FOREST
CARBON

Sustainability
Tech

Data-Driven Landscape Management
IoT Sensor Case Study

PROBLEM OVERVIEW

Indonesia's peatland areas at risk

UNMANAGED AREAS NEED MONITORING

- Dry, degraded peatland forest areas can easily catch fire

- Fires can burn for weeks underground and are hard to extinguish

- Sumatra and Kalimantan hold an estimated **13 million ha** of peatland

- **Over 20%** is unmanaged, degraded landscape

- BRG has identified "priority areas" and has begun long-term restoration activities

- However, an immediate solution is needed to reduce risk to these areas during the coming 2020 fire season
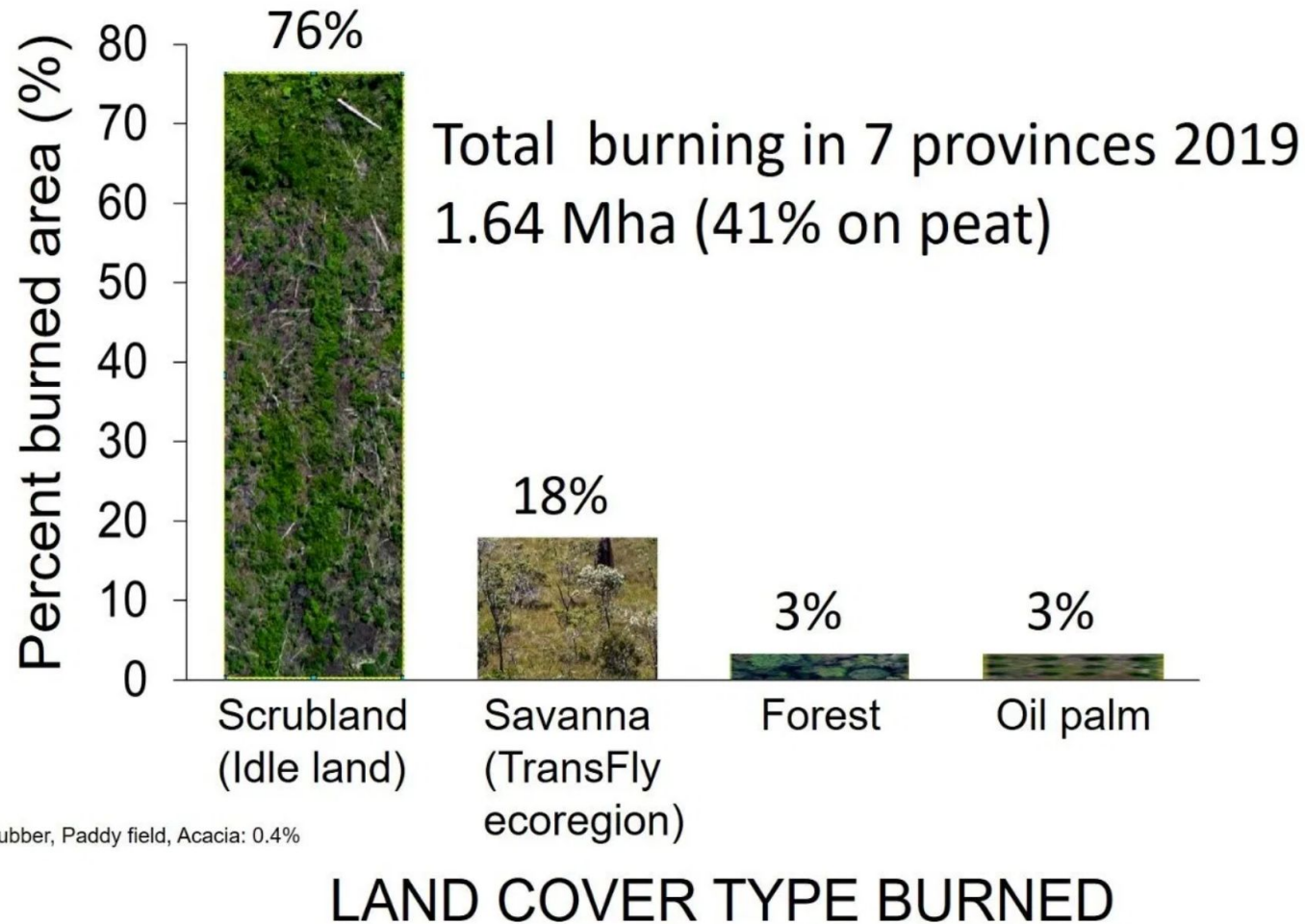
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PEATLAND FIRES ACCELERATE CLIMATE CHANGE

More than 5,000 fires spread across Indonesia in 2019, causing a regional haze crisis and accelerating climate change.

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LANDSCAPES ARE AT RISK

Indonesia 2019 Fires

- Caused $5.2 billion in economic losses

- Burned 942,000 hectares

- Caused GhG emissions double that of the Amazon fires in the same year

- 900,000 people reported respiratory illnesses due to haze in the region.

- Source (World Bank)

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PEATLAND FIRES ACCELERATE CLIMATE CHANGE

Total burning in 7 provinces 2019
1.64 Mha (41% on peat)

Percent burned area (%) — LAND COVER TYPE BURNED

- Scrubland (Idle land): 76%
- Savanna (TransFly ecoregion): 18%
- Forest: 3%
- Oil palm: 3%

Rubber, Paddy field, Acacia: 0.4%

- Of the areas burned in 2019 a 76% were on unmanaged peat or scrubland cleared for industrial purposes

- Many of these ecosystems still have high conservation values, and potential for long-term restoration

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CASE STUDY

Better data can prevent fires

before they occur

# CASE STUDY – SUMATRA MERANG PEATLAND PROJECT

- Fire risk in the landscape is high
- 23,000 ha peatland restoration area is hard to access on foot
- Carbon offset production reliant on water table measurements

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CASE STUDY – SUMATRA MERANG PEATLAND PROJECT

- SMPP initially tested **20 sensors** in 2019

- The project will deploy **70 additional** sensors in 2020

- Sustainability Tech sensors connect to an **IoT sensor hub**

- Water table sensors monitor peat hydrology **in real time**

- R&D funding from **Winrock and Packard foundation** refined hardware design across two sites in Kalimantan

- Sustainability Tech continues product R&D, for testing and deployment in **new Forest Carbon projects**

CASE STUDY – IOT SENSORS PROVIDE ACTIONABLE DATA
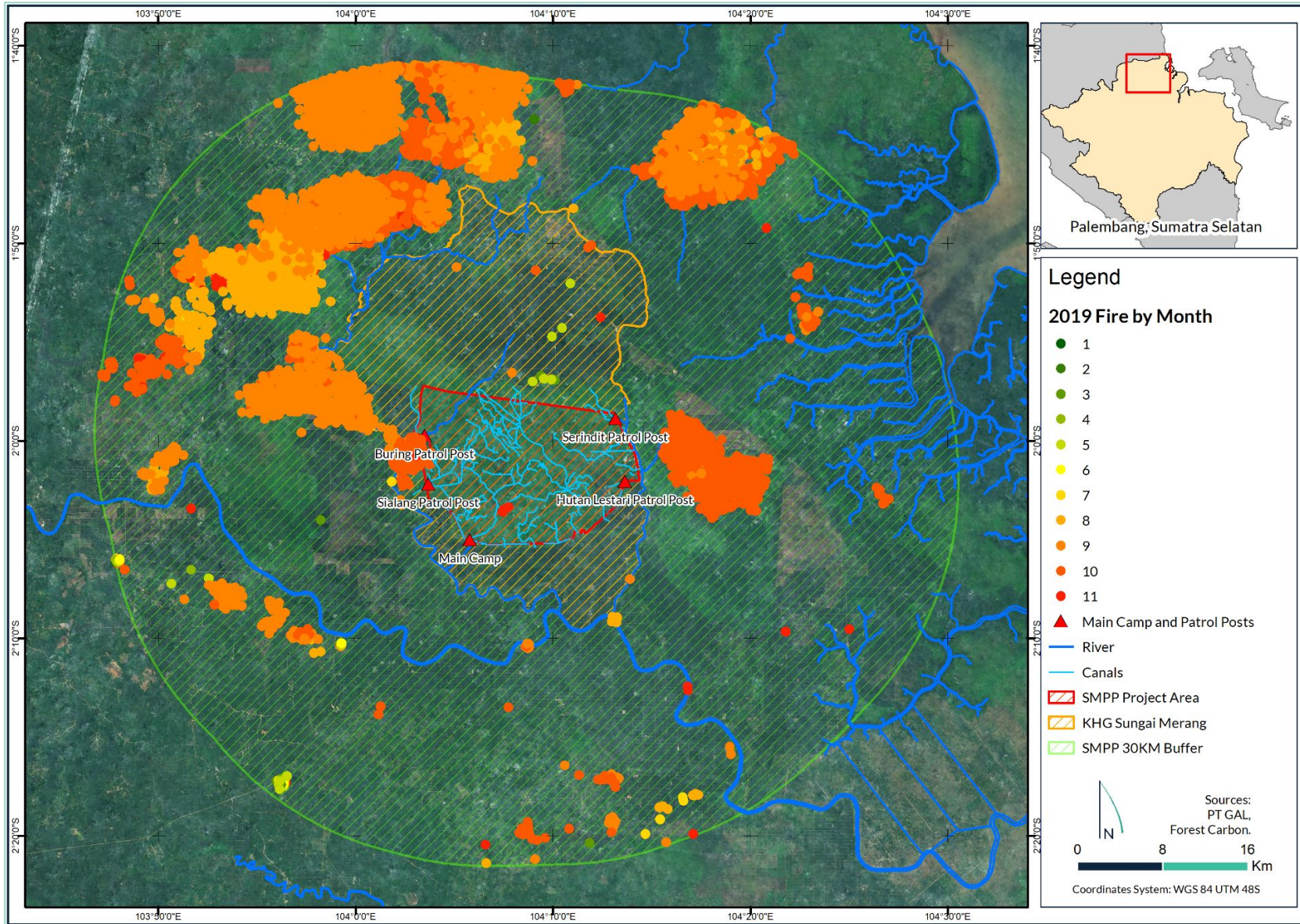
Mitigating fire risk:

- 1,968 hotspots were detected within 30km of SMPP in 2019

- IoT sensors provide real-time data on water table levels

- Areas with low water levels present the highest fire risk

CASE STUDY – IOT SENSORS PROVIDE ACTIONABLE DATA
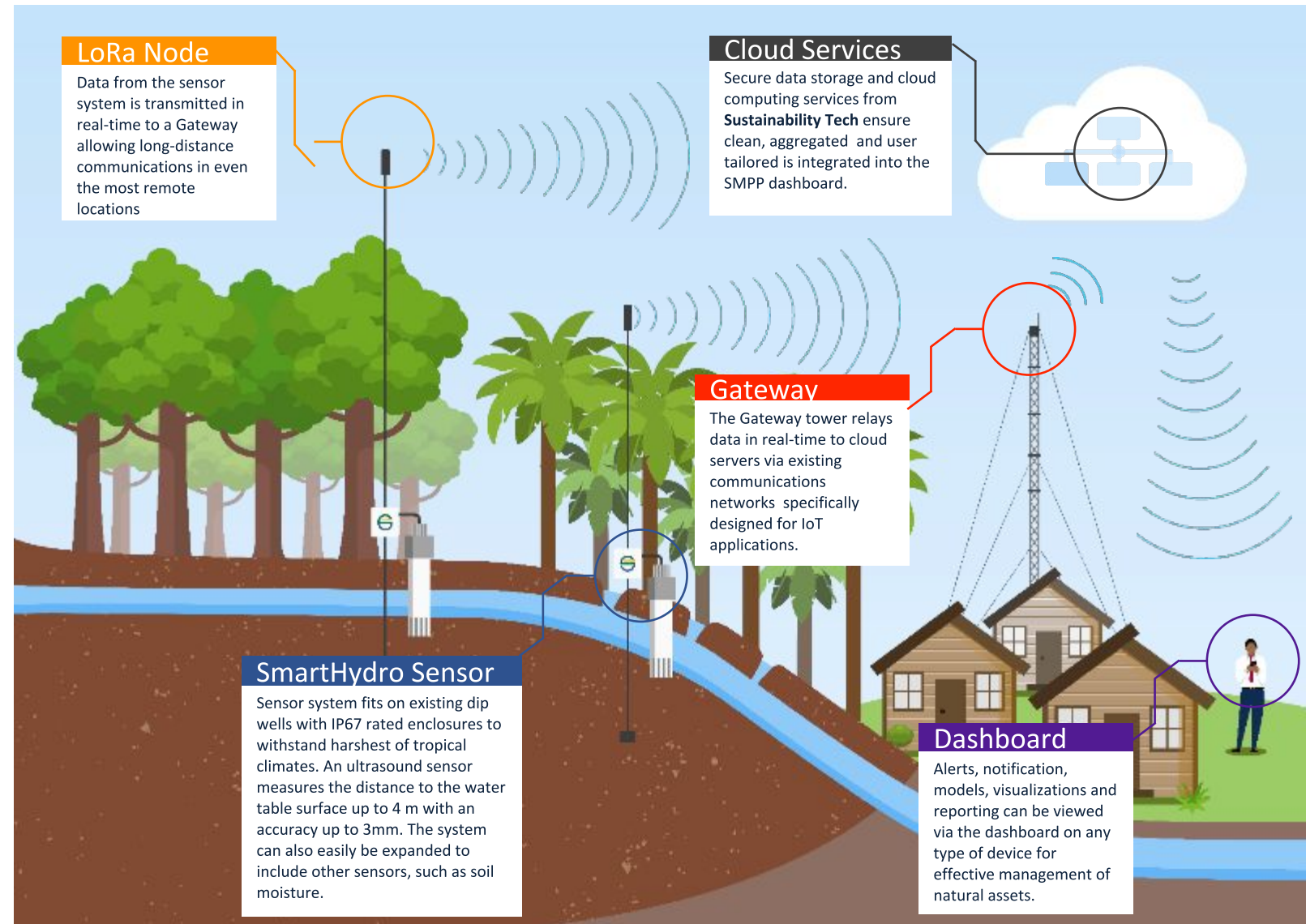

Mitigating business risk

- Data on water levels are required to verify emissions reductions

- IoT sensors record this information more reliably, in real time

Improving project design

- Hydrology model guides placement of peat compaction dams

- Sensors refine the project hydrology model

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Sustainability Tech Hardware

IoT Sensor Hub:

- Water level data uploaded via central gateway
- Other sensors can be added the proprietary IoT hub
- Mobile and email alerts for fire risk

LoRa Node
Data from the sensor system is transmitted in real-time to a Gateway allowing long-distance communications in even the most remote locations

Cloud Services
Secure data storage and cloud computing services from **Sustainability Tech** ensure clean, aggregated and user tailored is integrated into the SMPP dashboard.

Gateway
The Gateway tower relays data in real-time to cloud servers via existing communications networks specifically designed for IoT applications.

SmartHydro Sensor
Sensor system fits on existing dip wells with IP67 rated enclosures to withstand harshest of tropical climates. An ultrasound sensor measures the distance to the water table surface up to 4 m with an accuracy up to 3mm. The system can also easily be expanded to include other sensors, such as soil moisture.

Dashboard
Alerts, notification, models, visualizations and reporting can be viewed via the dashboard on any type of device for effective management of natural assets.

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Hardware

Hardware Overview:

- Sensor hub supports four different sensor types

- Ultrasound water table sensor is accurate to 2mm

- Up to 3-year battery life on standard AA batteries

- Data sent via long-range WiFi or Satellite

- Heavy duty enclosure for harsh environments, rated IP-67 waterproof

- Small form factor (10cm x 10cm x 4cm)

Works together with smoke detection cameras to manage and prevent forest fires

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DASHBOARD

Landscape monitoring data, accessible

from the cloud

Integrated project dashboard
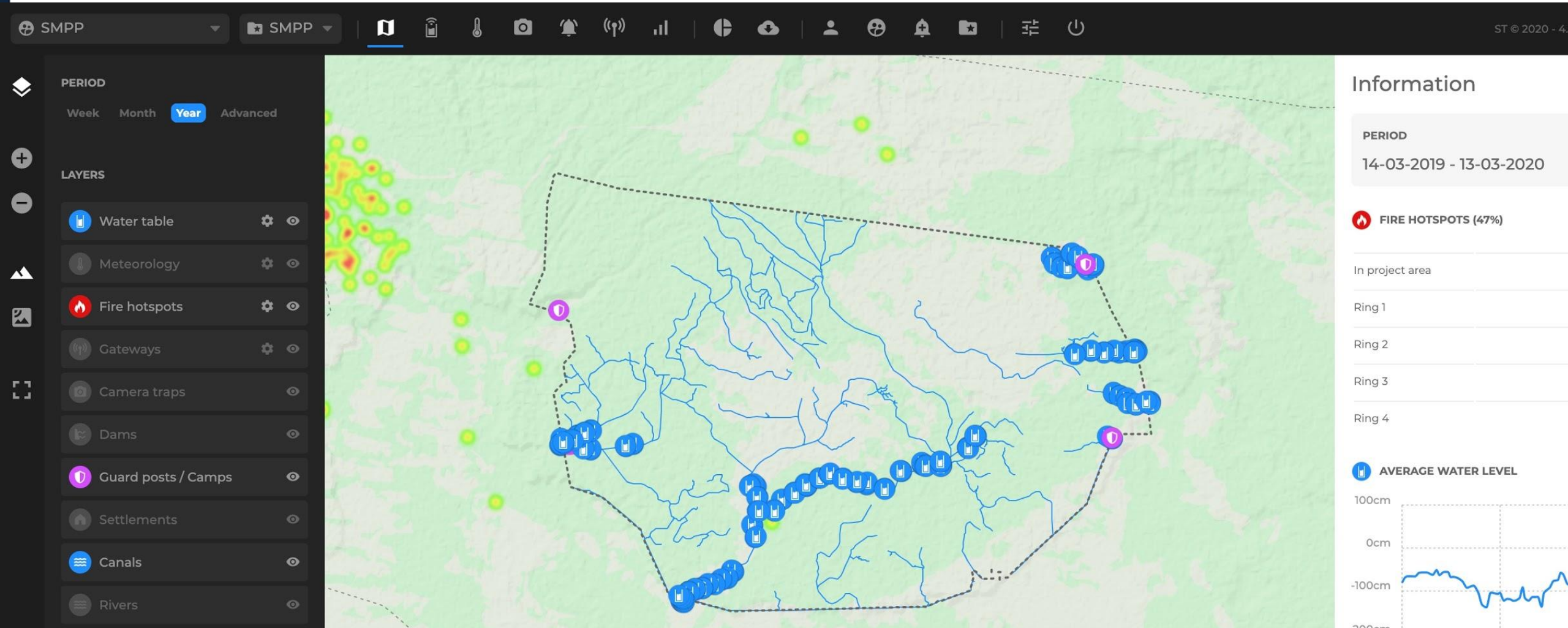
Satellite or topo map layers contextualize project

Custom layers show dams, patrol posts, sensor hubs, surrounding conservation areas and more

Updates from each sensor in the dashboard occur hourly

Sustainability Tech Dashboard

SMPP — ST © 2020 - 4.3.10

SELECT END DATE

17-03-2020

LAYERS

- Water table
- Meteorology
- Fire hotspots
- Gateways
- Camera traps
- Dams
- Guard posts / Camps
- Settlements
- Canals

Gelam Station ConocoPhillips
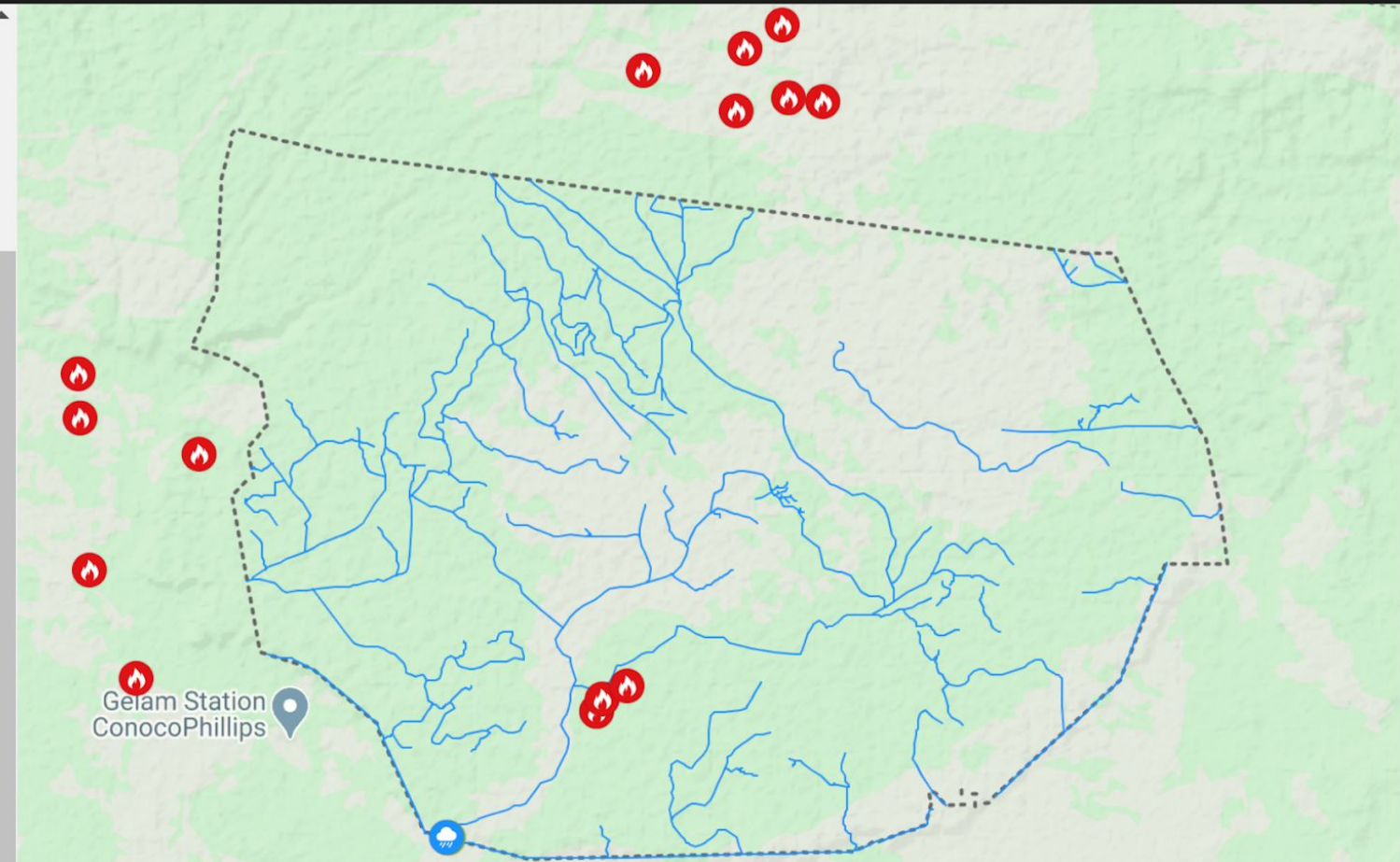
Information

PERIOD

01-03-2019 - 17-03-2020

FIRE HOTSPOTS (0%)

In project area	3
Ring 1	132
Ring 2	456
Ring 3	443
Ring 4	261

AVERAGE WATER LEVEL

100cm

0cm

Integrated hotspot tracking via NASA MODIS

Overlay historical fire and rainfall data with current water levels to identify high-risk areas

Custom mobile and email alerts for hotspot detection or water level fluctuation

Sustainability Tech
Dashboard

SMPP | SMPP | ST © 2020 - 4.11.3
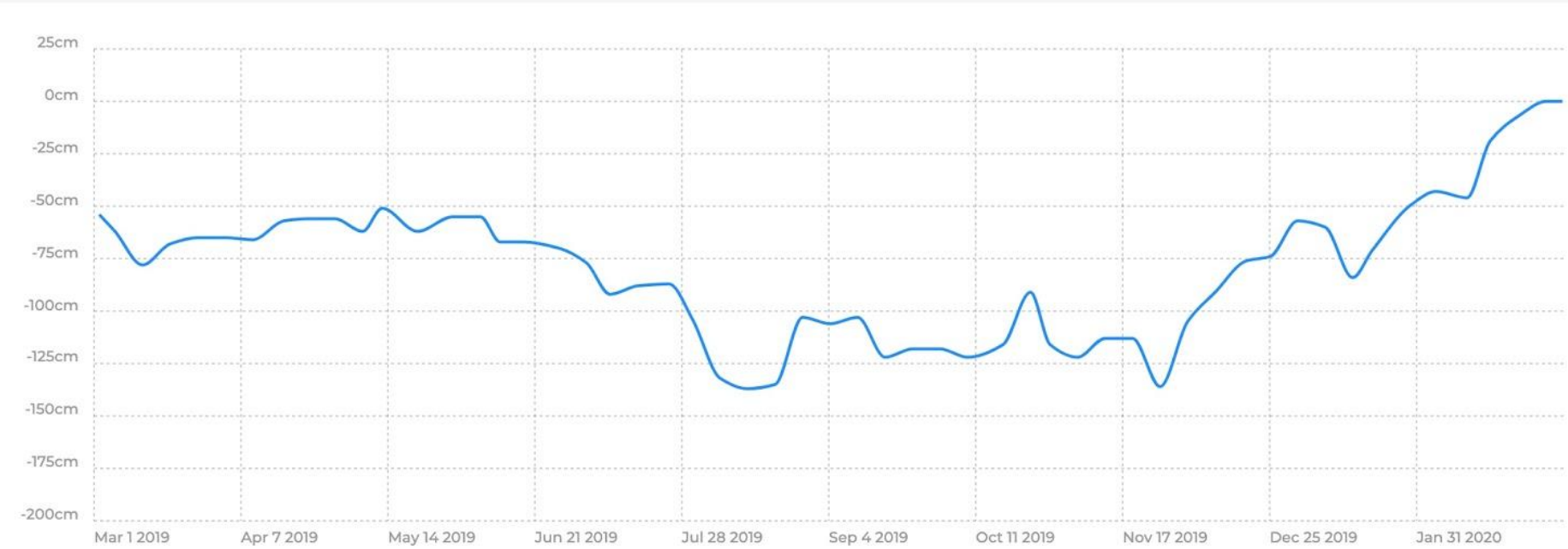
Report

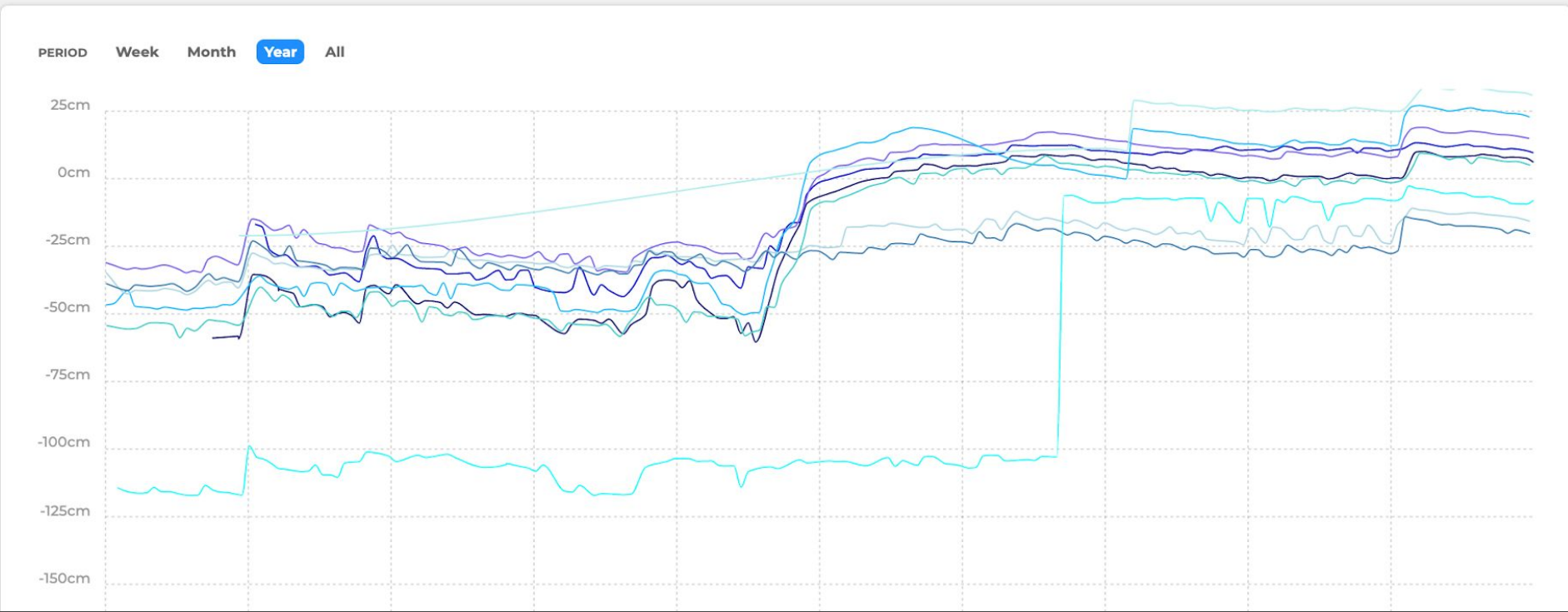Generate PDF

ORGANIZATION

SMPP

PERIOD

01-03-2019 - 09-03-2020
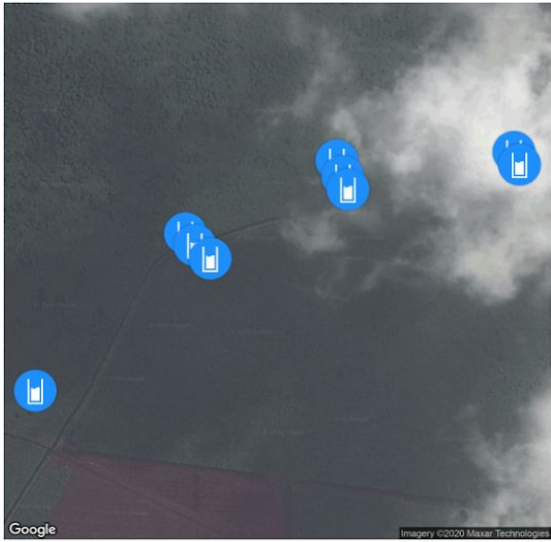
Average water level

Customizable, on demand reporting (average, weekly, monthly and annual data views)

Water level distribution and statistics for all sensors

Export to PDF or through API

Sustainability Tech
Dashboard

SMPP | SMPP | ST © 2020 - 4.11.3

Dipwells **Transects** Upload dipwells Upload measurements Upload offsets Upload transects

Select cluster [automatic ▾]

PERIOD Week Month **Year** All

25cm

0cm

-25cm

-50cm

-75cm

-100cm

-125cm

-150cm

Cluster information

Google — Imagery ©2020 Maxar Technologies

Label — Offset

Group sensors by area to correlate measurements, add existing data via simple CSV/KML/GeoJSON upload

View and configure sensor connectivity, calibration and notifications

Track if sensors are online/offline

# Sustainability Tech
Development Roadmap

Low Orbit Satellite Connections

- Better connectivity and uptime in forest cover areas
- Lower setup costs
- Ideal for hard-to access areas
- Trusted satellite network
- Comparatively affordable
- Available 2021

Soil-Powered Battery

- No chemical batteries
- 10-year battery life
- Reduces methane emissions
- Perfect for peatlands, drawing energy from water, plants and soil
- Currently beta testing
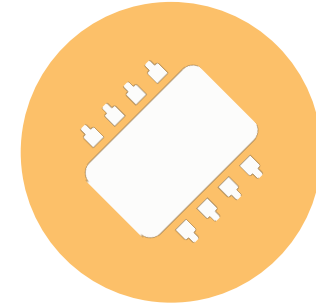
Machine Learning

- Advanced sound and image recognition enables IoT hubs to analyze data before upload and have real time tracking
- Build data model based on collected training data for IA to improve data analysis and adaptive management

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Thank You