



**APCE – UNESCO CONTRIBUTION IN IMPLEMENTING SDGS
TARGET AND INDICATOR REGARDING SCIENCE, ENGINEERING,
TECHNOLOGY AND INNOVATION (SETI)**

Regional Workshop, 7-9 June, 2017 in Dilli-Timor Leste



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Associate Professor in Chemical and Environmental Technology

Outline

- **APCE as Category II Centre of UNESCO**
 - History
 - Vision & Mision
 - Strategic Goals
- **Target and Indicator**
- **SETI to support SDG**



Asia Pacific Centre for Ecohydrology – UNESCO Category II Centre

Global Water Problems



In many regions, changing precipitation or melting snow and ice are altering hydrological systems, affecting water resources in terms of quantity and quality



Economic losses caused by floods and droughts have been on the rise. Developing countries are experiencing higher fatality rates and relative economic losses expressed as a proportion of GDP



By the end of the 21st century, the number of people exposed annually to a 20th-century 100-year flood is projected to be three times greater for RCP8.5 than for RCP2.6

IPCC AR5 WG2 SPM (2014)

“Human interaction with the environment is at the center of water security..” (Anonymous)

Main Issues Related to Water in Asia Pacific Region

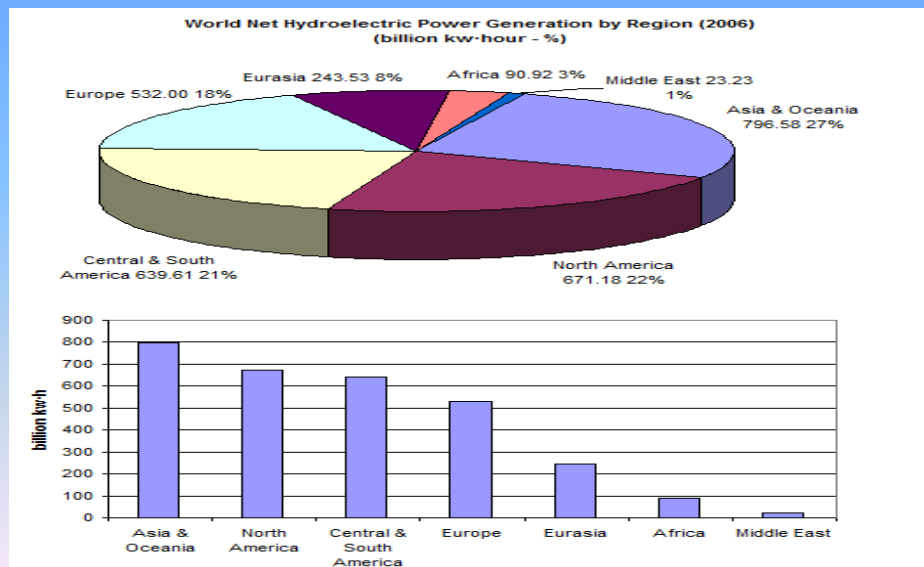
- Lack of clean water and sanitation → water related-diseases
- Water Conflicts
- Water pollution
- Droughts and Floods
- Loss of biodiversity

Impact on food security

Impacts of Flood and Drought on Household and Livelihood

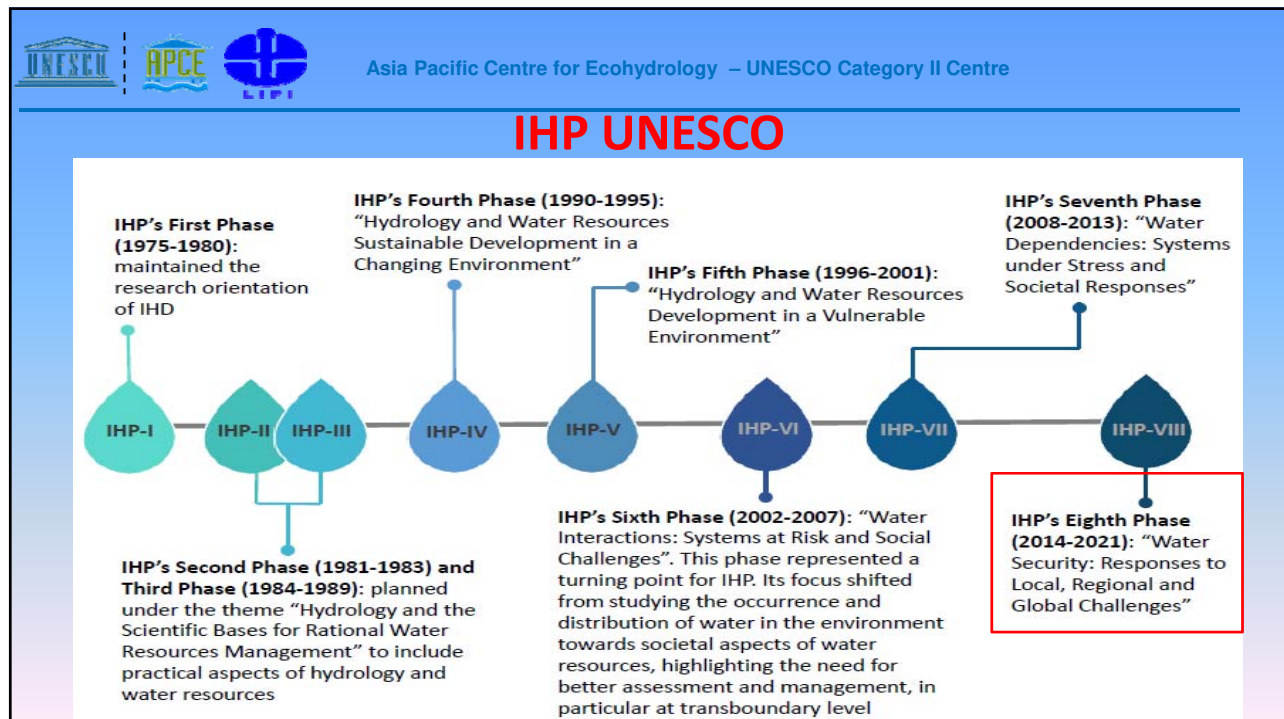
Impact	Flood (%)	Drought (%)	Total (%)
Impacts on household			
Not affected	1	0.5	0.6
Moderate	13	16	15.2
Severely affected	86	83.5	84.2
Impacts on livelihood			
Crop production	100	100	100
Food prices	79	85	83
Livestock	31	37	35
Fishing	10	30	23
Houses/properties	37	1.4	12

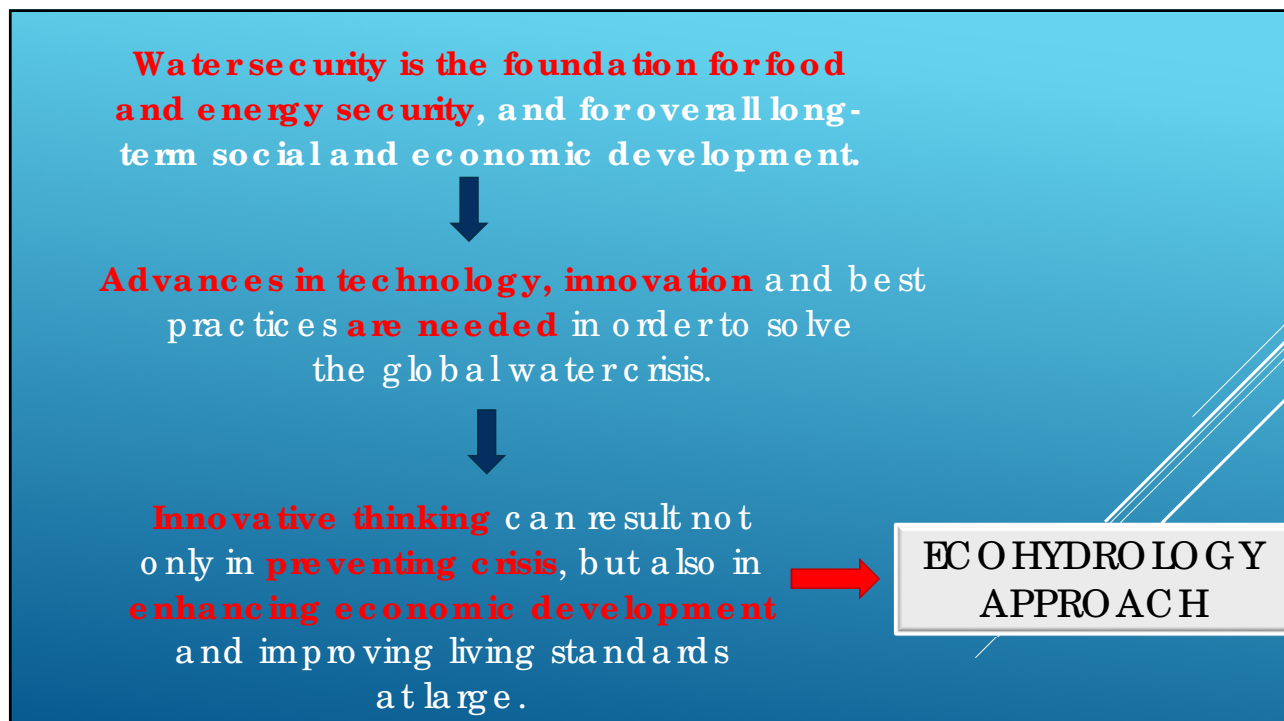
Impact on Energy Security

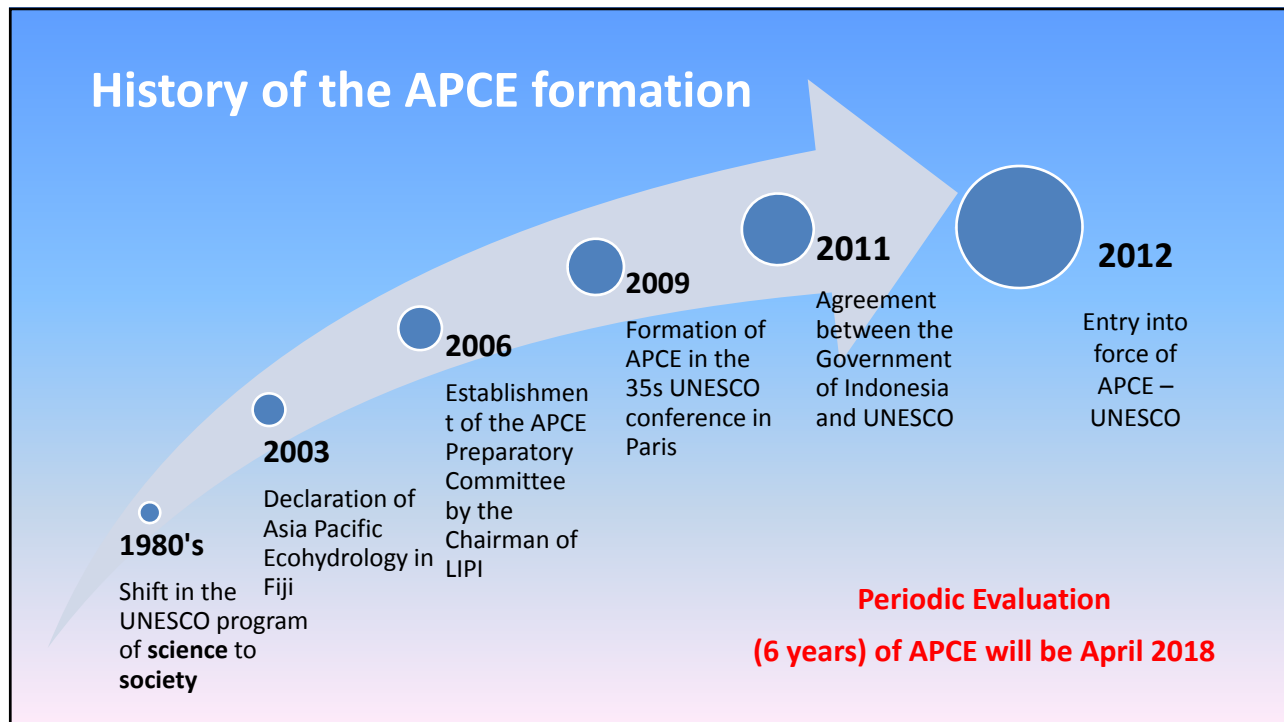


Potential Water Conflicts

2012	2013	2014
Injuries during protest over dam releases in India's Cauvery River	Water shortage leads to local fighting in India	Kyrgyzstan and Tajikistan security clash over border dispute
Violent protests over water shortages in New Delhi	Chinese dam builders killed after attack by Uyghurs	Upper caste women reportedly restrict access to water sources
Pakistani militants attack water systems in Kashmir	Five killed at protest against lack of water at Indonesian prison	Armed bandits force villages to pay a "water tax"
Uzbekistan cuts gas over Tajik dam project	Kyrgyz villagers block canal at border	
Indonesian mobs battle over water source	Sri Lankan archbishop accuses army of killing unarmed protestors	
Chinese protestors challenge Japanese factory for discharging contaminated wastewater	Pakistan and India clash over Siachen Glacier	
Militants block work at the Wullar Dam construction site in India		







APCE AS CATEGORY II CENTRE OF UNESCO		
European Regional Centre for Ecohydrology (ERCE), Poland	Further development of ecohydrological science and its implementation for restoring freshwater resources	the European Water Framework
International Centre on Coastal Ecohydrology (ICCE), Faro, Portugal	Scientific knowledge, design and implement adaptation and mitigation strategies and policies for coastal zones, including the impacts of climate change,	African and Mediterranean regions.
Asia-Pacific Centre for Ecohydrology (APCE), Cibinong, Indonesia	environmental/ ecological problems for sustainable provision of water as an environmental service and ecological component for all people, by enhancing science, education and culture	Regions in Asia-Pacific

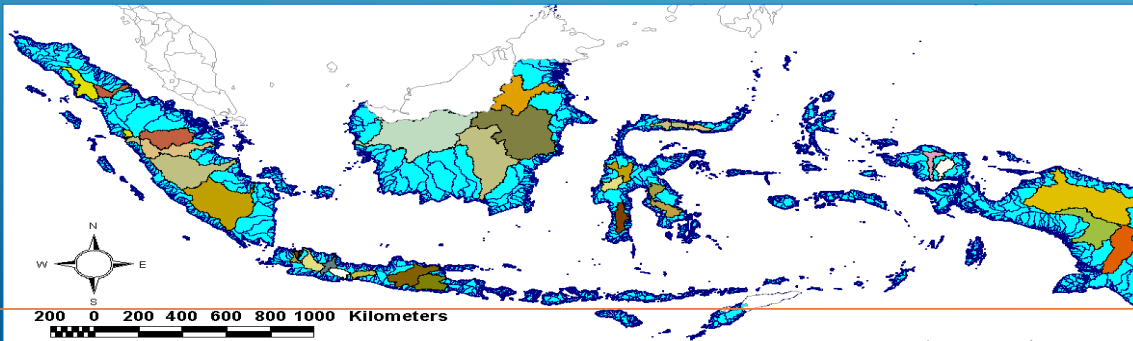
WATER & CULTURE

Indonesia, it consists of

1. Mostly volcanic islands
2. More than 17000 islands
3. More than 400 ethnics
4. 5 main religions (Islam, Christian, Hindu, Budha, Kong Hu Chu)
5. Population 240 million (120 million in Java)

Water and Culture:

“Due to its fundamental role in society’s life, water has a strong cultural dimension. Without understanding and considering the cultural aspects of our water problems, no sustainable solution can be found”



APCE DIRECTIVE

VISION

- To be an internationally Reputed Asia Pacific Center in Urban and Rural Ecohydrology by 2021

MISSION

Understanding and practices of ecohydrology through research, training and knowledge exchanges, information systems and public awareness.

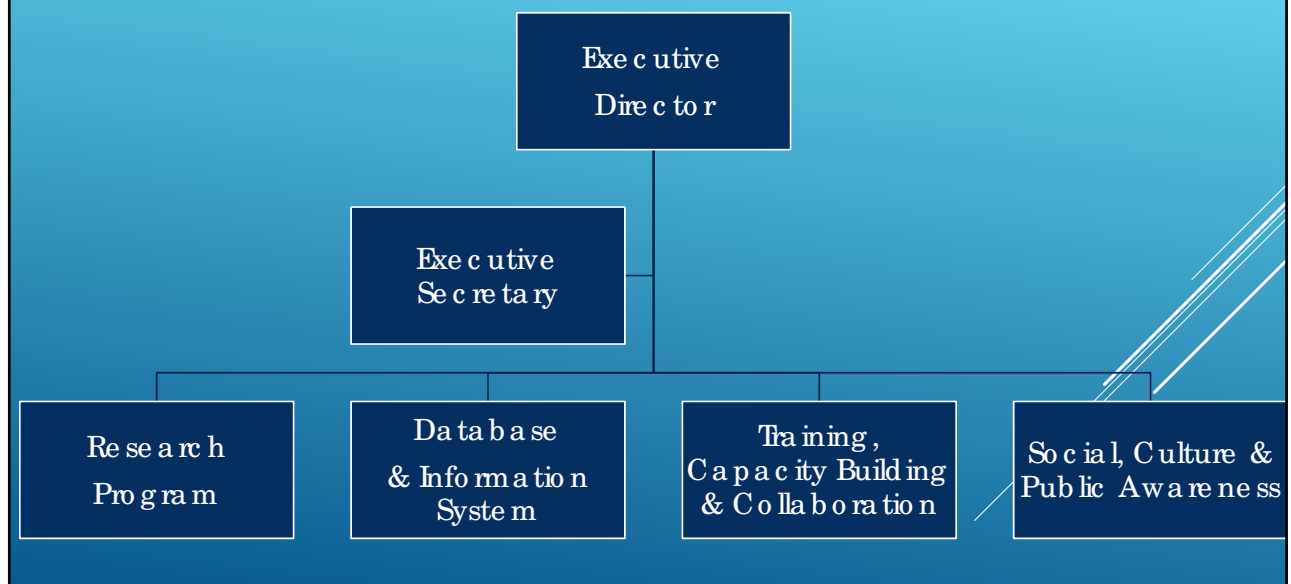
VALUES

- Wisdom
- Integrity
- Harmony

STRATEGIC GOAL

1. To promote local resources base ecohydrological research
2. To strengthen local capacity to adopt ecohydrological concept and approach
3. To provide easy access to local resources based ecohydrological information and knowledge
4. To enhance public awareness of local resources based ecohydrological practices

ORGANIZATION STRUCTURE OF APC E



APCE COLLABORATION

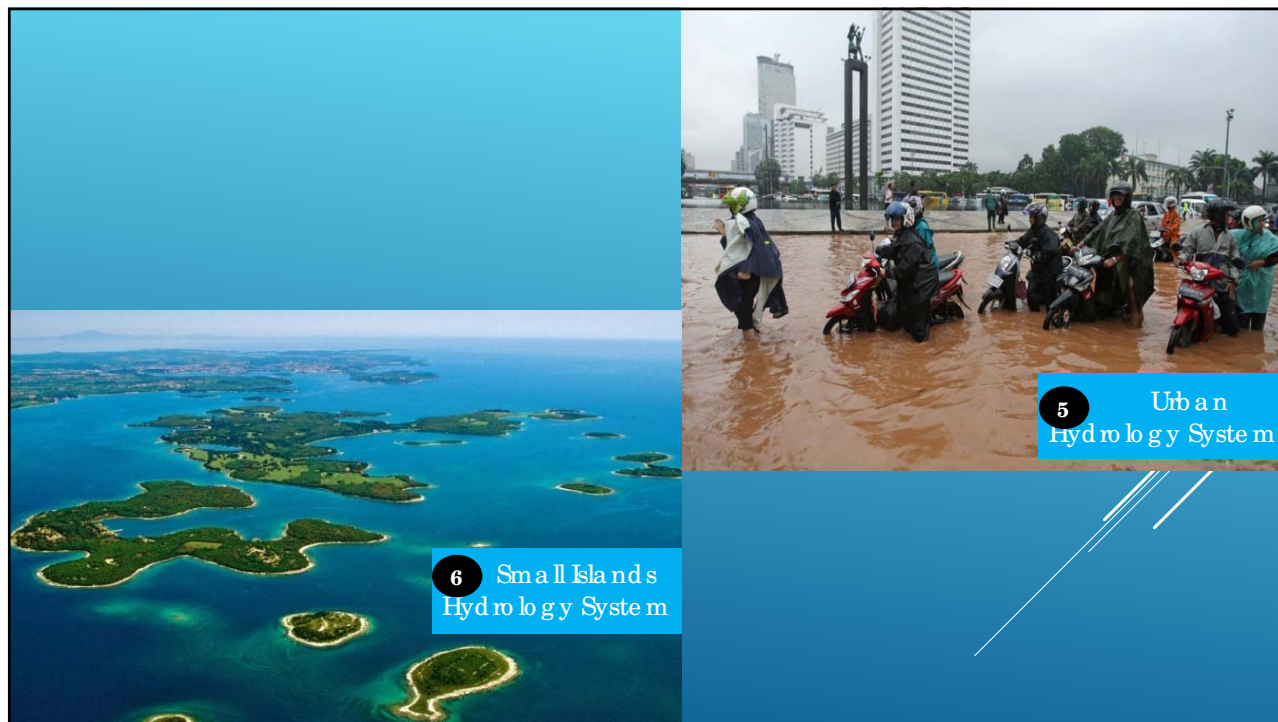
International

- ▶ UNESCO Jakarta Office
- ▶ ICHARM, Japan
- ▶ HIC Kuala Lumpur, Malaysia
- ▶ ICUWRM, Tehran – Iran
- ▶ ANU & University of Canberra, Australia
- ▶ University of Queensland Australia
- ▶ Kyoto University
- ▶ ILEC, Japan
- UNESCO Jakarta Office
- ERCE, Poland
- Centre for Coastal Ecohydrology, Portugal
- University of Western Sydney, Australia
- K-Water, Korea (future)

National

- ▶ MAB – UNESCO
- ▶ MOST (Management of Social Transformation)
- ▶ MOW (Memory of The World)
- ▶ Gov. Of Special Region of Yogyakarta
- ▶ UGM, Yogyakarta – Indonesia
- ▶ IPB, Bogor – Indonesia
- ▶ UNLAM, Banjarmasin, Indonesia
- ▶ University of Palangkaraya, Indonesia
- ▶ University of Timor, Indonesia
- ▶ Ministry of Environment and Forestry
- ▶ Ministry of Public Work and Housing
- ▶ Indonesia Power
- ▶ Islamic Boarding School





SUSTAINABLE DEVELOPMENT GOALS

Goal 6: Ensure access to water and sanitation for all

Goal 13: Take urgent action to combat climate change and its impacts

Goal 15: Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss

APCE involved in Goal 6, Goal 13 and Goal 15




Target SDGs	Indicator SDGs	APCE-UNESCO Activities
6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all	<ul style="list-style-type: none"> Proportion of population using safely managed drinking water services 	<ul style="list-style-type: none"> Research on the recycling of peatland water to drinking water for all in <u>Banjarbaru-Kalimantan</u> and Sumatera – Indonesia

6.1

RESEARCH ON EC O HYDRO LOG Y APPRO ACH FOR SUSTA INABLE PEA TLAND MANA GEMENT IN C ENTRAL KALIMANTAN (WA TER DA ILY USE)



		
Target SDGs	Indicator SDGs	APCE-UNESCO Activities
<p>6.3 By 2030, 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</p>	<ul style="list-style-type: none"> • Proportion of wastewater safely treated • Proportion of bodies of water with good ambient water quality 	<ul style="list-style-type: none"> • Build <u>demosite</u> of ecohydrology (constructed wetland) in <u>Saguling DAM</u> and <u>Citarum River-Indonesia</u> which have several problems due to water quality caused by heavy metal compound in river.

6.3

DEVELOPMENT OF SAGULING EC OHYDRO LOG Y DEMO SITE



Collaboration: APCE-UNESCO. LIPI, Indonesia Power, Local Government and Pesantren Sumur Bandung



Target SDGs	Indicator SDGs	APCE-UNESCO Activities
6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes	<ul style="list-style-type: none"> Change in the extent of water-related ecosystems over time 	<ul style="list-style-type: none"> Cleaning action the lake and river with students and regional authority to enhance community capacity building to restore and protect ecosystem from garbage.

6.6

CLEANING ACTION THE LAKE AND RIVER WITH STUDENTS AND REGIONAL AUTHORITY



		
Target SDGs	Indicator SDGs	APCE-UNESCO Activities
<p>6.A By 2030, 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</p>	<ul style="list-style-type: none"> Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan 	<ul style="list-style-type: none"> Held Workshop “Ecohydrology and Lake Ecosystem, cooperation with APCE – P2Limnologi – ILEC – Shiga University, 2 Juni 2014 International cooperation with <u>Universitas Sains Malaysia</u>, <u>Lestari: Institut Lingkungan Alam Sekitar-Malaysia</u>, <u>Universitas Kebangsaan Malaysia (UKM)</u>, <u>HTC KL</u>, <u>Nahrim</u>, <u>Perbadanan Putrajaya</u>, MOU with government of <u>Nusa Tenggara Timur</u> to promote research in small arid area,


APCE COLLABORATION

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- HTC Kuala Lumpur, Malaysia
- ICUWRM, Tehran – Iran
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Target SDGs	Indicator SDGs	APCE-UNESCO Activities
<p>6.B Support and strengthen the participation of local communities in improving water and sanitation management</p>	<ul style="list-style-type: none"> Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management 	<ul style="list-style-type: none"> Capacity building with Muslim Leader (MUI) Capacity building with Leader of SUBAK (Traditional irrigation system) in Bali-Indonesia Capacity building with <u>Palangkaraya</u>, <u>Banjarbaru</u> and Yogyakarta Province Held Training IHP on Yogyakarta cooperation with Unesco Jakarta and P2L-LIPI Held International Conference on Ecohydrology (ICE) Yogyakarta, 10-12 November 2014 cooperation with Unesco Jakarta Office, KNIU, LIPI, UGM and Yogyakarta Province

CAPACITY BUILDING OF COMMUNITY LEADERS

As a Way of paradigm shift to increase in community awareness and participation



MUI Leaders

Capacity Building Ecohydrology for Subak Management in Bali



Capacity Building Ecohydrology for Agriculture in Peatland Areas





Target SDGs	Indicator SDGs	APCE-UNESCO Activities
<p>13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning</p>	<ul style="list-style-type: none"> Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions 	<ul style="list-style-type: none"> Build <u>demosite</u> of ecohydrology including weather station and water level station in <u>Cibitung River</u> which is one of the river that have climate change impact in Indonesia. From this <u>demosite</u>, community and local government can <u>access</u> weather and water level information online via website.

The image illustrates the integration of physical infrastructure with digital data monitoring. On the left, a weather station is mounted on a pole. In the center, a yellow sensor box is situated on a concrete structure overlooking a river, with a red arrow pointing to it from the word 'Sensor'. To the right, a screenshot of the 'e-mat' web interface shows various data graphs, including 'Water Level' and 'Water Temperature', with a large red arrow pointing from the sensor box towards the website. A small inset image at the bottom shows a close-up of the yellow sensor box.



Target SDGs	Indicator SDGs	APCE-UNESCO Activities
<p>15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally</p>	<ul style="list-style-type: none"> Progress towards sustainable forest management 	<ul style="list-style-type: none"> Promote research on sustainable water resources management in aride small islands in Indonesia Promote research on sustainable water resources management in ex-PLG (degraded peatland) in Kalimantan.

Promote research on sustainable water resources management in aride small islands



- Location : TTU distric, NTT province
- Problem : lack of water supply and management
- Contacts : local government, NGO, local people, University

Water gates condition in the ex PLG



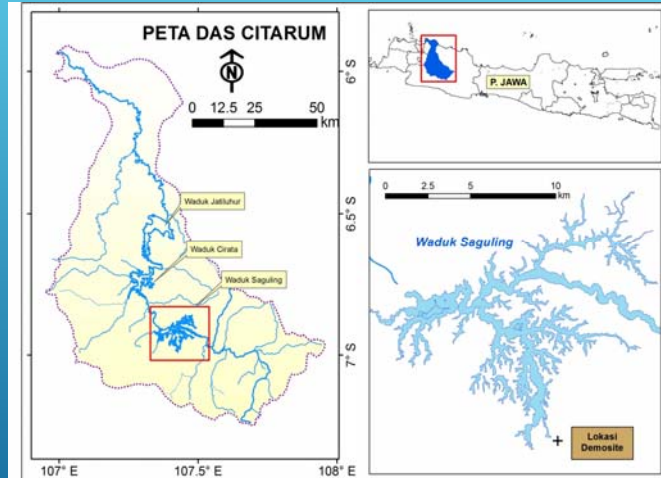
To build water gates through community bases



CONSERVATION AGRICULTURE AND MICRO WATER MANAGEMENT IN THE PEATLAND

Science, Engineering, Technology and Innovation (SETI) to support SDG

Demosite Ecology in Saguling Reservoir



Citarum River was appointed as National Strategic River Catchment Area (Kepres 12/2012 : penetapan wilayah sungai)

Problems of Saguling Reservoir / Citarum River

Water Quality

- PT Ind. Power, Pembangkit Jawa Bah & PT II: kadar logam berat melebihi ambang batas KAS I
- Logam berat cenderung meningkat (2000 - 2010)
- EPLHD : sungai Citarum sebagian besar sudah tercemar berat
- Limnologi

Erosion-sedimentation

- Erosi 22 ton/ha/th (ditoleransi 12,5 ton/ha/th)....
- Sedimentasi W Saguling 8,2 jt m³/th (1986-2004), perencanaan 1,5 jt m³/th, umur waduk 183 - 34 th.

Δ Q

- RRS St. Nanjung naik antarm 55 sampai 105 (1974 - 2008)
- Basflow mendekati nol, tp ketika banjir Q 578 m³/dt
- PITA turun dari 228 - 153 MW/h
- Th 2010 ketiga waduk sudah maksimum kapasitas tampungan, shg air dilepas dari waduk... banjir Bekasi, Kamwang & purwakarta

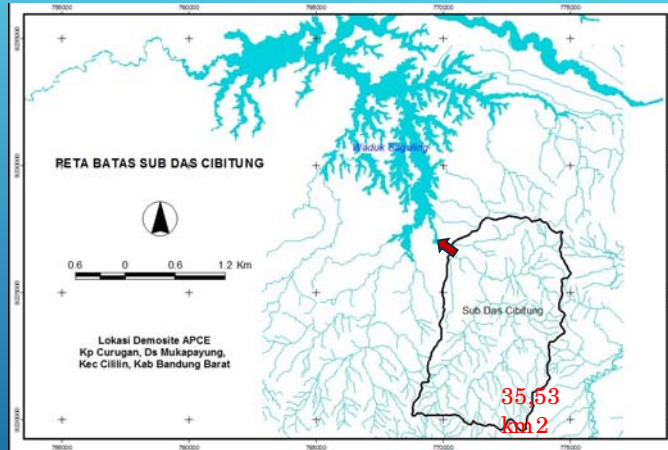
Climate Change Impact

- Kawasan Citarum hulu penurunan hujan tahunan 10 mm/th, shg menurunkan laju aliran 3 mm/th (data 100 tahun)
- Peningkatan suhu hujan deras

Sociale and Culture

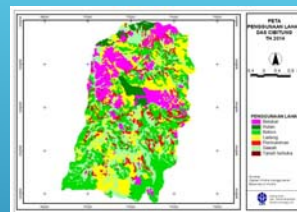
- Kependudukan thp kelestarian SDA yg rendah
- Tdk ada pauman yg sangat sulit di temukan
- Kembangkan formal yg kumng optimal

Sub Catchment Area of Cibitung

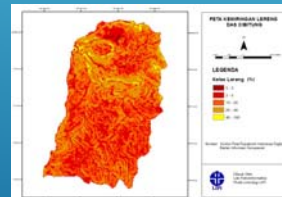


Characteristics of Sub Catchment Area of Cibitung

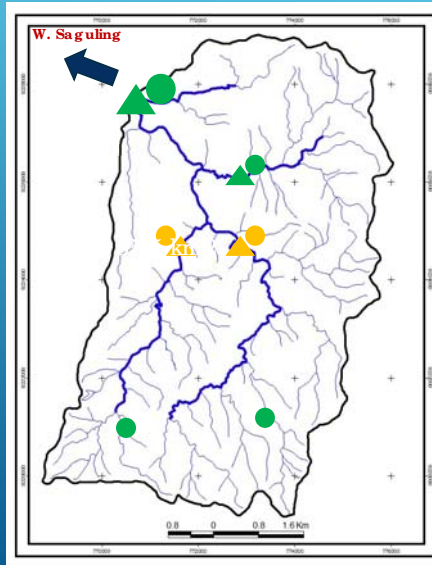
- Land cover
- Slope
- Soil
- Morphometry Watershed
- Hydrometry Watershed



Landuse	%
Forest	3.6
Kebun	31.5
Belukar	14.6
Ladang	20.6
Paddy filed	21.8
Open Land	0.2
Permuk.	7.7



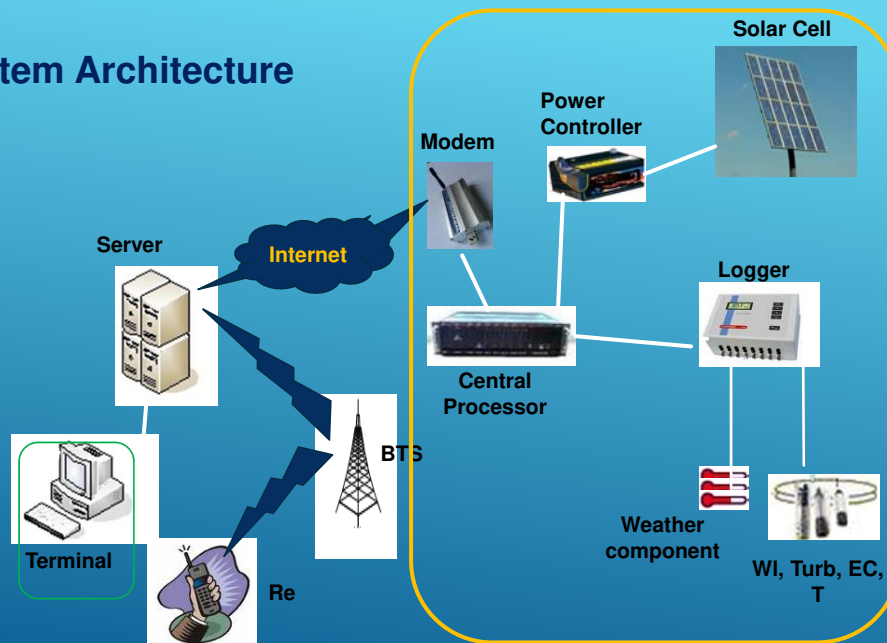
Water and Weather Station in Cibitung River



- : ra in fa ll Sta tio n
- : me te o ro lo gy Sta tio n
- ▲ : ri ve r Wa te r le ve l sta tio n
- ▲ : wa te r q ua li ty & Wa te r le ve l sta tio n
- ▲ ● : sta tio n de ve lo pe me nt pl a n

- mo ni to ri ng of en vi ro n me n ta l co n di ti o n
- ca li br a ti o n of ec o hy dr o lo gy mo de l

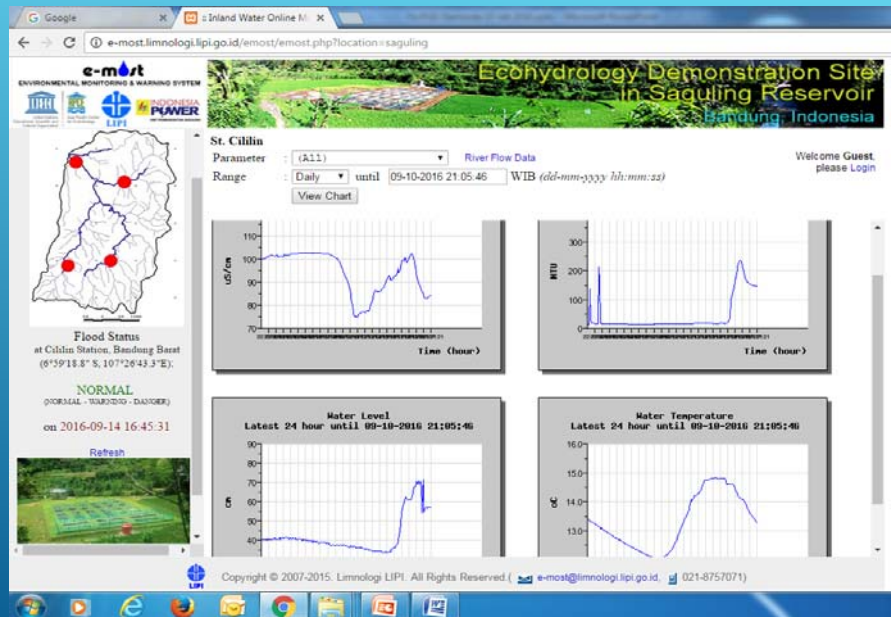
System Architecture

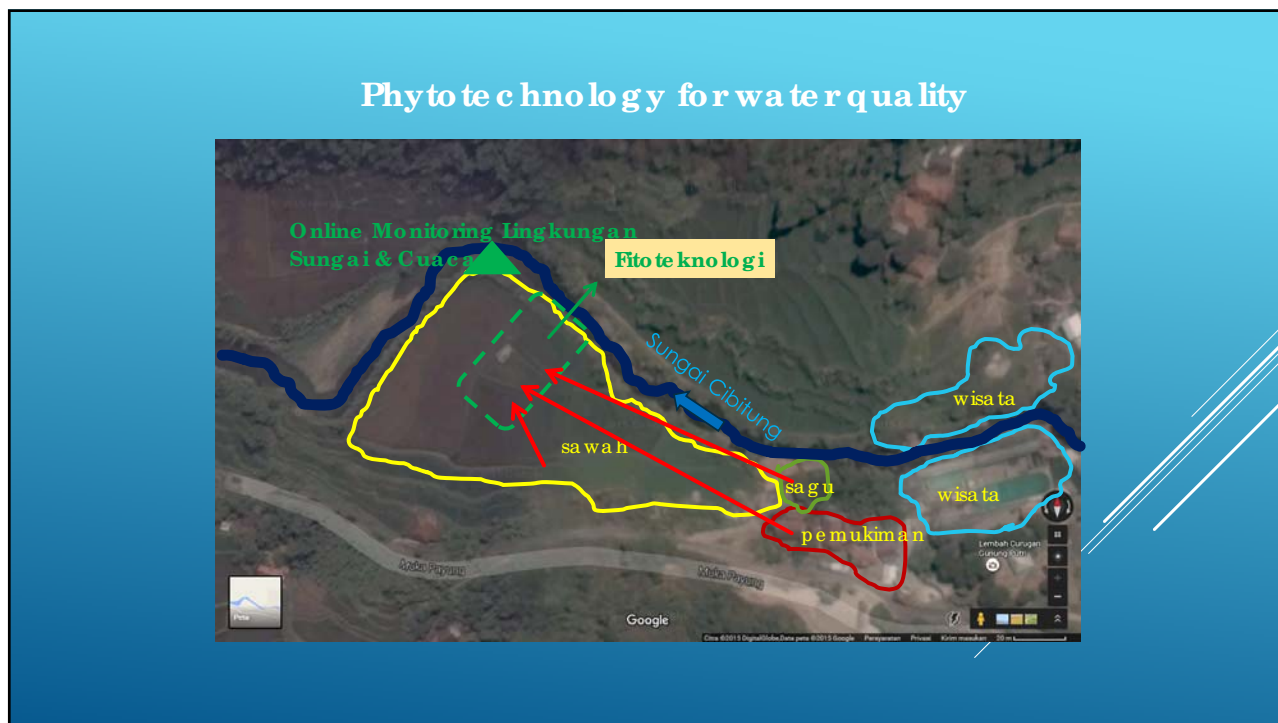
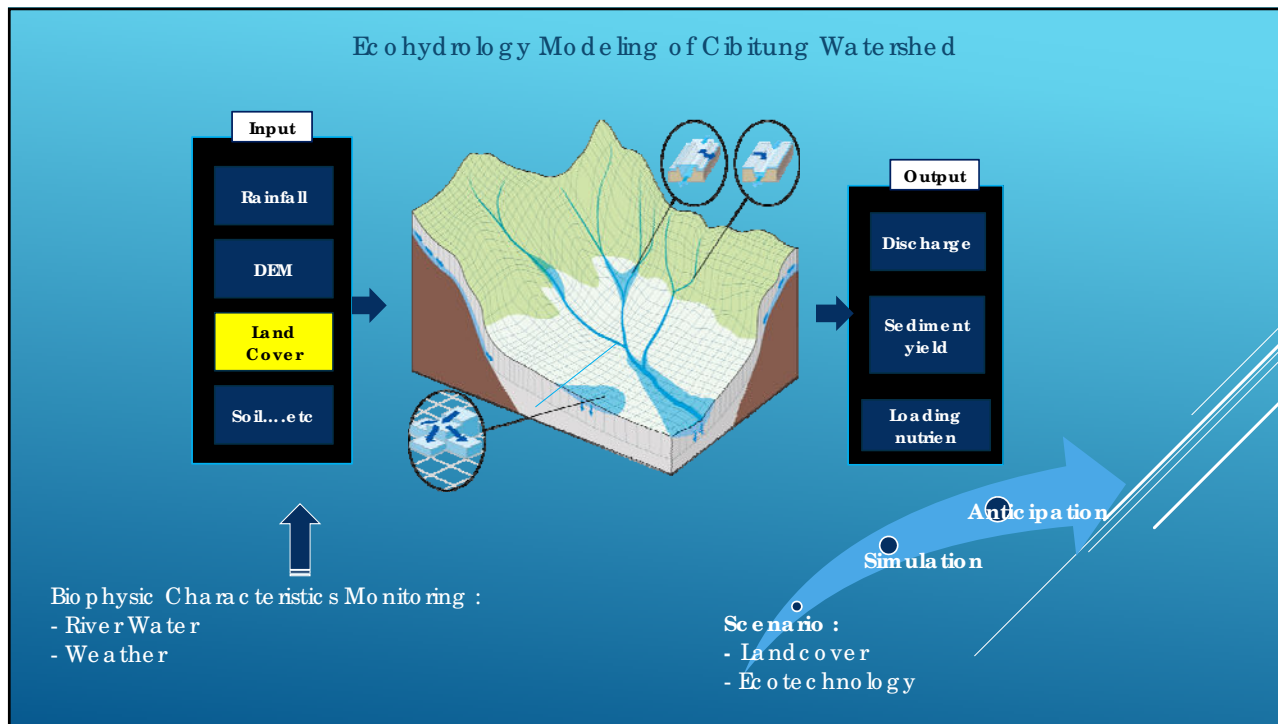


Tools Weather and Water Level Station

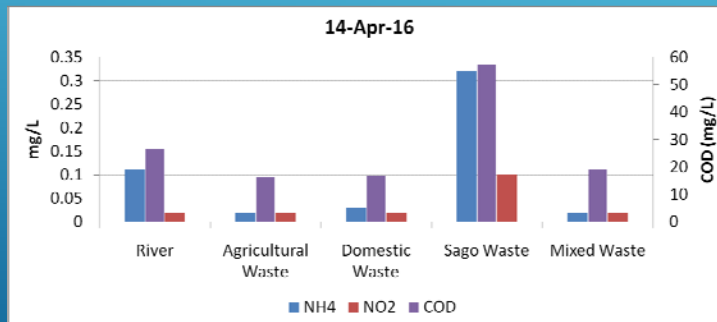



Online via WEB





Ecology Demonstration Site in Saguling Reservoir





**Future Phyto technology Implementation
in Cihaur – W.Saguling**



Save Water ... Save Life
THANK YOU...