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## 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 easier



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

This dry spell has already hit Sarawak, with the Miri Fire and Rescue Department hard at work with battling wildfires in five different locations due to open burning and the meltingly-hot weather. On top of that, the Meteorological Department also forecasted that there will be less cloud cover and rainfall across Malaysia, except Sabah.

Peat swamp forests, in particular, are prone to burning in hot weather as they comprise of organic matter that can turn into tinder when dry (peat is made of accumulated dead leaves and plants within a water-saturated environment).

The soil substrate is so flammable once dry that a single stray cigarette butt can turn into an inferno. One of the country's most notable peat swamp forests, the Raja Musa Forest Reserve (RMFR) in Kuala Selangor, has recorded several fire cases due to drought, agricultural land-clearing, illegal encroachment and human negligence.

There has been various precautionary measures and rehabilitation programmes by various parties in RMFR over the past few years, including the set-up of a system to predict danger zone based on weather status, besides tree planting, constant patrolling and blocking drainage canals constructed by plantation companies.

Even so, more innovative solutions need to be in place. To step up preventive measures, Universiti Putra Malaysia (UPM) has teamed up with the national applied research and development (R&D) centre Mimos to build an Internet of Things (IoT)-based early warning system for peat forest fire in RMFR.

The solution provides real-time data on temperature, ground water level and surveillance system for round-the-clock monitoring to avert fire flashovers.

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UPM, as the project leader, will be contributing its expertise in wireless communication and forestry research through its Wireless and Photonics Network Research Centre of Excellence (WiPNET) and Institute of Tropical Forestry and Forest Products (INTROP).

UPM Faculty of Engineering researcher Aduwati Sali explains that the project is aimed at implementing both technological and social innovation for RMFR communities in protecting Mother Nature.

"The technological innovation is to deploy, analyse and disseminate information using an IoT-based peatland forest monitoring system to avoid forest fires which may cause transboundary and local haze situations," she explains.

"In terms of social innovation, the initiative is to reach out the local community, particularly the Sahabat Hutan Gambut Selangor Utara (Friends of North Selangor Peat Swamp Forest), where we want to engage them on the development and deployment of IoT-based monitoring system in peatland management. The project will benefit and can be applied to other peatland areas in Malaysia," she adds.

Funded by Japan's National Institute of Information and Communications Technology (NICT) and ICT Virtual Organisation of ASEAN Institutes (ASEAN IVO), the project is organised under Networked ASEAN Peat Swamp Forest Communities (NAPC), which is also participated by Brunei and Indonesia.

The system consists of a number of sensor nodes that have been installed by Mimos at one of the high risk areas in RMFR, where they are capable of gathering information on surrounding environment and peat condition.

Trends on climate and environment are monitored by collecting parameters such as air temperature, humidity and pressure; precipitation intensity, ultraviolet index, radiation illuminance, solar radiation power, wind direction and wind speed.

For peat condition, the sensors for soil temperature and humidity have been deployed together with an electronic piezometer, which is used to measure peat's water level. A nearby lookout tower is equipped with another device called wireless gateway to collect all data from the multiple sensor nodes in the area.

The transmission between sensor nodes and the gateway uses LoRa (Long Range) technology. The gateway is connected to the Internet and the data will be transmitted to the Mimos Internet Services of Things (Mi-MIST) platform, a middleware with integrated services to manage smart devices and sensors to enable applications in IoT solutions.

This application-enablement platform integrates intelligent devices in a simple and standardised way to provide smart services such as this forest fire early warning system. Essentially, important parameters of the forest can be viewed on laptops and computers at any any given time, making monitoring much easier.

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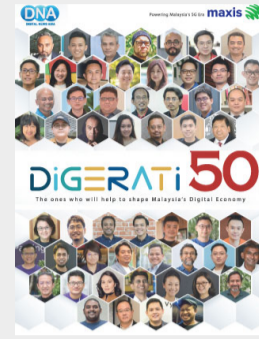
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