

Biennial Reports by UNESCO's Water-related Centres on activities related to the IHP in the period (June 2014- May 2016)

1. Basic information on the centre

Name of the Centre		The Regional Humid Tropics Hydrology and Water Resources Centre for Southeast Asia and the Pacific (HTC Kuala Lumpur)
Name of Director		Dr. Md. Nasir bin Md. Noh
Name and title of contact person (for cooperation)		Dr. Norlida Bt. Mohd Dom Deputy Director Sandra Ligong Assistant Director
E-mail		htckl@water.gov.my
Address		No. 2, Jalan Ledang, off Jalan Duta, 50480 Kuala Lumpur, Malaysia.
Website		http://htckl.water.gov.my
Location of centre		city/town : Kuala Lumpur;country :Malaysia
Geographic orientation *		<input type="checkbox"/> global <input checked="" type="checkbox"/> regional
Region(s) (for regional centres)		Southeast Asia and the Pacific
Year of establishment		17 Years (since 1999)
Year of renewal assessment		2016 (Proposed Year)
Signature date of most recent Agreement		16 July 2016 (Proposed Date)
Themes Of activities during reporting period	Focal Areas ♦	<input type="checkbox"/> groundwater <input checked="" type="checkbox"/> urban water management <input type="checkbox"/> rural water management <input type="checkbox"/> arid / semi-arid zones <input checked="" type="checkbox"/> humid tropics <input type="checkbox"/> cryosphere (snow, ice, glaciers) <input checked="" type="checkbox"/> water related disasters (drought/floods) <input checked="" type="checkbox"/> Erosion/sedimentation, and landslides <input checked="" type="checkbox"/> ecohydrology/ecosystems <input type="checkbox"/> water law and policy <input type="checkbox"/> social/cultural/gender dimension of water <input type="checkbox"/> transboundary river basins/ aquifers <input type="checkbox"/> mathematical modelling <input type="checkbox"/> hydroinformatics <input type="checkbox"/> remote sensing/GIS <input checked="" type="checkbox"/> IWRM <input type="checkbox"/> Watershed processes/management <input type="checkbox"/> global and change and impact assessment <input type="checkbox"/> mathematical modelling <input checked="" type="checkbox"/> water education <input checked="" type="checkbox"/> water quality <input type="checkbox"/> nano-technology <input checked="" type="checkbox"/> waste water management/re-use <input checked="" type="checkbox"/> water/energy/food nexus <input checked="" type="checkbox"/> water systems and infrastructure <input checked="" type="checkbox"/> other: (please specify) Storm water management,
	Scope of Activities ♦	<input type="checkbox"/> vocational training <input type="checkbox"/> postgraduate education <input type="checkbox"/> continuing education <input type="checkbox"/> public outreach <input checked="" type="checkbox"/> research <input checked="" type="checkbox"/> institutional capacity-building

* check on appropriate box
 ♦ check all that apply

	<input checked="" type="checkbox"/> advising/ consulting <input checked="" type="checkbox"/> software development <input checked="" type="checkbox"/> data-sets/data-bases development <input checked="" type="checkbox"/> other: (please specify) <u>Seminar, Workshop & Training</u>
Support bodies ¹	The Government of Malaysia
Hosting organization ²	Department of Irrigation and Drainage (DID)/ Ministry of Natural Resources and Environment (NRE),Malaysia
Sources of financial support ³	The Government of Malaysia (Main) Malaysia Fund In Trust (MFIT) (Extrabudgetary)
Existing networks and cooperation ⁴	UNESCO/ICHARM/RCUWM/RSC for Southeast Asia and the Pacific/ Partner of the GWP/ IWA/ APAC Water-related Centre Category II/MyWP/Malaysian Stormwater Organization/Asia-Pacific IHP HELP and Ecohydrology/Regional Sejahtera ESD Network (RSEN)
Governance	<input type="checkbox"/> director and governing board <input checked="" type="checkbox"/> other: (please specify) <u>IHP National Committee</u> Link to election of board members to the IHP Intergovernmental Council (IGC) and hosting country IHP National Committee _____ Frequency of meetings: once every <u>1</u> year(s) <input checked="" type="checkbox"/> Existence of UNESCO presence at meetings
Institutional affiliation of director	None
Number of staff and types of staff	Total number of staff (full-time, or equivalent) : 13 Number of staff who are water experts: 2 Number of visiting scientists and postgraduate students:8
Annual turnover budget in USD	Operational =USD1,237,394.00 Programmes and Activities =USD930,713.00

2. **Activities undertaken in the framework of IHP in the period June 2014– May 2016**

- 2.1 Educational activities (i.e., those with accreditation) that directly contributed to the IHP-VIII(Appendix-1) and WWAP *Please include here those activities which led to accreditation of degrees, or those held in formal school settings.*

There are 2 Students had completed their Ph.D, 6 students had completed Master's Degree and 7 undergraduates students had completed their Bachelor Degree in 2015. All of them are attached to the Research and Development Project carried out by HTC Kuala Lumpur with the collaboration with local universities. All of the students are under The Director of HTC as their external supervisor. Currently there are 2 master students doing their industrial training with HTC Kuala Lumpur until September 2016. The tabulated form below is the summary of the said student;

¹please specify bodies that cover the operational costs of the centre, and other essential costs such as salaries and utility bills, and that provide institutional support to ensure centre's sustainability

²if different from support bodies

³please specify sources of main budgetary and extrabudgetary funds to implement projects

⁴ please write international networks, consortiums or projects that the centre is part of, or any other close links that the centre has with international organizations or programmes, which are not already mentioned above

Table 1: Summary of the student output involved in the R&D activities

NO	R&D PROJECT	Ph.D	Master	Undergraduates
1	Alum Sludge	1	2	-
2	Stepped Solar Still	-	1	-
3	Artificial Bio-Macropore	-	1	-
4	Phytoremediation Technique	-	1	3
5	Gross Pollutant Trap	1	1	4
TOTAL		2	6	7

- 2.2 Research activities that directly contributed to the IHP-VIII activities as well as Sustainable Development Goals (SDGs) No.6 i.e Ensure availability and sustainable management of water and sanitation for all *Please include research/applied projects outputs such as publications that directly contributed to the IHP-VIII and WWAP objectives*

HTC Kuala Lumpur carries out its R&D activities according to its first two functions under Article II (i.e. (a) to coordinate the implementation of cooperative hydrological and water resources research projects and activities, and (b) to network with IHP National Committees and other similar centres for exchange of scientific and technical information on research results) and the UNESCO-IHP cross-cutting programmes of SWITCH-in-Asia: Urban Water Management; as well as UNESCO-HELP River Basin (Langat River).

The R&D carried out is also in conjunction with Phase IHP-VIII (2014-2021) for the themes and focal areas of Theme 1, Theme 3, Theme 4, Theme 5 and Theme 6. The main focuses are in Stormwater management, river management and waste water management.

Most of the R&D are being carried out through collaboration and networking with local universities and under the R&D committee of Malaysian National IHP programmes.

The R&D carried out in HTC Kuala Lumpur is in conjunction with phase IHP-VIII(9Nos) and SDGs Goal No. 6 is as per table below:

- **Benefits to UNESCO-IHP Programme, Regionally and Internationally**

Table 2: List of 2014-2015 Completed R&D Activities

No	TITLE	REMARKS	
		Phase IHP-VIII	SDGs (No.6)
1.	Study On Artificial Bio-Macropore For Stormwater Management At Humid Tropics Center And Langat-Help River Budget Source: NRE/DID	THEME 1 : Water related Disasters and Hydrological Change	6.5 Implement integrated water resources management
2.	Debris and Mudflow Warning System for Cameron Highlands (DMFWS Phase 1) Budget Source: NRE/DID	THEME 1 : Water related Disasters and Hydrological Change	6.6 Protect and restore water-related ecosystems
3.	Application Of A Stepped Solar Still For Sea Water Desalination At PulauPerhentian Budget Source: NRE/DID	THEME 3: Addressing Water Scarcity and Quality	6.1 Achieve universal and equitable access to safe and affordable drinking water

No	TITLE	REMARKS	
		Phase IHP-VIII	SDGs (No.6)
			6.3 Improve water quality
4.	Study On River Water Quality Pasive River Water Quality Treatment Using Phytoremedation At Universiti Putra Malaysia (UPM) Budget Source: NRE/DID	THEME 3: Addressing Water Scarcity and Quality	6.3 Improve water quality 6.5 Implement integrated water resources management
5.	Research on Performance of Gross Pollutant Trap (GPT) Trapping Devices Versus Life Cycle Cost and Gross Pollutant Management Strategies Knowledge Portal Case Study River Of Life Budget Source: NRE/DID	THEME 3: Addressing Water Scarcity and Quality	6.3 Improve water quality 6.b Support and strengthen the participation of local communities
6.	Rural River Rejuvenation (R3), Jenderam River; a Tributary of Langat_HELP Basin Budget Source: NRE/DID	THEME 4: Water and Human Settlements of the future	6.5 Implement integrated water resources management
7.	A Novel Approach To Reuse Alum Sludge In Manufacturing Of Soil Erosion Protection Blocks/Bricks And Building Material Using Admixtures And Thermal Curing Budget Source: NRE/DID	THEME 4: Water and Human Settlements of the future	6.3 Improve water quality
8.	Decision Support System (DSS) For Msma Integrated Stormwater Management Ecohydrology Budget Source: NRE/DID	THEME 5: Ecohydrology, Engineering Harmony for a Sustainable World	6.5 Implement integrated water resources management
9.	Upscaling Water Security To Meet Local, Regional And Global Challenges <ul style="list-style-type: none"> • Comparative Studies for customizing IWRM for better management at river basin level • Water management curricula using ecohydrology and IWRM • Proceeding of dissemination workshop conducted for at least 5 LCDS in Asia and Africa, 5 Universities and 2 category II centers Budget Source: UNESCO JAKARTA/MFIT	THEME 5: Ecohydrology, Engineering Harmony for a Sustainable World	6.5 Implement integrated water resources management 6.a Expand international cooperation and capacity-building

All the 8 R&Ds (No. 1 to No. 8) mentioned above are completed in 2015 meanwhile R&D no. 9 was completed in March 2016. The project outputs and outcome of each R&Ds are as per figure below;

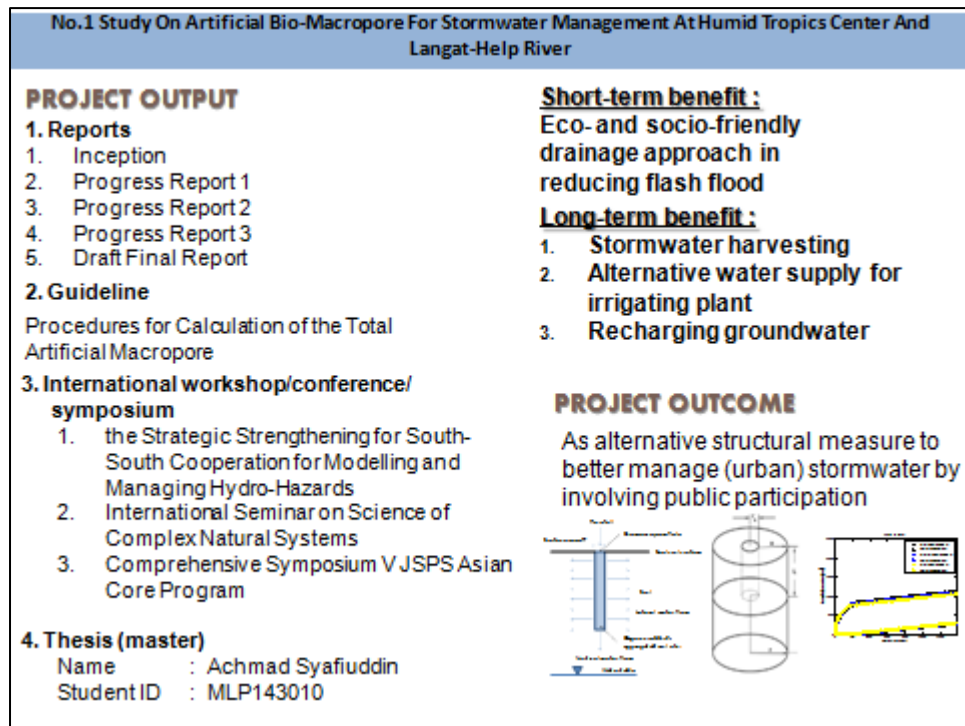


Figure 1: Study on Artificial Bio-Macropore for Stormwater Management at Humid Tropics Center and Langat-Help River

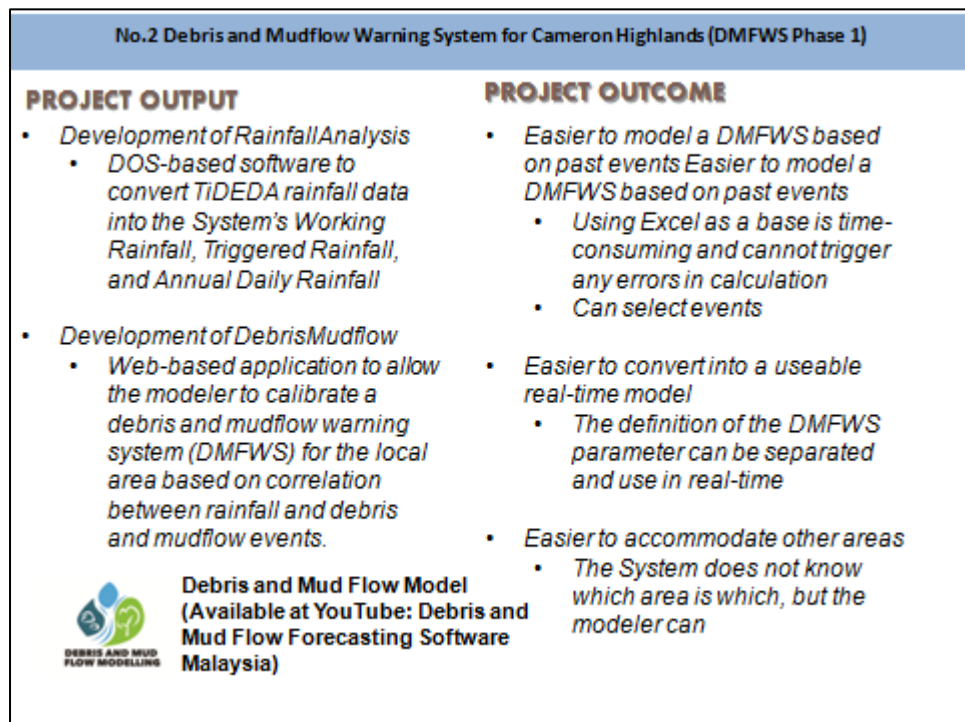


Figure 2: Debris and Mudflow Warning System for Cameron Highlands (DMFWS Phase 1)

No.3 Application Of A Stepped Solar Still For Sea Water Desalination At Pulau Perhentian

PROJECT OUTPUT

1. Reports

1. Inception
2. Progress Report 1
3. Progress Report 2
4. Progress Report 3
5. Draft Final Report

2. Prototype

- i. Scale
- ii. Pilot Project

3. Submitted Papers:

1. *Renewable Energy*. ID RENE-D-15-01270 IF3.476
2. *Desalination IF3.756*
3. to *Desalination*. DES-D-15-01266 IF 3.756
4. 2nd IWA Malaysia Young Water Professional Conference 2015 for Special Issue *Desalination and Water Treatment Journal*. SCOPUS

4. Thesis (master)

Name: Mohamad Affendi Ismail

PROJECT OUTCOME

1. Provides alternatives for safe drinking water
2. Provides alternatives method in industrial desalination (to treat salt water) with lowest cost
3. To promote renewable energy desalination, mainly solar

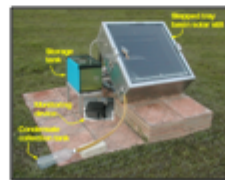
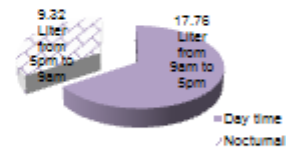
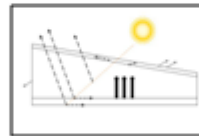


Figure 3: Application of A Stepped Solar Still for Sea Water Desalination at Pulau Perhentian, Terengganu, Malaysia

No.4 Study On River Water Quality Pasive River Water Quality Treatment Using Phytoremediation At Universiti Putra Malaysia (UPM)

PROJECT OUTPUT

1. Reports

1. Inception
2. Progress Report 1
3. Progress Report 2
4. Progress Report 3
5. Draft Final Report

2. Technical Report

Phytoremediation technique using Vetiver Grass for river water quality treatment

3. Thesis (Undergraduate)

- i. Ashton Lim SueLee
- ii. Nur Ainunazia Nordin
- iii. Tony Austin Bin Sharif@Ukang

4. Thesis (master)

Nor Amidiniewani Ibrahim

5. Conference paper:

The 3rd International Conference on Agricultural and Food Engineering (2016)



6. Journal:

International Journal of Phytoremediation



PROJECT OUTCOME

1. Provide the localized maintenance guide for Vetiver Grass
2. Promote the phytoremediation technique as non structural measure for pasive rive water treatment

Figure 4: Study on River Water Quality Pasive River Water Quality Treatment Using Phytoremediation at Universiti Putra Malaysia (UPM)

No.5 Research on Performance of Gross Pollutant Trap (GPT) Trapping Devices Versus Life Cycle Cost and Gross Pollutant Management Strategies Knowledge Portal Case Study River Of Life

PROJECT OUTPUT

1. Reports

1. Inception
2. Progress Report 1
3. Progress Report 2
4. Progress Report 3
5. Draft Final Report

2. Thesis (Undergraduate)

- i. Nga Ik Kwong
- ii. Auni Mahsuri Zainal Abidin
- iii. Yeoh Wey Kee
- iv. Tan Wei Chong

3. Thesis (master)
Nur Farazuien Md Said

4. Thesis (Phd)
Chandrika Mohd Jayothisa

5. Conferences:

- i. International Conference on Advances in Renewable Energy Technologies
- ii. 9th International Conference Novatech

6. Publication:

- i. Journal of Environmental Management
- ii. SCOPUS Indexed
- iii. International Journal of Scientific Research and
- iv. International Journal of Scientific Research and Development (ISSN : 1115 – 7569) ISI Indexed

PROJECT OUTCOME

- ❑ **Gross pollutant wet load and characterization**
- ❑ **GPT knowledge database system** that will assist the JPS (PLSK) and designers to monitor GPT's and **provides complete inventory database** of Proprietary GPTs in study area.
- ❑ **Estimation of LCC and EAC** which is helpful for the JPS to allocate sufficient budget for future operation and maintenance of GPTs.

Figure 5: Research on Performance of Gross Pollutant Trap (GPT) Trapping Devices versus Life Cycle Cost and Gross Pollutant Management Strategies Knowledge Portal Case Study River of Life

No.6 Rural River Rejuvenation (R3), Jenderam River; a Tributary of Langat_HELP Basin

PROJECT OUTPUT

1. Reports

1. Inception
2. Progress Report 1
3. Progress Report 2
4. Progress Report 3
5. Draft Final Report

2. Site Inventory

3. Bill of Quantities & Specification

4. Drawings

1. Material around the river and riverbank condition

PHOTO 1: Existing concrete built bio

PHOTO 2: River flow fast.

PHOTO 3: River bank erosion

PHOTO 10: *Michantus sinensis*

PHOTO 10: *Michantus sinensis*

PROJECT OUTCOME

1. Few River listed as benchmarking for river rehabilitation works;
 - i. Pasig River, Manila
 - ii. Ciliwung River, Jakarta
 - iii. San Antonio River, Texas USA
 - iv. Epicentrum River, Jakarta

Figure 6: Rural River Rejuvenation (R3), Jenderam River; a Tributary of LangatHELP Basin

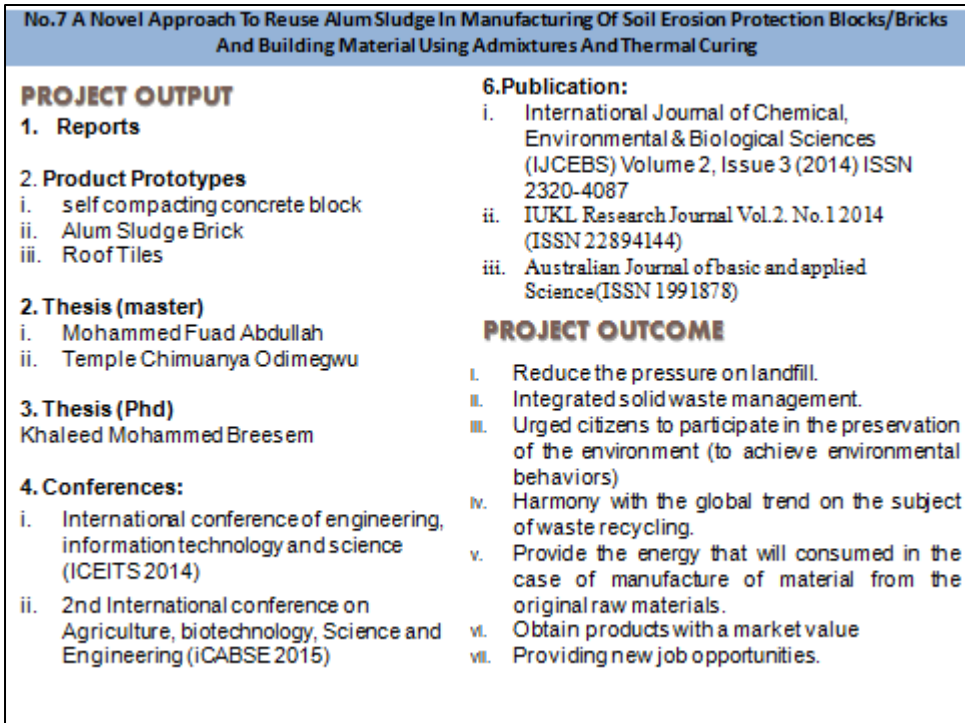


Figure 7: A Novel Approach to Reuse Alum Sludge in Manufacturing of Soil Erosion Protection Blocks/Bricks and Building Material Using Admixtures and Thermal Curing

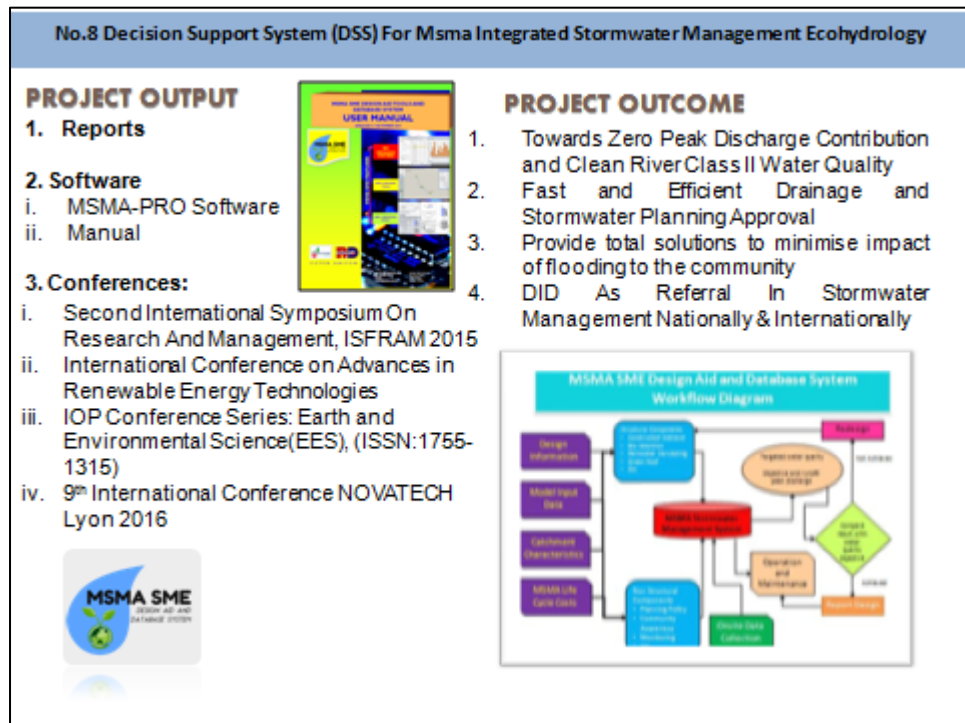


Figure 8: Decision Support System (DSS) For MSMA Integrated Stormwater Management Ecohydrology

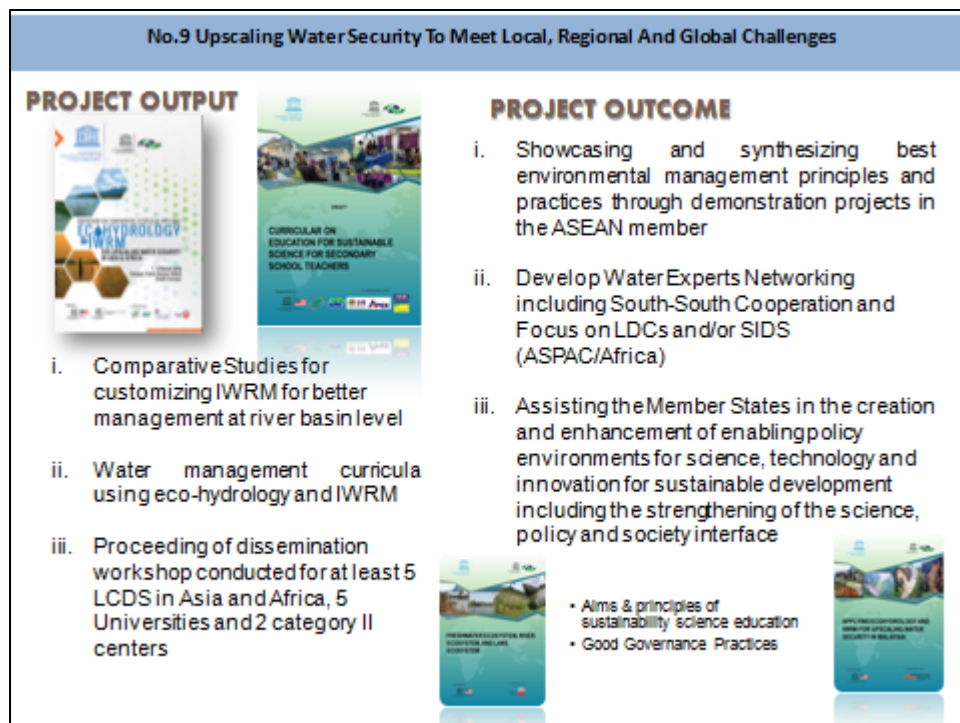


Figure 9: Upscaling Water Security to Meet Local, Regional and Global Challenges

The ongoing R&D activities carried out by HTC Kuala Lumpur for this year till 2020 (as per 11th Malaysia Plan) are as per table below;

Table 3: Ongoing R&D Activities (2016-2020)

NO	TITLE	REMARKS	
		Phase IHP-VIII	SDGs (No.6)
1	Debris Mud Flow Warning System (Phase II)	THEME 1 : Water related Disasters and Hydrological Change	6.6 Protect and restore water-related ecosystems
2	Mobile Wall Barrier	THEME 1 : Water related Disasters and Hydrological Change	6.6 Protect and restore water-related ecosystems 6.6a Expand international cooperation and capacity-building
3	Urban Heat Islands (UHI)	THEME 1 : Water related Disasters and Hydrological Change	6.a Expand international cooperation and capacity-building
4	Biodiversity Flow at Jenderam River, tributary of Sg Langat	THEME 5: Ecohydrology, Engineering Harmony for a Sustainable World	6.3 Improve water quality
5	Biodiversity Flow at Tasik Chini (Lake)	THEME 5: Ecohydrology, Engineering Harmony for a Sustainable World	6.3 Improve water quality
6	Development of Soil Water Index for Highland Area	THEME 1 : Water related Disasters and Hydrological Change	6.5 Implement integrated water resources management at

NO	TITLE	REMARKS	
		Phase IHP-VIII	SDGs (No.6)
		THEME 3: Addressing Water Security and Quality THEME 4 : Water and Human Settlements of the Future THEME 5: Ecohydrology, engineering harmony for a sustainable world.	all levels, including through transboundary cooperation as appropriate 6.6a Expand international cooperation and capacity-building

Notes: Once the R&D projects and programmes completed, the output will be either or combinations in the form of technical reports, technical guidelines, papers, proceedings, posters and innovation products.

2.3 Training activities that directly contributed to the IHP-VII/VIII and WWAP objectives

- Participated & co-organized The 13th International Conference on Urban Drainage (ICUD 2014) in Borneo Convention Centre Kuching, Sarawak (BCKK) from 7th -12th September 2014. The theme of this conference is “Urban Drainage in the Context of Integrated Urban Water Management: A Bridge between Developed and Developing Countries”.
- Organised Best Thesis Award (PhD; Masters; Undergraduate) in Hydrology and Water Resources for Malaysia’s Universities and Higher Learning Institution in conjunction with Malaysia World Water Day (WWD) 2015 on 12th May 2015 at Auditorium DID, Ampang. The theme of the WWD2015 is Water and Sustainable Development.
- Participate & co-organized The 3rdInternational Conference on Water Resources (ICWR2015) with University Technology Malaysia (UTM) which was as held at the Bayview Hotel Langkawi, Malaysia from 24th - 25th November 2015.
- Conducted a Workshop on Comparative Studies of Applying Ecohydrology and Integrated Water Resources Management for Upscaling Water Security in Asia and Africa through UNESCO Category II Water Centre with the collaboration of UNESCO in JAKARTA Office, UniversitiTenagaNasional (UNITEN) & LESTARI UniversitiKebangsaan Malaysia (UKM), 7-9 March 2016 at Berjaya Times Square Hotel, Kuala Lumpur.
- Organised Best Thesis Award (PhD; Masters; Undergraduate) in Hydrology and Water Resources for Malaysia’s Universities and Higher Learning Institution in conjunction with Malaysia World Water Day (WWD) 2016 on 24thMarch 2016 atKompleksSukan Air, Putrajaya. The theme of the WWD2016 is Water and Jobs.
- Co-organised with the Malaysia Water Partnership (MyWP) the Seminar On Water Resources Security In The Context Of Sustainable Development Goals 2016,25 May 2016 at Palm Garden Hotel, Putrajaya
- Co-organised with the Malaysian National Commission for UNESCO the Malaysia UNESCO Day, 28 – 29 May 2016 at Putrajaya Wetland Park



Photo 1: Some of the Training Activity Conducted by HTC Kuala Lumpur

3. Collaboration and linkages

3.1 Participation in major international networks, programmes, partnerships with other UN or other International Agencies, media and professional bodies

- SWITCH-in-ASIA Urban Water Management
- Networking/ Partnerships
 - UNESCO
 - ICHARM-Japan
 - RCUWM-Tehran (Refer to MoU Appendix-3)
 - UNESCO Jakarta Office
 - Asia Pacific Centre for Ecohydrology (APCE) (Refer to MoU Appendix-3)
 - Partner of the GWP
 - International Water Association (IWA)
 - MyWP (Malaysia Water Partnership)
 - Regional Sejahtera ESD Network (RSEN)
- Trainings
 - Attended & presented a paper at the Seminar on Forecasting Flood and Control Technology at Infrastructure University Kuala Lumpur (IUKL) on 17 June 2014.
 - Attended & presented a paper at the Peri Urban 2014 International Conference in Sydney, Australia from 8th – 9th July 2014.
 - Attended & presented a paper at the Joint University of Canberra-UNESCO International Forum on Sustainable Landscape Future: Solving Complex Problems through sustainable science in Canberra, Australia from 10th – 11th July 2014.
 - Attended & presented a paper at the 7th RCE Asia Pacific Meeting and International Symposium on “A Decade of Regional Centres of Expertise on ESD: Reflections and advances in Asia-Pacific” on 27th August 2014 at DewanBudaya, Universiti Sains Malaysia & Minden Height National School.

- Attended & presented a paper at the Training Course on Ecohydrology: A Tool for IWRM Implementation at the River Basin Level, 09 November 2014 at Yogyakarta, Indonesia.
- Attended & presented a paper at the International UNESCO-PAGASA-IFI Workshop “Enhancing Resilience against Multi-Hazards through Effective Mitigation Systems and Adaptation Strategies, 24 – 26 February 2015 at La Breza Hotel, Quezon City, Philippines.
- Attended & presented a paper at the Regional Dialogue on Sustainable Science Policy to Support the Post – 2015 Development Agenda on 4-5 March 2015 at KLCC, Kuala Lumpur, Malaysia.
- Attended & presented a paper at the 7th World Water Forum 2015, 14– 17 April 2015 at Daegu & Gyeongbuk, Rep. Of Korea.
- Attended & presented a paper at the Water Seminar 2015 in Brunei Darussalam World in conjunction of Brunei’ Water Day 2015 which was held at Rizqun Hotel, Bandar Seri Begawan, 27 April 2015. The theme of this Seminar was Water and Sustainable Development.
- Attended and represented UNESCO Jakarta Office for the 15th International Convention on Melaka Twin Cities 2015: “ Future Green Cities”, 29 -30 April 2015 at Equatorial Hotel Melaka, Malaysia
- Attended the course on Disaster Management for Landslide And Sediment-Related Disasters in JICA TOKYO Centre from 11 September 2015 – 12 December 2015
- Attended & presented a paper at the Workshop for Capacity Building on Climate Change Impact Assessments and Adaptation Planning in the Asia-Pacific Region: Needs and Challenges for Designing and Implementing Climate Action, 27-28 January 2016 in Manila, The Philippines.
- Attended & presented a paper at the Asia Water Seminar 2016, the Region’s Leading Water Industry Event, 6-8 April 2016 in Kuala Lumpur Convention Centre.
- Attended & presented a paper at the Seminar on Climate Impact in Malaysia: Attenuation through an Integrated Safer Built Environment, 6 May 2016 in Putrajaya, Malaysia.

3.2 Participation in meetings related to the IHP and UNESCO (e.g., the UNESCO General Conference, the UNESCO Executive Board, the IHP Intergovernmental Council and/or other meetings organized by IHP)

- International/ Regional
 - Attended the 21st Intergovernmental Council (IGC) UNESCO – IHP, Paris on 18 -20 June 2014
 - Attended the “22nd Regional Steering Committee Meeting UNESCO-IHP Southeast Asia & the Pacific held in Yogyakarta, Indonesia from 08th – 15 November, 2014
 - Attended a Meeting of Water Related UNESCO Category II Centres at Koblenz, Germany, 15 to 17 December 2014 and presented the HTCKuala Lumpur Activities Related to IHP.
 - Attended a Strategic Meeting and a Workshop on Tools for Customizing IWRM Guidelines for Water Security in Asia and the Pacific: Challenges and Opportunities for HELP and

Ecohydrology,11 - 12 March, 2015 at Grand Kemang Hotel, Jakarta, Indonesia.

- Attended the "23rdRegional Steering Committee Meeting UNESCO-IHP Southeast Asia & the Pacific held in Medan, Indonesia, 19-22 October 2015
 - Attended the Coordination Meeting of Water Related UNESCO Category II Centres at Beijing China, 15 -18 May 2016
 - Attended the Experts' Consultation Meeting for Advancing Water Education in Asia and the Pacific, 24 - 25 May 2016 in Medan, Indonesia.
 - National
 - Malaysia National Committee for International Hydrological Programme Meeting (MIHP)
 - Science Committee Meeting, twice yearly for organization affiliate to UN and UNESCO
- 3.3 Collaboration and networking with other UNESCO category 1 or 2 institutes/ centres
- 3.3.1 cross-appointment of directors of the category 1 or 2 institutes or centres on the governing board
None
- 3.3.2 exchange of information on activities such as training/educational materials, and funding opportunities
- Proceedings
 - Proceedings of Seminar on the first National Conferences on Non Point Source Pollution (NPS2014).
 - Proceeding of the 3rdInternational Conference on Water Resources (ICWR2015): Sustainable Solutions to Global Change: Challenges on Water and Environmental Security.
 - Proceeding of dissemination workshop conducted for at least 5 LCDS in Asia and Africa, 5 Universities and 2 category II centers

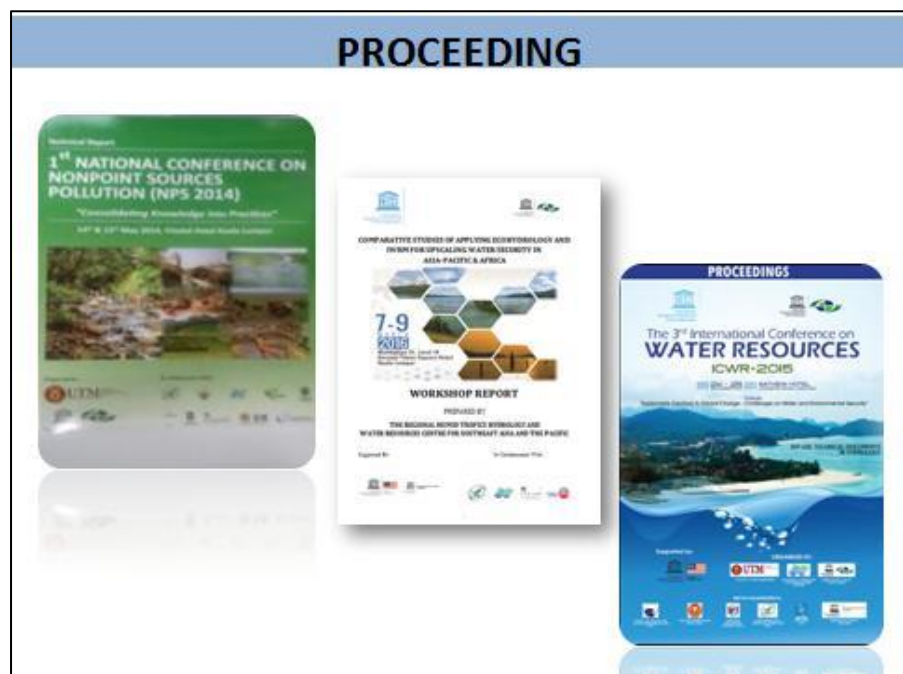


Photo 2: Some of the Proceedings by HTC Kuala Lumpur

- Publications/ Technical Reports
 - Journal of Water Resource Management, Vol. 1, No. 3, December 2014
 - Technical Report: Rainwater Harvesting, 2014
 - Technical Report: Bioretention System, 2014
 - Journal of Water Resource Management, Vol. 1, No. 4, December 2015 (draft)
 - Water management curricula using eco-hydrology and IWRM (draft)



Photo 3: Some of the Technical Report and Journal by HTC Kuala Lumpur

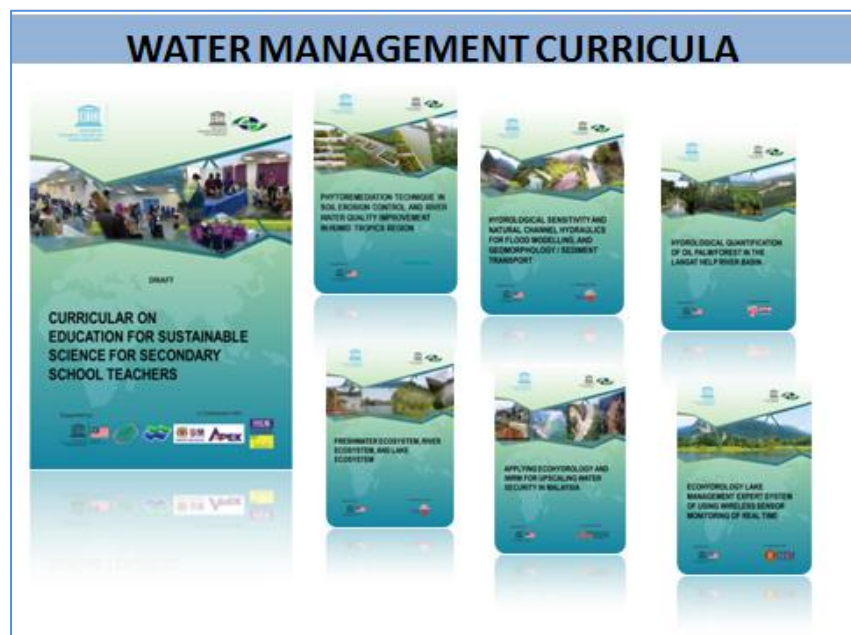


Photo 4: Some of the Draft Water Management Curricula by HTC Kuala Lumpur

3.3.3 Exchange of staff, most notably professionals and students
 - None

3.3.4 Implementation of joint activities, such as workshops, conferences, training programmes, joint projects, field visits, software and data sharing, knowledge exchange and publications

- Workshop on Comparative Studies of Applying Ecohydrology and Integrated Water Resources Management for Upscaling Water Security in Asia and Africa through UNESCO Category II Water Centre with the collaboration of UNESCO in JAKARTA Office, Universiti Tenaga Nasional (UNITEN) & LESTARI Universiti Kebangsaan Malaysia (UKM) on 7-9 March 2016 at Berjaya Times Square Hotel, Kuala Lumpur.
- Manual for Debris and Mudflow Forecasting Software by HTC Kuala Lumpur, Version 2 is available in YouTube at Debris and Mudflow forecasting Software Malaysia <https://youtu.be/LKczFScC21E>

3.4 Relationships with the UNESCO field and regional office whose jurisdiction covers the country of location

- Good relationship with UNESCO Jakarta Office

3.5 Relationship with the UNESCO National Commission and the IHP National Committee in the country of location and with other organizations of other countries

- Good relationship with:
 - Malaysian National Commission for UNESCO
 - Malaysia National Committee for International Hydrological Programme (MIHP)

3.6 Relationship with other UNESCO-related networks, such as UNESCO Clubs, ASPnet, and UNESCO chairs

- Malaysian National Commission of UNESCO

4. Communication

4.1 Communication and knowledge dissemination activities undertaken in the framework of IHP

- Through cross-cutting programmes:
 - UNESCO SWITCH (Sustainable Water Management Improves Tomorrow's Cities Health)-in-Asia: Urban Water Management
 - UNESCO-HELP (Hydrology for the Environment, Life and Policy) River Basin
- Through giving lectures such as Integrated Water Resources Management and Integrated Flood Management.
- Through conducted seminars and workshops.
- Through proceedings, Journal and technical guidelines publications.
- Through meetings on conducted research.
- Through booth exhibition during big event /seminar such as World Water Day, Malaysian UNESCO Day and Asia Water Seminar
- Through ICT Media such as YouTube, Social Media such as Facebook and Instagram.

- 4.2 Policy documents and advice
- National Water Resource Policy

5. Update on Centre Operations

- 5.1 Membership of the Board of Governors between designated period
- IHP National Committee Chairman of Southeast Asia and Pacific
 - Co-ordination Committee
- 5.2 Key decisions made (attach minutes of meetings)
- Not available

6. Evidence of the Centres' Impacts

- 6.1 Science Impacts (Major contributions to the science, technology, education, and regional and/or international cooperation in the field of water)
- MSMA Stormwater Management Eco-hydrology (MSMA SME)
 - MSMA Pro Software
 - Public Outreach Program Outcome from Gross Pollutant Trapped Devices Analysis
 - Phytoremediation Technique for River Pollutant
 - Debris and Mudflow Model Software
 - Porous and Permeable Pavement System
 - Greywater Reuse System
 - Constructed Wetland System
 - Rain Water Harvesting System
 - Green Roof System
 - Bioretention System

Note: Her Excellency Madam Irina Bokova, Director General UNESCO had visited HTCKL on 21st May 2013. She had officially launched the UNESCO-SWITCH in Asia: MSMA Stormwater Management Ecohydrology at HTC Kuala Lumpur by releasing fish into the constructed wetland & signing of plaque.

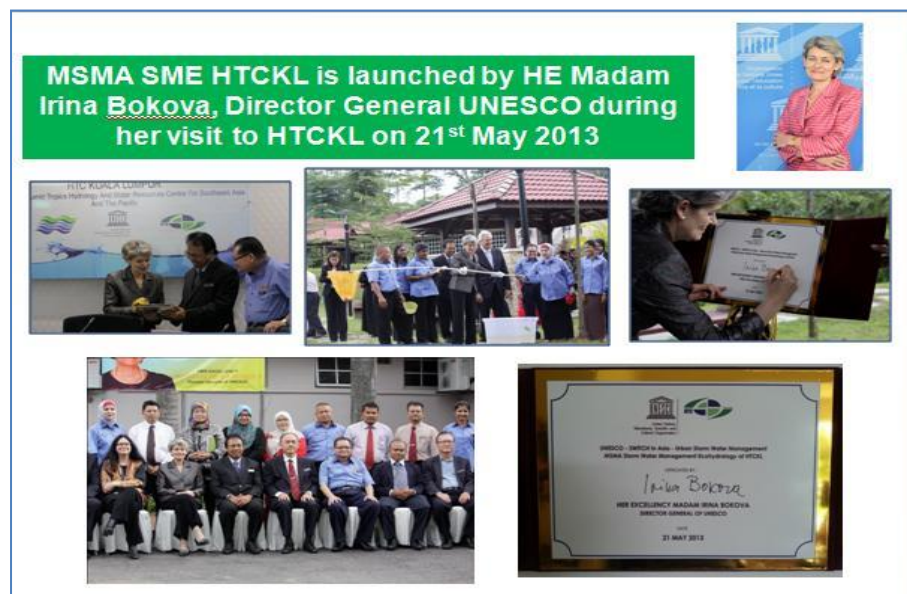


Photo 5: HE Madam Irina Bokova, Director General UNESCO Visited HTC Kuala Lumpur

In addition to that, for the year 2017, HTC Kuala Lumpur was requested by Ecohydrology Coordination Office, Ethiopia on Transfer of Technology in Urban Stormwater Management (MSMA Pro) for their centre in Ethiopia.

Subsequently, MSMA Pro Trainer Training was approved generally by the UNESCO Jakarta Office during the Experts' Consultation Meeting for Advancing Water Education in Asia and the Pacific, 24 – 25 May 2016 in Medan, Indonesia.

6.2 Knowledge Transfer Impacts (Major achievements in the dissemination of knowledge and technology transfer)

- Many lecturers, university students and others (from overseas including UNESCO and local) visit HTCKL to see and gain knowledge through our integrated Stormwater Management Ecohydrology (SME) and R&D programmes/projects. The list of the technical visit from Local Universities and other organization to HTC Kuala Lumpur is listed below;

Table 4: List of Technical Visitors Visited to HTC Kuala Lumpur

NO	ORGANIZATION	DATE	NO. OF VISITOR
1	Universiti Tunku Abdul Rahman (UTAR)	5.8.2014	31
2	Universiti Tunku Abdul Rahman (UTAR)	7.8.2014	36
3	Pejabat Lembaga Sungai Klang (PLSK), Malaysia	21.01.2015	15
4	University Malaya	01.06.2015	32
	Director General of UNESCO Jakarta & Delegation	17.09.2015	3
5	Assistant Minister of Natural Resources and Environment & Delegation	06.01.2016	5
6	Polytechnic Port Dickson	28.01.2016	22
7	Ecohydrology Coordination Office, Ministry of Water, Irrigation and Energy Mr. Yohannes Zerihun Negessie	17.3.2016 -19.3.2016	1
8	King's College London Prof. Dr. Sampurno Bruijnzeel	17.3.2016	1
TOTAL			146



Photo 6: Visits by UNESCO Office and Water Centre Visitors to HTC Kuala Lumpur

6.3 Policy Impacts (advice sought by government and other bodies and evidence of inputs into policy arena)

- Contribution to the National Water Resource Policy; on the thrust 3 i.e use of alternative of water resources and sources, thrust 4 i.e water related disaster reduction, preparedness and response and last but not least on thrust 9 which is capacity building and awareness.



Photo 7: The Government Policies and Approved

7. Future activities that will contribute directly to IHP and/or to WWAP

7.1 Operational Plan (attach if available)

HTCKL will continue to perform and carry out its obligation under Article 2 of the Agreement related to – coordinating the implementation of cooperative hydrological and water resources research projects and activities; networking with IHP National Committees and other similar centres for exchange of scientific and technical information on research results; organizing training courses, seminars, workshops and meetings for knowledge and technology transfer; and producing related hydrological and water resources publications and media for distributions.

HTC Kuala Lumpur is proposed the following activities for future endeavor;

- i. Seminar on Water Security (HTC & ISTIC & Water Centers Category 2) + Coordination meeting among Water Centers Category 2 -2017
- ii. Training on Urban Stormwater Management (MSMA Pro) for Ethiopia
- iii. Dissemination of Modula Curriculars to UNESCO Water Centers and Water Families as show example in Photo 4

7.2 Strategic Plan linked with IHP-VIII(Appendix-1). Focal areas within IHP-VIII the centre plans to contribute to and specific actions the centre will undertake to align its activities with the strategic plan for IHP-VIII.

Strategic Plan linked with IHP-VIII (Appendix-1)

- HTCKL Focus Area on R&D based on UNESCO IHP VIII Themes (2014 – 2021) (Appendix 1) as well as in SDGs No. 6 (Appendix-2)

For future endeavors, HTC Kuala Lumpur will continue to carry the trust and responsibilities given to us focusing on IHP-VIII Strategic Plan 2014-2021, fill the gaps for theme II while playing bigger role to cope with the country and regional challenges particularly the water security agenda for “Humid Tropics” area around globe.

The Themes:

- Climate Change and Hydrology
- Water Resources and Water Security

The Focal Area Such as:

- Urban Water Management
- Urban Water
- Humid Tropics
- Water and Environment
- Ecohydrology/Ecosystems
- IWRM
- Water Education
- Water Quality
- Storm Water Management
- Water Hazard
- Urban Heat Islands

Focal areas within IHP-VIII the centre plans to contribute to and specific actions the centre will undertake to align its activities with the strategic plan for IHP-VIII (Please see Appendix-1)

The R&D carried out is in conjunction with IHP Phase VIII (2014-2021) for the themes and focal areas of Theme 1, Theme 3, Theme 4, Theme 5 and Theme 6. The main focuses are in stormwater management, river management and waste water management.

Most of the R&D are being carried out through collaboration and networking with local universities and under the R&D committee of Malaysian National IHP programmes.

8. Annexes

8.1 List of publications released by the centre (there can be overlap with those listed in 3.3.2 above)

- Proceedings
- Publications
- Research Reports
- Technical Reports
- JWRM Journal
- Water Curricular
- Manuals

8.2 List of training courses conducted (there can be overlap with those listed in 2.3 above)

- Software Trainings
- Seminar and Paper Presented as listed in 2.3
- HTC Kuala Lumpur Technical Talks

Appendix-1

Overview of the Core Programme Themes of the Eighth Phase of the IHP (2014-2021) WATER SECURITY: ADDRESSING LOCAL, REGIONAL, AND GLOBAL CHALLENGES

THEME 1: WATER-RELATED DISASTERS AND HYDROLOGICAL CHANGE

- Focal area 1.1 - Risk management as adaptation to global changes
- Focal area 1.2 - Understanding coupled human and natural processes
- Focal area 1.3 - Benefiting from global and local Earth observation systems
- Focal area 1.4 - Addressing uncertainty and improving its communication
- Focal area 1.5 - Improve scientific basis for hydrology and water sciences for preparation and response to extreme hydrological events

THEME 2: GROUNDWATER IN A CHANGING ENVIRONMENT

- Focal area 2.1 - Enhancing sustainable groundwater resources management
- Focal area 2.2 - Addressing strategies for management of aquifers recharge
- Focal area 2.3 - Adapting to the impacts of climate change on aquifer systems
- Focal area 2.4 - Promoting groundwater quality protection
- Focal area 2.5 - Promoting management of transboundary aquifers

THEME 3: ADDRESSING WATER SCARCITY AND QUALITY

- Focal area 3.1 - Improving governance, planning, management, allocation, and efficient use of water resources
- Focal area 3.2 - Dealing with present water scarcity and developing foresight to prevent undesirable trends
- Focal area 3.3 - Promoting tools for Stakeholders involvement and awareness and conflict resolution
- Focal area 3.4 - Addressing water quality and pollution issues within an IWRM framework - improving legal, policy, institutional, and human capacity
- Focal area 3.5 - Promoting innovative tools for safety of water supplies and controlling pollution

THEME 4: WATER AND HUMAN SETTLEMENTS OF THE FUTURE

- Focal area 4.1 - Game changing approaches and technologies
- Focal area 4.2 - System wide changes for integrated management approaches
- Focal area 4.3 - Institution and leadership for beneficitation and integration
- Focal area 4.4 - Opportunities in emerging cities in developing countries
- Focal area 4.5 - Integrated development in rural human settlement

THEME 5: ECOHYDROLOGY, ENGINEERING HARMONY FOR A SUSTAINABLE WORLD

- Focal area 5.1 - Hydrological dimension of a catchment– identification of potential threats and opportunities for a sustainable development
- Focal area 5.2 - Shaping of the catchment ecological structure for ecosystem potential enhancement – biological productivity and biodiversity
- Focal area 5.3 - Ecohydrology system solution and ecological engineering for the enhancement of water and ecosystem resilience and ecosystem services
- Focal area 5.4 - Urban Ecohydrology – storm water purification and retention in the city landscape, potential for improvement of health and quality of life
- Focal area 5.5 - Ecohydrological regulation for sustaining and restoring continental to coastal connectivity and ecosystem functioning

THEME 6: WATER EDUCATION, KEY FOR WATER SECURITY

- Focal area 6.1 - Enhancing tertiary water education and professional capabilities in the water sector
- Focal area 6.2 - Addressing vocational education and training of water technicians
- Focal area 6.3 - Water education for children and youth
- Focal area 6.4 - Promoting awareness of water issues through informal water education
- Focal area 6.5 - Education for transboundary water cooperation

Appendix-2

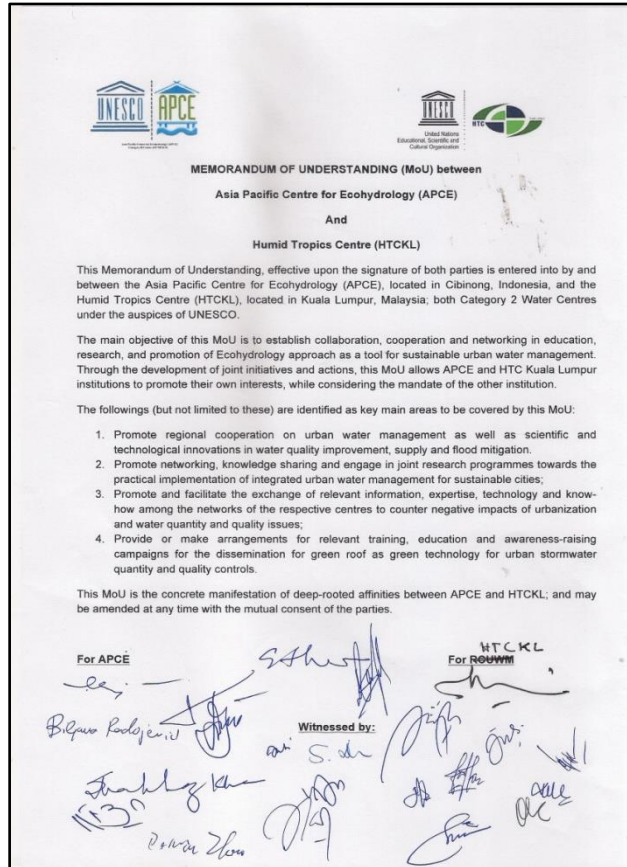
SUSTAINABLE DEVELOPMENT DEVELOPMENT GOALS

Goal 6. Ensure availability and sustainable management of water and sanitation for all

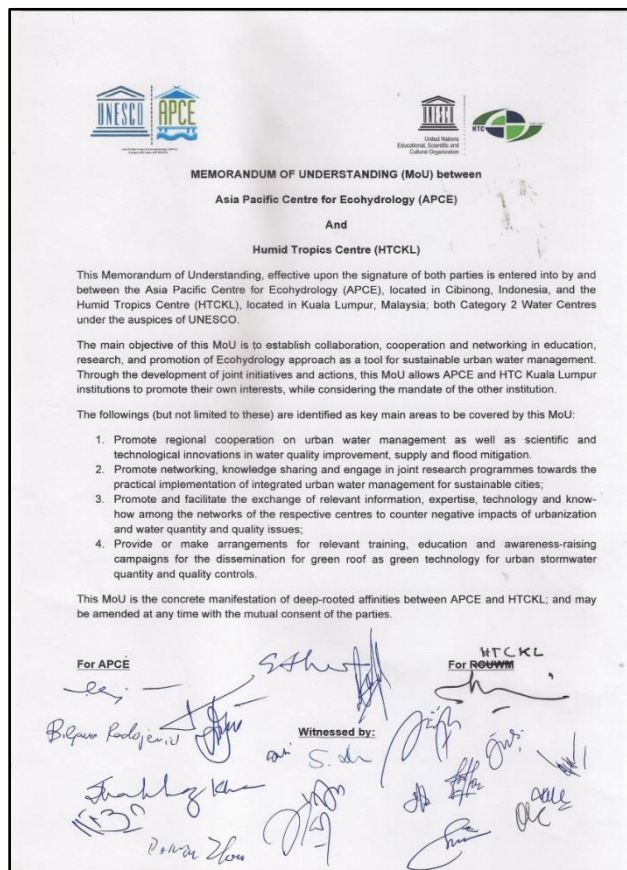
- 6.1** Achieve universal and equitable access to safe and affordable drinking water for all
- 6.2** Achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations
- 6.3** Improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
- 6.4** Substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity
- 6.5** Implement integrated water resources management at all levels, including through transboundary cooperation as appropriate
- 6.6** Protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
 - 6.a** Expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies
 - 6.b** Support and strengthen the participation of local communities in improving water and sanitation management

Appendix-3

MEMORANDUM OF UNDERSTANDING (MoU)



MoU between HTC Kuala Lumpur and Regional Centre on Urban Water Management (RCUWM, Tehran)



MoU between Asia Pacific Centre for Ecohydrology (APCE) and HTC Kuala Lumpur