Visual-Peat: Adoption of technology in the mitigation of peatland forest fire in ASEAN

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Country Lead for Brunei: NAPC 2018 - 2021 & Net Peat 2022

(Need to Expand these projects to ensure sustainable social innovation with our respective stakeholders)

WORK TOGETHER FOR THE COMMON GOAL

“Alone we go fast, together we go far”

THANK YOU

Any Questions

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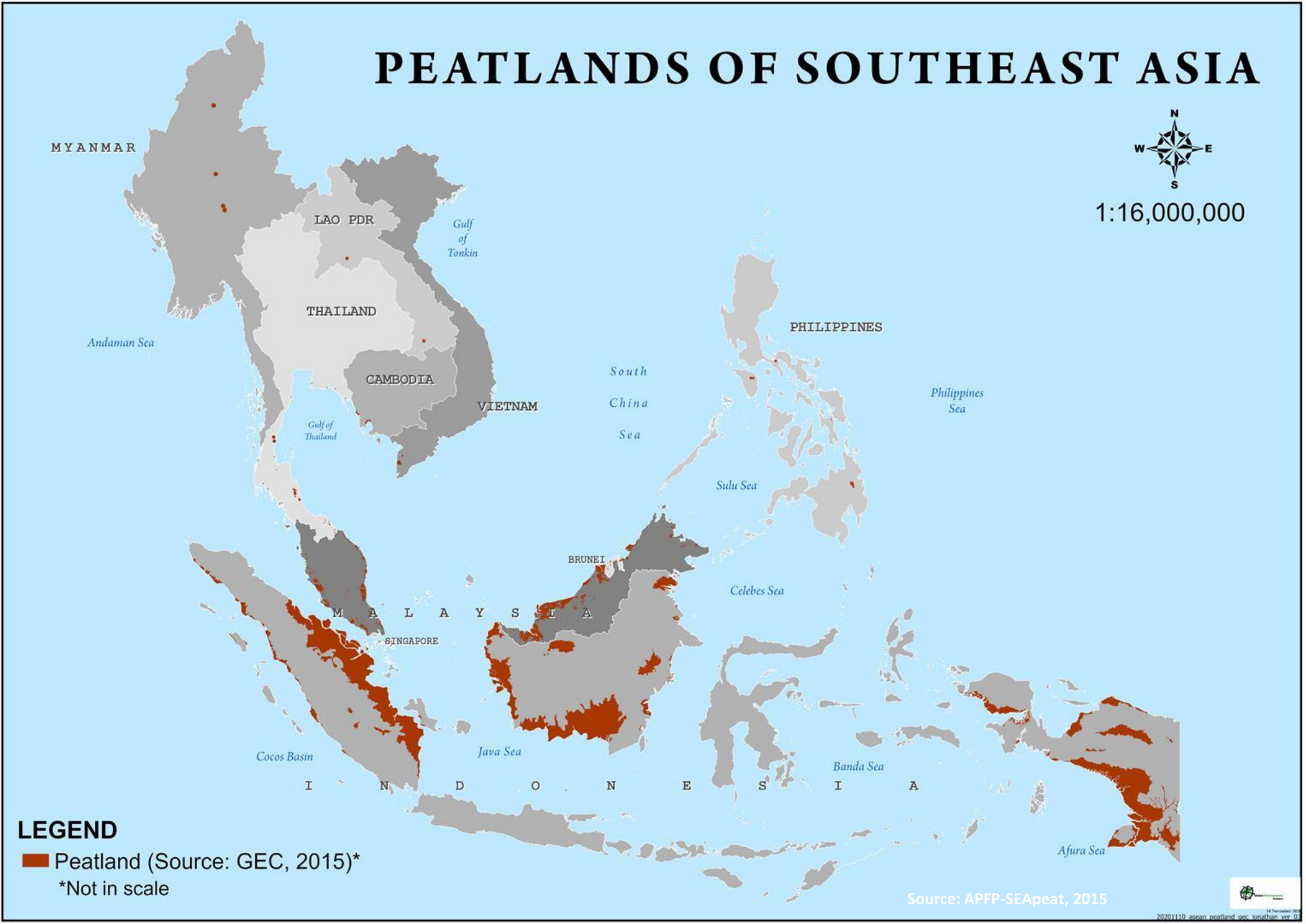


Total estimated peatland areas of 23 million ha

Country	Hectare
Brunei Darussalam	90,900[a]
Cambodia	9,850+[b]
Indonesia	20,200,000[c]
Lao PDR	1000+[b]
Malaysia	2,560,341[d]
Myanmar	11,233+[e]
Philippines	20,188[e]
Thailand	64,555[e]
Viet Nam	24,000[e]
TOTAL	**22,982,067**

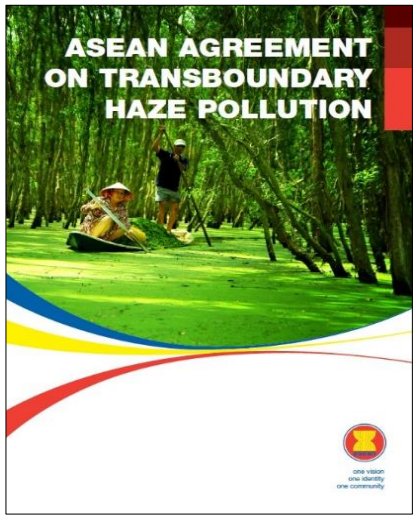
Sources:
a – National Action Plan on Peatland, 2014
b – SEApeat reports, 2015
c – CIFOR, 2018
d – DOE, 2019
e – AMS, 2020

More than 5 million ha of peatlands have burnt in last 20 years

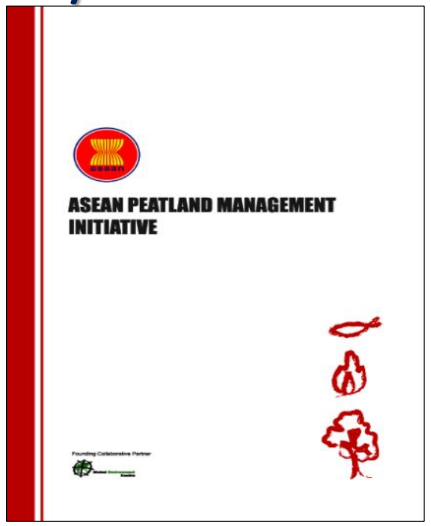
70% of peatlands have been degraded in the past 40 years



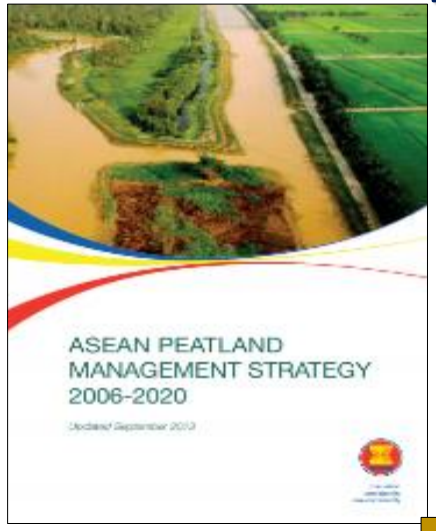

ASEAN Policy Framework Guidelines and Key Achievements to address Peatland issues



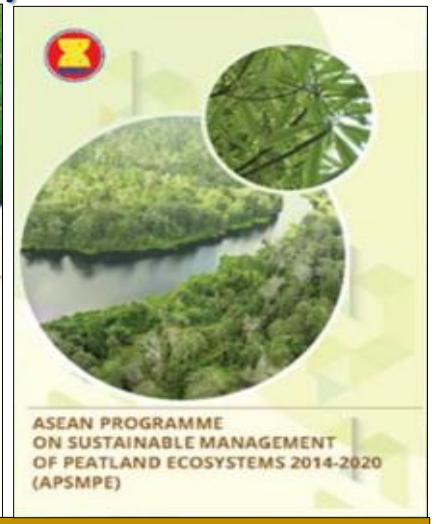
ASEAN Agreement on Transboundary Haze Pollution (AATHP) 2002



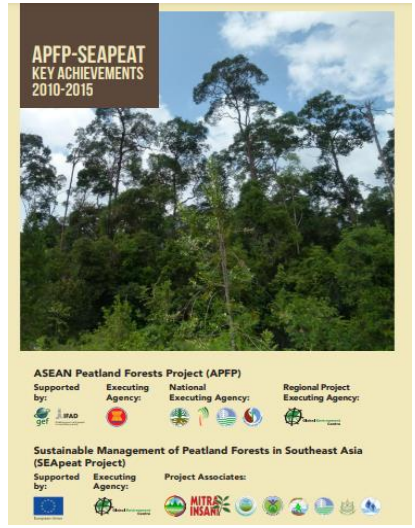
ASEAN Peatland Management Initiative (APMI) 2003



ASEAN Peatland Management Strategy 2006-2020 (APMS)



ASEAN Programme on Sustainable Management of Peatland Ecosystems 2014-2020 (APSMPE)



APRP-SEAPEAT Key Achievements (2010-2015)

ASEAN Guidelines on Peatland Fire Management (2016)

Original Peatland vs Degraded Peatland

- Peatland – good source of carbon
- Naturally can guard itself against fire and drought unfortunately when the eco system is disrupted it no longer can sustained this property
- Once fire break-out, an amount of carbon is released
- As the eco-system disrupted natural source of water is no longer available
- To get to the location is also difficult
- In densely peat forest, to bring in the water source to kill the fire will be tedious and an expensive task
- For eg: Brunei in 2016, spend US$5.6Millions to water bomb the affected area (BFRD, 2016)

Peatland management issues in ASEAN

- Over-exploitation of forest resources
- Large scale agriculture, oil palm and forest plantation development
- Peat over-drainage and subsidence
- Peatland fires and associated smoke haze
- Fragmentation and disruption of peatland landscapes
- Loss of peatland biodiversity
- GHG emissions and climate vulnerability

Outcomes of low and high peatland water level

Dry

Wet

Fire suppression methods

- "Total Flooding"

- Water Bombing

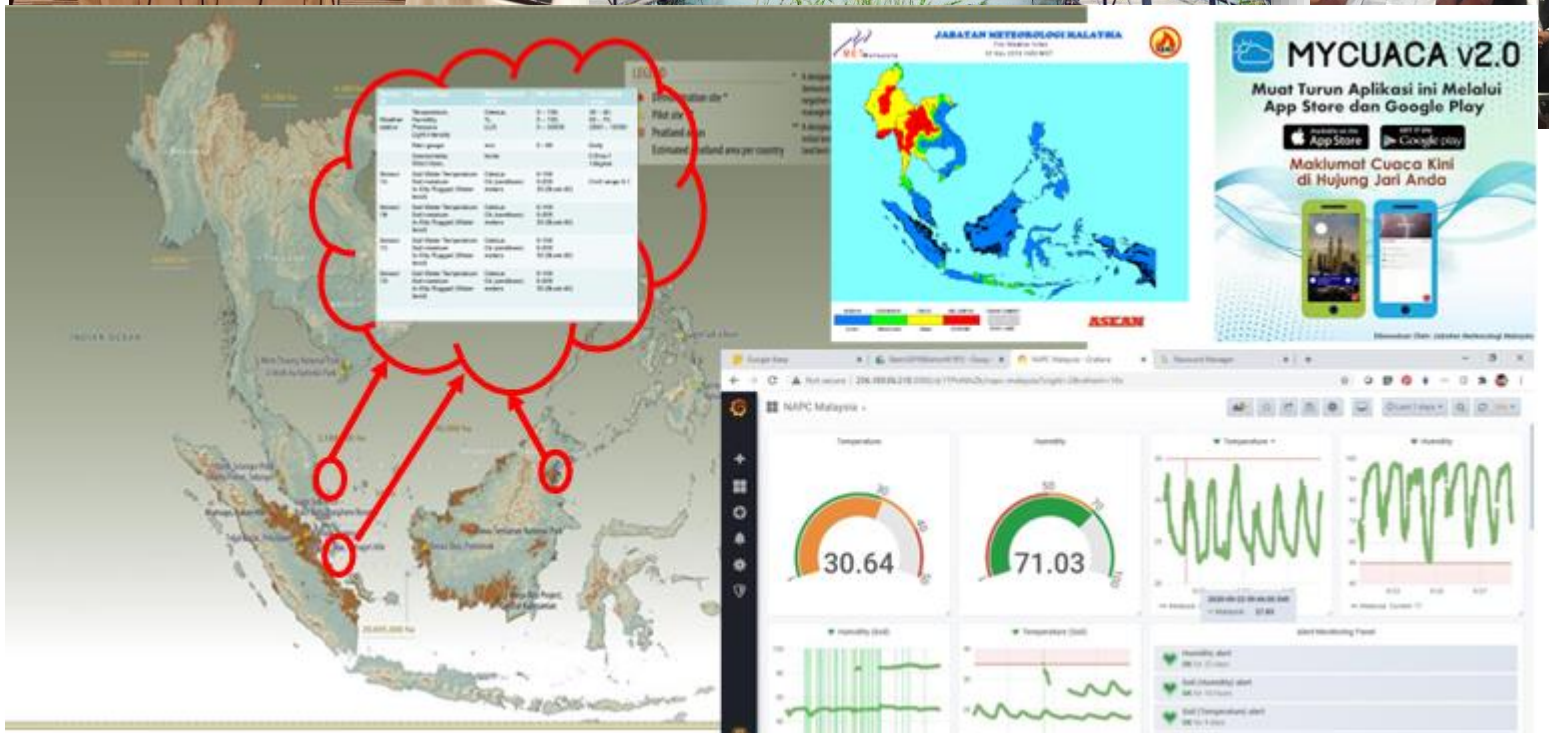
- Make a fire break/temporary lake or pool
  - Slow down the spread of the fire
  - Easily access by firefighters
  - Minimise the fire damage

ASEAN IVO 2018 -2021: Smart Environment (NAPC)

Indonesia

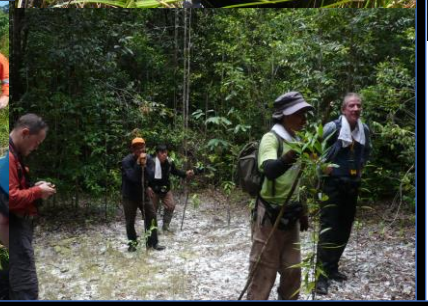
Malaysia

Brunei



Social Innovation: Important to Engage with Stakeholders and Collaborators, Thus need to sustain

Develop Biodiversity Action Plan



Develop Fire Communication Plan

Conservation by Tree Planting

Implementation Plan for restoring degraded areas

Stakeholder Involvements

- AITI – Signing in April 2019
- DST - Internet connectivity
  - DST have agreed to sponsor for connectivity VIA sim.
  - Sign 28th August 2019
- ANIAN – LoRA Gateway & knowledge transfer
  - Sign MOU with ANIAN –LORA
  - 26th September 2019

BDMD Brunei Darussalam Meteorological Department

MINISTRY OF PRIMARY RESOURCES AND TOURISM BRUNEI DARUSSALAM

ASEAN IVO

NICT National Institute of Information and Communications Technology

Wetlands INTERNATIONAL

SMART Singapore-MIT Alliance for Research and Technology

List of Publications:

Peatlands Monitoring in Malaysia with IoT Systems: Preliminary Experimental Results (CIIS 2020)
IoT Initiative in Malaysia for Forest Fire Monitoring, (INTROPica Highlights)

International Conference on Computational Intelligence in Information System
CIIS 2018: Computational Intelligence in Information Systems pp 157-167 | Cite as

Towards Developing a Peatland Fire Prevention System for Brunei Darussalam

Authors | Authors and affiliations

Nurul Wardah Haji Hamzah, Siti Aisyah Haji Jalil, Wida Susanty Haji Suhaili

Conference paper
First Online: 18 October 2018

221 Downloads

Part of the Advances in Intelligent Systems and Computing book series (AISC, volume 888)

Conference Paper

IoT-Based Environmental Monitoring System for Brunei Peat Swamp Forest

September 2020
DOI:10.1109/ICOSICA49951.2020.9243279
Conference: 2020 International Conference on Computer Science and Its Application in Agriculture (ICOSICA)

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IOP Conference Series: Earth and Environmental Science

PAPER • OPEN ACCESS

Opportunities in using visual IOT in the mitigation for peatland area

W S Suhaili[1], Y Yusop[1] and A T Wan[1]

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Citation W S Suhaili *et al* 2020 *IOP Conf. Ser.: Earth Environ. Sci.* **479** 012040
DOI 10.1088/1755-1315/479/1/012040

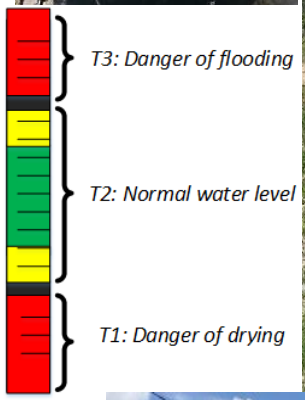
POC using Camera to capture image using number line indicator: Experiment & Results from camera in terms binary image. Some Issues to ponder

Requirements of Visual IOT

- Camera
- Data consumption
- Power consumption
- Connectivity
- Image processing

Capture image when required

Additional sensors to allow action triggered so image can be captured

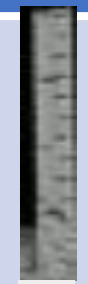
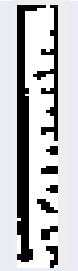
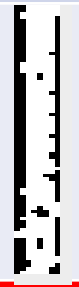


Issues with Visual IOT

- Need to consider [1]
  - Advanced video transmission technology
  - Information extraction from images by
  - image recognition techniques
  - Consideration for privacy issues are important
- Design Factors need to look at [2]

  Low cost, High quality, Mobility, Security, Intelligence and Durable
- Disaster Mitigation [3]

  Volcano monitoring, River monitoring, Land slide monitoring, Metropolitan Monitoring

Distance (meter)	3	5	10	15	20	25	30
Original images							
Thresh binary images							
Visibility of staff gauge	ACCEPTABLE					NOT ACCEPTABLE	
Visibility of line markers	ACCEPTABLE			NOT ACCEPTABLE			
Visibility of characters	ACCEPTABLE	NOT ACCEPTABLE					

Visual IOT: Architectural Challenges and Opportunities; towards a self-learning and energy neutral IoT. DOI:10.1109/MM.2016.96 (Ravi Iyer and Emre Ozer,2016)

Design and Development of Real-time video transmission system using Visual IoT device. Proc. 12thMultidisciplinary International Conference on Artificial Intelligence (MIWAI 2018) K.T Murata et al, 2018)

Ken Murata and Team, from Visual Lab, NICT Japan

Climate Change

How do we mitigate the impacts of climate change and build resilient?

Conclusion

- Visual IoT can be used to combat climate change and build resilient
- Good opportunity to adopt visual IOT in mitigating of peatland disaster
- React quickly to any incident – form early type of warning system
- Rooms for improvement and good research scope for the betterment of the mitigation system
- Other IOT sensor parameters are used to verify the water level and confirm image capture
- Triggered mechanism required for all system to be integrated as one

Visual IoT concerns for any disaster monitoring deployment

- Storage requirements
- The kind of camera – night vision, infra-red, out door lenses
- Outdoor environment
- Placement of camera
- Image processing

Can be used in disaster management area.

- With real time notification and dashboard, end users are able to monitor remotely for both situation low and high
  - Low : Fire
  - High: Flood,

Visual IoT concerns for Peatland area Deployment

- Distance depends on the kind of camera used
- Position of the staff gauge within or outside
  - To determine the threshold for the water level
- Tipping bucket – used to wake up camera
- Junction box
  - Ants repellent, ants nor rats
  - Heat generated – reflection paint
- Image transfer require 3G connection
- Solar panel for real deployment
- Triangulation of data
- Image processing