LAND SUITABILITY EVALUATION AND MANAGEMENT FOR OIL PALM PLANTATIONS

NORDIANA ABD AZIZ; ZULKIFLI HASHIM; AHMAD AFANDI MURDI; MOHD NAJIB AHMAD; MOHAMAD IZZUDDIN ANUAR and IDRIS ABU SEMAN

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Malaysia's primary plantation crop, covering about 5.87 million hectares in 2020, generates around 18.3% of world palm oil production and exports 17.37 million tonnes of oil, accounting for approximately 34.3% of total palm oil commerce (Parveez *et al*., 2021). Malaysia's palm oil sector continues to provide a substantial contribution to the country's economic development and foreign currency gains as the world's second-largest producer and exporter of palm oil and palm oil derivatives. The oil palm industry is facing issues to enhance productivity in an era when fertile land is limited and most oil palm businesses rely on labour.

When major oil palm expansion happened in unsuitable areas, it will lead to low site yield potential (SYP), prone to environmental problems, deforestation and biodiversity loss. As the oil palm industry is having an acute shortage of manpower, implementing mechanisation also requires initial planning of site selection. The topographic of the land gives information on elevation, slope and aspects (Nordiana *et al*., 2012), of the area which is very important to implement and maintain good agricultural practices (GAP) for oil palm planting.

This information will assist farmers in determining appropriate regions for oil palm planting and avoid the unsuitable region. It was previously established that elevations greater than 200 m above mean sea level (MSL) is not advised for oil palm planting due to the potential for reduced growth and production. While slope data can assist in determining the risk for soil erosion, oil palm trees should not be planted on slopes more than 25°. Planting oil palm on a slope of 20°-24° requires stable terraces and platforms and increased harvesting costs (Nordiana *et al*., 2013).

The identification of suitable areas at preliminary site selection for oil palm using digital and spatial data will help the decision-making process through visualisation and evaluation of the area.

In the era of digitalisation, the oil palm industry must not be left behind in the use of digital technology for sustainable planting. To boost the climate resilience and increase productivity, promoting good agriculture practice (GAP) is not enough. There should be smart guidance from the beginning, strategic/careful site selection and proper planning as well as development to enhance the implementation and adaptation of new technology in mechanisation and precision agriculture. This will reduce the expansion issues and promote sustainable oil palm plantations.

DIGITAL AGRICULTURE

Digital agriculture uses digital technology to connect modern technologies to achieve sustainable development. The technology can help smallholders to get agronomic advice, be more productive, make better decisions, reduce their environmental footprints, and elevate output and productivity. Based on the available data, digital advisory supported by Geographic Information Systems (GIS), remote sensing and geolocation can complement traditional advisory services to give scaled solutions. Spatial information can give a wealth of data that can be used to influence future agriculture sector goals and decisions on crop fit and adaptation. This technology enables the utilisation of remotely sensed data for assessment, planning, simulation and visualisation. Remote sensing imaging has allowed images and other raster formats to record geographic data at ever-increasing scales and better resolutions. Since the development of the Oil Palm Resource Information System (OPRIS) (Nordiana *et al*., 2008), more spatial and digital data has been added and more applications can be expanded (*Figures 1* and *2*).

THE SERVICE

The latest digital data comprises spatial data which includes services as follows:

- Identification of the best area for oil palm planting.

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Head of Corporate Implementation and Consultancy Unit, Malaysian Palm Oil Board. 6, Persiaran Institusi, Bandar Baru Bangi, 43000 Kajang, Selangor, Malaysia.
Tel: 03-8769 4574 Fax: 03-8926 1337 E-mail: tot@mpob.gov.my Website: www.mpob.gov.my

- Determination of site yield potential (SYP).
- Provide new soil profile data based on new soil class.
- Provide a detailed peat depth profile and ecosystem characteristics.
- Provide information on the elevation and slope.
- Identification of buffer of river networks and forest area.
- Provide maps database of the plantation block.
- Various digital and spatial data for reference.
- New applications and services can be developed, supplied and implemented.

BENEFITS AND ADVANTAGE

Choose the best area for oil palm planting to gain more yield and improve productivity. The service will help to reduce the environmental impacts and conserve natural flora and fauna habitats. This will support the implementation of mechanisation in oil palm plantations and the provision of the Malaysian Sustainable Palm Oil (MSPO) certification campaign.

ECONOMIC ANALYSIS

Eliminate unnecessary costs and problems that arise due to wrong decisions during preliminary

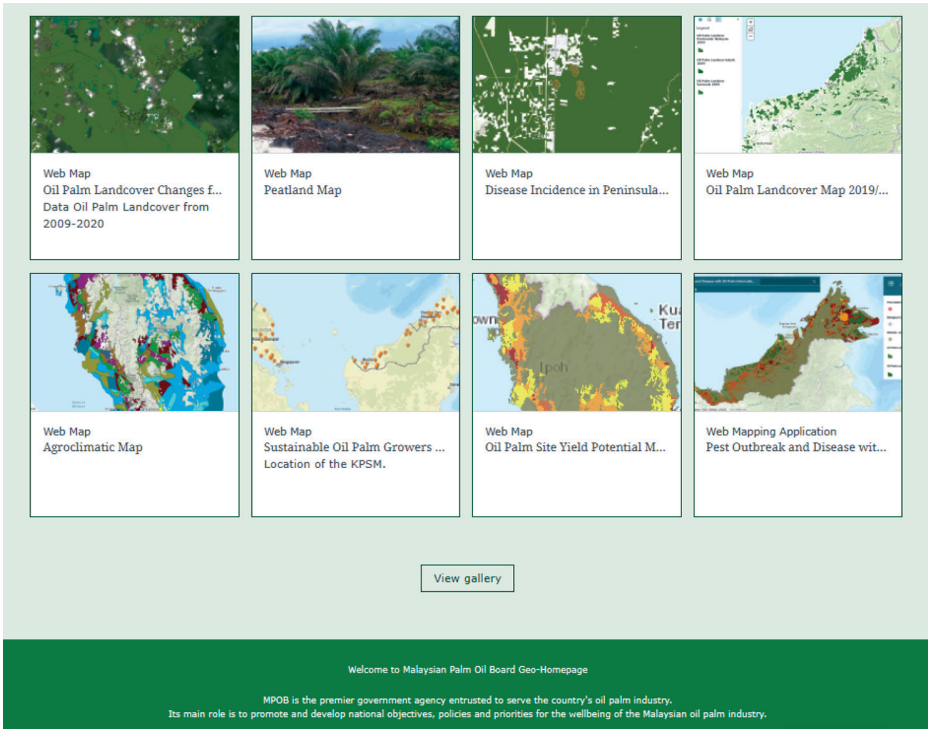

Figure 1. Digital spatial database.

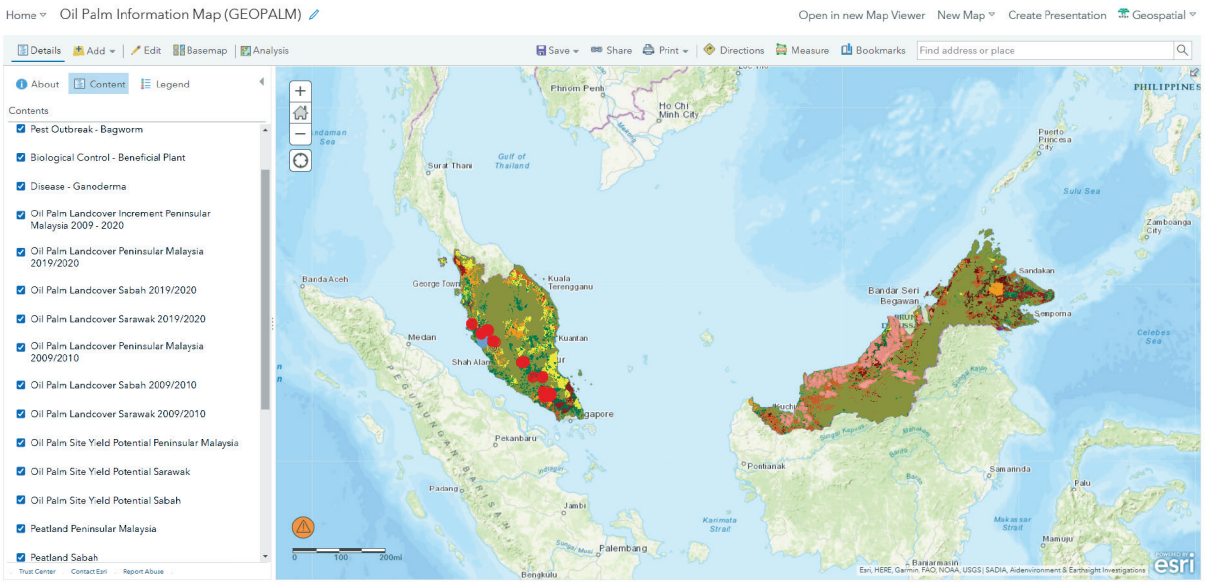

Figure 2. Spatial data for the service.

site determination. Planting oil palms on a manageable terrace will reduce harvesting difficulties and avoid workers from changing their job as well as maintaining worker's health quality. This will give a good image to the oil palm industry.

CONCLUSION

Digital data for preliminary site identification will help the growth of the oil palm industry towards sustainable oil palm plantations. The opening of new peatland and encroachment of forest areas can be avoided.

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For more information, kindly contact:

Head of Corporate Implementation
and Consultancy Unit, MPOB
6, Persiaran Institusi, Bandar Baru Bangi,
43000 Kajang, Selangor, Malaysia
Tel: 03-8769 4574
Fax: 03-8926 1337
E-mail: tot@mpob.gov.my
www.mpob.gov.my