ASEAN IVO

ICT Virtual Organization of ASEAN institutes and NICT

NAPC: Networked ASEAN Peat Swamp Forest Communities

ASEAN IVO Project Review and Progress Report

Prof. Ir. Dr. Aduwati Sali (UPM)

ASEAN IVO Forum 2020

Project Overview

- Project Title:
  - NAPC: Networked ASEAN Peat Swamp Forest Communities
- Project Fund:
  - ICT Virtual Organization of ASEAN Institutes and NICT (ASEAN IVO)
- Project Members:
  - Wireless and Photonic Network Research Centre (WiPNET), UPM Malaysia
  - Institute of Tropical Forestry and Forest Products (INTROP), UPM Malaysia
  - MIMOS Berhad, Malaysia
  - School of Computing and Informatics, Universiti Teknologi Brunei (UTB), Brunei
  - Faculty of Forestry, Bogor Agricultural University, Indonesia
  - NICT Asia Center, Chulalongkorn University, Thailand
  - Badan Pengkajian dan Penerapan Teknologi (BPPT), Indonesia
- Project Duration: July 2018 – June 2021 (3 years)
- Project Amount: USD76,000

Presentation Outline

- Project Overview
- Raja Musa Forest Reserve (RMFR)
- Technological Innovation:
  - IoT-Based Peat Swamp Monitoring
- Social Innovation:
  - Community Engagement
- Summary of Project Activities

Why This Project is of Paramount Importance

Red skies in Jambi caused by haze filtering out sunlight

ASEAN+

Monday, 23 Sep 2019

9:29 AM MYT

JAMBI: The skies turned red here on Sunday (Sept 22) due to the haze, caused by widespread forest fires, that has risen to the upper levels of the atmosphere, reports *Sinar Harian*.

The Malay daily reported that Indonesia National Board for Disaster Management information chief Agus Wibowo Soet had explained that the phenomenon, which was also known as "Rayleigh Scattering", was caused by the movement of haze away from hotspots.

Indonesian astronomer Marufin Sudibyo also explained that the skies did not turn red because of a sudden increase in temperatures.

"Rayleigh Scattering happens when sunlight is dispersed by smoke, dust or airborne particles that filter shorter wavelengths and release longer wavelengths that are in the orange or red spectrum, making the area appear to be dim and red," he said.

Marufin also told Sinar Harian that in the Jambi situation, the density of the micro- and nano-particles in the air was large enough to make it much more dense than the normal atmosphere.

However, he stressed that the phenomenon did not have any adverse effects on human vision.

Haze: Still no respite for Malaysians

NATION

Monday, 23 Sep 2019

PETALING JAYA: There is no respite for Malaysians from the haze, as many areas are recording polluted air levels or are at the brink of breaching the "unhealthy" mark.

This is despite forecast that the haze may lift soon.

The geographical scope of the haze has widened, with more parts of the country experiencing polluted air.

As of 5pm yesterday, the number of areas with high API readings across the country rose to 45.

This was a stark contrast to only 18 areas which were classified as having unhealthy or very unhealthy API levels at 5pm on Saturday.

Very unhealthy air quality levels were recorded at Johan Setia in Klang (208) at 5pm yesterday, while Sri Aman peaked at 205.

NEWS NATIONAL

To blunt impact of forest fires, Brunei to introduce new law to tackle open burning

Incidents of open burning recorded daily in past year

Wardi Wasil

© AUGUST 5, 2019

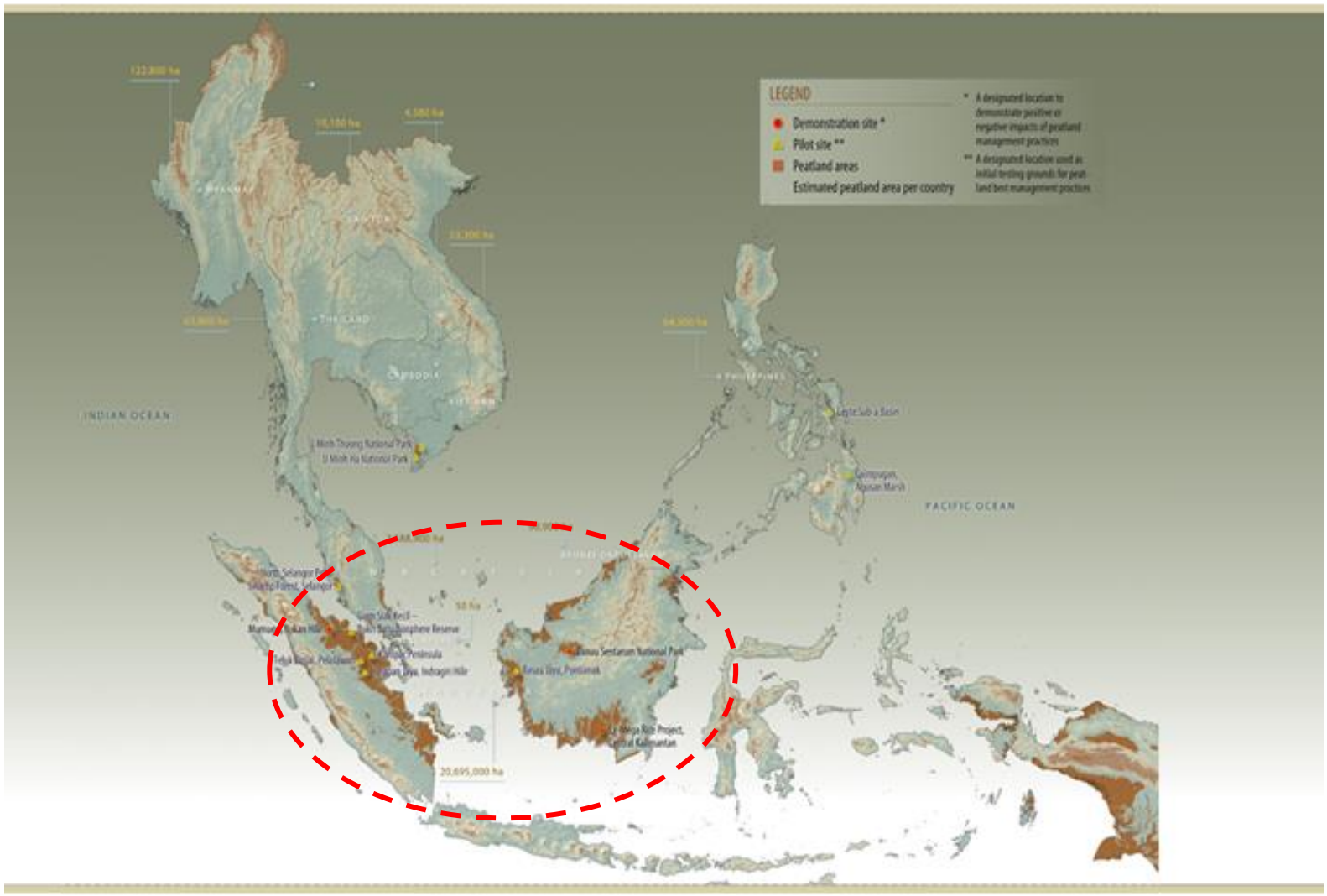
Firefighters extinguish fire on peat land forest in Central Kalimantan during Indonesia's worst bout of haze in 2015. The fires were lit by companies clearing vast tracts of land for plantations. Photo: Romeo Gacad/AFP

SHARE TWEET SUBMIT

BANDAR SERI BEGAWAN – Brunei is set to introduce a law that will tackle "rampant" open burning in an effort to mitigate bush and forest fires.

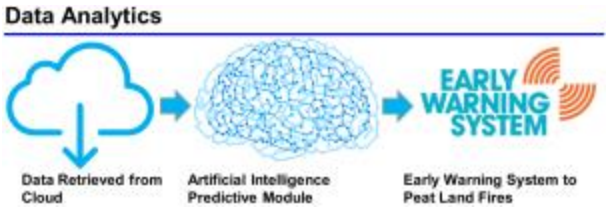
- Burned peatland releases more smoke than regular forest fires due to the carbon content of peat.
- The carbon is also the source of fine particulate matter, the stuff that makes haze bad for health.

Peatland in ASEAN



Project Overview

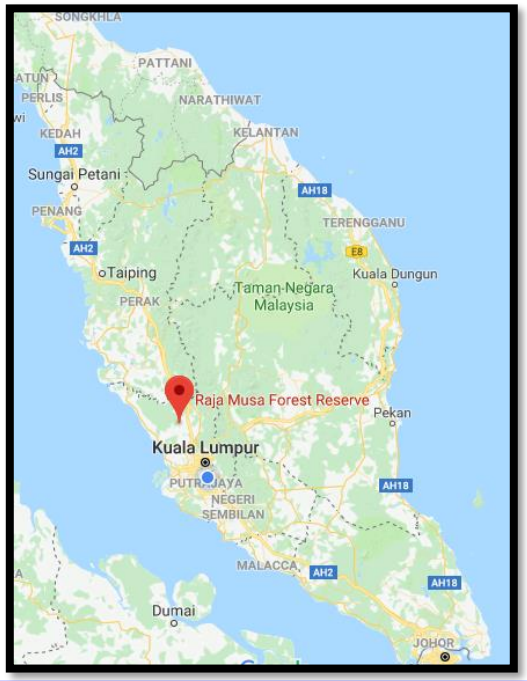
- Deploy **IoT-based solution for peat swamp forest monitoring** with the communities
- **Technological innovation**: to deploy, analyse and disseminate information using an IoT-based peat swamp forest monitoring system
- **Social innovation**: to conduct social programs for peat swamp forest communities such as educational and entrepreneurship events related to the peat swamp forest

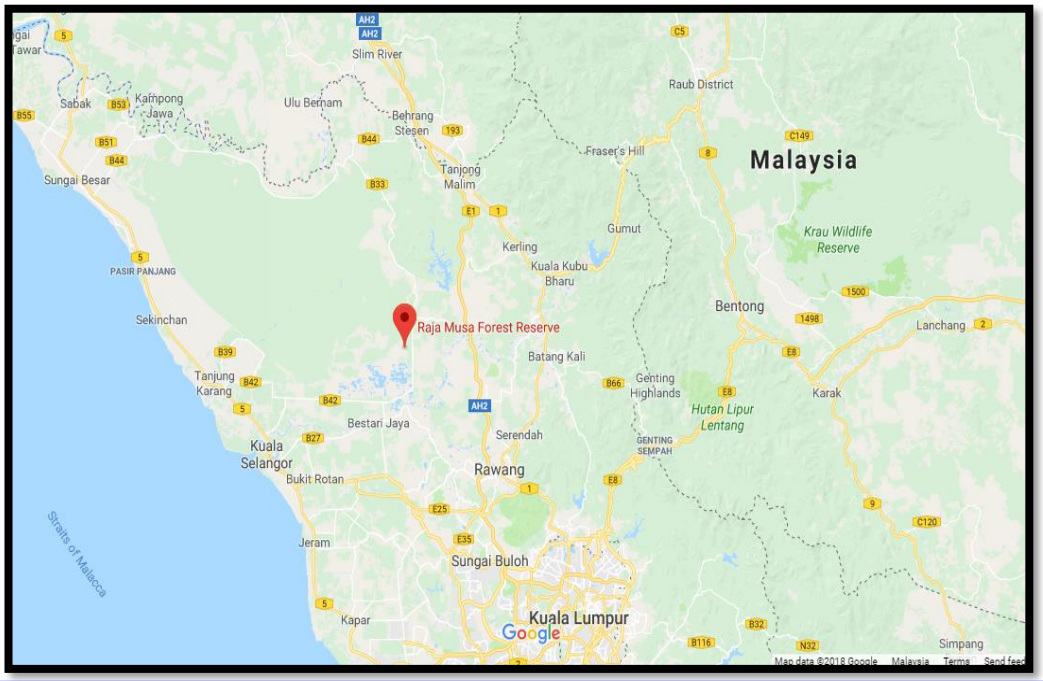


MALAYSIA:
RAJA MUSA FOREST RESERVE

Raja Musa Forest Reserve

- Raja Musa Forest Reserve (RMFR) is located at 3° 24' 48.0744" N,101° 23' 2.0256" E, in the north western part of Selangor State.
- The rainfall recorded for RMFR is between 58.6mm to 240mm per month.





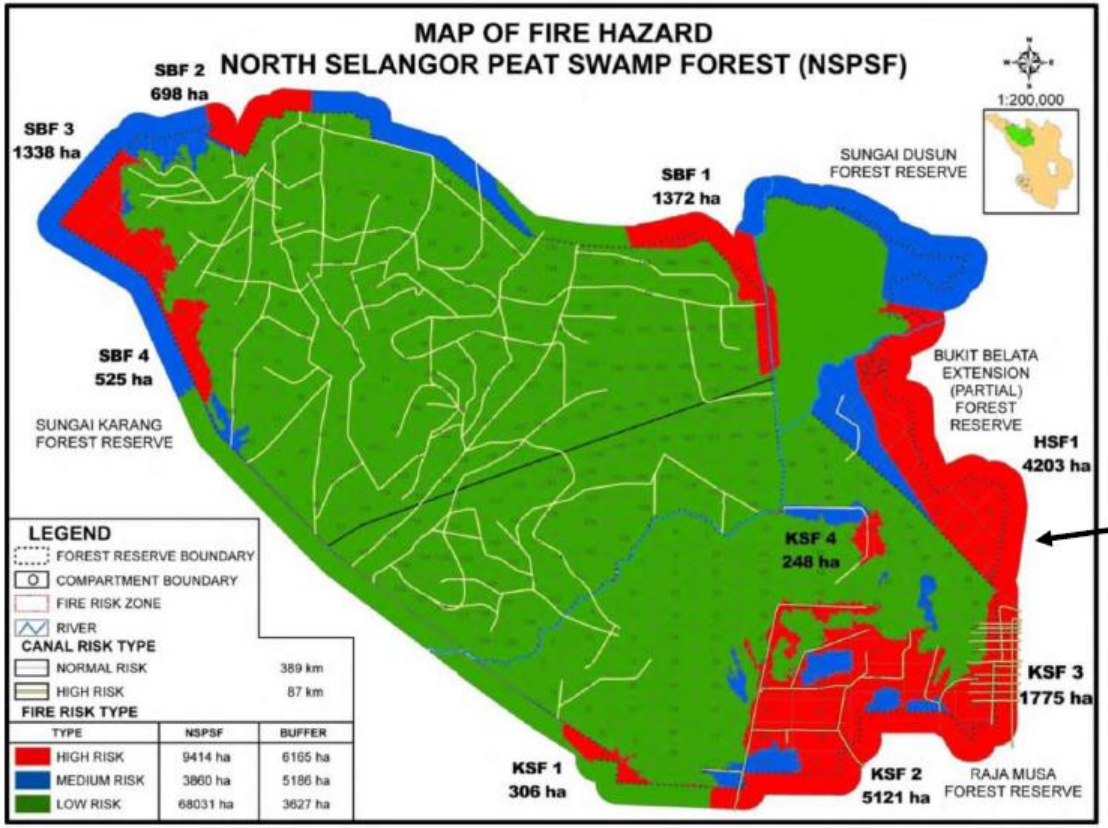
Map of Raja Musa Forest Reserve

Land use map of North Selangor peat swamp forest

Lookout tower in RMFR

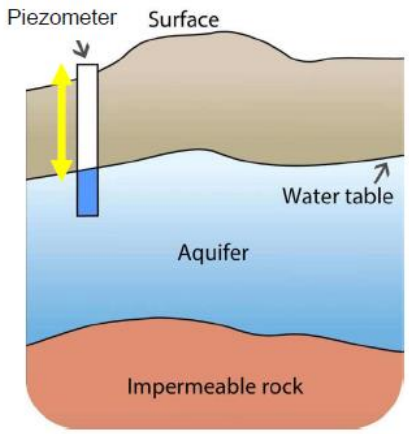
Peat swamp area in RMFR

Map – Fire Hazard

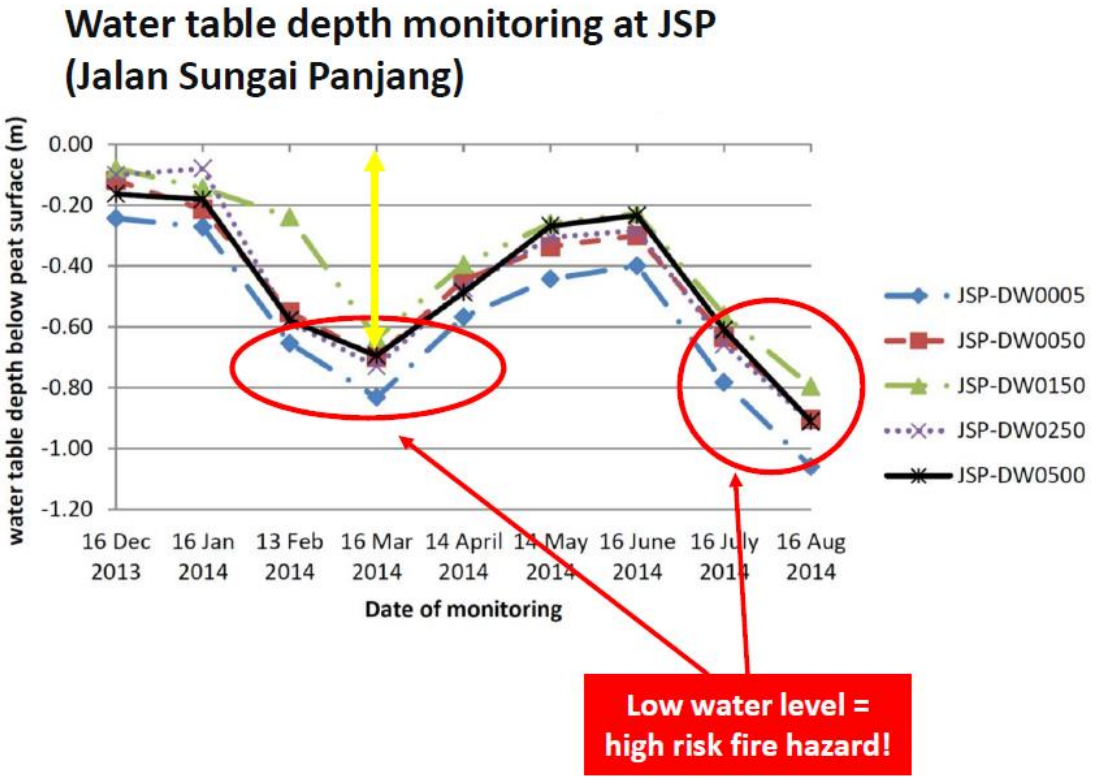


Red = High Risk

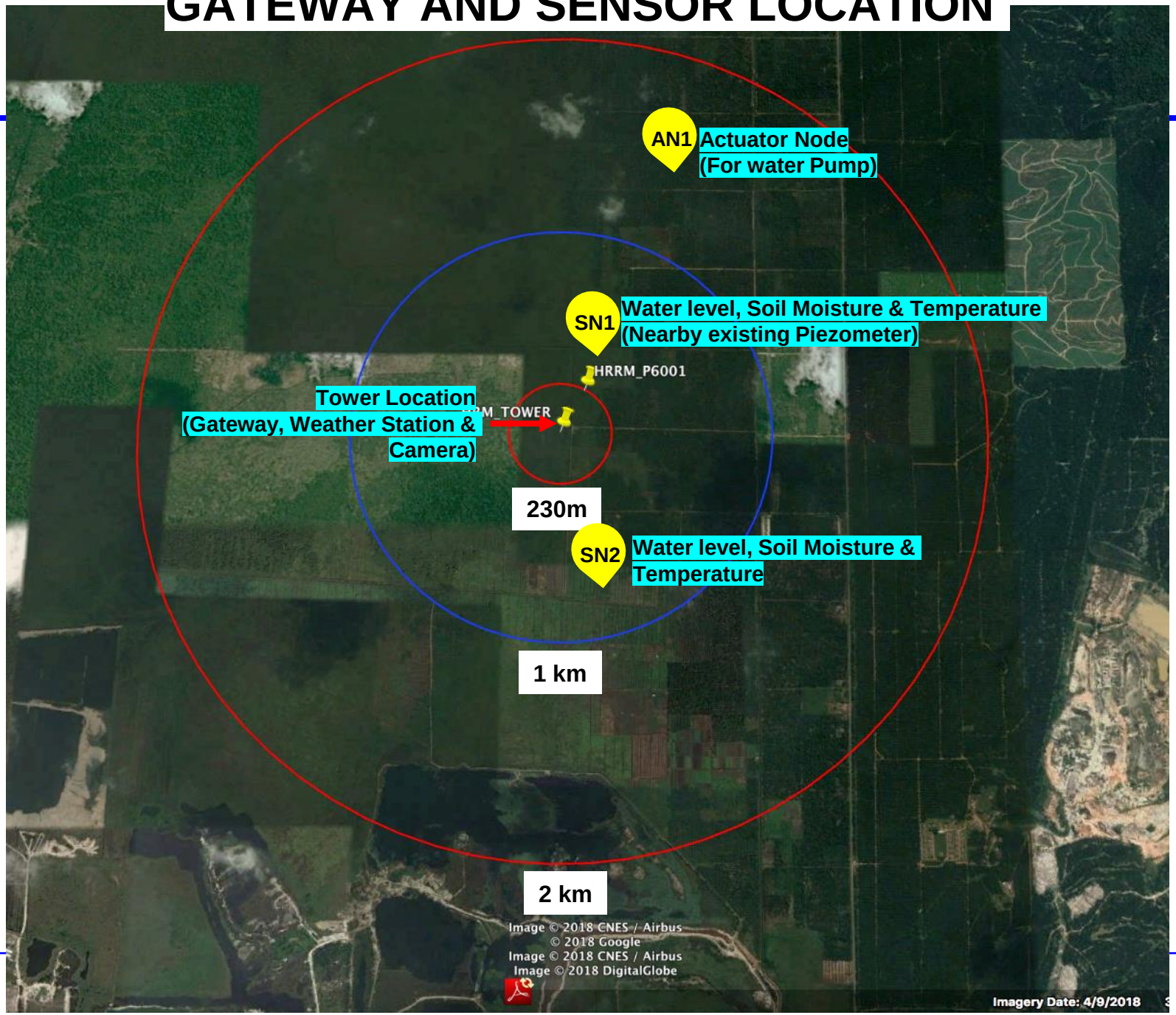
Manual Data Collection



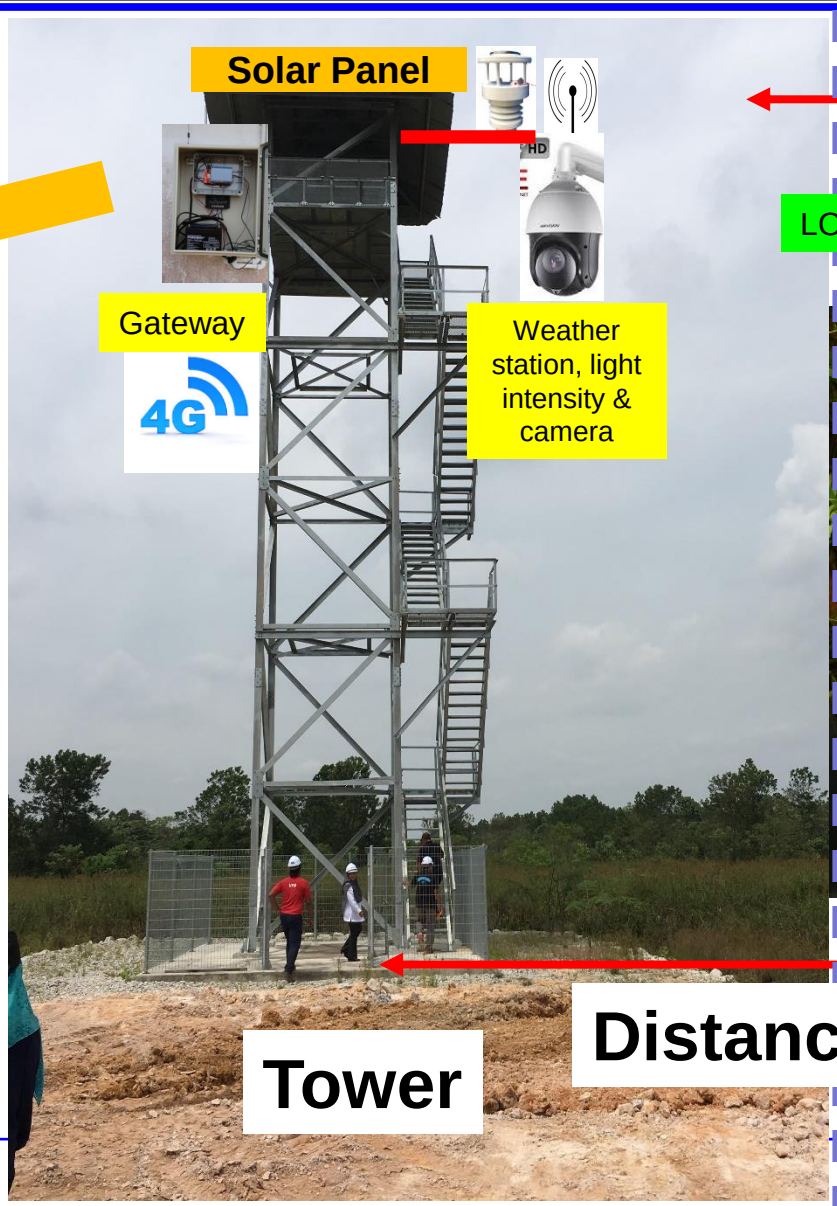
Monitoring water table
(level below which the ground is saturated with water)

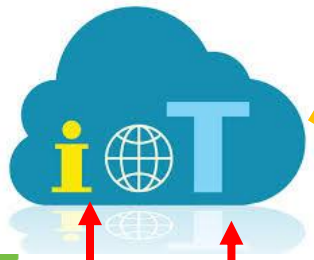


GATEWAY AND SENSOR LOCATION



Site Implementation

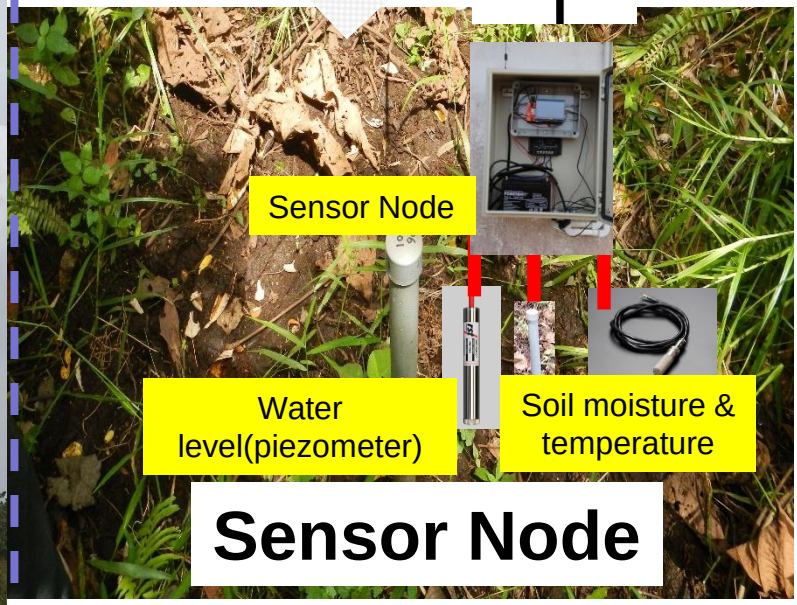




Server

GUI

LORA



Distance ~ 150m to 1km

WATER LEVEL & SOIL MOISTURE

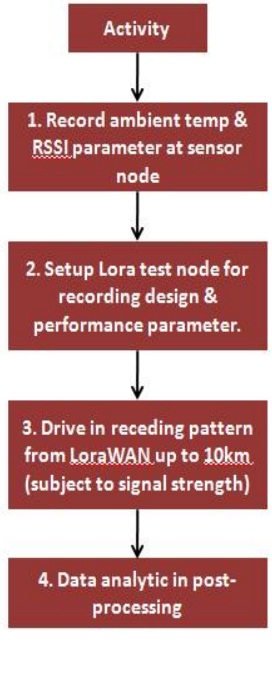
TOWER – G/W, WEATHER STATION

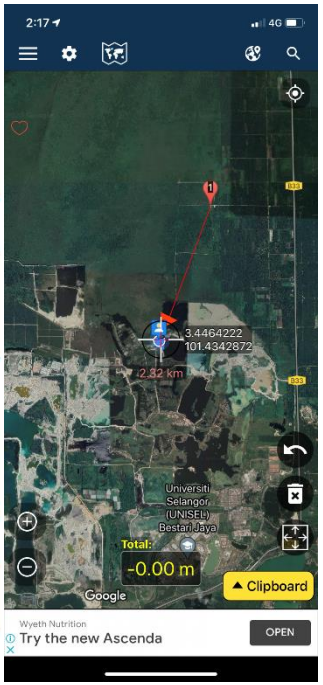





PUMP HOUSE – WATER VOLUME

LoRa Measurement Campaign





ICT Virtual Organization of ASEAN Institutes and NICT (ASEAN IVO)

Test cases for sensor node (N1)
**Remarks: Test cases will be conduct using script

Table of data measurement for N1

Location (Fixed)	Time (30 min interval)	Temperature (°C)	RSSI (dBm)	Remarks
(3°27'57.42"N, 101°26'29.69"E) – existing Loranode (GS 1 & 2)	Logged every 15 min interval			-min 2 days -could correlate with rain fall data

Test cases for test node (N2)
**Remarks: Test cases will be conduct using script

Lora node parameter trial routine

Trial Routine	Spreading Factor (SF) / 125 kHz	Data Rate (DR)	Bits/s	May Payload
1	12	0	250	59
2	11	1	440	59
3	10	2	980	59
4	9	3	1760	123
5	8	4	3125	230
6	7	5	5470	230

Peatland Data Analytics

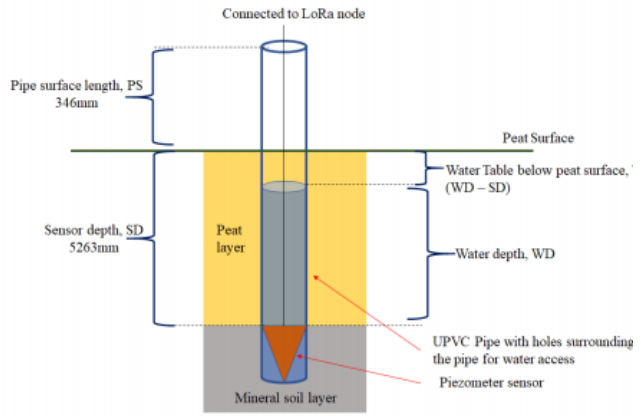
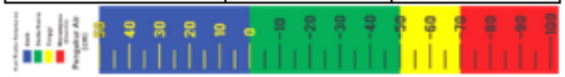


Fig. 3. Piezometer installation layout.

Table 2 Fire Risk Codes (GEC, 2012)

Water Table Depth (mm) Range	Colour Code	Fire Risk
500 to 0	Blue	Low
-500 to 0	Green	Medium
-500 to -700	Yellow	High
-700 to -1000	Red	Extreme



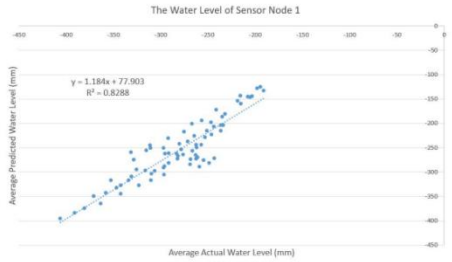


Figure 4.5: The Water level of Sensor node 1 (r^2)

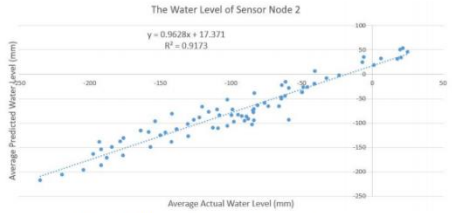


Figure 4.6: The Water level of Sensor node 2 (r^2)

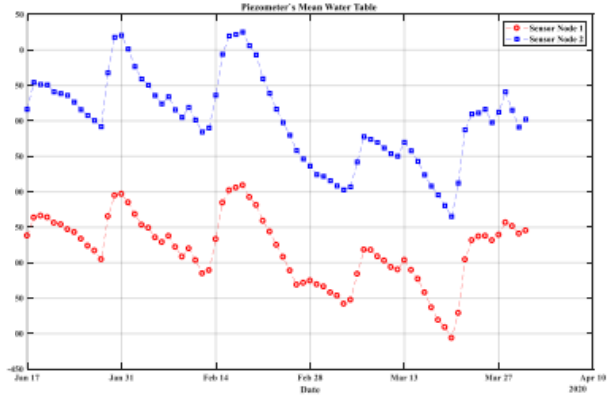


Fig. 4. Mean water table recorded from January to April 2020

Project Promotion and Media Coverage

UPM, Mimos partner to develop IoT-based early warning system to curb peat fires

By Digital News Asia August 18, 2020

- During impending heatwave, peat forests are susceptible to fire
- New IoT system uses sensors to make monitoring of peat conditions easie

Well, it seems that on top of a global pandemic, Malaysians will now have to hunker
of heat and dryness. The Malaysian Meteorological Department had recently predicte
will experience a dry spell caused by the Southwest Monsoon season, which is expect
until mid-September.

IoT atasi kebakaran tanah gambut

Oleh FAIRUZ MOHD. SHAHAR

BARU-BARU ini, Jabatan Meteorologi memaklumkan Malaysia akan mengalami musim kemarau dalam masa terdekat akibat daripada musim Monsun Barat Daya, yang dijangka bertersusan hingga pertengahan September.

Jabatan Meteorologi juga menasihatkan bahawa seluruh negara akan mengalami tabiran hujan yang sedikit, kecuali Sabah.

Sarawak dilaporkan telah mengalami musim kering. Jabatan Bomba dan Penyelamat Miri baru-baru ini menjalankan operasi memadam kebakaran hutan di lima lokasi sekitar bandar tersebut akibat pembakaran terbuka dan cuaca panas.

Setiap kali tibanya musim kemarau, agensi berkaitan seperti Jabatan Bomba dan Penyelamat, Jabatan Alam Sekitar dan Jabatan Perhutanan akan bersiap siaga untuk menghadapi seberang kemungkinan kes kebakaran hutan.

Hutan paya gambut, khususnya, paling mudah terbakar dalam cuaca panas kerana ia mengandungi bahan organik yang boleh berubah dan mudah terbakar apabila kering.

Tanah gambut terbentuk daripada sisa-sisa daun dan tumbuhan mati yang terkumpul di dalam takungan air.

Jika sepuntung rokok terjatuh di atas permukaan tanah gambut, ia boleh menyebabkan kebakaran, bahkan ia boleh menyebabkan api marak dengan begitu cepat dan sukar dipadamkan sehingga satu tahap ia boleh menjadi jerebu.

Salah satu kawasan hutan paya gambut di negara ini, Hutan Simpan Raja Musa (HSRM) di Kuala Selangor, mencatatkan beberapa kes kebakaran. Ia disebabkan oleh beberapa faktor termasuklah antaranya kemarau, pembukaan tanah untuk tujuan pertanian, pencerobohan haram dan kecuaian manusia.

Antara kes kebakaran termasuk pada tahun 2011 apabila anggota bomba mengambil masa selama 1 hari untuk memadam api yang mengakibatkan 10 ha (hari tanah musnah. Pada tahun 2012 pula, kawasan seluas 6,500 ha di HSRM musnah dalam kebakaran.

Beberapa program pencegahan dan pemulih telah dijalankan oleh pelbagai pihak untuk memastikan kelestarian hutan simpan tersebut.

Antaranya, pembuhan sebuah sistem ramalan cuaca; penanaman semula pokok, rondaan secara ke dan menyekat saluran air yang dibina oleh syarikat-syarikat pembalakan.

Bagi meningkatkan lagi pencegahan, Universiti Putra Malaysia (UPM) bekerjasama dengan pusat penyelidikan dan pembangunan (R&D) MIMOS Berhad untuk membangun sistem amaran awal berasaskan Internet Segala Benda (IoT) bagi mengesan kebakaran hutan atau api di HSRM.

Penyelesaian ini menyediakan data masa nyata mengenai suhu, paras air dalam tanah serta sistem pengesan untuk pemantauan bagi mengelak kejadian kebakaran.

Sebagai peneraju projek, UPM menyumbang kepakarannya dalam bidang komunikasi tanpa wayar dan perhutanan melalui Pusat Kecemerlangan Penyelidikan Rangkaian Tanpa Wayar dan Fotonik (WiPNET) dan Institut Perhutanan Tropika dan Produk Hutan (INTROP).

Penyelidik Fakulti Kejuruteraan UPM, Prof. Dr. Aduwati Sali berkata, projek itu bertujuan melaksanakan inovasi teknologi dan sosial untuk komuniti HSRM dalam melindungi alam sekitar.

Katanya, inovasi teknologi ini bertujuan memperbaikan, mengamalkan dan memberi maklumat menggunakan sistem pemantauan hutan gambut berasaskan IoT untuk menghindari kebakaran hutan.

Seperti yang kita tahu, kebakaran hutan yang tidak terkawal boleh menyebabkan jerebu di dalam negara dan juga rentas sempadan.

"Dari segi inovasi sosial, misalnya ini adalah untuk menyangkau kepada masyarakat setempat terutamanya Sahabat Hutan Gambut Selangor Utara kerana kita mahu mereka terlibat dalam pembangunan dan penggunaan sistem pemantauan berasaskan IoT ini supaya ia lebih mesra pengguna," katanya.

"Projek ini dapat memberi manfaat kepada masyarakat setempat dan seterusnya dapat ditempakan di kawasan hutan gambut lain di negara ini," katanya.

Projek ini dibiayai oleh Institut Teknologi Maklumat dan Komunikasi Kebangsaan Jepun (NICT) dan ICT Virtual Organisation of Asean Institutes (Asean IVO).

Ia dianjurkan oleh Komuniti Hutan Paya Gambut ASEAN (NAPC) yang turut disertai oleh Brunei dan Indonesia.

Projek ini membolehkan penyambungan sistem pemantauan berasaskan IoT di kawasan hutan paya gambut di negara-negara ASEAN yang terlibat.

Melalui projek ini, komuniti pengurusan hutan dan para penyelidik juga dapat lebih memahami ekosistem hutan paya gambut dengan menganalisis data iklim mikro yang terkumpul.

MIMOS telah memasang beberapa nod penderia (sensor) di salah satu kawasan hutan tinggi dalam HSRM untuk mengumpul maklumat mengenai keadaan tanah dan kelembapannya.

Maklumat pada iklim dan alam sekitar dipantau dengan mengumpul parameter seperti suhu udara, kelembapan dan tekanan, tahap pemendakan indeks ultra violet, pencahayaan radiasi, kuasa sinaran suria, arah angin dan kelajuan angin.

Penderia untuk mengesan suhu dan kelembapan tanah juga dipasang bersama piezometer elektronik untuk mengukur paras air dalam tanah gambut.

Selain itu, menara tinjau yang berdekatan telah dilengkapi dengan sejumlah peranti yang dipanggil gerbang tanpa wayar untuk mengumpul semua data daripada nod penderia.

Penghantaran maklumat antara nod penderia dan gerbang tersebut menggunakan teknologi LoRa (Long Range). Gerbang itu disambungkan ke internet dan data akan dihantar ke platform MIMOS Internet Services of Things (Mi-MIST).

Mi-MIST adalah sejenis alat tengah (middleware) yang digabungkan dengan perkhidmatan bersepadu untuk menguruskan peranti pintar dan penderia bagi membolehkan aplikasi dalam penyelesaian IoT.

Platform ini mengintegrasikan peranti pintar dengan cara yang mudah dan sesuai untuk pelbagai penyelesaian sektor.

Mi-MIST; penderia dan sambungan tanpa wayar bagi menghasilkan penyelesaian yang berguna bertujuan mengatasi masalah kehidupan seharian.

Platform Mi-MIST juga fleksibel dan digunakan untuk aplikasi dan projek lain seperti pembuatan pintar dan pertanian pintar.

Realitinya, tanah gambut memainkan peranan sangat penting untuk ekosistem dan kehidupan kita.

Tanah gambut bertindak seperti span gergasi yang menyimpan karbon dan bertindak sebagai pemulihanan biodiversiti, sistem kesterilmbangan hidrologi, mitigasi banjir serta sumber bekalan air tawar dan produk semula jadi.

Hutan paya gambut juga menjadi habitat kepada haiwan-haiwan terancam seperti beruang matahari (*Malayan sun bear*), harimau kumbang dan tapir, serta menempatkan pokok-pokok unik seperti ramin melawis (*Gonystylus bancanus*), meranti bakau (*Shorea uliginosa*), jangkang paya (*Xylopia fusca*) dan gerunggang (*Cratoxylum* sp.).

Seperti hutan-hutan lain, hutan paya gambut mempunyai karbon dioksida dari atmosfera. Karbon ini akan dikunci dalam tanah, bahkan hutan ini menyimpan lebih banyak karbon berbanding jenis-jenis tumbuhan lain.

Tetapi jika hutan paya gambut dicerobohi, dibakar, ditebang dan tanahnya dikeringkan, ia akan melepaskan karbon dioksida yang sangat banyak ke atmosfera dan mengubah ekosistem hutan kita, yang akhirnya menyebabkan pencemaran alam serta kerugian ekonomi dan sosial.

PARA penyelidik dari UPM, MIMOS, juruterа-juruterа Loranet Technologies dan pegawai renjer hutan dari Jabatan Perhutanan Negeri Selangor (JPNS) di hadapan Pusat Kecemerlangan Hutan Paya Gambut Negeri Selangor.

An example of another HICoE that has an important project in the pipeline is the Institute of Tropical Forestry and Forest Products (INTROP) based in UPM. INTROP together with UPM's Wireless and Photonics Network Research Centre of Excellence (WiPNET) aims to fight fires before they start.

To combat this problem, the UPM research centres have teamed up with the national applied research and development centre MIMOS to build an Internet of Things (IoT)-based early warning system for peat forest fire.

Funded by Japan's National Institute of Information and Communications Technology (NICT) and ICT Virtual Organisation of Asean Institutes (Asean IVO), the research team intend to help local communities beginning with the Friends of North Selangor Peat Swamp Forest.

‘UPM dan MIMOS menubuhkan sistem berasaskan IOT di Hutan Simpan Raja Musa untuk mengurangkan kejadian kebakaran’, 8 Sept 2020, TechSemut http://techsemut.com/upm-dan-mimos-menubuhkan-sistem-berasaskan-iot-di-hutan-simpan-raja-musa-untuk-mengurangkan-kejadian-kebakaran/

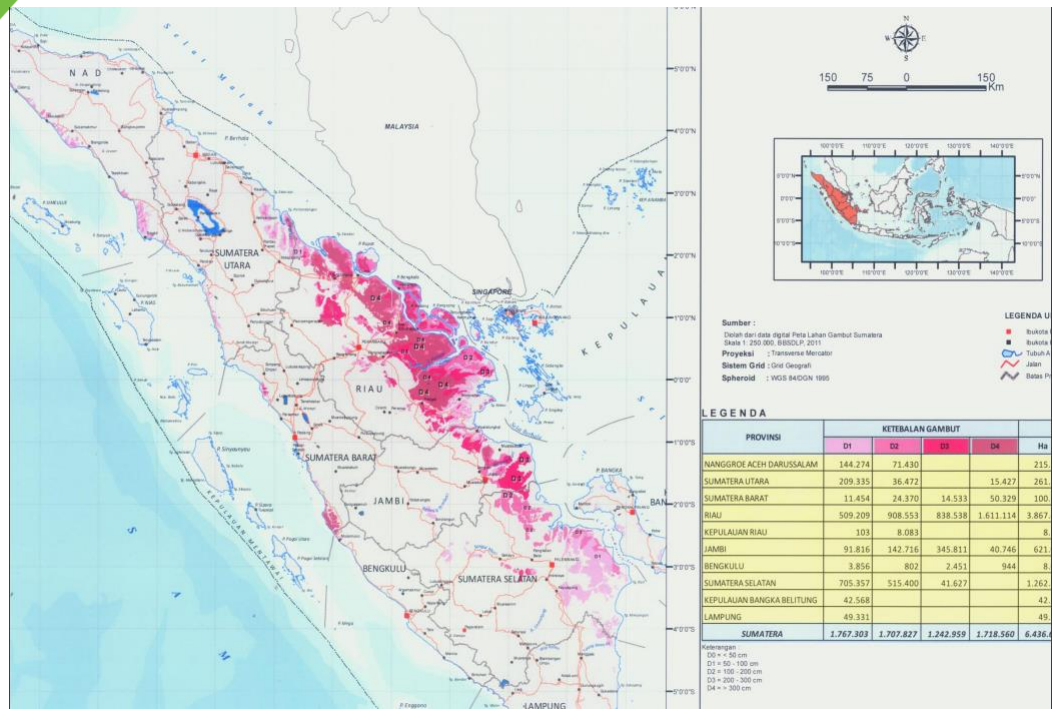
‘IoT atasi kebakaran tanah gambut’, 14 Sept 2020, Utusan Malaysia https://www.utusan.com.my/gaya/2020/09/iot-atasi-kebakaran-tanah-gambut/

‘UPM, Mimos partner to develop IoT-based early warning system to curb peat fires’, 18 Aug 2020, Digital News Asia https://www.digitalnewsasia.com/digital-economy/upm-mimos-partner-develop-iot-based-early-warning-system-curb-peat-fires

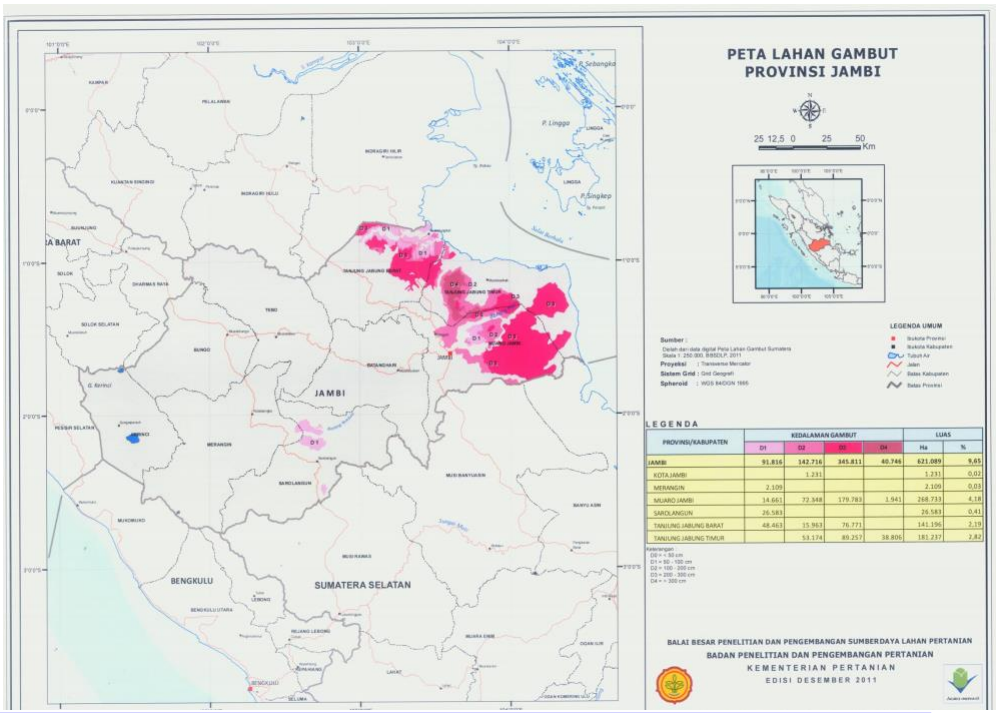
INDONESIA:
JAMBI, SUMATERA

Jambi, Sumatera

- Jambi is one of Province in Sumatera with the large peatland of 621,089 ha or 11.6% of the total area located at 0° 45’ - 2° 45’ South and 101° 10’ - 104° 55’ East.
- Jambi Province is one of the fire prone areas is bordered by Riau Province (North), South China Sea and Riau Islands Province (East), South Sumatera Province (South), and West Sumatera Province (West).



PROVINSI	KETEBALAN GAMBUT				
	D1	D2	D3	D4	Ha
NANGGROE ACEH DARUSSALAM	144.274	71.430			215.
SUMATERA UTARA	209.335	36.472		15.427	261.
SUMATERA BARAT	11.454	24.370	14.533	50.329	100.
RIAU	509.209	908.553	838.538	1.611.114	3.867.
KEPULAUAN RIAU	103	8.083			8.
JAMBI	91.816	142.716	345.811	40.746	621.
BENGKULU	3.856	802	2.451	944	8.
SUMATERA SELATAN	705.357	515.400	41.627		1.262.
KEPULAUAN BANGKA BELITUNG	42.568				42.
LAMPUNG	49.331				49.
SUMATERA	*1.767.303*	*1.707.827*	*1.242.959*	*1.718.560*	*6.436.*



PROVINSI/KABUPATEN	KEDALAMAN GAMBUT				LUAS	
	D1	D2	D3	D4	Ha	%
JAMBI	91.816	142.716	345.811	40.746	621.089	9,65
KOTA JAMBI		1.231			1.231	0,02
MERANGIN	2.109				2.109	0,03
MUARO JAMBI	14.661	72.348	179.783	1.941	268.733	4,18
SAROLANGUN	26.583				26.583	0,41
TANJUNG JABUNG BARAT	48.463	15.963	76.771		141.196	2,19
TANJUNG JABUNG TIMUR		53.174	89.257	38.806	181.237	2,82

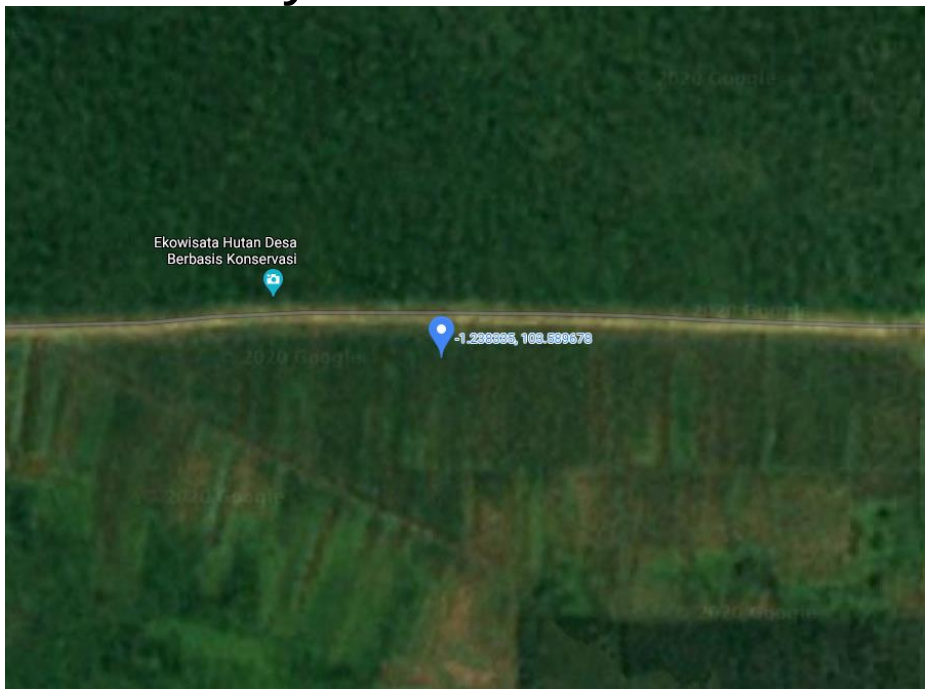
MAPFire 2019

- MAPFire 2019 in conjunction with 2nd International Conference on Environment and Forest Conservation (ICEFC2019), http://icefc2019.ipb.ac.id/
- Agenda of MAPFire 2019

IoT Deployment Plan: East Tanjung Jabung

Location

- Gateway and Weather Station

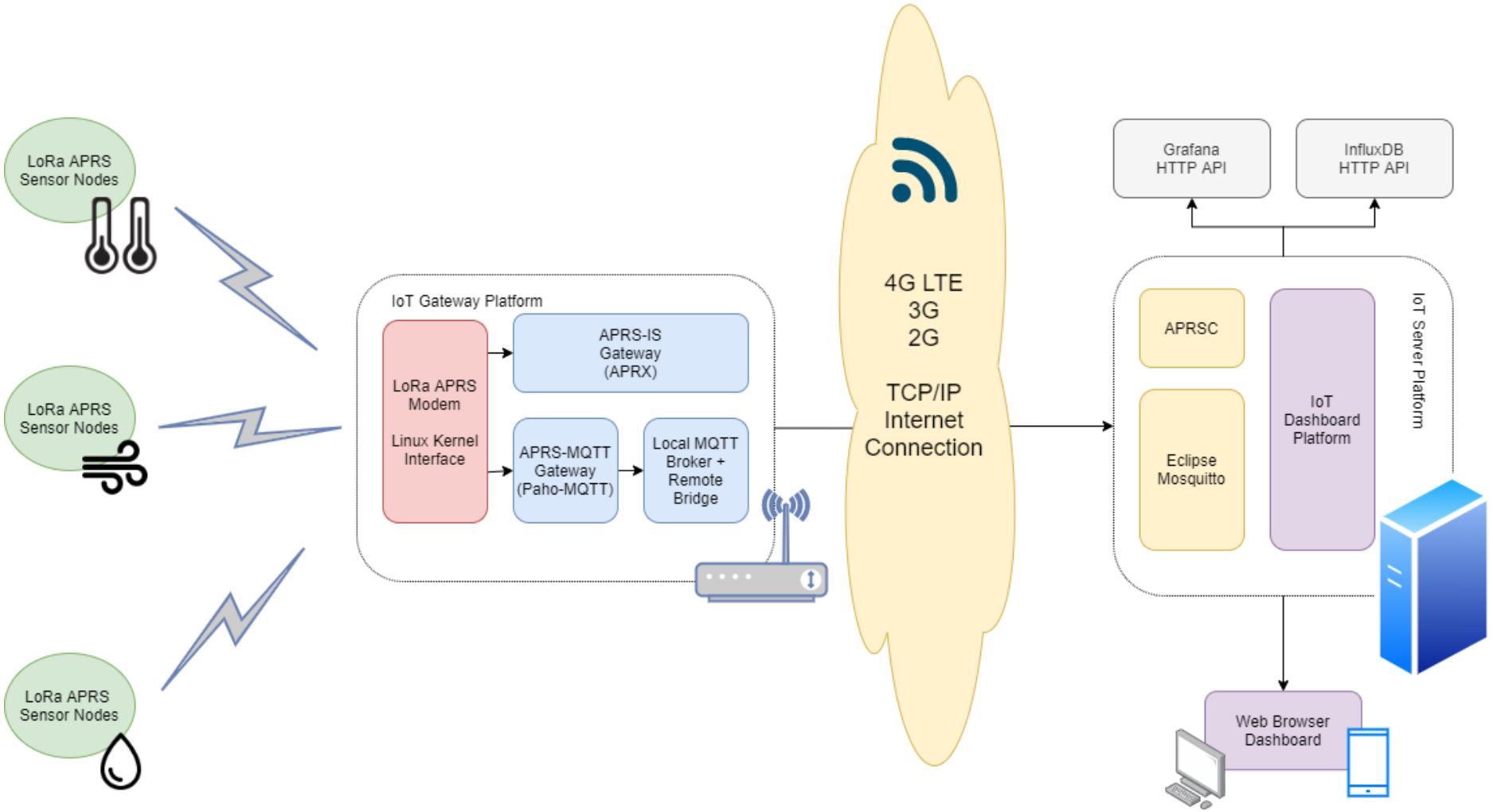


Soil Moisture, Ground Water Level and Soil Temperature

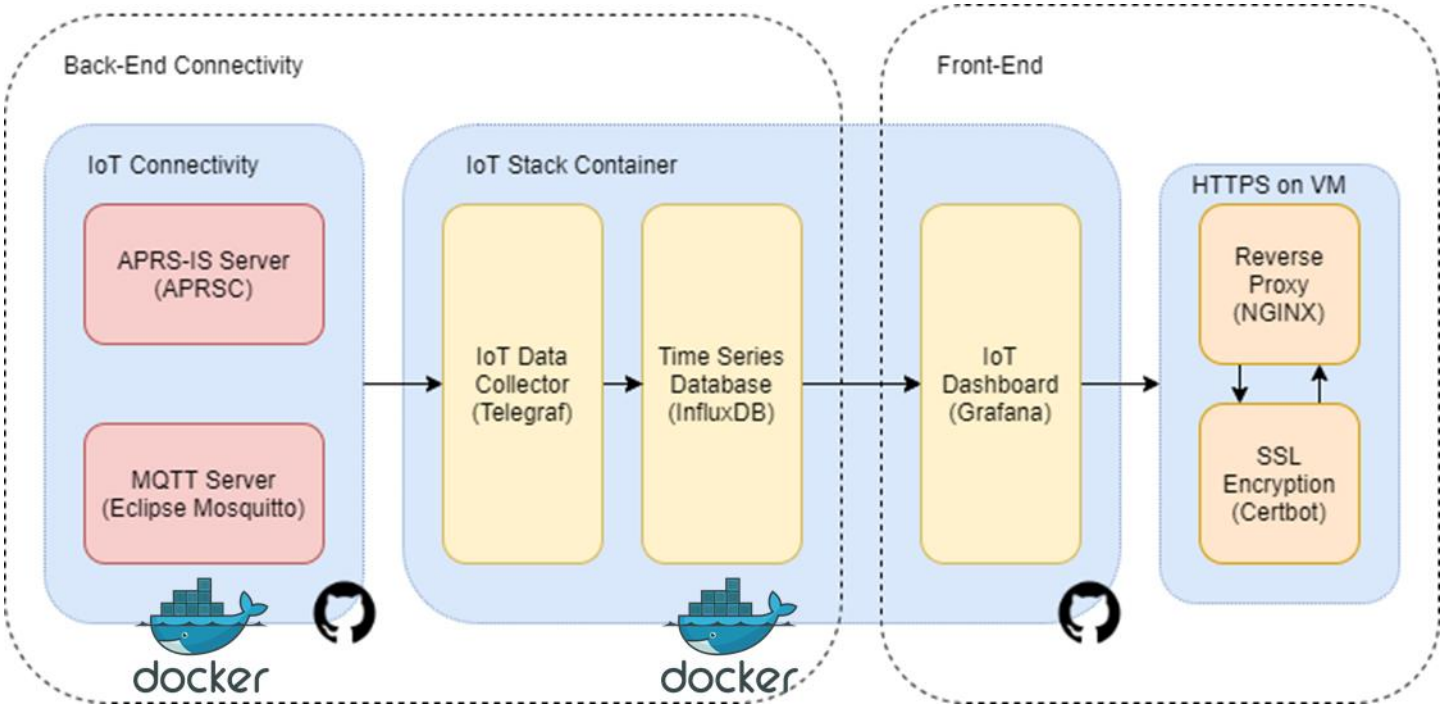
Network Challenges

- Internet of Things networking must remain in Indonesia according to regulation
- A local-only network infrastructure for LoRa is required to comply with the regulation
- A simple LoRa network is built by using open source MQTT and APRS protocol that is hosted in Indonesia

LoRa APRS-MQTT Network Architecture



Indonesia Internet of Things for Peatlands Monitoring Server Platform



ICEFC 2019

International Conference on Environment and Forest Conservation Held in Bogor, Indonesia on 1-3 October 2019

Paper contribution from NAPC Project

Publication of paper presented in International Conference on Environment and Forest Conservation

ICEFC2019 IOP Publishing
IOP Conf. Series: Earth and Environmental Science **528** (2020) 012066 doi:10.1088/1755-1315/528/1/012066

Techno-Socio Approaches in Peatland Fire Control in Indonesia

L Syaufina[1*], I S Sitanggang[2]

[1]Department of Silviculture, Faculty of Forestry, IPB University (Bogor Agricultural University), Bogor, Indonesia
[2]Department of Computer Science, Faculty of Natural Science and Mathematics, IPB University (Bogor Agricultural University), Bogor, Indonesia

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Abstract. Peatland fire has been the most prominent cause of transboundary haze problem in the ASEAN region since 1997/1998. The impacts are not locally but also globally identified. The paper aims to elaborate on how peatland fire occurred and techno-socio approaches for fire control. The study was based on a Focus Group Discussion of relevant stakeholders and

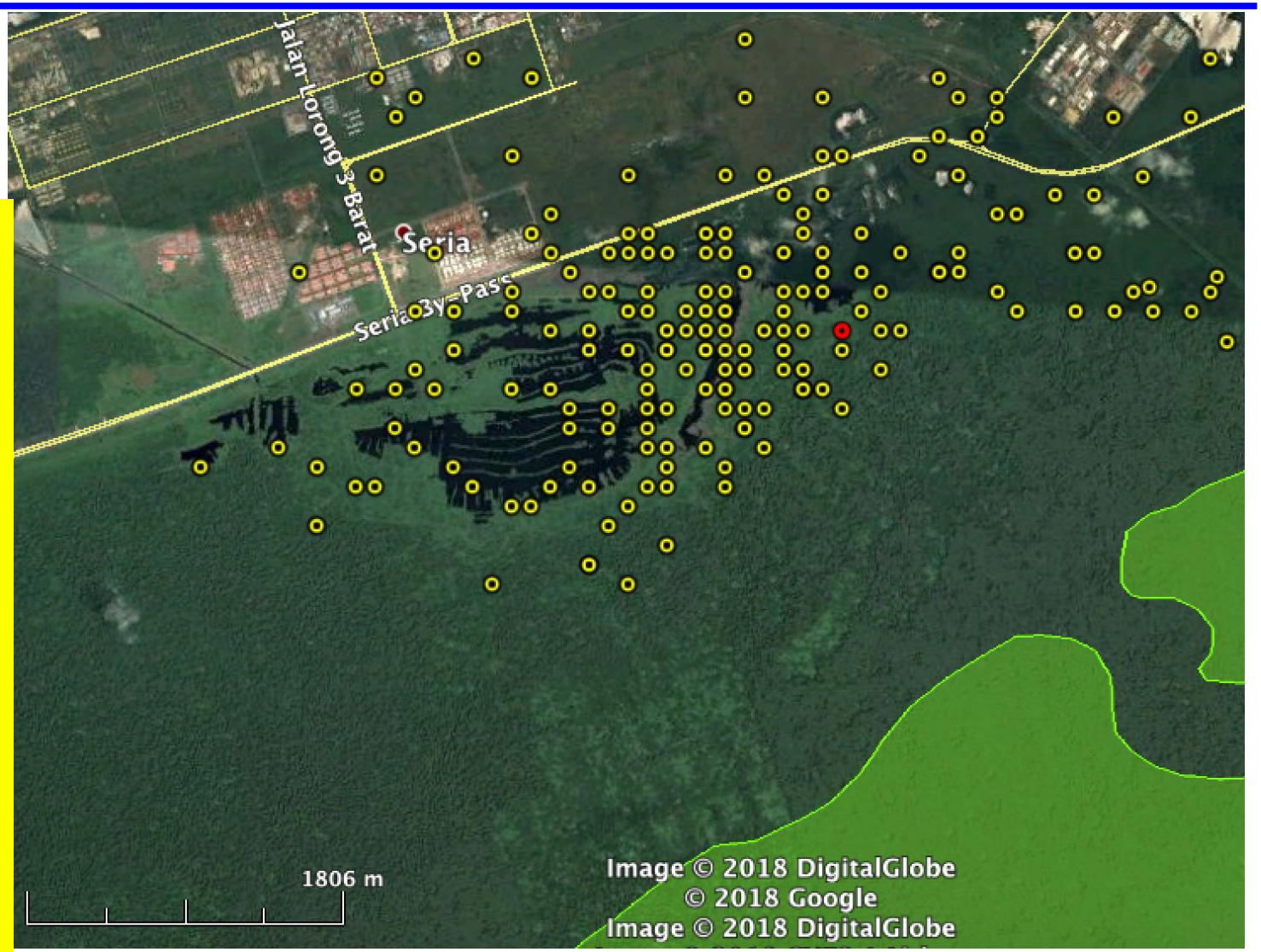
NAPC Project Rev....pptx

BRUNEI: BADAS

Specific Location in Brunei: Badas Peatland

- Study area
- N 4.59º E114.35º, radius 3 km

Yellow spots mark fire events in Feb-April 2016 (MODIS data). Black polygons are water bodies created by sand mining. Light green area (SE) is the central area of the peat dome, dominated by quite pristine "padang alan" (S. albida) forest. Just north of the road are housing estates. In NE corner is an oil & gas sector industrial estate. Informal, illegal farmers grow crops in burnt areas and gather food products from the peatland.



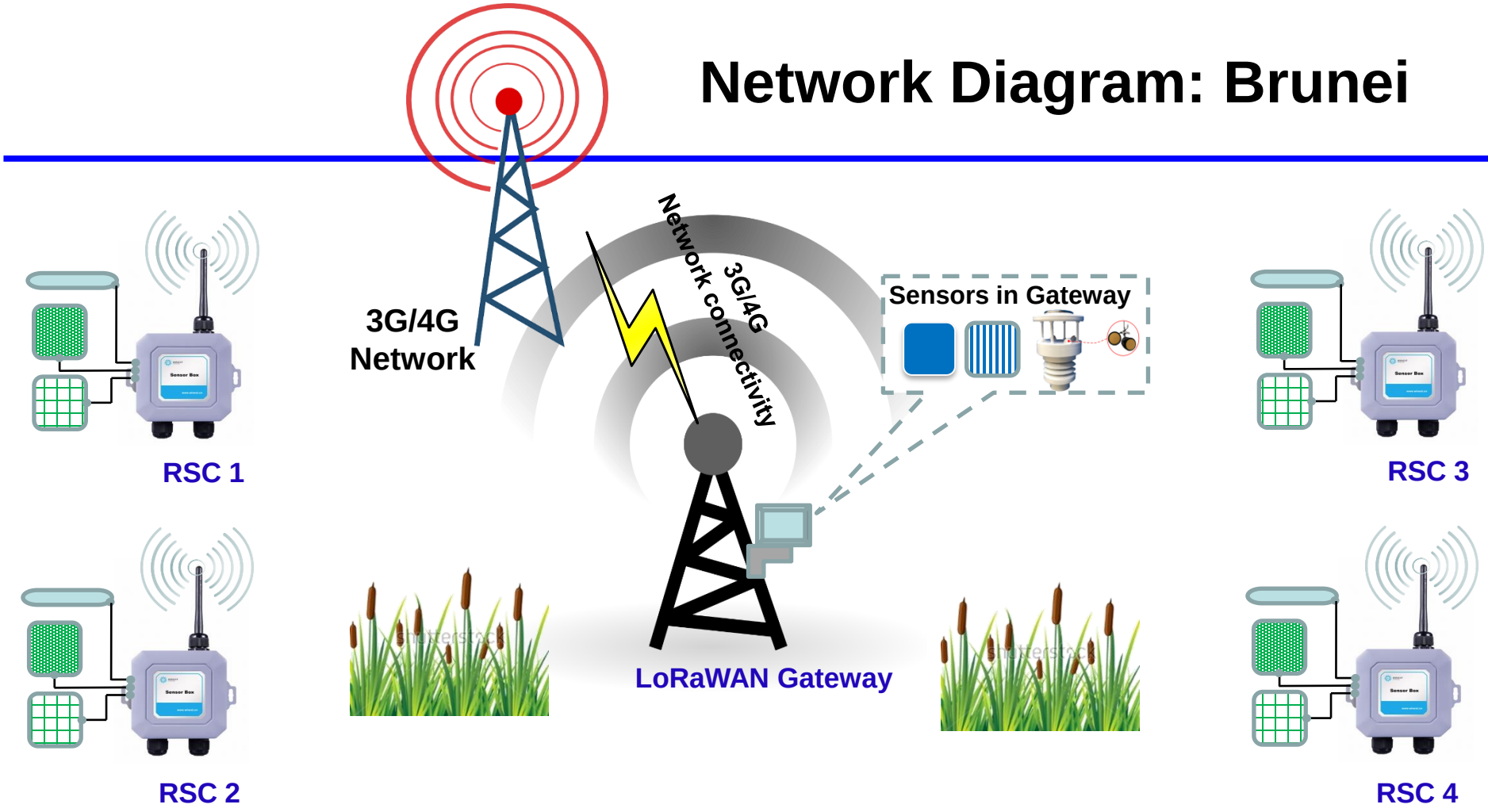
Degraded peatland. Alan Bunga forest 1 km away in background. Regeneration of invasive Acacia and grass in burnt area. Lakes and ponds are common features in peatland.

Government warning against use of land

Illegal growing of food

Housing estate

Network Diagram: Brunei



Sensors deployed in LoRaWAN Gateway

- 9370-P [Temperature, Humidity and Pressure Probe]
- 9325-P [Luminosity (luxes accuracy) Probe]
- WS-3000 [(anemometer + wind vane + pluviometer) probe]

Deployment in Remote Sensing Clusters (RSCs)

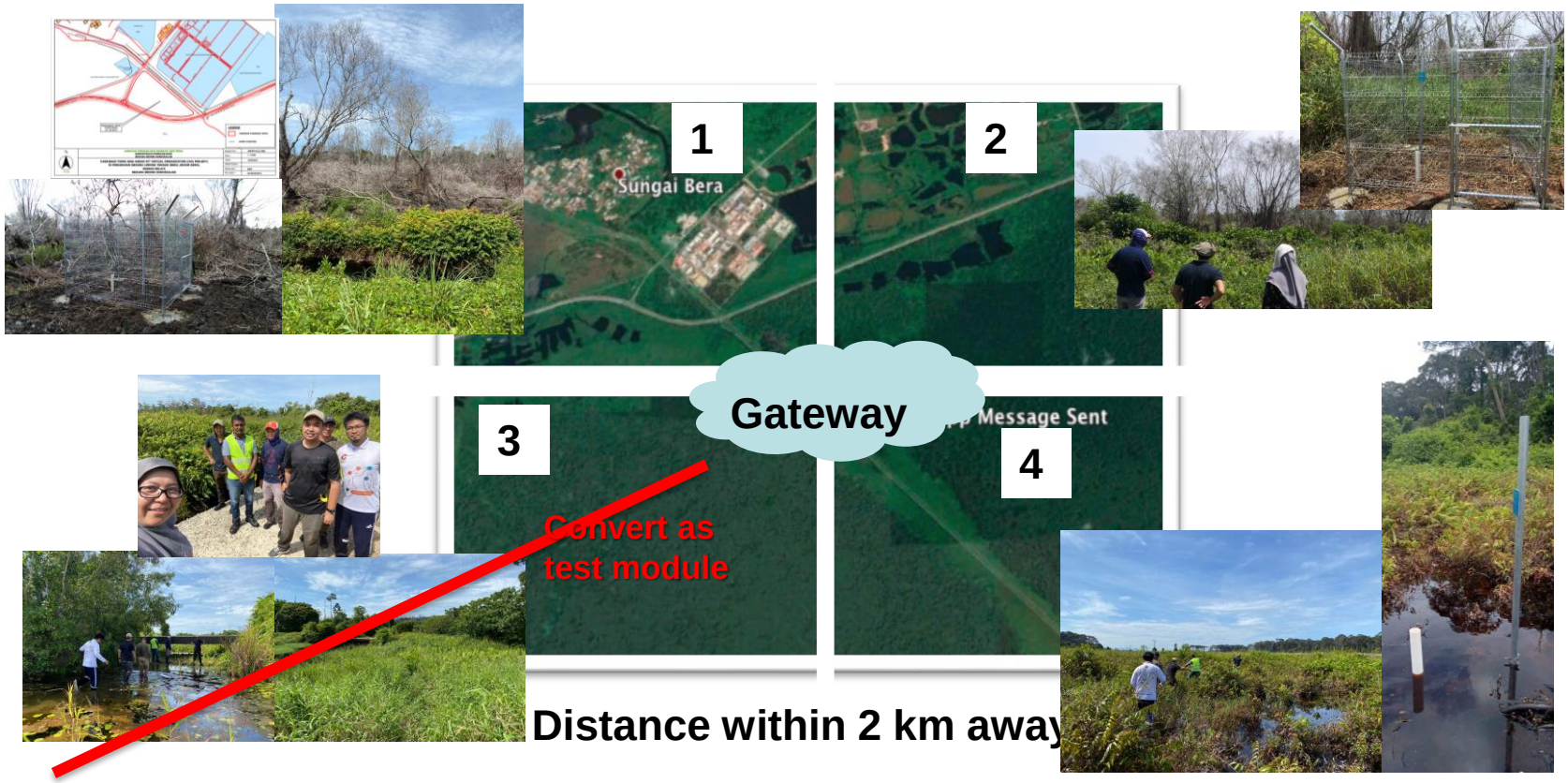
Sensors and data logger

- 0091940 [In-Situ Rugged TROLL 200]
- 9255-P [Soil/Water temperature (Pt-1000) Probe]
- 9323-P [Soil moisture 8 m Probe 90,00 4 360,00]

LoRaWAN components

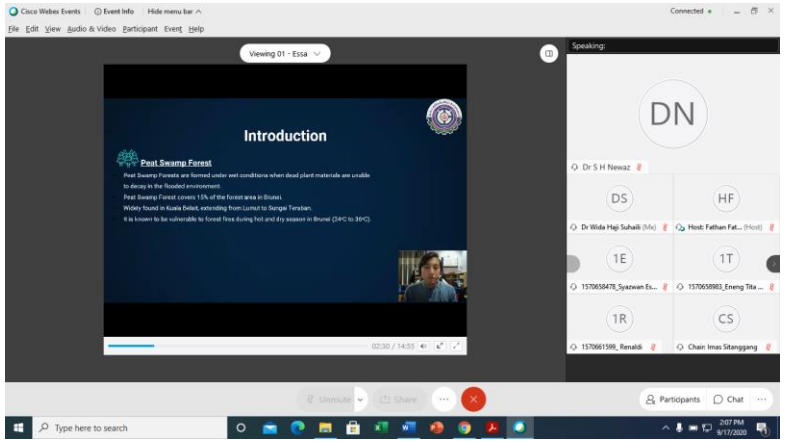
- LoRaWAN Device

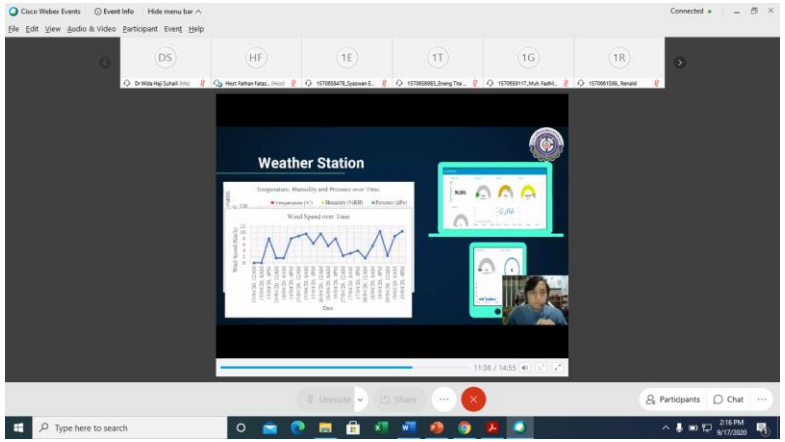
Deploy to 4 sectors with 4 sensor node station



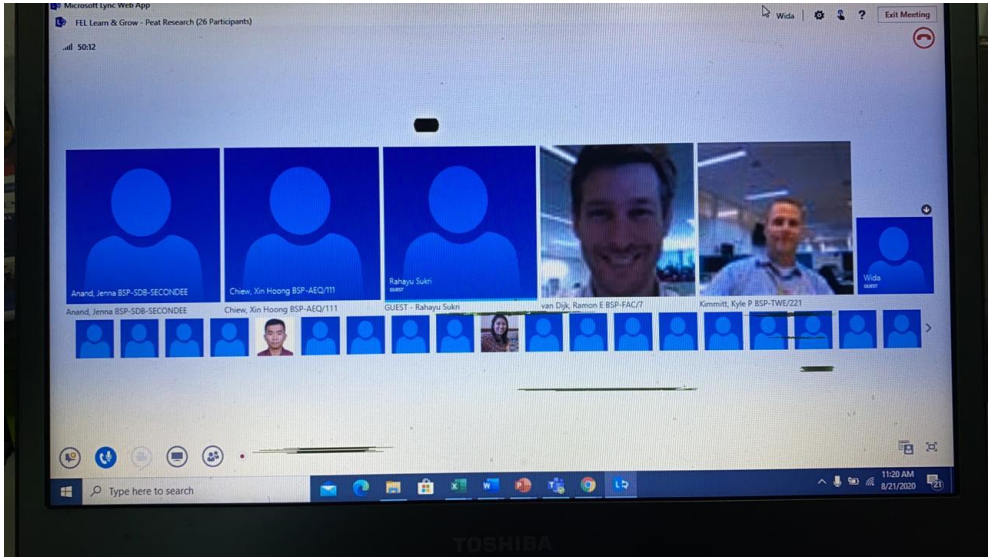
Due to the harsh location we decided to convert node3 as our test module in the lab. If problem exist with any of our 3 other sensors we can replace and fix it without any further downtime.

BRU-NAPC paper presented in ICOSICA2020





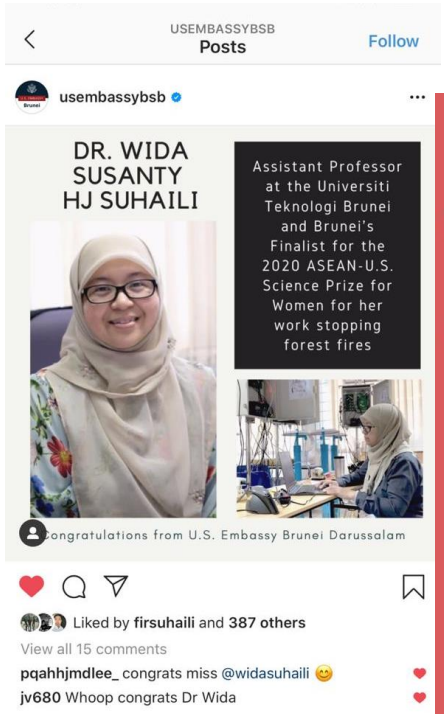
Peat Research Sharing with BSJV



National finalist for ASEAN-US Science Price for Women 2020

https://www.youtube.com/watch?v=snkdkEJiWcI

https://scienceprize4women.asean.org/#national-finalists



http://www.utb.edu.bn/dr-wida-represents-brunei-in-the-asean-us-science-prize-for-women/

Next: Insitu (piezometer) integration required

Power Implications

Typical battery life for both the Level TROLL 700 and th
Aqua TROLL 200 is shown in the following table:

Data Logger	Battery lifetime, typical	Data records*	Deployment temperature
Level TROLL 700	10 years	260,000	-20 to 80° C
Aqua TROLL 200	5 years	190,000	-20 to 80° C

** Data records include the measured values that are averaged but not shown in the data log.*

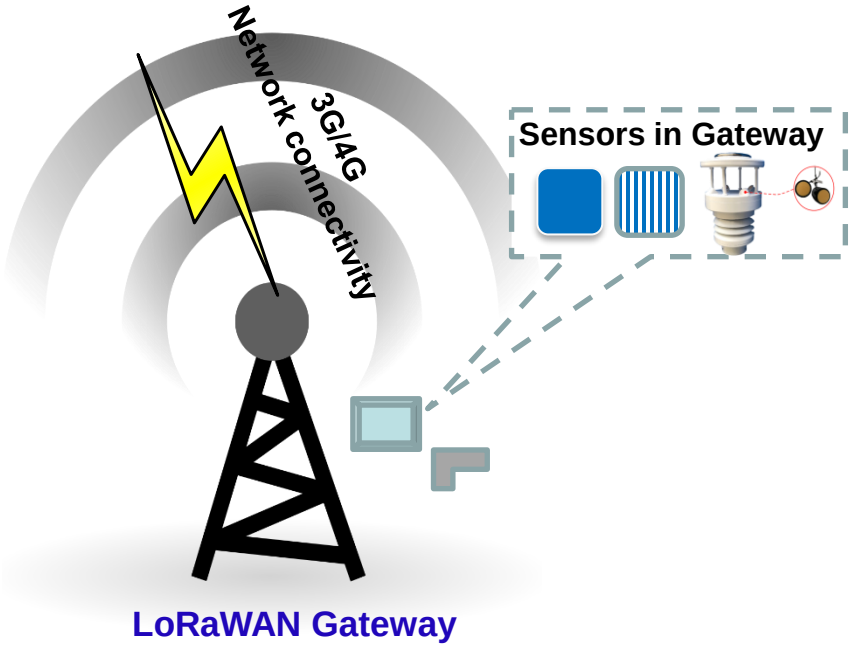
Both devices can collect data using the Linear Averagin
logging method without the need for external power.
However, the software may issue a warning during
programming that battery power will be consumed
quickly if the user-specified sampling rate is very high.
An example of the warning is shown below:

Hardware integration next software integration needed

All components purchased and need to solder it all together.

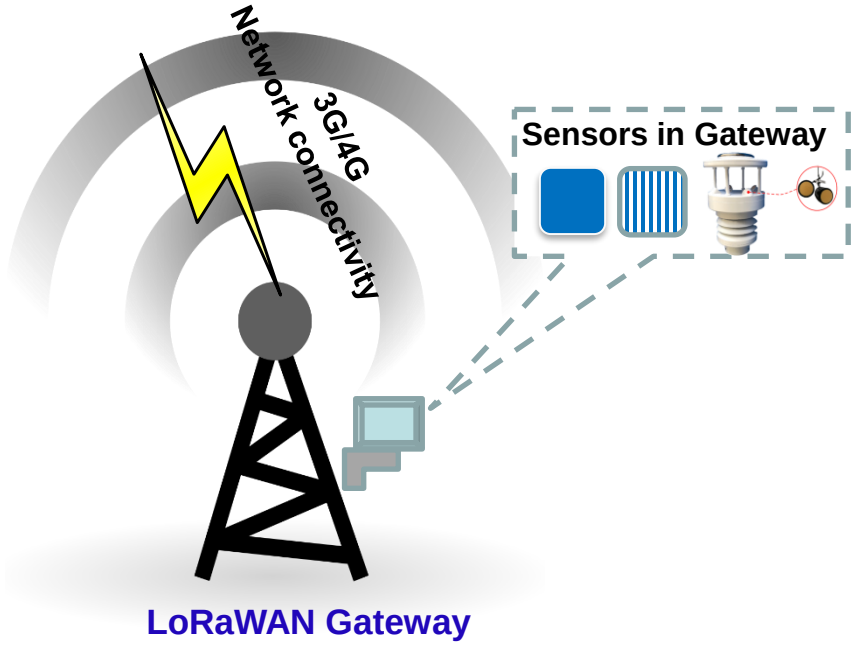
Gateway

- Gateway location



Sensor Testing – Weather Station

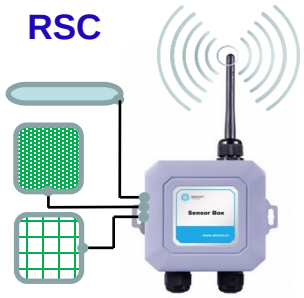
- Consulted Meteorology Department and they will help to calibrate our weather station



Sensor Testing – Sensor (RSC)

- Sensors

RSC



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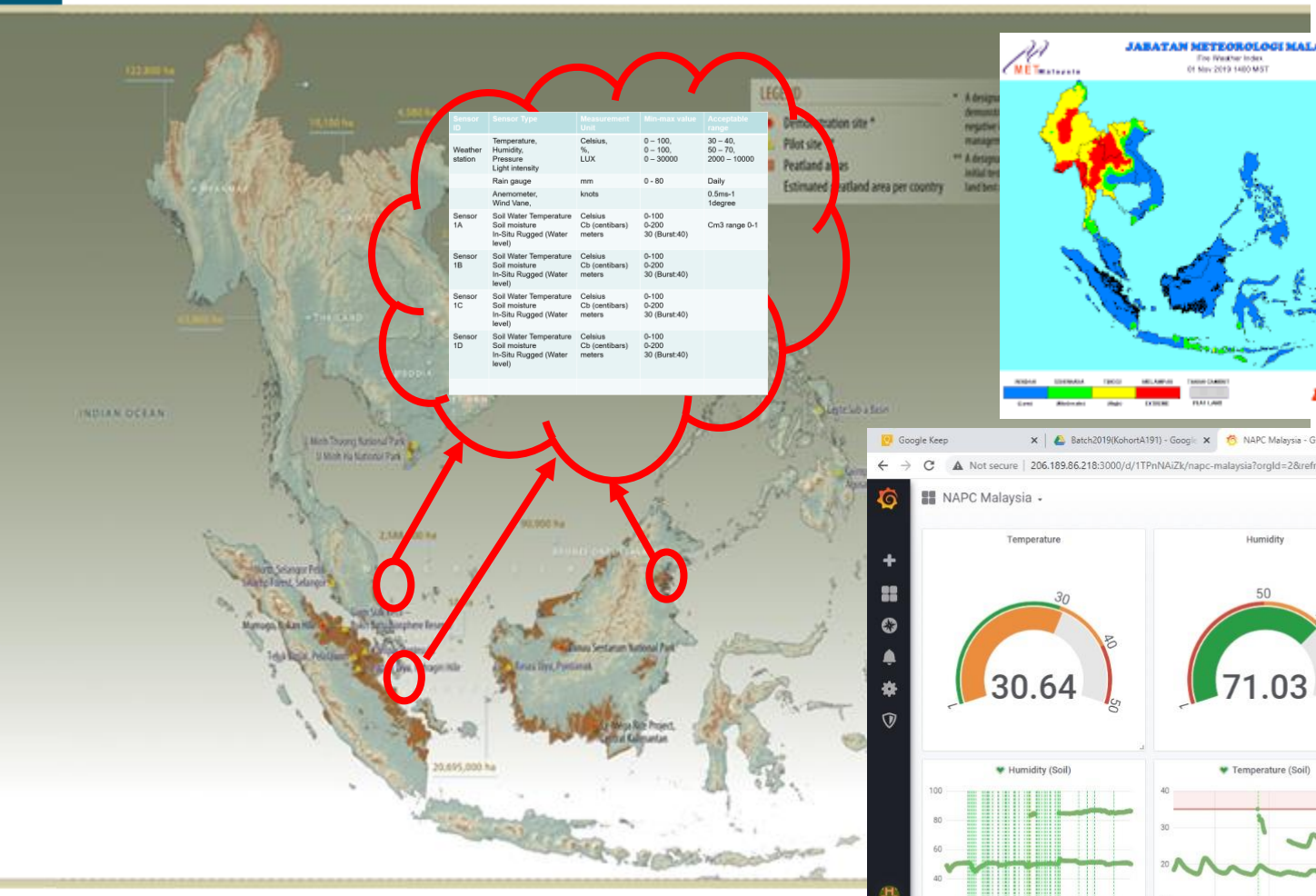
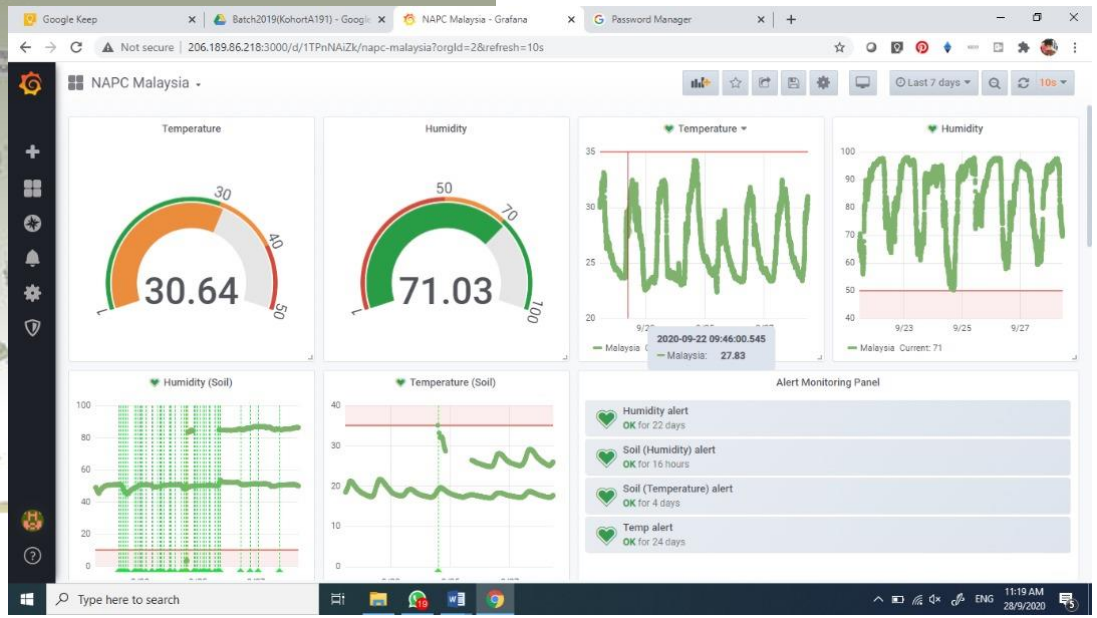
LoRaWAN components

LoRaWAN Device

TECHNOLOGICAL INNOVATION

Data Governance





SOCIAL INNOVATION

Social Innovation: Community Engagement

- Stakeholders
  - Jabatan Perhutanan Negeri Selangor (JPNS)
  - Sahabat Hutan Gambut Selangor Utara (SHGSU)
  - Global Environment Centre (GEC)
  - Primary and Secondary Schools

- Community Engagement
  - Alert system – local technology acceptance
  - Social community program for community
    - Education – awareness programs
    - Entrepreneurship
    - Ecotourism

Project Activities

1st NAPC Workshop (Kick-off Meeting) – UPM, 6-7 Aug 2018

LoRa Sharing and Exchange Session - MIMOS, 18 Oct 2018

Global Environment Centre

Jabatan Perhutanan Negeri Selangor

Discussion with local authorities

and communities - to engage and get approval

Collaboration Meeting

Monthly Webex Meeting

Cisco webex

Stakeholder Involvements

- AITI – Signing in April 2019
- Internet connectivity - Cloud
  - DST have agreed to sponsor for connectivity 1GB/mth sim on data only.
  - Sign 28th August 2019
- LORA – Gateway
  - Sign MOU with ANIAN –LORA
  - 26th September 2019

Project Activities

2nd NAPC Workshop

UTB, 28 – 29 Jan 2019

UTB hosts dialogue session

A DIALOGUE session on Brunei-Networked ASEAN Peat Swamp Forest Communities (BRU-NAPC) under the ICT Virtual Organisation of ASEAN Institutes (ASEAN IVO) and National Institutes of Information and Communications Technology (NICT) was held at the Lecture Theatre 2, Library Complex, Universiti Teknologi Brunei (UTB) yesterday.

The session began with the recitation of *Surah Al-Fatihah* and *Doa Selamat* followed by welcoming speech by the Group Leader for Brunei NAPC for ASEAN IVO Project Dr Wida Susanty binti Haji Suhaili and an official opening by the guest of honour Assistant Vice-Chancellor (Research) of UTB Professor Dr Zuriati Abu Samah.

Forumon Peatland Conservation and Mitigation Attempts' was delivered by six local organisations and three regional members. The presenters were Forestry Officer from Heart of Borneo Zaridi bin Haji Bernadin, Senior Officer from Department of Environment, Parks and Recreation (JASTRe) Dayangku Haryanti binti Pengiran Haji Petra, Senior Superintendent of Fire and Rescue Muhd Shahreeni bin Haji Yussof, Environmental Affairs Advisor from Brunei LNG Sdn Bhd Almayati binti Haji Pernadin, Technical Officer from Wetland

3rd NAPC Workshop

IPB, 26 – 27 Aug 2019

Sharing and Dissemination of Information

JASTIP
Japan - ASEAN Science, Technology and Innovation Platform

5th JASTIP Symposium,16-19 October 2018, Sepang, Malaysia

“Disaster Risk Reduction & Environmental Sustainability for Social Resilience“.

MESTECC-APCTT 2018 Conference on the 4th Industrial Revolution , 23-24 October 2018, Putrajaya, Malaysia

“New and Emerging Technologies in Achieving Sustainable Development Goals”

APCTT
Asian and Pacific Centre for Transfer of Technology

State Forestry Department

16 January 2019

-Meeting with Director of Selangor Forestry Department (DSFM)

- SFM agreed on proposed monitoring system
- Location of the gateway, sensors and actuator was agreed

Sahabat Hutan Gambut Selangor Utara (SHGSU)

Engagement with local community

- Meeting with SHGSU on 2 July 2019
- Awareness of the peatland IoT system
- Economic empowerment
- Ecotourism

Summary – List of Activities

Aug 2018

COMPLETED

1st NAPC Workshop, UPM Malaysia
CRDA discussion

Jan 2019

2nd NAPC Workshop, UTB Brunei
Procurement process

COMPLETED

Sept 2019 - Dec 2020

IoT System Deployment, Malaysia, Indonesia, Brunei
Peatland data acquisition
Cloud server configuration
CRDA signing process

Aug 2019

3rd NAPC Workshop, IPB Bogor, Indonesia
Cloud server meeting, UPM
ASEAN Transboundary Haze Centre
MAPFire

COMPLETED

Jan - June 2021

Social Innovation Workshop, Brunei (Jan 2021)
Social Innovation Workshop, Indonesia (Mar 2021)
Final NAPC Workshop, Malaysia (Apr 2021)

Beyond June 2021

Haze prediction using Machine Learning
Transboundary Haze Centre research activities
Sustainable Peatland Management

List of Presentations / Publications / Media Coverage

1. Presentations
   - 5th JASTIP Symposium,16-19 October 2018, Sepang, Malaysia, “Disaster Risk Reduction & Environmental Sustainability for Social Resilience“
     - NAPC: Networked ASEAN Peat Swamp Forest Communities - Brunei’s Perspective
     - NAPC: Networked ASEAN Peat Swamp Forest Communities
   - MESTECC-APCTT 2018 Conference on the 4th Industrial Revolution , 23-24 October 2018, Putrajaya, Malaysia, “New and Emerging Technologies in Achieving Sustainable Development Goals”
2. Media Coverage
   - ‘HICoE proof of higher education institutions' effectiveness’, 21 Sept 2020, https://www.nst.com.my/opinion/columnists/2020/09/626124/hicoe-proof-higher-education-institutions-effectiveness?fbclid=IwAR0vpllXPj3ghDcyK_4A8dR19KLPZBJUFRJty-Xuuy6StdShmkKn-9E-pT4
   - ‘UPM dan MIMOS menubuhkan sistem berasaskan IOT di Hutan Simpan Raja Musa untuk mengurangkan kejadian kebakaran’, 8 Sept 2020, TechSemut, http://techsemut.com/upm-dan-mimos-menubuhkan-sistem-berasaskan-iot-di-hutan-simpan-raja-musa-untuk-mengurangkan-kejadian-kebakaran/
   - ‘IoT atasi kebakaran tanah gambut’, 14 Sept 2020, Utusan Malaysia https://www.utusan.com.my/gaya/2020/09/iot-atasi-kebakaran-tanah-gambut/
   - ‘UPM, Mimos partner to develop IoT-based early warning system to curb peat fires’, 18 Aug 2020, Digital News Asia https://www.digitalnewsasia.com/digital-economy/upm-mimos-partner-develop-iot-based-early-warning-system-curb-peat-fires
3. Publications
   - 'Peatlands Monitoring in Malaysia with IoT Systems: Preliminary Experimental Results’, CIIS 2020
   - ‘IoT-based Environmental Monitoring System for Brunei Peat Swamp Forest’, ICOSICA 2020
   - ‘IoT Initiative in Malaysia for Forest Fire Monitoring’, INTROPica Highlights

Summary – Financial Management

1. 2018 Expenses USD7,200.71
   Project Meeting in UPM, Malaysia
   Project Leader Expenses in ASEAN IVO Forum, Jakarta, Indonesia
   Project Meeting in Brunei

2. 2019 Expenses USD33,978.65
   Purchase of equipment and installation in Malaysia and Brunei
   Project Meeting in Bogor, Indonesia

3. 2020 and 2021 Committed Expenses **USD34,820.64**

UTB Security enclosure deployment	USD4,000
Purchase of equipment and installation in Indonesia	USD15,000
System Integration Meeting, Putrajaya, Malaysia, Dec 2019,	USD250
Social Innovation Workshop, Brunei, Feb 2019,	
Social Innovation Workshop, Indonesia, Apr 2019,	USD5,000
Final Project Meeting, Malaysia, June 2019,	USD3,000

Thank you!

Prof. Ir. Dr. Aduwati Sali
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Faculty of Engineering, UPM.

aduwati@upm.edu.my