutodesmus Acuminatus</i> For Recovery of Rare Earth Elements from Electronic Industrial Wastewater By Yasuhiko Funahashi

##### Session 1.6 – Anaerobic Digestion

Session Chair: Ms Sushmita Mandal

Venue: MR 306, Level 3, KLCC

Time	Topic
1145-1200	<b>Featured Speaker</b> Mixing Potential of Biogas Production in Anaerobic Reactors Consequences for Digester Design By Prof Em Helmut Kroiss IWA Past President
1200-1215	Modelling Multiple Minerals Precipitation in Anaerobic Digestion Process By Yaakoubi Mohamed
1215-1230	Investigation of A Low Cost, High Rate Sulfate-Reducing Up-Flow Sludge Bed Reactor Equipped with Continuous Gas Recirculation for Mainstream Anaerobic Treatment By Bo Wang
1230-1245	Full-scale Anaerobic Endless Channel for Treating Palm Oil Mill Effluent By Kazumasa Kamachi

##### Session 1.7 – Sanitation & Health

Session Chair: Prof Gen-Shuh Wang

Venue: MR 307, Level 3, KLCC

Time	Topic
1145-1200	Removal of Mono-Nitrophenols By Slow Sand Filtration and UV Irradiation By Keiko Katayama-Hirayama
1200-1215	Impact Comparison of Pretreatment on Design and Operation of Ultrafiltration By Patrick Buchta
1215-1230	Distribution of Diarrhoeagenic E. Coli from Clinical Isolates and Environmental Water Sources in Gauteng Province, South Africa By Koussir Hoozook
1230-1245	The Effect of Soil Borne <i>Aspergillus Flavus</i> Strain KRP1 on the Bioavailability of Mercury from Contaminated Soil By Evi Kumiat

\*Programme is accurate at the time of printing. Organiser reserves the right to change.

## 表 貳-9 研討會第 1 天(Session2)講題

7<sup>th</sup> IWA-ASPIRE CONFERENCE 2017 & WATER MALAYSIA EXHIBITION 2017

### Scientific Programme: (Monday) Day 1 - 11<sup>th</sup> September 2017

#### SESSION 2

##### Session 2.1 – Biological Treatment

Session Chair: Dr Farrah Aini Dahalan

Venue: Banquet Hall, Level 3, KLCC

Time	Topic
1500-1515	One-Stage Nitritation/Anammox Process by a Biofilm Reactor with Two Inflows <i>By Zulkamrani</i>
1515-1530	Nitrogen Removal by Sulfate Reduction, Denitrification / Anammox and Nitritation Process <i>By Yuka Kosugi</i>
1530-1545	Evaluation of Process Performance of a Down-Flow Hanging Sponge Reactor for Treatment Domestic Wastewater Discharged from Apartment House <i>By Mai Kada</i>
1545-1600	Enhanced Adsorption and Photo-Degradation of Bisphenol A from Aqueous Solutions by IP-Cyclodextrin Modified Sawdust <i>By Yanbo Zhou</i>

##### Session 2.2 – Innovative Solution

Session Chair: Mr Hain Basri

Venue: MR 302, Level 3, KLCC

Time	Topic
1500-1515	Energy Efficiencies of Closed-Loop Water-Wastewater Systems with Alternative Water Resources for Water-Stressed Cities <i>By Xiaoming Liu</i>
1515-1530	New Paradigm of Ultrafiltration Membrane Water Treatment Systems Fouling Analysis Through Membrane Autopsy <i>By Chun Ming Chew</i>
1530-1545	Control of Bio-Particle Combined Fouling on Reverse Osmosis Membrane Using Hypochlorite and Nanobubbles <i>By Masaki Ohno</i>
1545-1600	Removal Kinetic of Chromium by Nano-Magnetite at Different Biogeochemical Environment in Soil and Groundwater <i>By Nurul Aqilah Abdul</i>

##### Session 2.3 – Disaster Associated Issues

Session Chair: Dr Sumiary Ambran

Venue: MR 303, Level 3, KLCC

Time	Topic
1500-1515	The Approach of Expected Values in Risk Management as TWD Faces ISO 4064 Change <i>By Chia-Jung Chou</i>
1515-1530	Disaster Risk Management <i>By Tomohiro Ebizuka</i>
1530-1545	Effort of Reinforcing Earthquake-Resistant Joint of Water Distribution Pipes <i>By Eiji Omori</i>
1545-1600	Checking the Water Pressure in The Capital's Central Agencies With PHS Line in Case of Earthquake Disaster <i>By Seiji Ichinomya</i>
1600-1615	Emergency Water Supply from Fire Hydrant and Others, Residents and Municipalities as New Providers <i>By Tomohiro Ebizuka</i>

##### Session 2.4 – Chemical Contaminants

Session Chair: Ms Bushra Nishat

Venue: MR 304, Level 3, KLCC

Time	Topic
1500-1515	Preparation of Composite of Cationic Gel and Iron Hydroxide for Adsorbing Arsenic from Ground Water <i>By Takehiko Gotoh</i>
1515-1530	Removal of Heavy Metals (Pb2+ and Zn2+) Using Cactus Opuntia sp. Plant as Low Cost Adsorbent <i>By Yitga Weldu Abirha</i>
1530-1545	Reductive Dechlorination of Perfluorooctanoic Acid by Vitamin B12 and Copper Nanoparticles <i>By Yu-Chi Lee</i>
1545-1600	The Effectiveness of Trihalomethanes Removal by Conventional Water Treatment Plants of Metropolitan Waterworks Authority, Thailand <i>By Supakon Sa-Nguansin</i>
1600-1615	Application of Phyto-Fenton Process to PCP-contaminated soil <i>By Keita Harada</i>

##### Session 2.5 – Smart & Innovative Wastewater Treatment

Session Chair: Ms Sushmita Mandal

Venue: MR 306, Level 3, KLCC

Time	Topic
1500-1515	Introduction of Kerosene-City Gas Dual-Fuel Emergency Generator in Tokyo Sewage Treatment Plants <i>By Yusuke Sasaki</i>
1515-1530	Oxidation of Arsenic (III) in Ozone Assisted Microbubble System <i>By Snigdha Khuntia</i>
1530-1545	Study of Different Biofouling Mechanisms in Reverse Osmosis and Pressure-Retarded Osmosis Processes <i>By Taek-Seung Kim</i>
1545-1600	Nitrous Oxide Emissions Reduction by Aeration Restriction in Conventional Activated Sludge Process <i>By Ateuko Michinaka</i>
1600-1615	The Effect of Calcination and Kinetic Studies of TiO <sub>2</sub> Photocatalyst Based on Sol-gel Synthesis <i>By Fahrihal Adnan</i>

##### Session 2.6 – Smart & Innovative Wastewater Treatment

Session Chair: Dr Norhayati Abdullah

Venue: MR 307, Level 3, KLCC

Time	Topic
1500-1515	Effect of Organic Wastewater Concentration and Temperature Condition on Anaerobic Fluidized Bed Reactor Using Carrier <i>By Tomohiro Iikura</i>
1515-1530	Removal of Heavy Metals from Wastewater using PAC and Modified PAC <i>By Tae-Kyoung, Kim</i>
1530-1545	Microalgal Biomass Production and Nutrient Removal by The Cultivation of Euglena Gracilis in Domestic Wastewater <i>By Michihiko Ike</i>
1545-1600	Cultivation of Aerobic Granular Sludge for Actual Domestic Wastewater Treatment at Hot and Low Humidity Climate Circumstances <i>By Azmah Nor Anuar</i>

\*Programme is accurate at the time of printing. Organiser reserves the right to change.

# 表 貳-10 研討會第 2 天(Session3)講題

7<sup>th</sup> IWA-ASPIRE CONFERENCE 2017 & WATER MALAYSIA EXHIBITION 2017

## Scientific Programme: (Tuesday) Day 2 - 12<sup>th</sup> September 2017

### SESSION 3

#### Session 3.1 – Managing Water Loss – Capturing Non-Revenue Water (NRW)

Session Chair: Ir Mansor Abd Ghani Venue: Banquet Hall, Level 3, KLCC

Time	Topic
1000-1015	Holistic NRW Program in Kuantan By <i>Sufian Sidek</i>
1015-1030	Improving Operational Efficiency Through a Holistic NRW Program By <i>Nor Suhada Hassan</i>
1030-1045	Data Logging, Acquisition and Monitoring as a Key Platform in Non-Revenue Water Reduction By <i>Andy Sang Yang Ho</i>
1045-1100	Melaka Gets Tough on Non-Revenue Water Loss Load By <i>Gary Wyatt</i>
1100-1115	NRW Reduction Technology Training and Capacity Building Project in Malaysia By <i>Phan Kieu Dung Nguyen</i>
1115-1130	Wide-Area Business Operation in Tama Area By <i>Norumi Tashiro</i>

#### Session 3.2 – Water and Communities Engagement

Session Chair: Ir Hj Mohamad Asari Bin Daud Venue: MR 302, Level 3, KLCC

Time	Topic
1000-1015	Implementation of Water Safety Plan for School Water Supply Systems in Taiwan By <i>Gan-Shuh Wang</i>
1015-1030	Divers of Household Water Consumption of Different Socioeconomic Classes in Selected Communities in Metro Manila, Philippines By <i>Marita Angeles F. Ancheta</i>
1030-1045	Anomaly Detection and Discrimination Using RealTime Monitoring Data in a Water Distribution System By <i>Njounjoul Kim</i>
1045-1100	Improvement of Wastewater, Sanitation and Health Issue of Hanoi Via Integrated Wastewater Treatment System By <i>Lee Yun Fook</i>
1100-1115	Possibilities of Hamakko-Doahi The Water Significance of the Sale of Water in PET Bottles by Yokohama Waterworks Bureau By <i>Saori Honkoshi</i>
1115-1130	Factors Affecting Water Distribution in Nairobi, Kenya: A Case Study of Nairobi City Water and Sewerage Company By <i>Samuel Karanja</i>

#### Session 3.3 – Flood Prediction & Mitigation

Session Chair: Prof Zulkidli Yusop Venue: MR 303, Level 3, KLCC

Time	Topic
1000-1015	Oyster Contamination with Human Norovirus Impacted by Urban Drainage and Flood in Central Vietnam By <i>Gia Thanh Nguyen</i>
1015-1030	Evaluation of The Metabolic Activity of Halobacter Mediterranei for the Reduction of Nitrate and Sulfate in RO Rejected Brine Water By <i>Elaine Chiang</i>
1030-1045	Development of Floods Predicting Method in Kelantan River Basin in Malaysia By <i>Hiroki Ohashi</i>
1045-1100	Protecting Lives in Hong Kong: A Local Approach to Flood Risk Assessment in Rural Areas - River Flood Risk Study By <i>Kamath Chuan Hai Kwok</i>
1100-1115	Performance Monitoring for Happy Valley Underground Stormwater Storage Scheme, Hong Kong By <i>Cheuk-kin Leung</i>
1115-1130	Towards Sustainable Stormwater Management in Hong Kong: The First Comprehensive Implementation at Development of Anderson Road Quarry By <i>Eric Chi-Kwok Li</i>

#### Session 3.4 – Water & Energy Nexus

Session Chair: Ms Katharine Cross Venue: MR 304, Level 3, KLCC

Time	Topic
1000-1015	Utilization of Communal Sewage for Cooling Large Buildings By <i>Pat Kiss</i>
1015-1030	A Study on the Use of Sewage Treatment Plant as a Base for Circulation of Materials and Energy By <i>Toshiaki Fukushima</i>
1030-1045	A New Operation and Maintenance Approach of Wastewater Treatment Plants to Achieve Both Improvement of Effluent Water Quality and Reduction of Electricity Consumption By <i>Takayo Hasegawa</i>
1045-1100	Introduction of Energy Saving System in Water Supply Stations By <i>Masaki Kawase</i>
1100-1115	Securing Material for Recovery - Never-breaking Supply Chain By <i>Hisao Tanikawa</i>
1115-1130	Towards Smart Energy Management - An Integrated Approach Adopted in Hong Kong's Water Supplies By <i>Ping-ko Cho</i>

#### Session 3.5 – Innovative Approach

Session Chair: Mr Hairi Basri Venue: MR 305, Level 3, KLCC

Time	Topic
1000-1015	A Novel Membrane Capacitive Deionization (MCDI) - Reverse Electrodialysis (RED) Hybrid System Integrated with Reverse Osmosis (RO) for Sustainable Seawater Desalination By <i>Jongmoon Choi</i>
1015-1030	Adsorption Desalination Technology for Reclamation of Ultra-High Conductivity Industrial Wastewater By <i>Kian-Poo Chang</i>
1030-1045	Nitrogen-cycling Functional Genes in Brackish and Freshwater Sediments in Yodo River in Japan By <i>Satoshi Soda</i>
1045-1100	Seasonal Change of Dissolved Organic Matter in Lake Ta Moek, Phnom Penh, Cambodia Determined by LC-OGD and EEM-PARAFAC Analyses By <i>Niko Yamagata</i>
1100-1115	Influence Study on Water Purification in Case of a Volcanic Eruption By <i>Yutaka Koshizawa</i>
1115-1130	Sponge City Practices Based on Finished Products and Facilities By <i>Shi Men</i>

#### Session 3.6 – Anaerobic Digestion

Session Chair: Prof Helmut Kroiss Venue: MR 306, Level 3, KLCC

Time	Topic
1000-1015	Characteristic of Anaerobic Degradation of Long Chain Fatty Acids in Palm Oil Mill Effluent By <i>Kazuki Syutsubo</i>
1015-1030	Anaerobic Digestion of Alkali Pretreatment Lignin of Aquatic Lignocellulosic Biomass: Effect of Electrocoagulation Pretreatment for Lignin Recovery By <i>Mitsuhiko Koyama</i>
1030-1045	Research on The Anaerobic-Anoxic-Oxic Process Using NADH Airflow Control By <i>Makoto Shimokoe</i>
1045-1100	Influence of Sulfate on Phosphorus Removal and Growth of Filamentous Bacteria in Anaerobic-Oxic Activated Sludge Process By <i>Sai Kawazawa</i>
1100-1115	Biodegradation of Veterinary Antibiotic and Intermediate Products During Aerobic and Anaerobic Processes for Livestock Wastewater Treatment By <i>Liang-Ming Whang</i>

#### Session 3.7 – Water Infrastructure Technologies & Issues

Session Chair: Ir Mohd Haniffa Abdul Hamid Venue: MR 307, Level 3, KLCC

Time	Topic
1000-1015	Measures Against Aging of Sewage Pipe By <i>Naoyuki Morikawa</i>
1015-1030	Measures Against Incineration Problems Caused by Clogging of White Smoke Prevention Preheater By <i>Masanori Hayasaka</i>
1030-1045	Analysis of The Corrosion Current on Dissimilar Metal Joint with Insulation Joint By <i>Yasuo Torii</i>
1045-1100	Stabilization of The Power Source with The Self-Sustained Power Generation Facilities By <i>Nobuyuki Kawagoe</i>
1100-1115	Works for Improving the Performance of Acyama Sedimentation Basin By <i>Yogo Suzuki</i>
1115-1130	'MYPBA': A Friendly Mobile App for Penang Water Consumers By <i>Mohammad Nizam Omar</i>

\*Programme is accurate at the time of printing. Organiser reserves the right to change.

# 表 貳-11 研討會第 2 天(Session4)講題

7<sup>th</sup> IWA-ASPIRE CONFERENCE 2017 & WATER MALAYSIA EXHIBITION 2017

## Scientific Programme: (Tuesday) Day 2 - 12<sup>th</sup> September 2017

### SESSION 4

#### Session 4.1 – Capacity Building

Session Chair: Dr Ching Too

Venue: Banquet Hall, Level 3, KLCC

Time	Topic
1130-1145	Decentralized Sewage Treatment Plants in Fort Shelter, Hong Kong By Andy Y Kwok
1145-1200	Human Resource Development "From Hard to Soft" By Meko Oogane
1200-1215	Wastewater Capacity Building: People By James Oliver Warren
1215-1230	Role of County Government in Water Resources Management in Nairobi City County By Hamud Chungani
1230-1245	PWSA Competency Training for the Malaysian Water Industry By Kah Cheong Teo

#### Session 4.2 – Digital Tide for Water Utilities

Session Chair: Mr Tom Mollenkopf

Venue: MR 302, Level 3, KLCC

Time	Topic
1130-1145	Development of "Communication-Enabled Manhole Cover" by Combining IoT and Sewerage System By Isamu Odaka
1145-1200	TOC Online Analytics - Monitoring of Effluent Water in Wastewater Treatment Plants to Ensure Water Quality and Protecting the Environment By Yong Chin Weh
1200-1215	The Paradox of Intelligent Water Systems By David Totman
1215-1230	A Robust Process Control System in Tai Po Water Treatment Works By Jeffrey Siu Ming Lai
1230-1245	Root Cause Analysis for The Treated Water Pump Motor Failure in Beaufort Water Treatment Plant By Sakthiaswaran Kaliappan

#### Session 4.3 – Smart Water Solutions

Session Chair: Mr Beh Hong Lim

Venue: MR 303, Level 3, KLCC

Time	Topic
1130-1145	Effect of Floc Size Reduction and Ozone Concentration on Excess Sludge Reduction Process Using Ozone Nanobubbles By Kiyumi Hashimoto
1145-1200	Applicability of Ozonized Water: Treatment for Controlling Fat, Oil, and Grease Deposition onto a Drainpipe By Naoyuki Hashimoto
1200-1215	Recycling Waterworks Sludge into Controlled Low-Strength Materials By Lei Wang
1215-1230	Treatability Tests of Biological And Physicochemical Methods For Removing Styrene From Wastewater By Hyeon Kim
1230-1245	Development of Wastewater Treatment System with Low Greenhouse Gases Emission for Natural Rubber Industry By Hiroaki Sonaka

#### Session 4.4 – Water Conservation

Session Chair: Ir Syed Mohd Adnan Mansor Al-Habshi

Venue: MR 304, Level 3, KLCC

Time	Topic
1130-1145	Wastewater Recycling/Reuse: A Reliable Solution for Water Supply in Semnan Industrial Park, Iran By Mohammad Reza Alavi Moghadam
1145-1200	Effect of First Flush Diversion on The Reliability of Urban Systems in Bangladesh By Mustique Rahman Khan
1200-1215	Guidance Book for Management of Raw Water Turbidity Fluctuations and a Series of Water Treatment Workshops By Hiroaki Hoshi
1215-1230	Sungai Dua: Penang's Most Highly Evolved Water Treatment Plant By Chong Meng Choon
1230-1245	Feasibility Study on Formation of Coastal Reservoir and Impounding the Surface Runoff for Urban Water Survival in a Coastal Brackish Water Region By Sivasekaran Arappall

#### Session 4.5 – Improving Health of Waterways

Session Chair: Dr Sumiati Ambran

Venue: MR 305, Level 3, KLCC

Time	Topic
1130-1145	Comprehensive Detection of Pathogenic Bacteria in Jar Water, Community Well Groundwater, and Environmental Water in The Kathmandu Valley, Nepal By Kazumasa Sei
1145-1200	Biodegradation of 2-methylisoborneol Uring Bacteria Enriched from Taiwan's Reservoirs By Yi-Ting Chiu
1200-1215	Estimation of Pollutant Loads from Pig Farming in Vietnam By Pham Ngoc Bao
1215-1230	Mitigation of Health and Safety Hazards and Impacts in the Sewerage Sector By Ayu Sunawaty
1230-1245	Septage Management in The Urban Areas of Indonesia - Case Study in Bandung and Denpasar City By Pham Ngoc Bao

#### Session 4.6 – Membrane Bioreactor

Session Chair: Dr Bibiana Yeoh

Venue: MR 306, Level 3, KLCC

Time	Topic
1130-1145	Anaerobic Fluidized Membrane Bioreactor for Cold-Rolling Wastewater Treatment from Steel-Making Industry By Liang-Ming Wang
1145-1200	Proposal of Controlling Expression of Limiting Permeate Flux in Ceramic Membrane Filtration of O/W Emulsion By Yuki Suzuki
1200-1215	Easy Cleaning Thermo-Responsive Polyulfone Ultrafiltration Membrane for Fouling Mitigation by Natural Organic Material By Manish Kumar Sinha
1215-1230	Development of a Novel Polyulfone Membrane with Embedded Zirconium Compound for Phosphate Recovery from Water By Akira Hatuka
1230-1245	Proper pH Adjustment Method Based on the Consideration of Suppression of Bromic Acid Formation in Drinking Water Treatment Processes By Yoshitiro Kobayashi

#### Session 4.7 – Climate Change Resilient & Adaptation

Session Chair: Datuk Ir Jaseni Masdima

Venue: MR 307, Level 3, KLCC

Time	Topic
1130-1145	<b>Featured Speaker</b> Reservoir Sustainability and Sedimentation Impacts of the Sultan Azlan Shah Dam Reservoir, Kinta By Dato' Ir Mohd Isa
1145-1200	Sustainable Water Sources Planning in Kelantan, Malaysia: Feasibility Study on Groundwater Subsurface Dam By Wan Mohd Zamir W Ismail
1200-1215	Assessment of Social and Environmental Impacts of Coastal Reservoirs By Shu-Qing Yang
1215-1230	Beach Water Quality Monitoring in Hong Kong: Past, Present and Future By Wai Thoe
1230-1245	Effect of Climate Change on Urban Flood Damage in Marikina - Paeng - San Juan River Basin, Metro-Manila, Philippines By Mohammed Kelli
1245-1300	The Operational and Financial Impact of Urban Water Supply and Institutional Reforms in Peninsular Malaysia By Balamurugan Nallamuthu

\*Programme is accurate at the time of printing. Organiser reserves the right to change.

# 表 貳-12 研討會第 2 天(Session5)講題

7<sup>th</sup> IWA-ASPIRE CONFERENCE 2017 & WATER MALAYSIA EXHIBITION 2017

## Scientific Programme: (Tuesday) Day 2 - 12<sup>th</sup> September 2017

### SESSION 5

#### Session 5.1 – Climate Change Resilient & Adaptation

Session Chair: Dr Tao Li

Venue: Banquet Hall, Level 3, KLCC

Time	Topic
1500-1515	<b>Featured Speaker</b> Landuse and Climate Change Impact on Water Resources in Malaysia By Prof Zulkifli Yusop Dean, Water Resource Sustainability Research Alliance, Universiti Teknologi Malaysia
1515-1530	Sludge Transportation Network was Utilized for Risk Management of Sludge Treatment. By S'hor Ohwa
1530-1545	Evaluating Adaptation Capacity of Filtration Technology to High-Turbidity Water
1545-1600	Risk and Value Management for a Major Water Source Expansion Project By Khor Chai Hui
1600-1615	Climate Resilience from Catchment to Tap By Katharine Cross

#### Session 5.2 – Water Quality for Health

Session Chair: Ms Noor Hidayah Sanusi

Venue: MR 302, Level 3, KLCC

Time	Topic
1500-1515	Water Quality Treatment - Applied at The Source By Michael Ben
1515-1530	Boron Removal in Seawater Desalination - A Pilot Study By Han-Hsu Huang
1530-1545	Multivariate Analysis for Correlation Between Disinfection By-Products of Chlorine Dioxide and Water Quality By Mahmoud Nasr
1545-1600	Characterization of Dissolved Organic Matter (DOM) During the Processes of Advanced Wastewater Treatment Plant and Evaluation of The Effect of its Effluent on River Water Quality By Kazuhiro Komatsu
1600-1615	Behavior of Pesticides in Drinking Water Purification System and Their Occurrence in Water Resources By Yasuko Kitamoto

#### Session 5.3 – Managing Microbial Risks & Impact

Session Chair: Dr Farrah Aini Dahalan

Venue: MR 303, Level 3, KLCC

Time	Topic
1500-1515	Species Identification of Antibiotic Resistant Bacteria in Activated Sludge Using Pyrosequencing By Itsuru Miura
1515-1530	Chlorination and Ultraviolet Light Disinfection of Antibiotic Resistant Bacteria: Survival and Potential Repair By Rosa Dethard
1530-1545	Engineered Biochar for Stormwater Harvesting: Removal of Metals and Bacteria by Disinfection Systems By Abbe Y.T. Liu
1545-1600	Survival Responses of Gram-Negative Waterborne Pathogenic Bacteria to Simulated Gastric Fluid By Atheesha Singh
1600-1615	Application of Automatic Ultraviolet Photometer for Water Treatment in Sapporo By Takuro Nakusa

#### Session 5.4 – Membrane Bioreactor

Session Chair: Dr Aznah Nor Anuar

Venue: MR 304, Level 3, KLCC

Time	Topic
1500-1515	Biodegradation with Springobium Fuligine OMI in a Lab-scale Membrane Bioreactor for 4-tert-butylphenol Degradation By Kazuki Takada
1515-1530	Operation of Low Energy Consumption MBR At High Flux By Brianna Yeo
1530-1545	Application of Ozone Cleaning to Submerged MBR Using PVDF Hollow Fiber Membrane By Yasuhiro Nakamura
1545-1600	Effect of Mountain-Type Baffle Plates Set Above Air Diffusers for Generation of Big Bubbles in a Submerged MBR Using Ceramic Flat-Plate Membrane Module By Tomoya Noguchi
1600-1615	Modelling of Fixed Bed Anaerobic Reactor with Coconut Shell as Media for Clogging Assessment in Batch and Continuous System By Nur Indradewi

#### Session 5.5 – Biological Treatment

Session Chair: Ms Sushmita Mandal

Venue: MR 305, Level 3, KLCC

Time	Topic
1500-1515	Biological Decomposition of Allylthiourea during Batch Respirometry Test By Bing Liu
1515-1530	A Study on Dewaterability Improvement Using Aeration for Anaerobically Digested Sludge By Katsuhiko Ohno
1530-1545	Continuous Co-digestion of Aquatic Weeds with Food Waste and the Availability of Digested Effluent By Masaki Fujiwara
1545-1600	Development of Performance Prediction Index (PPI) for Small-Scale Decentralized Sewage Treatment Plants (S-DSSTP) Using Microbial Respiration and SVI10 By Ysun-Kwon Kim
1600-1615	Biodegradation of Phenol in Combined Process Sequencing Batch Reactor and Inhibitory Effect on the Nitrification Process By Nik Noor Athirah Nik Yusoff

#### Session 5.6 – Water Conservation

Session Chair: Ir Kho Lip Khiong

Venue: MR 306, Level 3, KLCC

Time	Topic
1500-1515	System Dynamic Analysis for Developing Financially Sustainable Triple Water Supply System in Hong Kong By Man Wah Tiffany Mak
1515-1530	An Environmentally-Conscious Industrial Water Network Retrofit with Reuse and Recycle Strategies By Cheng Seong Khor
1530-1545	Economics of Wastewater Recycling By Adnan Saffian
1545-1600	Water Resource Sustainability Through Raw Water Balance and Augmentation: The Selangor Experience By Mansor Abdul Ghani
1600-1615	Assessing the Impact of Technology on Management Accounting in Water Service Utility Company - A Case for Nairobi Water Company By Kelvin Mwangi

#### Session 5.7 – Biological Treatment

Session Chair: Ms Bushra Nishat

Venue: MR 307, Level 3, KLCC

Time	Topic
1500-1515	Complete Ammonia Oxidation to Nitrate in an Activated Sludge Reactor without Air Sparging By How Seow Wah
1515-1530	Biological Enhancement by Phosphate Addition for Organic Matter Removal in MBR System By Yongli Zhang
1530-1545	Cultivation of Oil Producing Aurantiochytrium sp. L3W Using Excess Sludge By Kuya Maeda
1545-1600	Removal of Antimicrobial Residues and Resistance in a Combined Stabilization Ponds-Constructed Wetland Treating Urban Sewage in Thailand By Chawaf Rongsayamanont

\*Programme is accurate at the time of printing. Organiser reserves the right to change.

## 表 貳-13 研討會第 3 天(Session6)講題

7<sup>th</sup> IWA-ASPIRE CONFERENCE 2017 & WATER MALAYSIA EXHIBITION 2017

### Scientific Programme: (Wednesday) Day 3 - 13<sup>th</sup> September 2017

#### SESSION 6

##### Session 6.1 – Pollutants Control

Session Chair: Ms Sushmita Mandal

Venue: Banquet Hall, Level 3, KLCC

Time	Topic
1000-1015	Profiling Dissolved Organic Matter at Molecular Level in Environmental and Urban Water Resources by Orbitrap Mass Spectrometry By Phanwatt Phungsai
1015-1030	Comparison of Al and Fe Coagulants in The Coagulation-Microfiltration Process By Kana Ishii
1030-1045	Evaluation of Common Reed Function in Removing Tetracycline Compound and Resistant Genes by Using Lab-Scale Constructed Wetlands By Thanh Hien Pham
1045-1100	The Removal of Pollutants from Runoff by Different Types of Paving Surface Materials in Permeable Pavement Systems By Ziyang Zhang
1100-1115	Development of Treatment System for Solid/Lipid-Rich Wastewater with Biological Desulfurization Process By Takuya Fujihira

##### Session 6.2 – Green Energy

Session Chair: Ms Bushra Nishat

Venue: MR 303, Level 3, KLCC

Time	Topic
1000-1015	An Anaerobic-Aerobic Sequential Batch Process with Simultaneous Denitrification And Methanogenesis for the Treatment of Intermittently Discharged Organic Wastes By Shinichi Akizuki
1015-1030	Energy Recovery from Sewage Sludge Using Microwave Heating By Yu-Fong Huang
1030-1045	Recovery of Water and Minerals from Shale Gas Produced Water by Membrane Distillation Crystallization By Jungyun Kim
1045-1100	Modelling and Optimisation of the Biological Used Water Treatment Process By Ni Qing Puay
1100-1115	Function Verification of Ultrasonic Sludge Reduction System By Chen Shing-Der

##### Session 6.3 – Water Pricing and Finance

Session Chair: Mr Ganesh Pangara

Venue: MR 304, Level 3, KLCC

Time	Topic
1000-1015	<b>Featured Speaker</b> Public Private Partnership for Water Infrastructure By Dato' Dr. Tan Yew Chong Deputy Secretary General Ministry of Energy, Green Technology & Water, Malaysia (KeTTHA)
1015-1030	Needed Innovation in Both Water Pricing and Procurement in The Asia Pacific Region By Paul Reiter
1030-1045	Financial Optimization of Condition Assessment Spending for Pipeline Replacement Programs By Wilson Chua
1045-1100	The Effect of Drinking Water Quality on House Price: A Conceptual Review By Muhammad Najib Razali

##### Session 6.4 – Water Security and Compliance

Session Chair: Mdm Amy Yew

Venue: MR 305, Level 3, KLCC

Time	Topic
1000-1015	The Role of Law in Water Security: Conflicting Evidence from The Asia Pacific Region By William Garthwaite
1015-1030	The History and The Current Status of Water Quality Regulation in Tokyo By Manami Kawamoto
1030-1045	Sustainable Service Quality (SUSSERV) of Malaysian Water and Sewerage Companies By Abran Salleh
1045-1100	Spdownscale - An R-Package for Spatial Downscaling Using Bias Correction Approach By Ashiq Mohamed Rahsead
1100-1115	Implementation of An Automated System for Optimal Pump Control By Marcus Fowler

##### Session 6.5 – Biological Treatment

Session Chair: Prof Yongji Zhang

Venue: MR 306, Level 3, KLCC

Time	Topic
1000-1015	Comparison of Treatment Technologies for bis (2-Ethylhexyl) Adpate (BEHA) Removal from Industrial Wastewater By Gyutae Kwon
1015-1030	Biological Treatment of DMSO - Containing Wastewater from Semiconductor Industry Under Aerobic and Methanogenic Conditions By Liang-Ming Whang
1030-1045	Sequential Combination of Electro-Fenton and Electrochemical Chlorination Processes for Treatment of Anaerobically-Digested Food Wastewater By Jaesang Lee
1045-1100	Effect of Tetra-Methyl Ammonium Hydroxide (TMAH) on Biological Nitrogen Removal for Industrial Wastewater By Liang-Ming Whang
1100-1115	Effect of Calcination Temperature During Sol-Gel Process on Photocatalytic Activity of TiO <sub>2</sub> By Fahrizel Adnan

##### Session 6.6 – Industrial Wastewater Treatment

Session Chair: Ir Dr Lee Yun Fook

Venue: MR 307, Level 3, KLCC

Time	Topic
1000-1015	Prokaryotic Diversity in a Practical-Scale DHS Reactor Treating Municipal Wastewater Using Next-Generation Sequencing Analysis By Akonoi Iguchi
1015-1030	Optimization of Zinc Removal from The Rubber Manufacturing Industrial Wastewater Through Adsorption onto Palm Shell Activated Carbon By Fung Sheng, Addy Lee
1030-1045	Treatment of Pulp and Paper Wastewater by Aerobic Granulation Technology By Harsh Vashi
1045-1100	Study on Operating Conditions for Co-Digestion of Food Waste with Sewage Sludge By Sussana W K Lai
1100-1115	Multiple Aerobic and Anaerobic Baffled Constructed Wetland Reactors for Simultaneous Nitrogen and Organic Compounds Removal Using Different Emergent Plants By Harvinder Kaur Lehi

\*Programme is accurate at the time of printing. Organiser reserves the right to change.

## 表 貳-14 研討會第 3 天(Session7)講題

7<sup>th</sup> IWA-ASPIRE CONFERENCE 2017 & WATER MALAYSIA EXHIBITION 2017

### Scientific Programme: (Wednesday) Day 3 - 13<sup>th</sup> September 2017

#### SESSION 7

##### Session 7.1 – Water Resources Management

Session Chair: Dato' Teo Yen Hua

Venue: Banquet Hall, Level 3, KLCC

Time	Topic
1115-1130	<b>Featured Speaker</b> Downstream Reservoir, A Revolution to Water Industry By Dato' Noor Azahari Director General Ministry of Energy, Green Technology & Water, Malaysia (KeTTHA)
1130-1145	Analysis of Alternative Rainwater Use from Data of End-User Water Demand By Kaori Nishida
1145-1200	Quantitative and Qualitative Changes of Forest Soil Organic Matters Expected in Estuaries By Toru Watanabe
1200-1215	Effect of Dissolved and Particulate Matter on Biofouling in Reverse Osmosis Filtration By Cservinia Manalo
1215-1230	Development of Storage Prediction Model for Semenyih Dam By Siow Fang Yong

##### Session 7.2 – Innovative Approach

Session Chair: Dr Kyoung Pil Kim

Venue: MR 303, Level 3, KLCC

Time	Topic
1115-1130	Effect of Greywater Characteristics on Its Chemical Coagulation By M Mansoor Ahammed
1130-1145	Osmotic-Enhanced Dewatering (OED) Process for Enhanced Water Recovery By Jungwon Kim
1145-1200	A Natural Method to Obtain Higher Electron Density in Drinking Water By Hwang Sheng Lee
1200-1215	Comparison on Degradation of Reactive Black 5 (RB5) in Photocatalytic Fuel Cell (PFC) Under UV and Solar Light By Wan Fadhliah Wan Mohd Khalik
1215-1230	New Water Turbidity Measurement - Groundbreaking Technology By Yong Chin Wah

##### Session 7.3 – Water Related Diseases

Session Chair: Dr Hsin-Hsu Huang

Venue: MR 304, Level 3, KLCC

Time	Topic
1115-1130	Comparing Fecal Exposure Pathways in Living Environment of a Slum in Khulna City, Bangladesh By Min Li Chua
1130-1145	Detection, Characterization and Quantification of E. Coli Communities from Environmental Water Samples Using Molecular Biology Methods By Kousar Hoorzook
1145-1200	Escherichia Coli Communities in Wastewater: An Indication of New Super Gene Combinations? By Zaakirah Delair
1200-1215	Addressing the Unsafe Disposal of Child Faeces in Indonesia To Support the Healthy Family Program By Sri Inanti

##### Session 7.4 – Operational Asset Management

Session Chair: Mr Gary Wyeth

Venue: MR 305, Level 3, KLCC

Time	Topic
1115-1130	Guideline for Physical Asset Management of Sewer By Yoshinari Abe
1130-1145	Asset & Operational Risk Management Towards an Effective and Efficient Sewerage Service Delivery By Anusuyah Bai S. K. Sivalingam
1145-1200	Yuen Long Barrage Scheme, Hong Kong By Sylvia Chan
1200-1215	Management of Water Conservation Forests for Over 100 Years By Kenji Sakai
1215-1230	Quest for Optimal Asset Management By Marcus Fowler

##### Session 7.5 – Water Infrastructure & Technologies

Session Chair: Hj Mansor Abdul Ghani

Venue: MR 306, Level 3, KLCC

Time	Topic
1115-1130	Facing Up to High-Rate Anaerobic Treatment of Waste in Coastal Regions: SANI Process and Granular Sludge By Tianwei Hao
1130-1145	Elucidation of Behaviour of Bubbles and Membrane Contact Inside Immersion Type Hollow Fibre Membrane Module By Daisuke Yusa
1145-1200	Influence of Relaxation Ratio of Follow Fibre and Space Among Hollow Fibres on Bubble Flow Velocity Inside Follow Fibre Membrane Modules By Daisuke Yusa
1200-1215	Hong Kong's First Hydropower Plant By Clement Leung Man Hon
1215-1230	Challenges in The Construction of New Sg. Dara Water Treatment Plant By Lokman Abdul Rahim & Lim Soon Guan

##### Session 7.6 – Industrial Wastewater Treatment

Session Chair: Dr Mitsuhiro Koyama

Venue: MR 307, Level 3, KLCC

Time	Topic
1115-1130	Rapid and Efficient Removal/Recovery of Molybdenum from Wastewater of Etching Industry Using Zn(II)/Alpha-Al <sub>2</sub> O <sub>3</sub> Catalyst in Batch Experiments System By Shih-Jie Chou
1130-1145	Fertilization Design at The Rice Production Using Less Odor Treated Water Obtained by Reducing Odor of Sewage Treatment System with Humus Pellet Bioreactor By Hiroshi Ogawa
1145-1200	Development of Aerobic Granular Sludge in Textile Wastewater Treatment Using Modified Sequencing Batch Reactor: Effect of Nutrient Addition By Choerudin C.
1200-1215	Treatment of Cyanide and Heavy Metals in Plating Wastewater Using Electrocoagulation and Electrooxidation By Taeyeon Kim
1215-1230	Treatment of Anaerobically Digested Palm Oil Mill Effluent (POME) Using Sequencing Batch Reactor (SBR) By Anis Fatmaha Fahims

\*Programme is accurate at the time of printing. Organiser reserves the right to change.

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## 六、論文書面發表(Posters Presentations)

本研討會共有 57 篇書面發表論文張貼於吉隆坡會展中心 3 樓東翼大堂，論文分類區分為「產業廢污水處理科技」、「綠色科技」、「氣候變遷」、「供水管理」、「水資源永續」、「用水安全」、「廢水處理政策」及「其他」等議題；此次臺灣團同行之臺北自來水事業處同仁亦有水處理分析之論文書面發表，其張貼區域布置於主要走廊上，提供各國學者於產業對談時能充分意見交流，並且鼓勵作者在海報張貼期間能夠講解並呈現他們的研究內容。

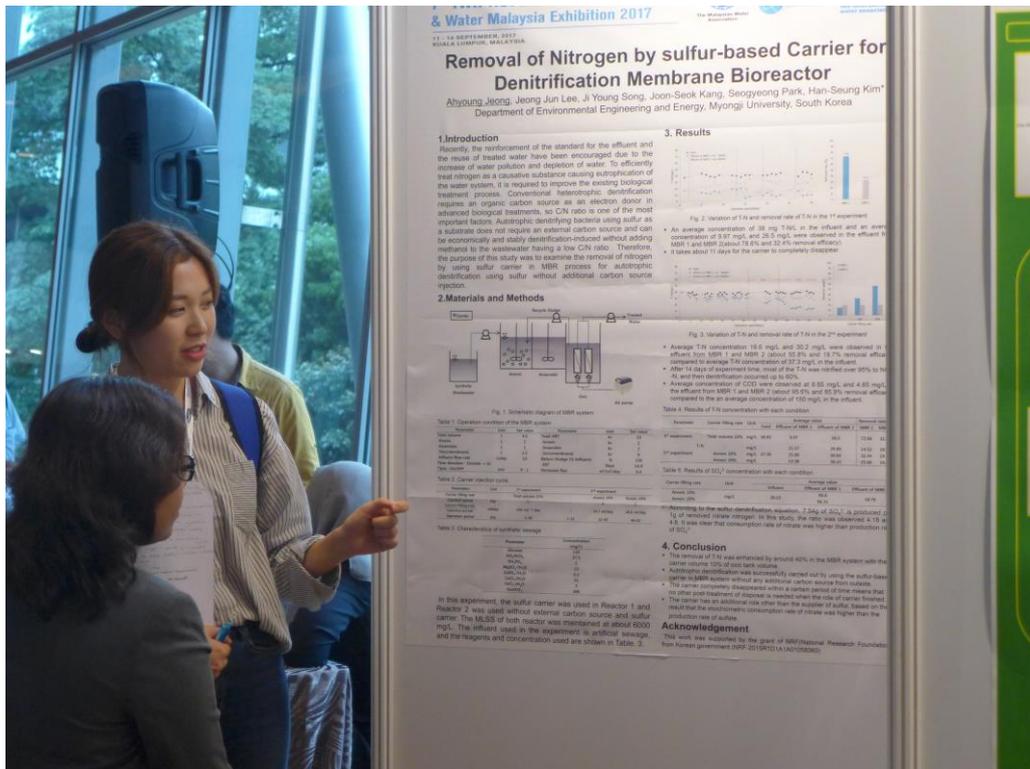


圖 貳-12 論文書面發表演場海報張貼及討論情形

## 七、商業展覽(Exhibition)

本次於馬來西亞舉辦之第七屆 IWA-ASPIRE 會議併同馬來西亞水展覽辦理，參展國家眾多，有 600 多名國際及地方專家學者代表參與，且吸引了超過 200 個技術廠商，提供先進的設備及各類水問題之解決方案，協助政府及全球水行業解決面臨的挑戰。本次展覽會主要為創新、實用、智能技術的展示，主題包含：

- 水資源保護與管理
- 防洪減災與管理
- 排水管理
- 綜合水管理
- 供水管理
- 非收入水管理
- 廢水管理
- 水再利用和雨水收穫
- 水質監測與建模
- 飲用水處理和分配
- 營養物去除和資源回收
- 膜技術

- 環境管理
- 污泥管理處置
- 污水處理管理
- 污染控制與管理
- 工業廢水處理

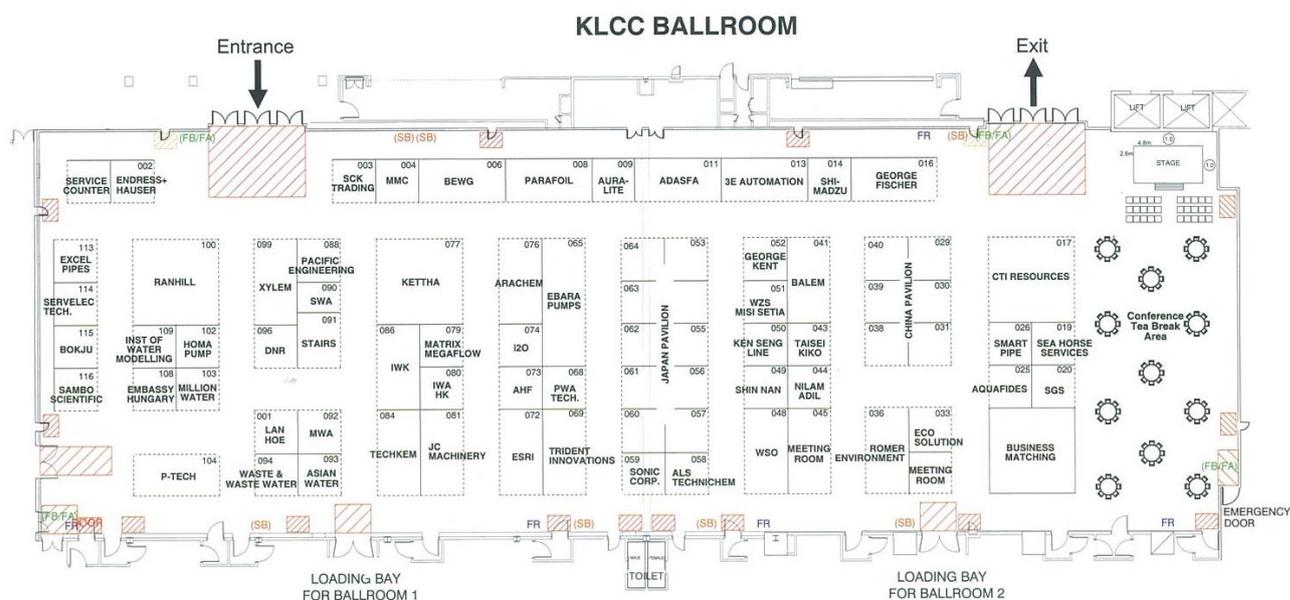


圖 貳-13 商業展覽會場參展廠商平面配置圖

本展覽會重要且具有指標性的攤位包含管材、閥類廠商、淨水系統公司展品陳列、空拍機公司展示其機器應用於水庫崩塌、水庫藻類生長研判、政府攤位包含節水標章推動、政策宣傳等，以下針對本署業務特性介紹本次展覽具代表性之公司、政府攤位。

馬來西亞雲端及物聯網技術科技公司(CTi Resources)係提供資訊設備服務，包含大數據分析、物聯網、機器學習、雲端服務及業務智能；傳統水產業監測工作多採人工或經驗在執行數據分享(使用電子郵件或架設 FTP 分享大量資訊)，但此種方式在數據的數量、品質、速度、價值上仍有其限制，以分析水網絡管理為例，傳統監測方式採單點設置獲取數據，但該公司在水產業上能夠提供最佳化套件，水網系統回報工具-需求預測及區域監測，來優化供水網絡，即時分析強化監控，便於營運管理及控制，結合虛擬感應可即時監測水壓、水

質，提供分析資料，發現潛在問題，預測未來變化，加速危機處理；但使用此網絡亦面臨一些挑戰，包含需進行基礎設備維護、回傳數據正確性及系統穩定性...等；此項技術對於未來署內智慧水管理之推動具有參考價值。

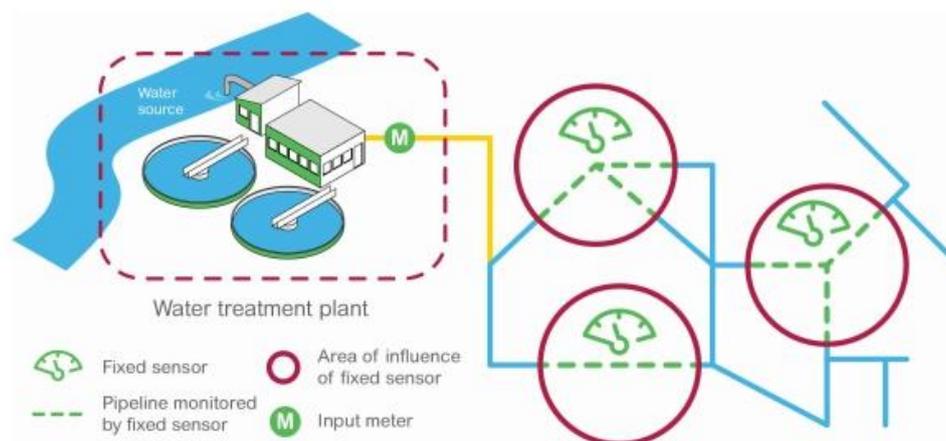


圖 貳-14 傳統水網採關鍵點位監測方式

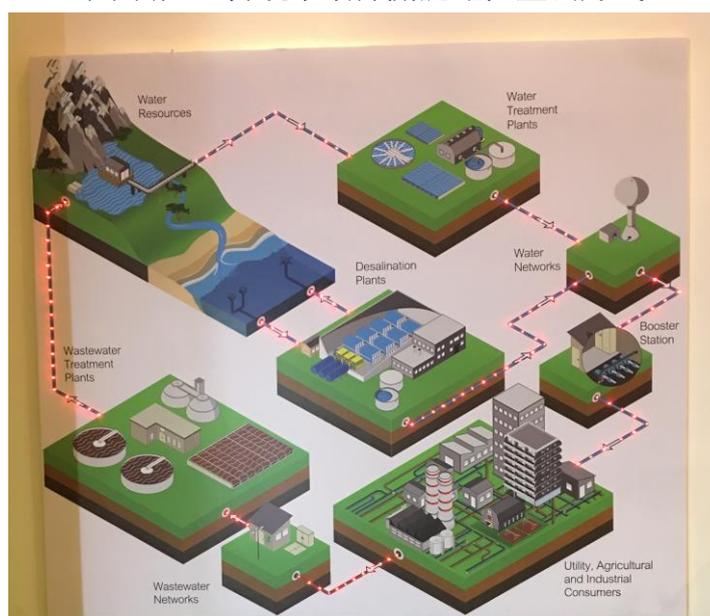


圖 貳-15 新式水網以最佳化分析提供大數據增值功能進行水網絡管理

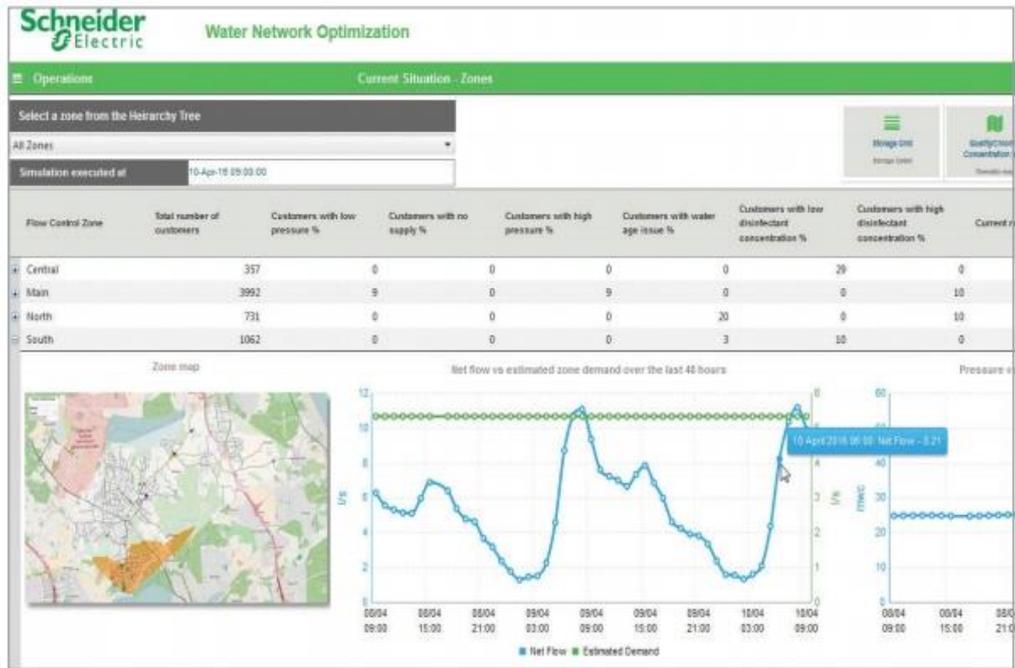


圖 貳-16 水網系統回報工具-需求預測

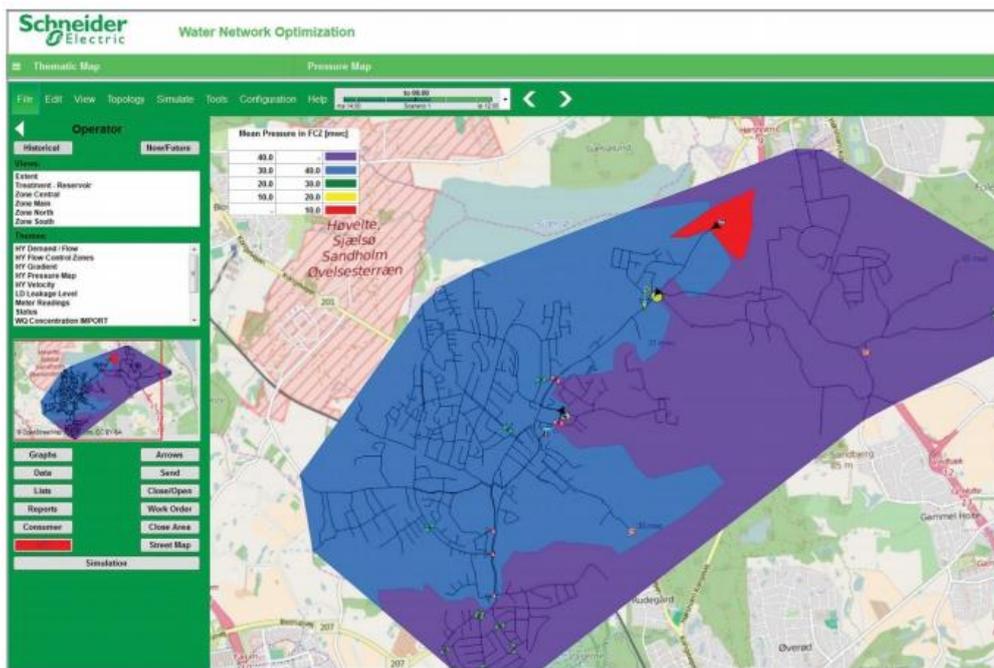


圖 貳-17 水網系統回報工具-區域監測

日本橫濱市水道局(Yokohama Waterworks Bureau)係執掌橫濱市供水之政府組織，橫濱市主要有 5 個供水系統，總供水能量為 1,955,700m<sup>3</sup>/day (橫濱市水資源地圖詳圖貳-18)，包含 3 座淨水場 Kawai, Nishiya 及 Kosuzume.本次展出包含橫濱市之水資源管理、淨水處理系統、水源地之森林保育、友善能源之供水系統、區域防災應變、水安全及水質管理、減少漏水損失、國際合作及公

私協力...等，其業務性質與本署高度相關，極具參考價值。

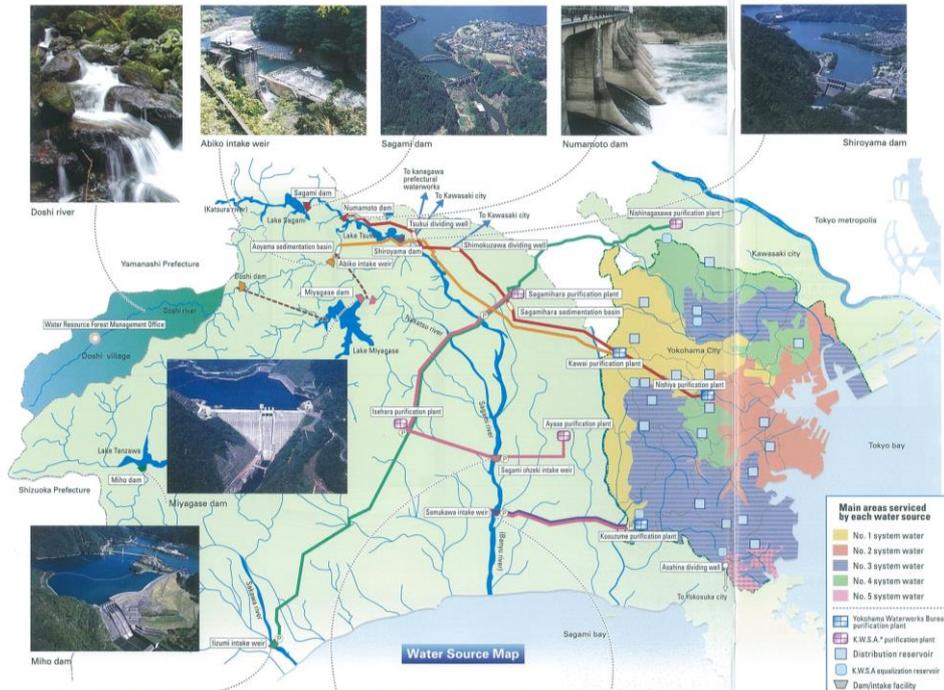


圖 貳-19 橫濱市水資源地圖

在水資源保育部分，日本橫濱市水道局成立水資源森林管理辦公室(Water Resource Forest Management Office)有系統的推動森林保育工作，成立志工服務隊維護山區原始山林，並建立水源基金致力於保護自然環境，比較特別的是該局販售官方瓶裝水「Hamakko-Doshi The Water」(圖貳-20)，產自於上游自然豐沛之清澈水流，販售所得用於挹注山林保育基金以及改善非洲國家水環境(該局國際合作計畫)。日本橫濱市水道局亦辦理多種友善能源供水系統(Eco-friendly Water Supply System)，例如於 2000 年時在 Kosuzume 淨水廠之過濾池上裝設移動式太陽能發電設施(此為日本第一座)，提供 1570kW 之乾淨能源；另外於供水管內設置小型水力發電設施，於 2015 年已設置 5 座分別位於 Onda Distribution Reservoir, Kohoku Distribution Reservoir, Kawai Purification Plant, Aoyama Water Resource Office and Mine Distribution Reservoir.本署近期亦推動多項水資源相關綠能政策，席間與該局事業推進部課長亦針對再生能源之效能討論及交流。



圖 貳-21 官方瓶裝水「Hamakko-Doshi The Water」收益用以挹注基金



圖 貳-22 太陽能及小水力發電位置圖



圖 貳-23 淨水廠過濾池上方裝設之移動式太陽能設施

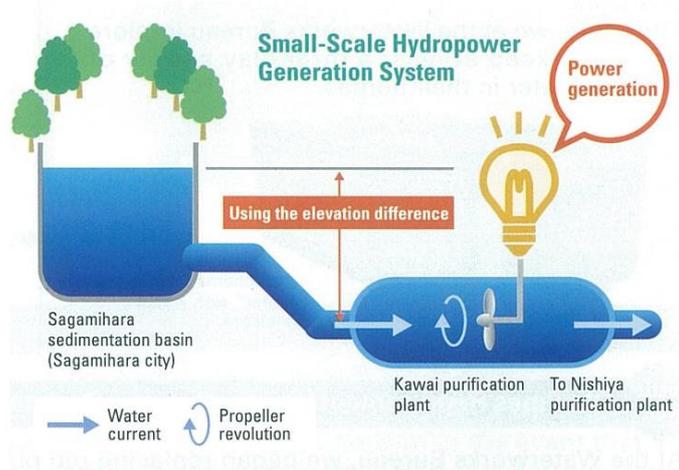


圖 貳-24 Kawai 淨水廠之小水力發電示意圖

在供水防災能力部分，日本橫濱市水道局以自救(Self-Help)、互救(Mutual Help)及政府支援(Public Help)來教導民眾防災知識，自救係宣導民眾應儲備足以供應3日飲用水之水量(9Liters/Person, 以3L/day計算)，雖然多數地區每1Km就有緊急使用之地下水供給站，但仍可能受時間或是天候影響，故該局鼓勵民眾皆應於家內儲存至少9L之飲用水(Yokohama 防災用罐裝水具有7年保存期限詳圖)；互救係採緊急供水站方式(Emergency Water Supply)，其配置狀況為134個地下水供水站、22處分散式水庫、358處依計畫供水水龍頭以及機動性較高之運水車(詳圖)；政府支援的部分採用更換老舊管線，改採抗震材質、增加主要水利設施抗震力、建設水源連通系統避免地震阻斷水源供給。



圖 貳-25 災時自救儲備水源-具有7年保存期限



圖 貳-26 災害發生時之緊急供水系統

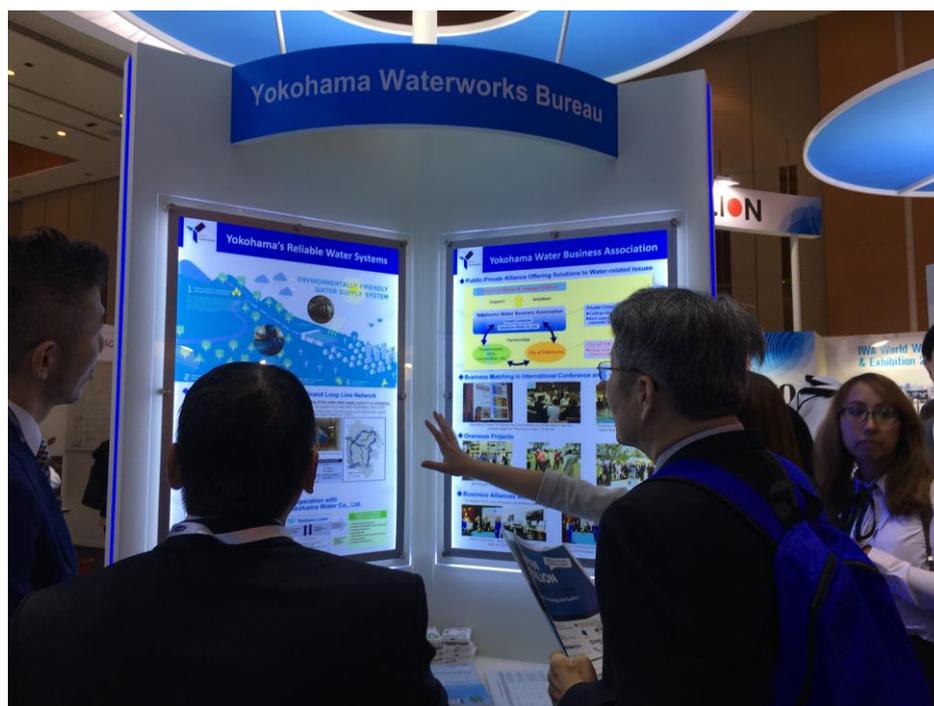


圖 貳-27 橫濱水道局課長為本署曹副署長華平解釋橫濱之供水系統、防災應變、水質管理方式。



圖 貳-28 日本於本次活動中之展出區域



圖 貳-29 新加坡於本次活動中之展出區域

## 八、現地參訪(Site Visit)

本次研討會安排了 5 場官方參訪地點提供選擇，分別為

(一) 精明隧道系統 Stormwater Management and Road Tunnel (SMART)

結合雨水管理及交通疏導之多用途隧道系統，以創新之方式解決吉

隆坡市區淹水問題及交通壅塞的問題。

(二) 污水處理廠 **Pantai 2 Sewage Treatment Plant**

處理吉隆坡內最大集水區之污水處理廠，具有生物燃氣發電設施、142 萬個 PE 污泥處理設施，且將採用地下開發的方式，同時提供休閒公園、行政大樓及社區設施。

(三) 淨水廠 **Langat 2 Water Treatment Plant**

本廠預計於 2019 年完成，2025 年開始供水，能往西及北部供應水源。

(四) 布城濕地 **Putrajaya Wetland**

本溼地總面積高達 335 公頃，具有高度的植物及魚類生物多樣性，為最受歡迎的旅遊景點之一，屬於城市綠肺，具有可持續發展之森林公園及自然路徑。

(五) 手套工廠之水回收技術 **Hartalega NGC Sdn Bhd**

此工廠每年生產 270 億隻手套，且將於 2020 年擴展至 420 億隻手套，此訪問的最主要目的為，此大型工廠具有良好之供水管理系統，包含水回收、廢水處理、減少耗水量等最新的設備和技術。

考量本署業務特性，本次參訪行程選擇精明隧道系統 **Stormwater Management and Road Tunnel (SMART)**，該隧道位於吉隆坡市中心，該國政府為了降低吉隆坡市區的淹水風險並舒緩交通壅塞的問題，提出了這項重大國家建設，此隧道是一項結合排水系統與道路系統的工程，長 9.7 公里的隧道是東南亞最長的雨水隧道（亞洲第二長）。本工程自 2003 年開始興建，於 2007 年 5 月 14 日啟用，為結合分洪功能與紓緩市區壅塞交通的共構隧道(上層為 3 公里的汽車通道，下層為 9.7 公里防洪水道)。



圖 貳-30 精明隧道系統管理中心



圖 貳-31 Klang 及 Gombak 兩條河流匯集處常造成災情



圖 貳-32 精明隧道(SMART)於流域內位置平面圖

Sg Klang 及 Gombak 兩條河流匯集處為吉隆坡城鎮之市中心及信仰中心(嘉美克清真寺)，有很長的淹水歷史，每逢大雨必定釀成重大災情，造成嚴重的人命傷亡及經濟損失；本分洪隧道興建完成後可將 Sg Klang 河主流之部分洪水導入位於 Berembang 的前池(Holding Pond)，經分洪隧道送至 Taman Desa Pond，續排入下游河道，有效降低市區河道水位，避免淹水災害。隧道一共具有 4 種操作模式，正常情況下(模式 1)，並不會有水量導入排洪隧道內；中

度洪水情況時(模式 2)，則透過位於車道下的分洪隧道進行分洪；大型暴雨事件時，汽車通道將全面關閉(模式 3)並開啟自動水密門(模式 4)，整條隧道做排洪之用，最高可容納 300 萬立方公尺水量，約為百年重現期距之洪水。洪水結束後，進行隧道安全檢查，並使用壓力水柱清洗後，高速公路與隧道會於 48 小時內恢復通車。

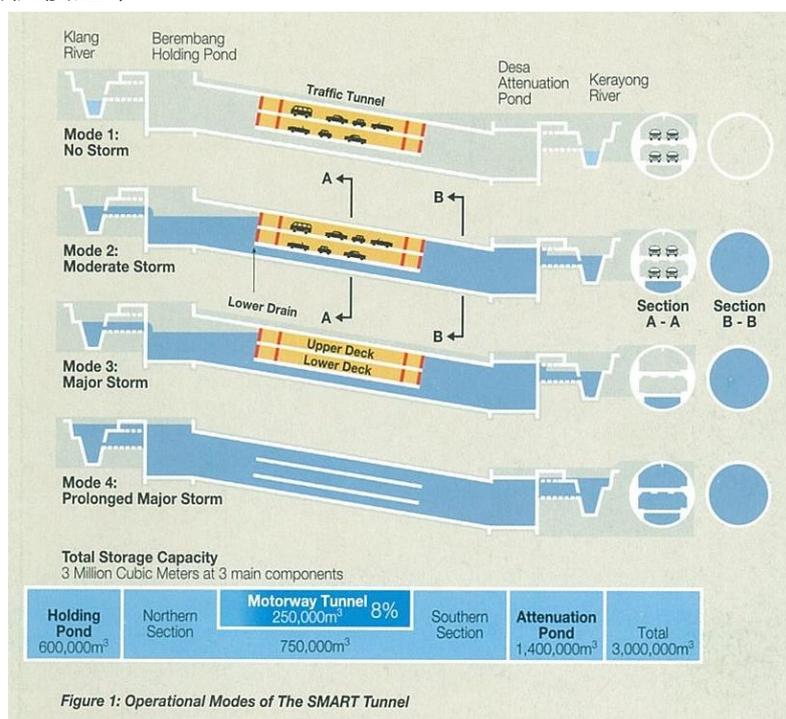


圖 貳-33 精明隧道(SMART)之四種操作模式示意圖

本精明隧道之工程內容：

- 建造成本：RM1,933 億元(US \$ 457.2 億)
- 雨水隧道長度： 9.7 公里(6.0 英里)
- 直徑： 13.2 公尺(43.3 英尺)(外徑)
- 隧道方式： 隧道掘進機(TBM)
- 工法： TBM 類型為泥水盾構



圖 貳-34 參觀精明隧道(SMART)之控制中心



圖 貳-35 參觀精明隧道(SMART)之前池(Holding Pond)及其攔砂設施



圖 貳-36 車輛行駛於精明隧道(SMART)之情形

## 九、晚宴及閉幕式

第 7 屆亞太地區發展與水管理研討會與展覽之歡迎晚會訂於 9 月 12 日晚間 8 點至 10 點於吉隆坡會展中心大型宴會廳舉辦，各國專家藉此難得齊聚一堂的機會，分享近幾日之專題研討心得並交流見解，晚宴由馬來西亞能源、綠色科技及水務部副秘書長暨指導委員會主席 Dato' Dr Tan Yew Chong 開場致詞，感謝幾日來各界發表之貢獻，副秘書長並於致詞後至台灣代表區致意，與本署曹副署長華平針對亞太地區未來水資源發展交談，並感謝台灣參與本次會議；晚宴席間安排之表演，充分展現馬來西亞多元文化融合之特色，由馬來人族群、華人族群、印度人族群、原住民族群，各著傳統服飾結合舞蹈，開啟歡慶融合的氣氛，主辦單位亦透過本次(第 7 屆)亞太地區發展與水管理研討會與展覽，捐贈款項給予兩間小學，透過該筆款項推展「水與青年」活動。



圖 貳-37 能源、綠色科技及水務部副秘書長開場致詞



圖 貳-38 本署與馬來西亞能源、綠色科技及水務部副秘書長作業務交流

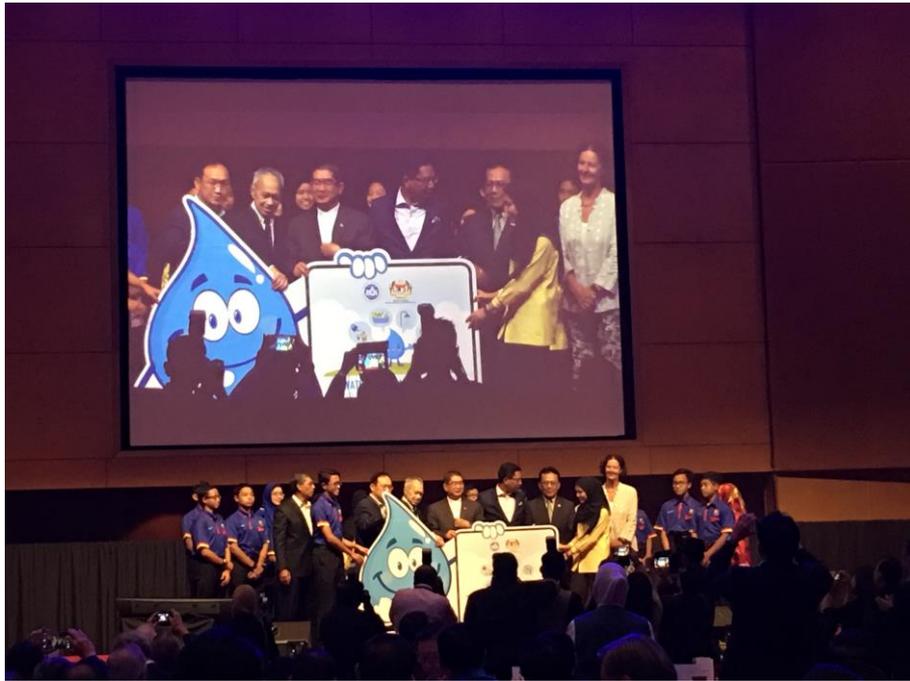


圖 貳-39 大會捐贈款項支持青年與水行動

閉幕式及頒獎典禮安排於 9 月 13 日下午 3 點，由大會主席致詞感謝各界參與，並安排專題討論「Water Façade: Face to Face with the Future of Global Water」對於全球水未來及本次會議之成果進行總結；接續為本次優秀之論文發表(口頭及書面)頒獎，最後將主辦牌交接予下一屆(第 8 屆 2019 年)主辦單位-香港，由香港發表歡迎及介紹影片。



圖 貳-40 交接主辦牌予下一屆(第 8 屆 2019 年)主辦單位-香港



圖 貳-41 下屆主辦國撥放邀請影片並合影



圖 貳-42 下屆(第8屆)主辦單位-香港特別行政區渠務署前來邀請本署參與2019年會議

## 第參章 心得及建議

- (一) 本次出訪結合研討會議及現地參訪，兼具學術及實務性質，全球水利專業人士齊聚一堂，其主題安排貼近全球重點水議題且與本署業務具有高度相關，有助於本署業務推展並提升同仁國際觀，建議未來可持續派員參加本論壇。
- (二) 本次研習除與馬來西亞建立緊密關係外，亦與一同參與會議之各國工程師分享交流彼此實務工作環境、方法、遭遇的困難及解決之方法等，例如會議期間及回國後就水利署水庫水資源管理、藻類處理方式...等合作。未來可加強聯繫，以增廣視野並及建立合作交流關係。
- (三) 本次台灣團同行之臺北自來水事業處工程師接受中華民國水協會補助論文書面發表及口頭發表數篇，近年來亞太地區發展與水管理研討會與展覽議題漸趨本署業務範疇，未來署內可針對本署強項於此國際研討會進行發表，有助於行銷台灣水技術並可增加技術輸出機會，拓展國內商機(如防洪預警、民眾參與、水庫排砂技術、智慧管理等)。
- (四) 參加本次研討會議不論研討會場地選擇、研討主題、專題演講安排、處處可感受到籌備單位之用心及細心，專題演講切合世界水管理面臨之挑戰及解決方案，主體會場旁之雙峰塔城中城公園周邊水域設施營造良好空間，許多民眾皆於假日在規劃良善之水域進行親水活動，其水環境營造值得效法。
- (五) 本次現地參訪安排馬來西亞驕傲之重大公共建設-精明隧道系統 Stormwater Management and Road Tunnel (SMART)，該隧道採具有疏導交通及疏洪雙重功能設計，一次解決馬來西亞市區 2 大問題，其工法之特殊性及設計之創新構想值得學習；惟就水利設施之觀點而言，實際檢視 2007~2017 年之操作紀錄，僅 5 次啟用交通隧道進行通水(mode 4)，且自 2013 起未曾使用 mode 4 操作之紀錄，實際與現場工程師詢問後發現，考量每次啟用 mode 4 後，至少需 48 小時之隧道安全檢查與壓力水柱清洗，

高速隧道才能再恢復通車，期間會影響市區交通流量甚鉅，且每次啟用 mode 4 後，隧道內照明、機電系統檢查常發現損壞，更換設備所費不貲，故作為疏洪使用之次數較低，顯示其防水技術及管理操作方式在防洪表現上，尚有精進空間；本署未來推動之水利工程倘具有複合式功能時(如防淤隧道內可供清運卡車通行)，可將其水利設施內之清潔方式、防水設施、更換方式...等經驗及限制條件納入參考，於設計時多加同步注意營運階段可能面臨之問題。

- (六) 本次本署主要以會議形式參與，並未參展，但對於國際大型展覽、論文發表、現地觀摩等仍帶回許多資訊可供未來出訪或國內舉辦國際型活動時參考。本次商展各國皆以其水產業之強項參與佈展，建議我國未來得把握以台灣名義參與之國際會議，統整國內相關單位共同推展，以達最大效益；本次台灣雖有廠商各別參展，惟標示、推廣及宣傳力度上稍弱，亦較難達成技術輸出之效果；未來若有大型國際活動，整體參展策略上機關可橫向合作，並以主要政策目標邀商前往參展，同時考量產品或技術輸出之可行性，如國內雖具優質管材與接頭廠商，惟可能受限國外招標規格不易打入市場，反而可考量以災害預警、水管理...等軟實力之強項展示打入各國市場，並可與南向政策相互呼應，達到加成效果。
- (七) 馬來西亞地理位置及氣候條件可稱為得天獨厚，其國家幾乎沒有地震及颱風之天然災害，且水資源充沛，惟其水處理及水管理能力較為薄弱，使得水資源在水質及水量之表現仍有很大空間，以鄰近國家新加坡為例，過去常須向馬國購水，惟透過精進再生水之方式，近幾年已有多次於馬國水資源遭受污染時，回售水之案例；台灣屬於災害敏感度相當高之國家，故造就我國水資源管理具有高精度技術，倘能協助馬國妥善規劃並推展精緻化水資源管理，成效將相當顯著並可活化國內水事業之產值。
- (八) 臺灣與馬來西亞現已有初步之水利技術輸出及學術交流合作，馬來西亞主要面臨之災害為都市開發造成之河川洪泛，目前結合台灣優勢科技成果及東南亞國家防災需求，配合政府新南向政策，我國已於馬國東部地區推

展洪水預警及防災系統，顯示臺灣水利之實力備受肯定，近年我國相關通報及防災資訊亦發展成熟，公民教育也逐步推動，未來應可就相關經驗與國外分享。