Innovation for ASEAN Peat Swamp Forest Management

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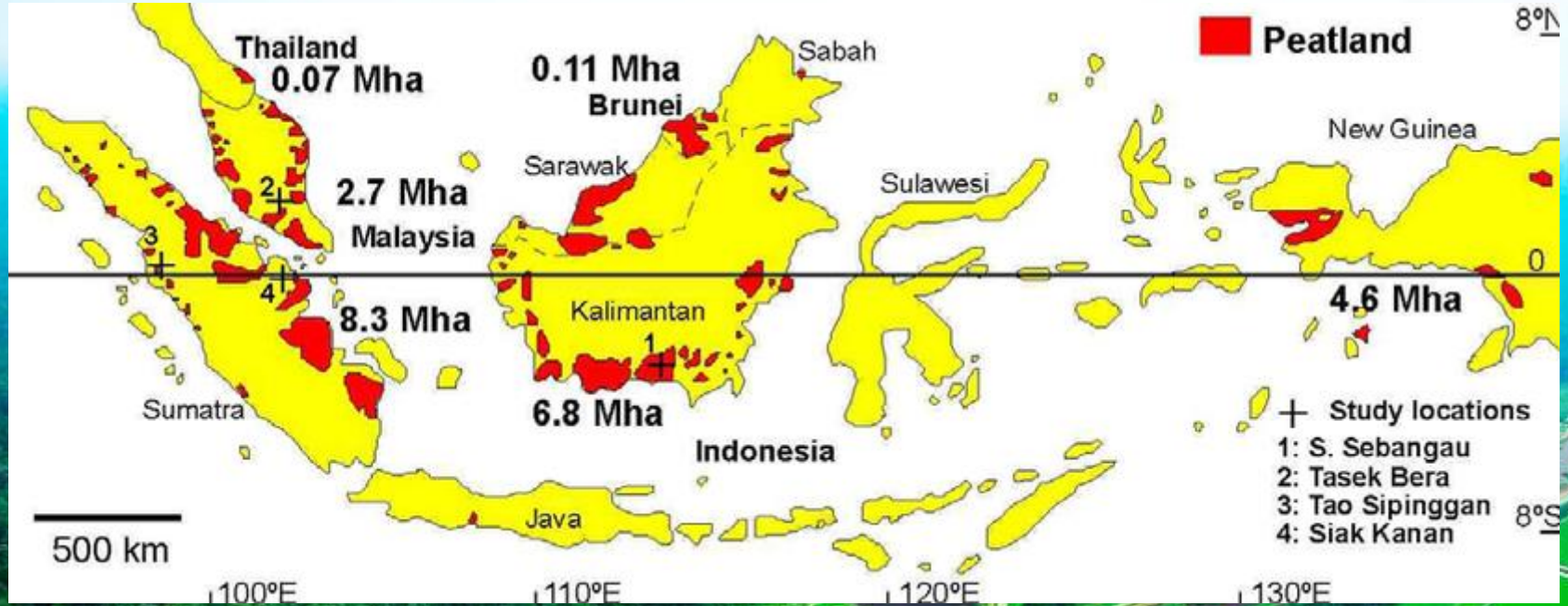
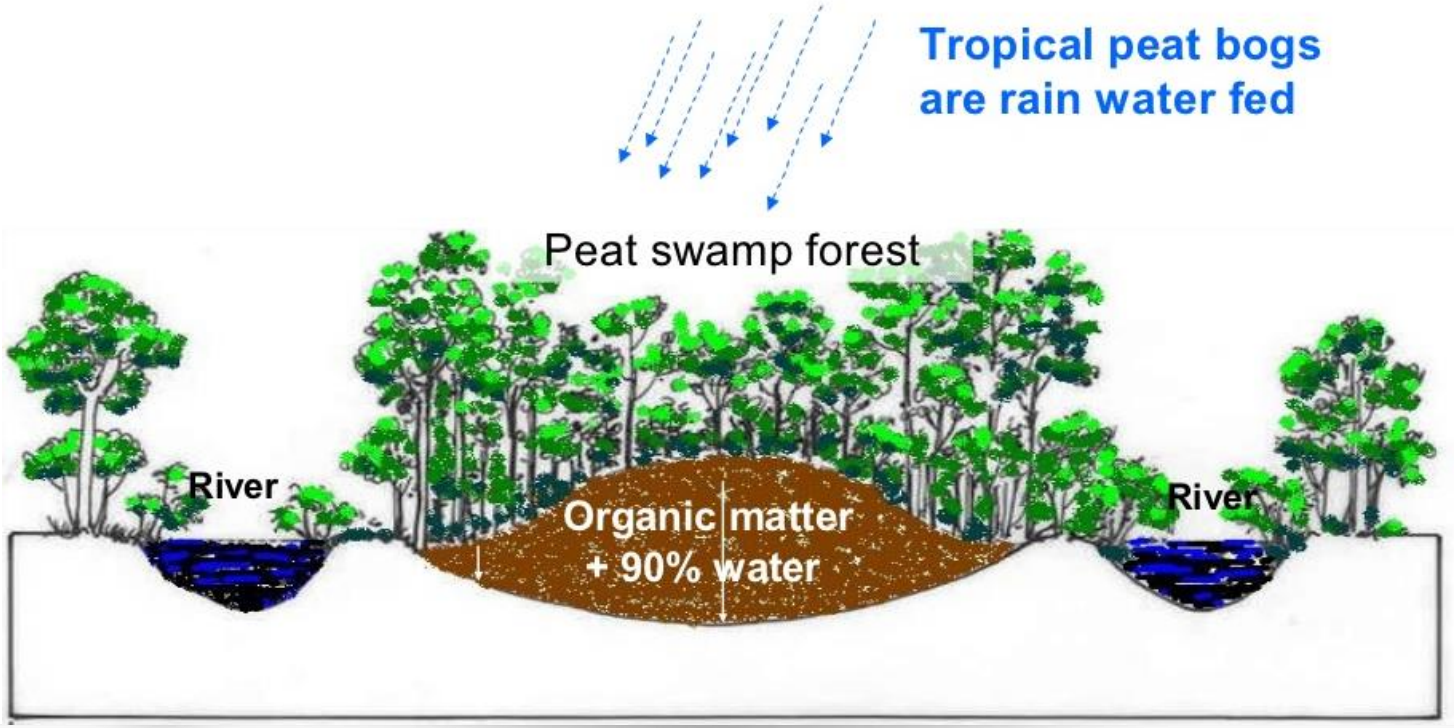


Peatlands in Southeast Asia = 60% of the world's tropical peatlands (25 million ha)

Major peatland areas are located in Indonesia, Malaysia, Brunei, Vietnam and Thailand

Peat Swamp Forest?

Peat = an accumulation of partially decayed vegetation or **organic matter**



Importance of Peat Swamp Forest

- Carbon storage
- Biodiversity conservation
- Regulation of hydrology and flood mitigation
- Source of freshwater supply
- Source of natural products

Project Locations

Location		
MALAYSIA	Raja Musa Forest Reserve	A
VIETNAM	Ca Mau Peat Swamp	B
BRUNEI	Badas Peatland	C
INDONESIA	Sebangau Park	D

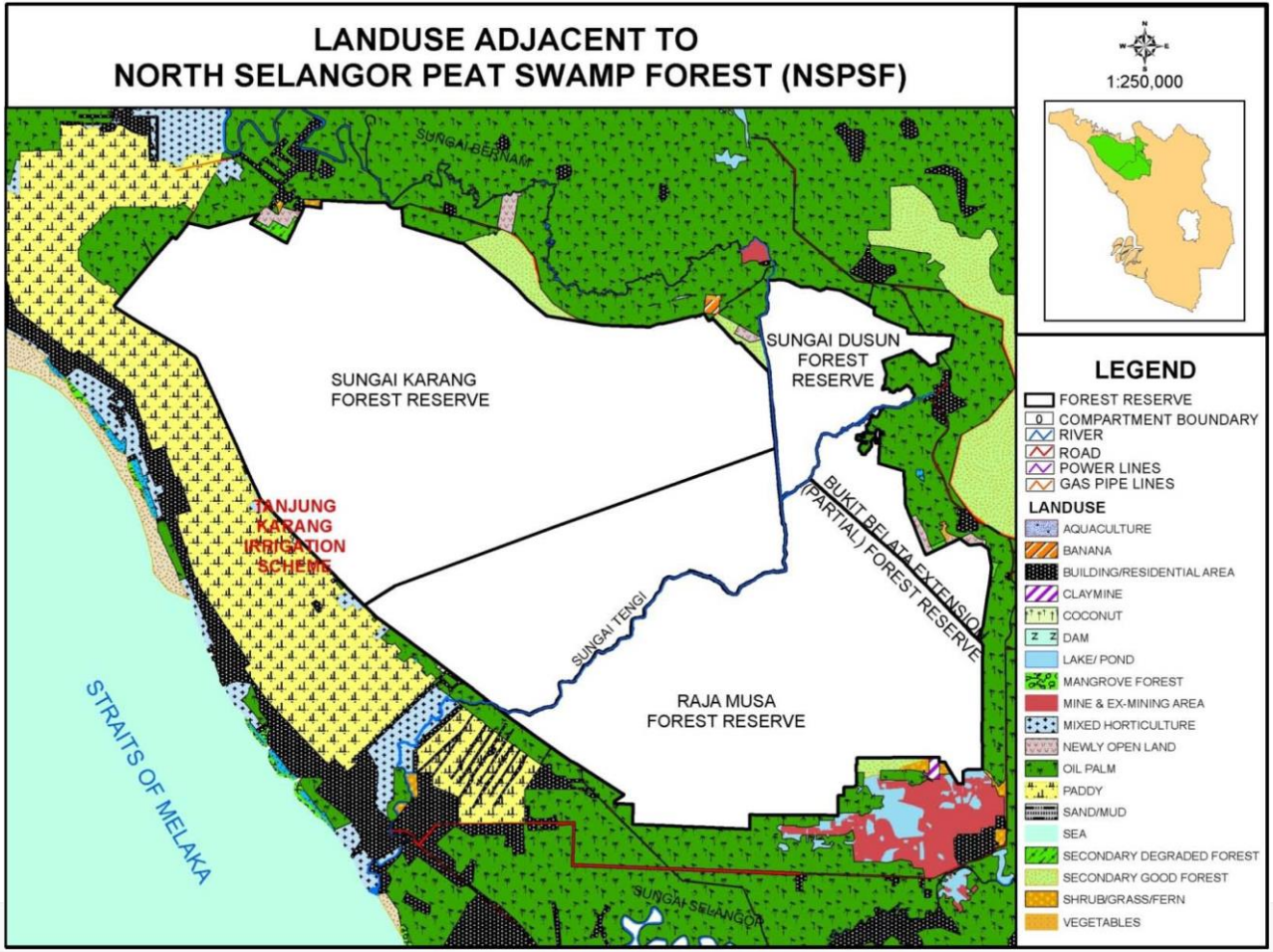
Project Location in Malaysia: Raja Musa Forest Reserve (RMFR)

Raja Musa Forest Reserve (RMFR)

Major Issue: Forest Fire

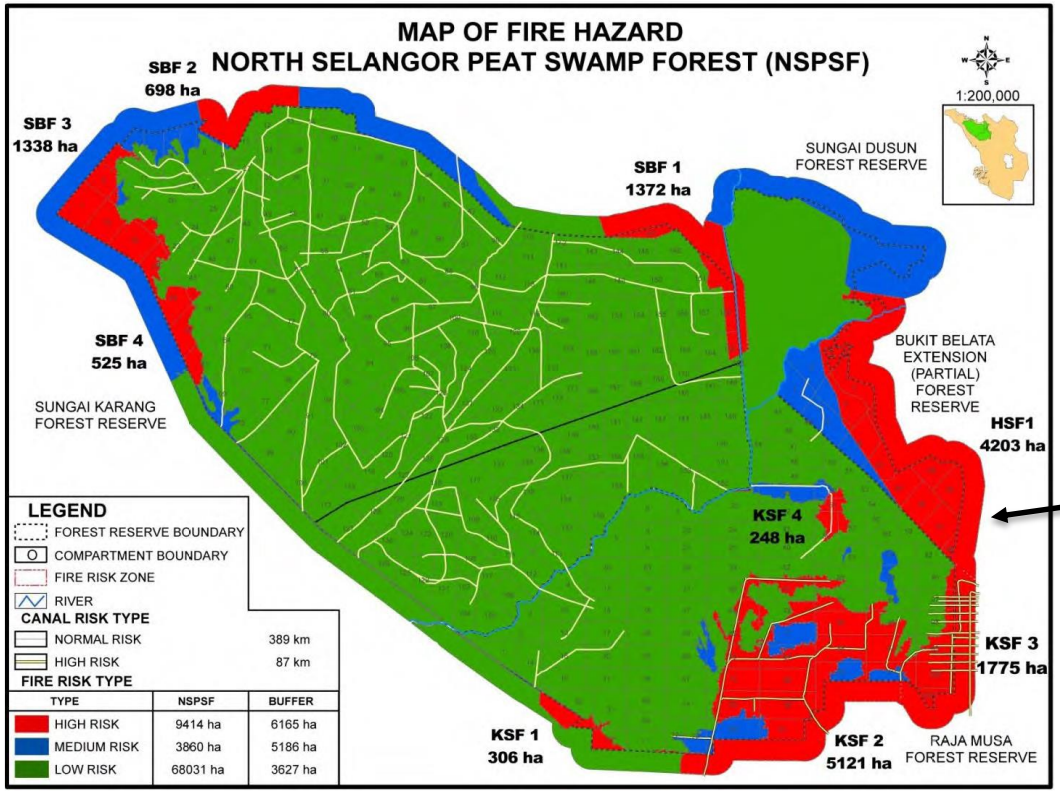
- Frequent fires during prolong dry spells
  - February to March and June to August
- Burning of agricultural waste outside the RMFR
- Illegal clearing for settlement, agriculture activities and other encroachment activities
- Southern part of the RMFR is directly affected by drainage and has been severely degraded by fire

Map: Peat Swamp Forest Area



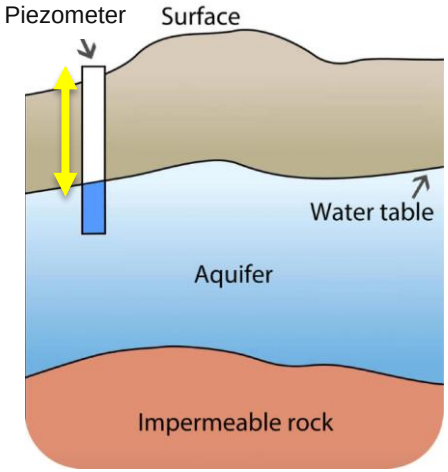
Total area = 73,592 hectares

Map: Fire Hazard

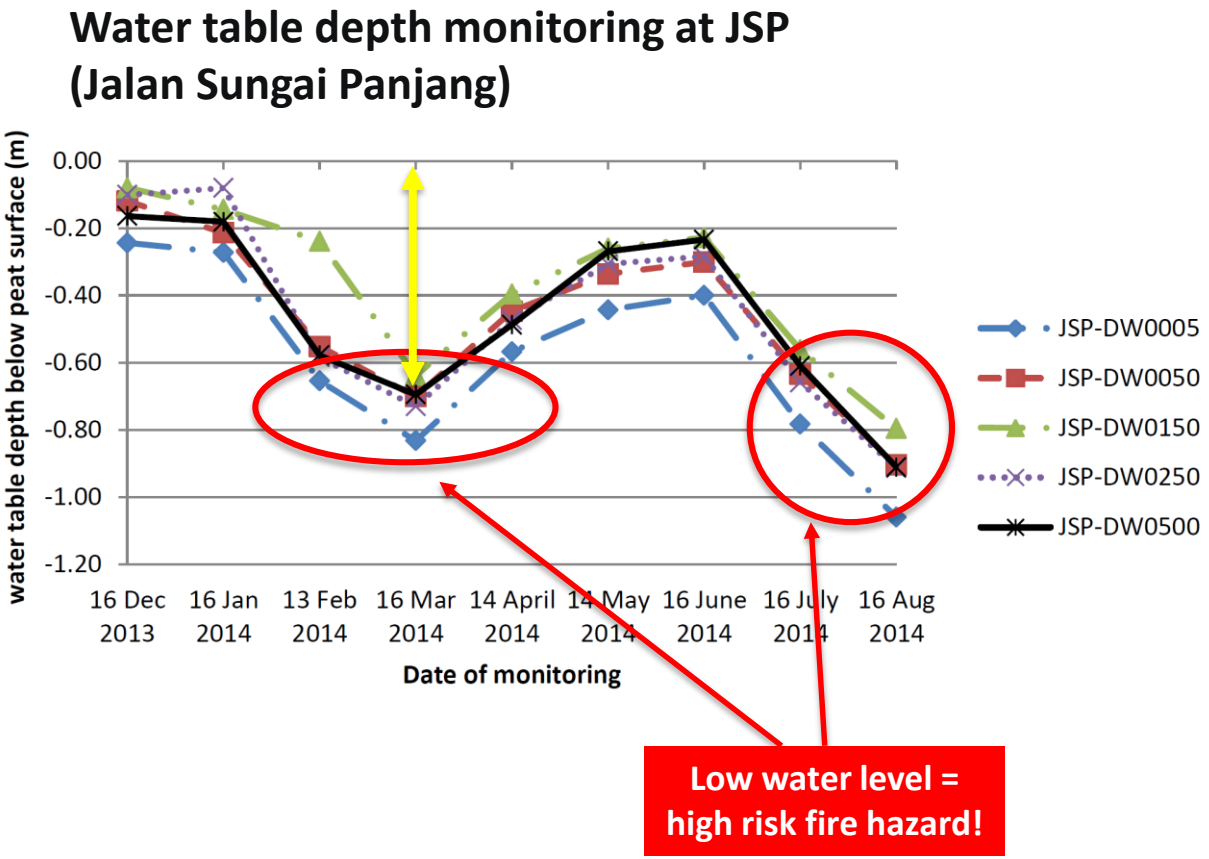


Red = High Risk

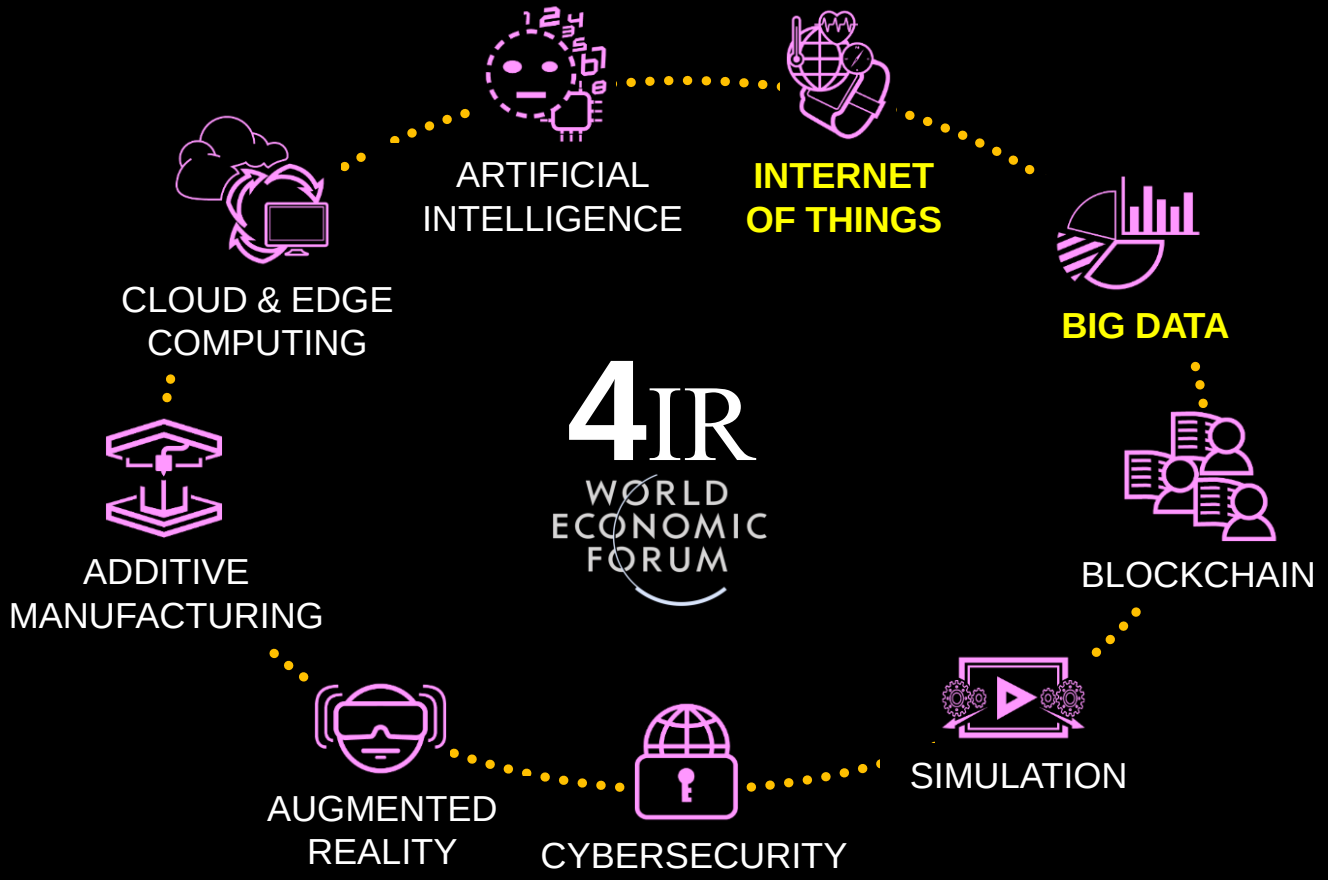
Manual Data Collection



Monitoring water table
(level below which the ground is saturated with water)



Key Technologies for the 4th Industrial Revolution



IoT Based Peat Swamp Monitoring

Project Members

- Wireless and Photonic Network Research Centre (WiPNET), UPM Malaysia
- Institute of Tropical Forestry and Forest Products (INTROP), UPM Malaysia
- MIMOS Berhad, Malaysia
- Universiti Teknologi Brunei (UTB), Brunei
- Bogor Agricultural University, Indonesia
- Posts and Telecommunications Institute of Technology (PTIT), Vietnam
- Japan International Research Center for Agricultural Sciences (JIRCAS)
- NICT Asia Center

- Project fund:
  - ICT Virtual Organization of ASEAN Institutes and NICT (ASEAN IVO)

IoT 4 Layers Architecture

Application Layer

Platform Layer

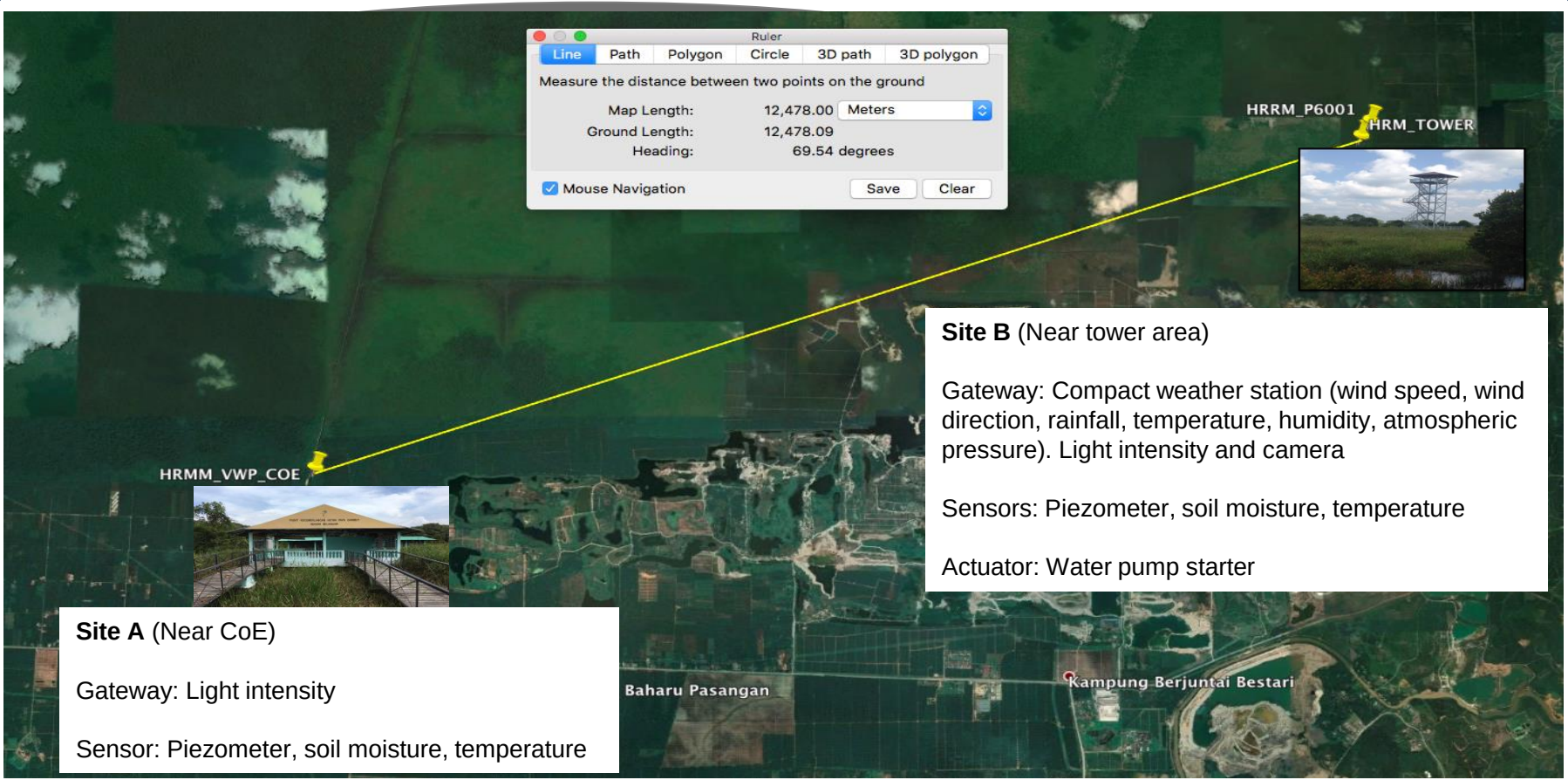
- Application enablement platform
- Platform middleware
- Platform ownership
- Rapid development platform

Network Layer

- Wired and wireless connectivity
- Edge middleware
- Pervasive network

Sensor and Actuator Layer

- Sensors & actuators
- Embedded middleware
- Mobile devices



Site B (Near tower area)

Gateway: Compact weather station (wind speed, wind direction, rainfall, temperature, humidity, atmospheric pressure). Light intensity and camera

Sensors: Piezometer, soil moisture, temperature

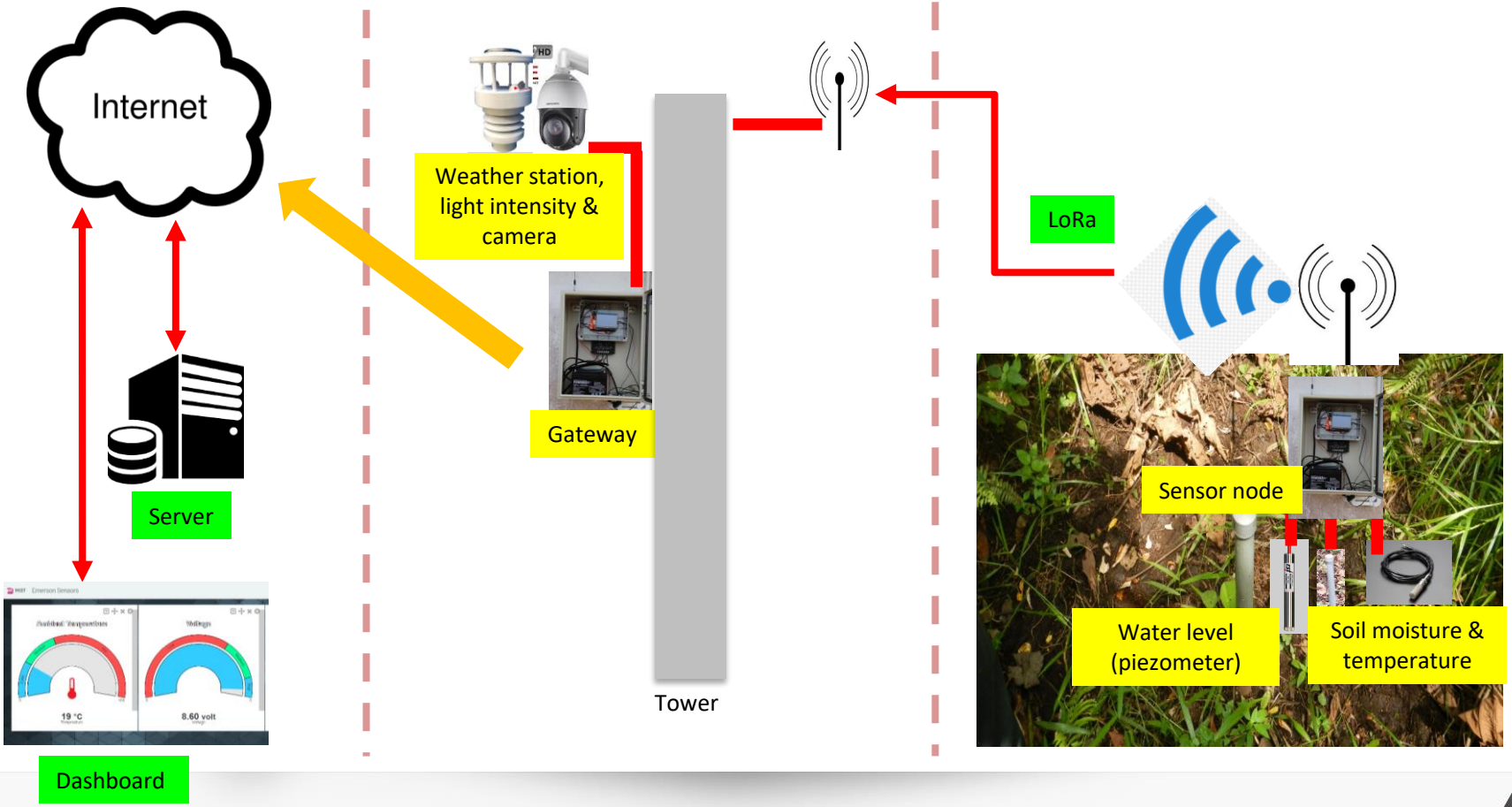
Actuator: Water pump starter

Site A (Near CoE)

Gateway: Light intensity

Sensor: Piezometer, soil moisture, temperature

System Overview



Project Impact

- Enable connectivity for IoT-based monitoring system in peat swamp forest areas in four ASEAN countries
- Enable forest management community and researchers to further understand peat swamp forest ecosystem by analyzing the collected micro climate data
- Serve as a peat swamp forest fire monitoring system for immediate human and automated interventions

SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

THANK YOU

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