

THE INTERNATIONAL MEETING ON LAND COVER AND LAND USE CHANGES 2019

Doubletree Hilton Hotel, Johor Bharu
22 JULY 2019



DEPARTMENT OF
AGRICULTURE
MALAYSIA

GEOSPATIAL TECHNOLOGY IN AGRICULTURAL APPLICATION IN MALAYSIA

Presented by
ISMAIL BIN HASHIM
Deputy Director
Land Resource Management Division
DEPARTMENT OF AGRICULTURE
MALAYSIA



CONTENTS



INTRODUCTION



GEOSPATIAL APPLICATION AND CHALLENGES



**UPDATING LANDUSE CHANGES ON
AGRICULTURE**



CURRENT GEOSPATIAL PRODUCT



WAY FORWARD



CONCLUSION



INTRODUCTION



VISION

Towards the creation of a competitive agriculture industry producing quality products which are safe and environmental friendly, and export-oriented.

MISION

Provide quality and efficient services to agricultural entrepreneurs through the application of advance technologies and agricultural regulatory services to boost production capability and ensure the safety of the country's agriculture sector



Agriculture Industry Overview

- ▶ Total land area - 33 million ha.
- ▶ Agricultural area - 6.6 million ha
(20% of total area)
- ▶ Industrial crops - Oil palm, rubber, cocoa, tobacco and pepper
(Occupy about 77% of total agricultural land)
- ▶ Horticultural crops - Paddy, fruits, vegetables & coconut
(Occupy 16% of total agricultural land)

Farmers' Profile

Total Number of Farmers : approximately 1 million *

Paddy : ± 400,000

Horticultural crop : ± 200,000 (Fruits, vegetables, floriculture)

Industrial Crops : ± 750,000 (Rubber, oil palm)

Other Crops : ± 50,000

* Some farmers are involved in more than 1 crop

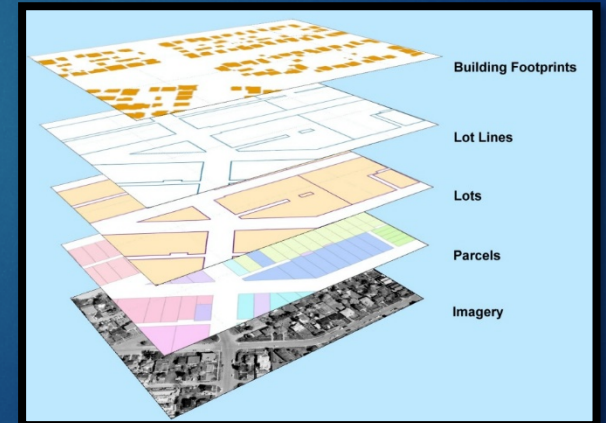
Malaysian Agricultural and Agro-based Industries Scenario

- ▶ Agriculture as the 3rd engine of national economic growth
 - ▶ Transform agriculture sector to be more dynamic and competitive
 - ▶ Main objectives:
 - ▶ To ensure that all aspects of supply chain management is evenly covered
 - ▶ Improved Quality and Food Safety
 - ▶ Worker Health and Safety
 - ▶ Environment
 - ▶ Sustainability
- Aim:
- To increase economic contribution for farmers and nation
 - To alleviate the national's dependence on imported foodstuff

11th Malaysia Plan

Modernisation of Agriculture Sector

- ▶ Strengthening national capacity to facilitate monitoring, analysis and interpretation of agriculture and natural resources information combined with information generated from remote sensing for sustainable agricultural land use planning and management.
- ▶ Sustainable agriculture development depends on correct planning, decision and management
- ▶ Soil resource and land use information have significant impact on successful agriculture planning and decisions
- ▶ With tools offered in GIS, an inventory of soil and land use information was established and help catalyze the transformation of data towards a better decision making and effective management



11th MP – GEOSPATIAL PROJECT





GEOSPATIAL APPLICATION



Overview Geospatial Application in Department of Agriculture

Currently DOA applied geospatial technology on listing project :

1. Development of National Food Crops Inventory Database by Cadastral Lot
2. Soil Geoinformation Project
3. Soil Profiling/MakGeo Project
4. Idle Land Development Project
5. Fruit Cluster
6. Vegetables Geospatial Project
7. Agriculture Rainfall Index (ARI)
8. Tube well Project
9. Business matching (farm to table)
10. Durian Traceability Project

SOIL SURVEY

LAND USE
MAPPING

TRACEABILITY

PRECISION
FARMING

SOIL PROFILING

PEST AND
DISEASE
FORECASTING

UAV
IMAGERY

YIELD
FORECASTING

History of Geospatial Application in DOA

1966

Arial Photo

- ❑ Scale 1:10,000
- ❑ Colombo Canadian Programme

Landuse 1966

National Planning Development Task Force

- ❑ Soil Capability Classification
- ❑ Natural Resources Inventory Programme
- ❑ First Malaysian Plan(1966 – 1970)

AGRICULTURE MONITORING USING GEOSPATIAL TECHNOLOGY

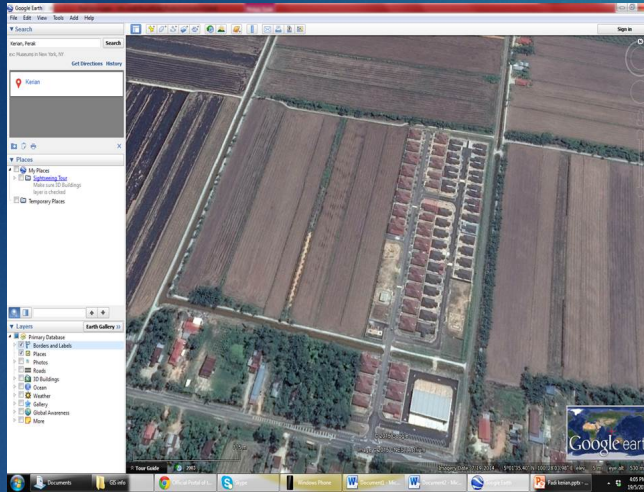
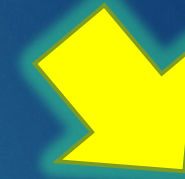
- ▶ Geospatial Technology provides direct information on indicators of production (cultivated area and yield).
- ▶ Agricultural parameters such as soil moisture, soil type, crop stage, crop vigor, crop type are vital for effective agricultural monitoring.
- ▶ Multi-temporal images for crop forecasting/estimation.
- ▶ Using Spatial and spectral resolution to improve agricultural monitoring.

MONITORING CROP PRODUCTION

Global systems to monitor and assess production are important decision making tool to:

- ▶ Provide timely information on crop production and yield in a standardized and regular fashion at the regional to global level.
- ▶ Provide estimates as early as possible during the growing season(s) and update the estimates periodically through the season until harvest.

CHALLENGES



Changes of Crop Area into Others Landuse e.g Fishing Ponds and Housing Complex



Large volume of data being stored in heavy documentation (non-spatial)

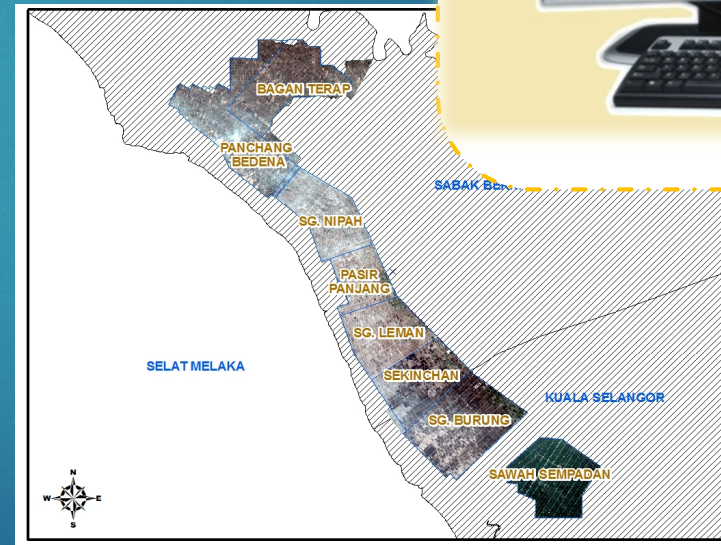
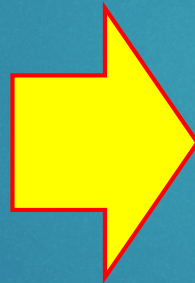


Conventional method- manpower for field activity monitoring

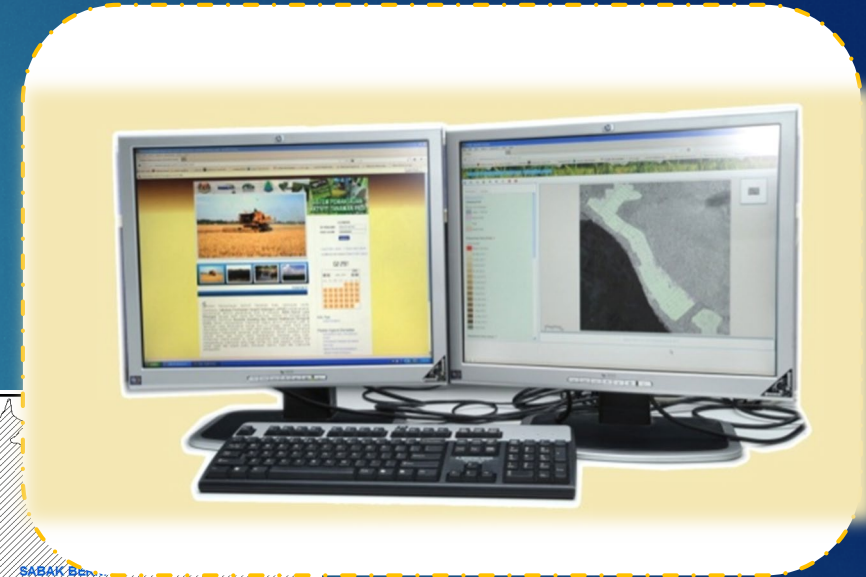
UPGRADE DATA KEEPING



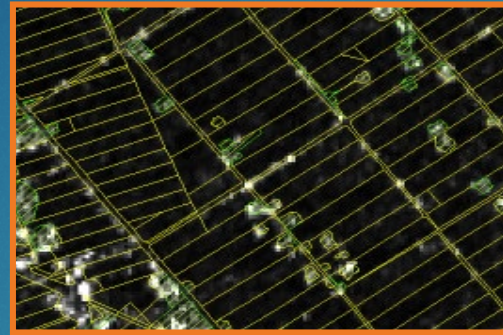
Non spatial



Spatial



EFFICIENT MONITORING



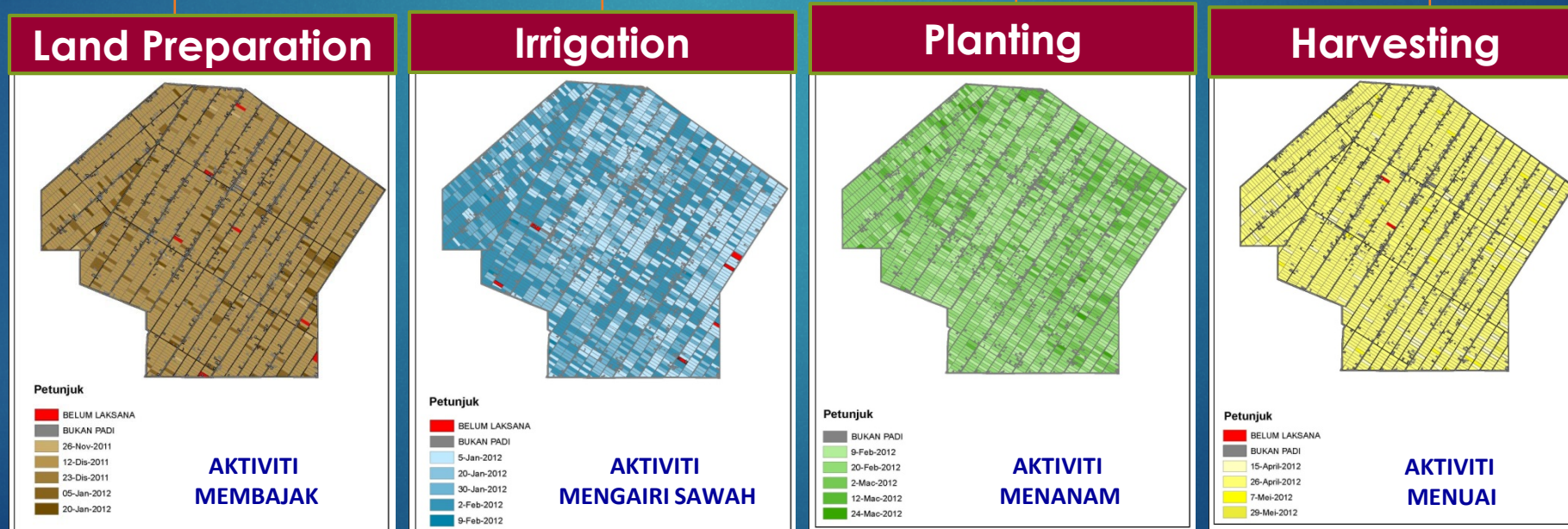
RADARSAT 2



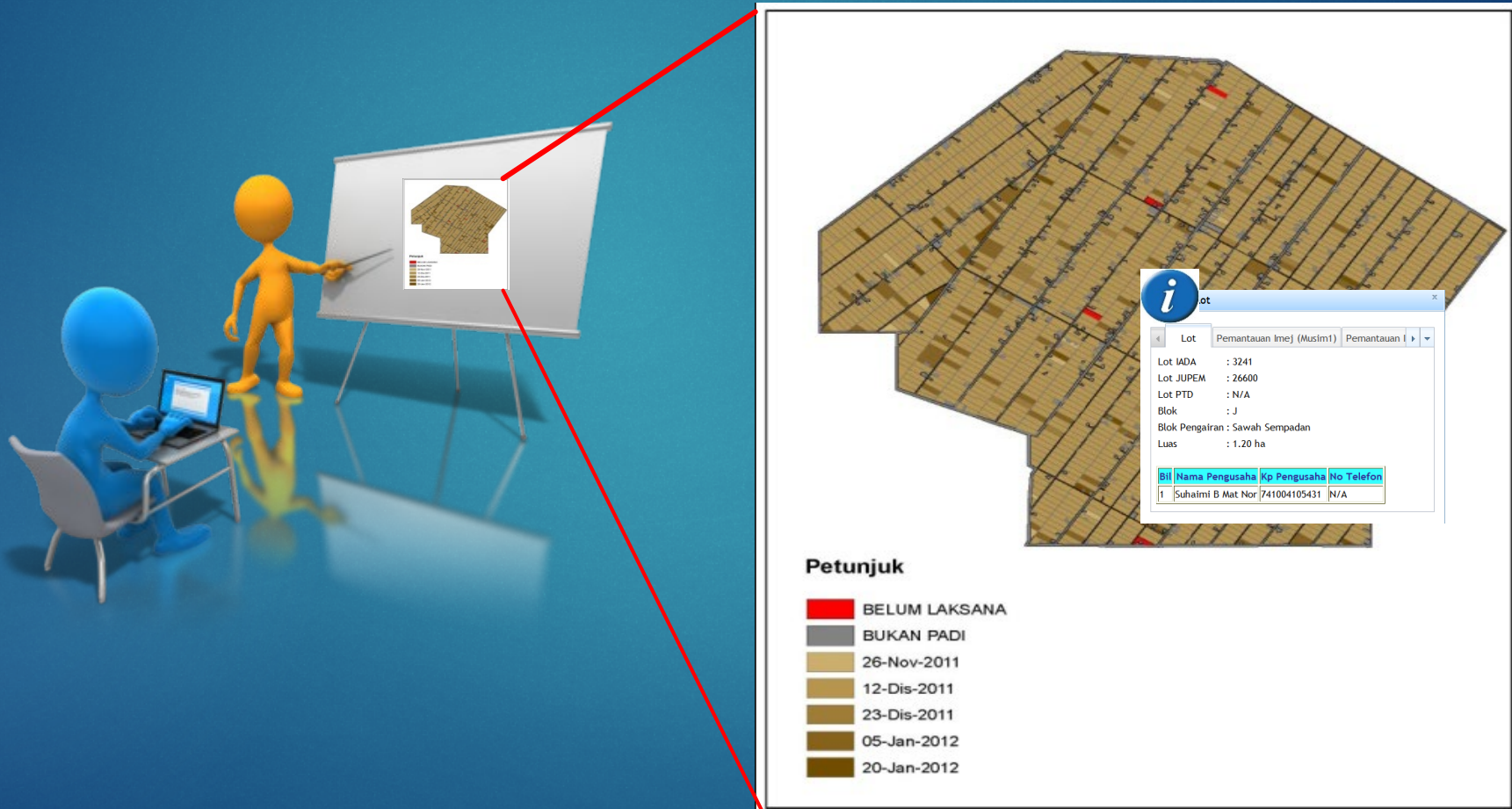
IMAGE PROCESSING



DIGITAL INFORMATION EXTRACTION & ANALYSIS



Geospatial information helps the field officers to detect any irregularities in implementation without site-visit



GEOSPATIAL SYSTEM

- ▶ MakGeo Padi
- ▶ GeoTanih
- ▶ GeoTanaman



KOSMOS ISHIN 26 DISEMBER 2016

K2 27
VARIA

MakGeo Padi urus data tanaman padi

Hab Pertanian
Oleh Datuk Ahmad Zakaria Muhammad Salleh
Penasihat Kanan
JABATAN PERTANIAN

PENGURUSAN data padi era ini menjadi lebih mencabar meskipun ia sebenarnya lebih mudah dengan kemajuan teknologi maklumat dan komunikasi (ICT). Pengurusan data membekalkan kita memproses dan menganalisis data yang sangat banyak serta boleh diakses dengan cepat dalam pelbagai variasi atau format.

Menyusuli cabaran ini, Jabatan Pertanian telah membangunkan sistem pengurusan maklumat penanaman padi yang menggabungkan kekhawatiran sebarang penerbit, profil pengasah, maklumat aktiviti perikanan di lapangan dan keperluan pengiraan setiap lot. Ia juga boleh diperluaskan kepada maklumat yang lebih banyak seperti penanaman hasil padi, jumlah inisiatif input yang diterima dan penggunaan baja.

Semua maklumat yang digunakan di atas dapat disediakan bagi setiap lot sawah yang boleh diujikaji dalam paparan antara digital dan mempunyai lokasi geografi yang tepat.

Sistem ini adalah Sistem Maklumat Geospasial Padi (MakGeo Padi) yang merupakan projek usaha sama antara Jabatan Pertanian dengan Agensi Remota Sensing Malaysia bagi menyediakan satu pangkalan data geospasial bersepadu tanaman padi di Semenanjung Malaysia.

Manfaat

Sistem ini juga dapat mengawal status perubahan semasa kawasan padi kepada lain-lain seperti ramah dan jalan secara terperinci dan lebih efisien. Selain itu, ia memberi gambaran dan maklumat yang lebih jelas dalam menentukan kawasan sebarang penerbit aktif semasa bagi membuat anggaran hasil yang lebih tepat.

Di samping itu, sistem ini dapat mengurangkan keperluan verifikasi setiap lot secara terperinci di lapangan dan proses penanaman juga boleh dilakukan oleh pegawai dari luar pejabat.

Paparan data padi juga adalah lebih sistematik dan efisien serta memudahkan perubahan data-data padi kerana data ditunggang secara digital dan online.

Sistem ini mempunyai liputan dan signifikan yang tinggi kepada pengurusan kawasan jelang padi.

Ia dapat meningkatkan kualiti dari segi pengurusan data untuk kawasan jelang padi dan hasil jelang padi dan berupaya memajukan laporan mengikut masa sebenar secara online bagi jelang padi kawasan padi dan bukaan padi bagi setiap lot kawasan padi menggunakan teknologi GIS dan Remote Sensing.

PANGKALAN data geospasial bersepadu tanaman padi memudahkan Jabatan Pertanian mengurus dan memantau secara sistematik.

Sistem yang berteknologi tinggi ini dibangunkan dengan gabungan teknologi (Sistem Maklumat Geografi) GIS, remote sensing dan ICT bagi membekalkan Jabatan Pertanian mengurus dan memantau tanaman padi dengan tepat, memelihara serta sistematik.

Pangai masa

Teknologi ini dipertingkatkan di Malaysia Agricultural Innovation Show (MAgIS) sempena Pameran Pertanian, HertiKultur dan Pemasangan (MAHA) 2016 dan berupaya memonitoring input masa.

Pembangunan Sistem MakGeo Padi ini dimulakan di Projek Pembangunan Pertanian Bersepadu (IADA) Harau Laut Selangor pada tahun 2012 dan diperluaskan ke tahap jelang padi utama Semenanjung Malaysia iaitu Lembaga Kemajuan Pertanian Mada, Lembaga Kemajuan Pertanian

Kemula, IADA Krian, IADA Seberang Perak, IADA Kemuning Senarak, IADA Palas Pinang dan IADA Kertau.

Pada tahun 2014, projek ini telah diperluaskan lagi ke kawasan padi luar jelang di Semenanjung Malaysia.

Kemudahan utama sistem ini adalah pangkalan data tanaman padi yang mengandungi maklumat sempadan kawasan dan rangka lot padi, kawasan sebarang penerbit, hasil dan profil pengasah serta status setiap aktiviti utama padi di lapangan iaitu penanaman, pengiraan, penanaman dan pemanisan.

Data yang digunakan dalam sistem ini ialah data satelit Remote dan Optical yang berupaya mengumpul maklumat penanaman padi walaupun dalam keadaan cuaca gelap, mendung dan hujan serta merangkumi kawasan yang luas.

Sistem ini mampu memantau kawasan padi aktif dengan lebih tepat, cepat dan efisien. Dengan menggunakan kelebihan teknologi GIS dan remote sensing, maklumat maklumat berkaitan status aktiviti penanaman padi di lapangan mampu disediakan dan boleh dikemukakan setiap dua minggu sekali.

Tujuan sistem ini dibina adalah untuk memudahkan kawasan penerbit aktif semasa dengan lebih tepat, dapat memantau

status empat aktiviti utama padi di lapangan di samping meningkatkan kecekapan penyediaan data-data padi secara bersepadu dan online.

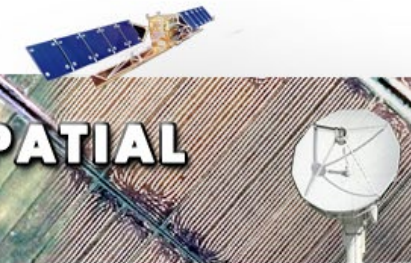
SISTEM ini dapat memantau kawasan tanaman padi dengan lebih tepat, cepat dan efisien.

GAMBAR rajah menunjukkan pengiraan padi dan bukaan padi mengikut lot individu.

* Kolum Hab Pertanian yang diterbitkan dalam Kosmo setiap hari telah merupakan artikel sambilan Jabatan Pertanian Malaysia.

MakGeo Padi

SISTEM MAKLUMAT GEOSPATIAL TANAMAN PADI



LOG MASUK

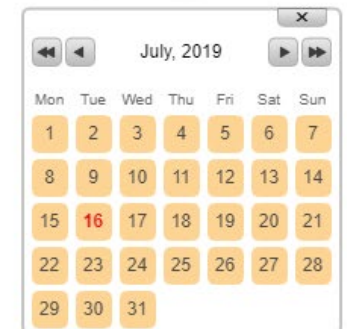
KP PENGGUNA

KATA LALUAN

HANTAR

[Lupa Kata Laluan](#) | [Tukar Kata Laluan](#)

Log Masuk Kali Pertama [Dapat Kata Laluan](#)



Bilangan Pelawat

Track Websites

Selamat Datang Ke



Menu Utama x ~Padi x +

apps2.remotesensing.gov.my/BLS/riceGIS/_gis/map2.php

Most Visited Getting Started 1. WildTangent 2. SugarSync Your Clo... 3. Norton Security Mic... Suggested Sites Web Slice Gallery

SISTEM PENGURUSAN TANAMAN PADI

Petunjuk Carian Ukuran

Lot Pengusaha

Blok Pengairan SAWAH SEMPADAN

Nama Pengusaha ABD HAMID BIN JABAR

Cari

Jumlah Lot = 2

Lot IADA	Blok	Blok Pengairan
2680	S	SAWAH SEMPADAN
2367	T	SAWAH SEMPADAN

Kad Pengenal

Luas Kawasan

Bilangan Lot

Luas Lot

Agensi Remote Sensing Malaysia © 2011

Desktop 12:44 19/05/2016

To LOCATE PADDY lot in PLANTING FIELD

By mapping the rice field area, the data is spatially enabled and it helps to locate a farmer's lot, which aids the field officers to implement extension works

Firefox - Menu Utama - ~Padi

apps2.remotesensing.gov.my/BLS/riceGIS/_gis/map2.php

SISTEM PENGURUSAN TANAMAN PADI

Petunjuk Carian

Petunjuk Peta

Jelapang Padi

Barat Laut Selangor

- Jalan / Tali Air
- Bukan Padi
- Padi
- Rezab Padi

Paparan Peta

Klik untuk memaparkan lapisan peta

Peta Asas

- Barat_Laut_Selangor

Pemantauan Imej

- Status_Pemantauan_M1
- Status_Pemantauan_M2

Imej Satelit

- Imej_Resolusi_Tinggi2
- Imej_Resolusi_Tinggi1

Informasi Lot

Lot Pemantauan Imej (Musim1) Pemantauan

Lot IADA : 2994

Lot JUPEM : 18944

Lot PTD : 18944

Blok : C11

Blok Pengairan : Panchang Bedena

Luas : 1.21 ha

Bil	Nama Pengusaha	Kp Pengusaha	No Telefon
1	Asnavi Bin Nasri	650713105959	N/A

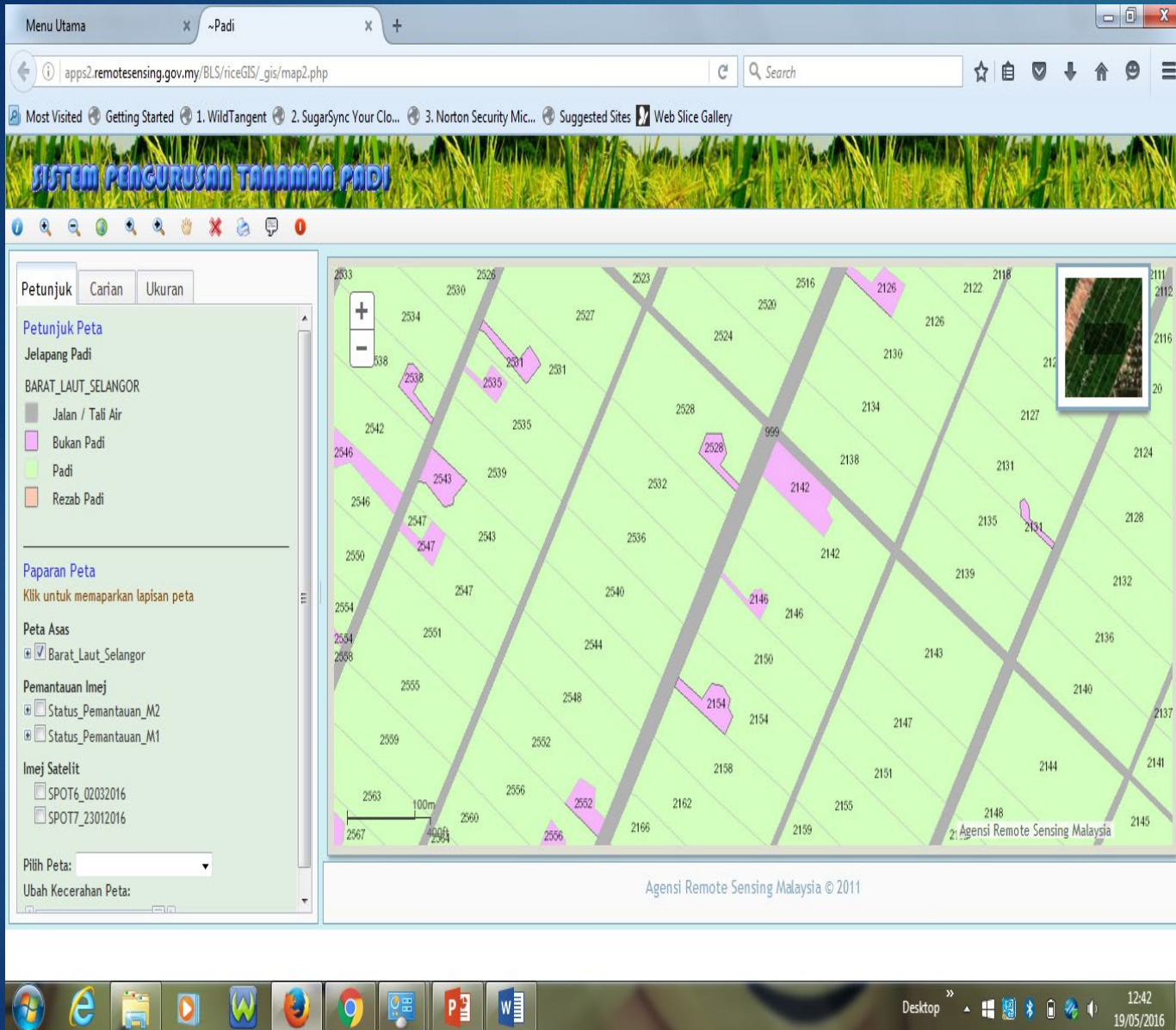
Agensi Remote

To begin, enroll your fingers.
You have not registered fingerprints.
To use your fingerprint system, complete the enrollment first.

3:20 PM
28/10/2013

FARMER'S PROFILE FOR EVERY INDIVIDUAL LOT

Apart from that, we are able to obtain the details of the farmers in a short time duration for every individual area in case of any issue on the related lot



CULTIVATED AND NON CULTIVATED AREA (HA)

Mapping using high resolution imageries helps to monitor the current changes in rice field by obtaining the data of cultivated and non cultivated area (ha)

GeoTanih

The screenshot shows the homepage of the GeoTanih website. At the top, there is a navigation bar with the logo of the Department of Agriculture, Malaysia, and the text "GeoTanih". Below the navigation bar, there is a banner with three images of soil. The main content area features an "Introduction" section with text about the Department of Agriculture, Malaysia, and its role in soil information. To the right of the introduction, there is a weather widget for George Town, Peninsular Malaysia, showing the time as 12:14 PM on Tuesday, 16 July 2019, and a temperature of 25°C. Below the weather widget, there are three main sections: "Soil Suitability Map", "Soil Profile Location", and "Soil Compendium". At the bottom, there is a section for "Recent Soil Survey Activities" with a link to "Soil Correlation 2019 - State of Terengganu Soil Pit Preparations (Petron 1)".

GeoTanaman

The screenshot shows the homepage of the Sistem Geoinformasi Tanaman Makanan Negara website. At the top, there is a navigation bar with the logo of the Department of Agriculture, Malaysia, and the text "Sistem Geoinformasi Tanaman Makanan Negara". Below the navigation bar, there is a banner with a large image of a hand holding a leafy vegetable, with the text "SISTEM GEOINFORMASI TANAMAN MAKANAN NEGARA" overlaid. Below the banner, there are two main sections: "APA ITU SISTEM GEOINFORMASI TANAMAN MAKANAN NEGARA?" and "DATA GEOSPATIAL TANAMAN JABATAN PERTANIAN".



UPDATING LANDUSE CHANGES ON AGRICULTURE



LANDUSE MAPPING

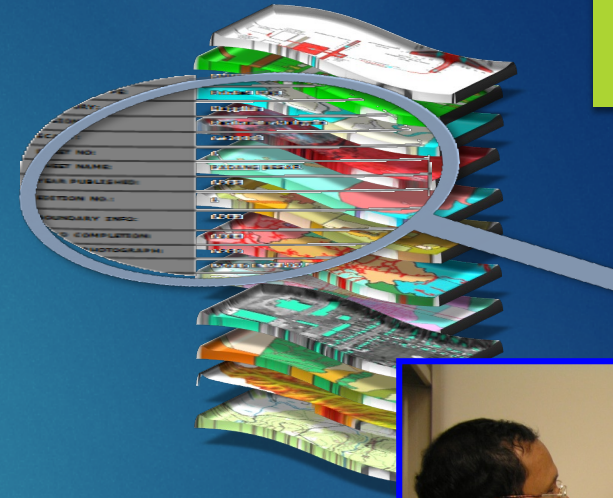
DOA has developed a consistent and detailed national landuse/land use change database to support agricultural policy makers and rural land use planners responsible for sustainable rehabilitation of agricultural sector, improvement of food security and reduction of rural poverty.

Land use is one of the main inputs for the area frame estimates of agricultural area for more reliable crop yield, crop forecast assessments and monitoring crop production.



Cont...

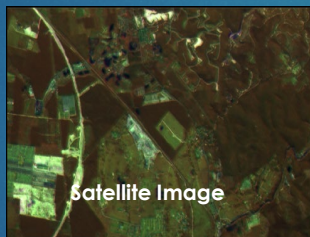
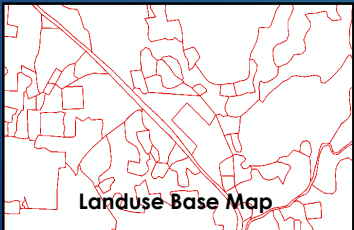
- ▶ Demand from stakeholders on geospatial soil and land use information for project planning and practical decision making is increasing
- ▶ As the custodian for soil resource and land use information, DOA has taken serious effort and initiatives to meet the demand
- ▶ Land use maps of Peninsula Malaysia was initially interpreted using aerial photos and field verification
- ▶ One of the main instruments used to interpret the aerial photos is a stereoscope
- ▶ The map was hand drafted and printed using color separation



Land Use Map and Data Preparation for Peninsular Malaysia

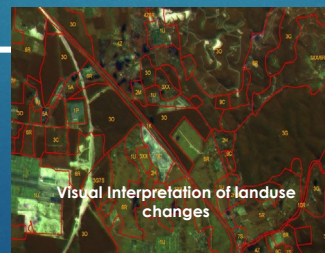
DATA SOURCES

- ▶ Satellite Image
- ▶ Landuse Base Map
- ▶ Topography Map
- ▶ Cadastral Map
- ▶ Boundary Map



METHODOLOGY

- ▶ Processing of Satellite Images
- ▶ Interpretation of Satellite Images
- ▶ Fieldwork Verification
- ▶ Updating Land use changes
- ▶ Preparation of statistic data



OUTPUT

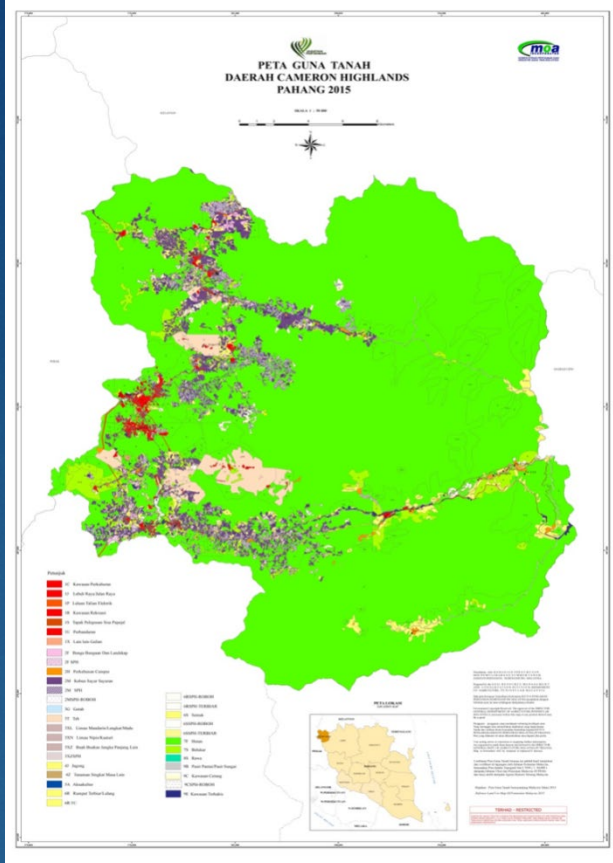
- Landuse map scale 1:50,000
- Landuse map scale 1:10,000
- Statistics Data



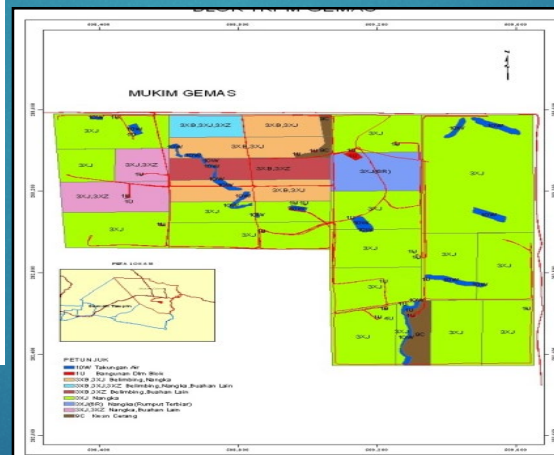
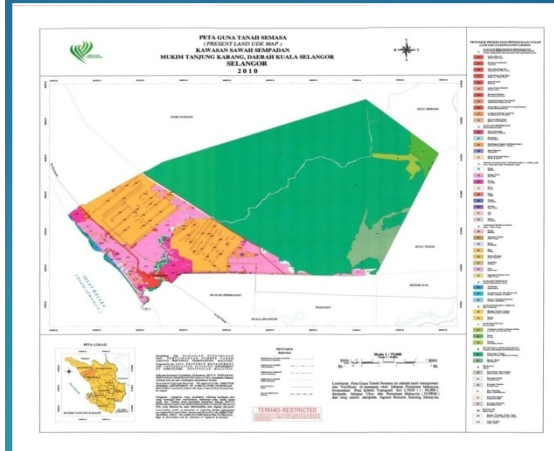
LAND USE MAPS

OUTPUT

LAND USE STATISTICS



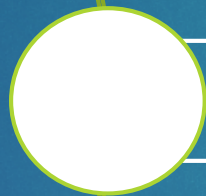
PETA GUNA TANAH KLUSTER CAMERON HIGHLANDS



PETA LOT TANAMAN KEKAL PENGELUARAN MAKANAN (TKPM) MUKIM GEMAS

LAND USE STATISTICS OF PENINSULAR MALAYSIA 2013

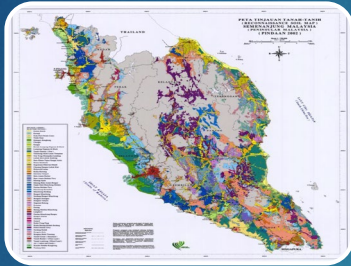
CATEGORY	SUB-CATEGORY	KELUASAN GUNA TANAH (HA)
URBAN	PERBANDARAN & KEDIAMAN	407,031
	PENGANGKUTAN, INFRASTRUKTUR & UTILITI	123,329
	INSTITUSI & KEMUDAHAN MASYARAKAT	30,008
CROPS	PERKEBUNAN CAMPUR TRADISIONAL	326,681
	TANAMAN SINGKAT MASA	381,307
	TANAMAN HIASAN	4,756
	TANAMAN INDUSTRI	4,453,539
	BUAH-BUAHAN JANGKA PANJANG	171,698
	BUAH-BUAHAN SINGKAT MASA	25,761
AQUACULTURE & LIVESTOCK	AKUAKULTUR	20,786
	PENTERNAKAN	25,314
FOREST	HUTAN DARAT	5,919,802
	HUTAN PAYA	396,421
WATER BODIES	SUMBER AIR	263,034
MINING	PERLOMBONGAN	66,522
OTHERS	KAWASAN TERBIAR	449,519
	PELBAGAI	148,469
JUMLAH KELUASAN GUNA TANAH (HA)		13,213,978



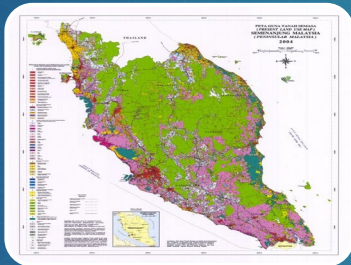
CURRENT GEOSPATIAL PRODUCT



CURRENT GEOSPATIAL PRODUCTS BY DEPARTMENT OF AGRICULTURE



SOIL RECONNAISSANCE MAP OF
PENINSULAR MALAYSIA



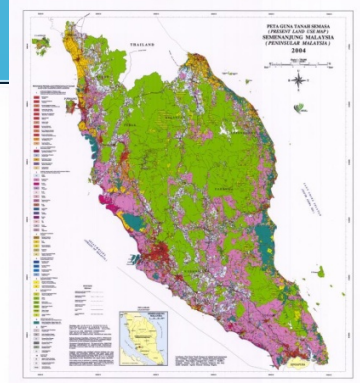
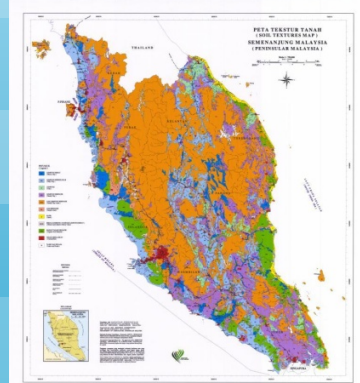
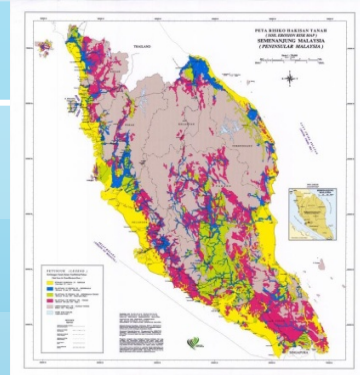
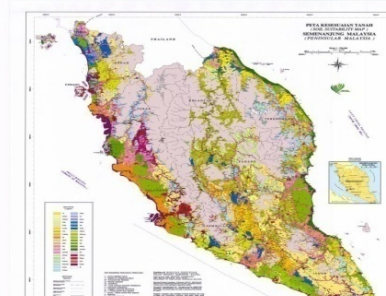
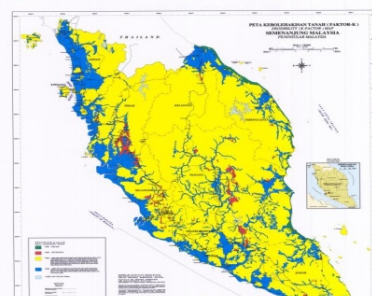
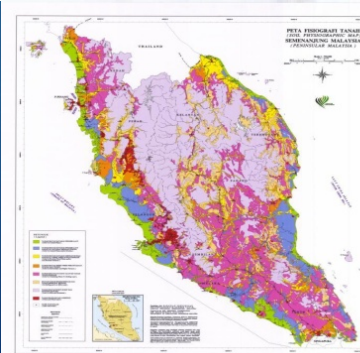
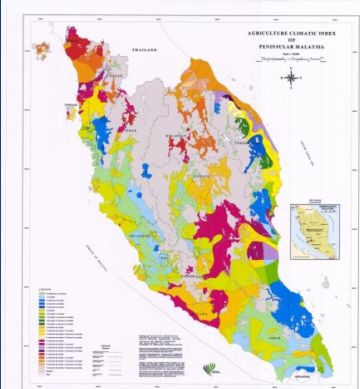
LAND USE MAP OF PENINSULAR
MALAYSIA



OTHER ADDED VALUE MAPS OF
PENINSULAR MALAYSIA

LIST OF OTHER ADDED VALUE MAPS OF PENINSULAR MALAYSIA

1. Soil Erosions Risk Map
2. Agroclimatic Map
3. Agriculture Rainfall Index Map
4. Soil Suitability Class Map
5. Soil Suitability Map
6. Crops Suitability Zone Map
7. Agroclimatic Zone Map
8. Soil Physiography Map
9. Agro-Ecological Zone Map



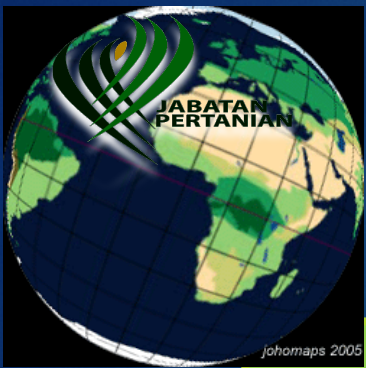


WAY FORWARD



WAY FORWARD

Strengthen Agricultural Development
using geospatial technology towards
Industrial Revolution 4.0

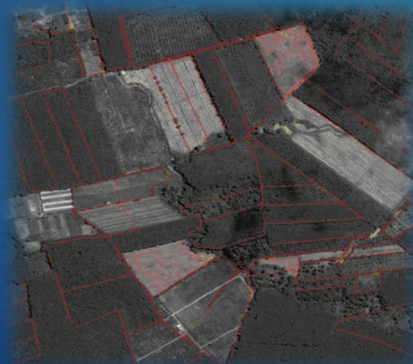


CONCLUSION



The geospatial technology in crop management is proven to be a strategic initiative in enabling the transformation in agriculture sector for a better future in the industry by:

- Planning and decision making is more efficient
- Extension works execution for the field officers is more structured
- Data analytics is improving crop production





THANK YOU



DEPARTMENT OF AGRICULTURE MALAYSIA