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Assalamualaikum,
Salam Sejahtera dan Salam 1Malaysia

Alhamdulillah, bersua kita kembali pada penerbitan Buletin Geospatial Sektor Awam (BGSA) edisi satu tahun 2014. Terbitan ini merangkumi dengan perkembangan teknologi terkini, laporan kerja usaha sama antara MaCGDI dan agensi lain serta laporan aktiviti-aktiviti berkaitan geospatial yang telah dijalankan.

Buletin kali ini turut memaparkan empat (4) rencana teknikal yang dapat dibaca oleh pembaca bagi meningkatkan pengetahuan dalam bidang geospatial dan bidang yang berkaitan dengannya. Pengisian pada kali ini juga memaparkan beberapa program yang telah dijalankan bagi memartabatkan bidang geospatial di Malaysia seperti penglibatan MaCGDI dalam program-program geospatial anjuran pihak luar termasuk agensi swasta. Selain itu, laporan kursus dan bengkel, lawatan dari pihak luar termasuk lawatan dari agensi antarabangsa ke MaCGDI, lawatan dari agensi luar ke MaCGDI, dan lawatan akademik pelajar IPT turut dimuatkan. Bagi meluaskan teknologi geospatial di kalangan pelajar, beberapa program telah diatur yang melibatkan pelajar-pelajar sekolah bagi memberi pendedahan awal berkaitan geospatial serta meningkatkan pengetahuan mereka seperti program *GIS Day* dan Sambutan Hari Geografi peringkat sekolah. Laporan program tersebut turut dilaporkan.

Saya berharap segala maklumat yang dimuatkan dapat dimanfaatkan bersama oleh semua pihak yang terlibat secara langsung atau tidak langsung dalam bidang geospatial. Tidak lupa juga kepada semua pihak yang memberikan kerjasama dan sumbangan dalam menerbitkan Buletin edisi ini.
Sekian, terima kasih.

Selamat membaca!

Fuziah binti Hj. Abu Hanifah
Pengarah MaCGDI

Ketua Editor

GPS: Making Sense of Earth's Atmosphere

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As the GPS technology is relatively new to the Malaysian weather forecasting community, this article describes the principles underpinning both atmospheric remote sensing techniques: ground-based atmospheric sounding method and GPS radio occultation (RO) method.

Abstract

Weather observation techniques have improved and there have been technological advancements in predicting the weather in recent times. Despite this major scientific and technical progress, many challenges remain, hence limiting meaningful forecasts more than 5~6 days in advance. Given that biological diversity, economic growth and human health and lifestyles are affected by day-to-day weather and climate variability, a greater understanding of critical atmospheric parameters (such as refractivity, pressure, temperature and humidity) is of paramount importance. Recently many countries have investigated the feasibility of using the space-based radio navigation satellites of the Global Positioning System (GPS) for weather and environmental studies. Based on using the transmitted GPS satellite radio signals to measure atmospheric profiles of refractivity, there are two primary methods by which GPS can be used to actively sense relevant atmospheric constituents: the ground-based atmospheric sounding method and GPS radio occultation (RO) method. As the GPS technology is relatively new to the Malaysian weather forecasting community, this article describes the principles underpinning both atmospheric remote sensing techniques. Further discussion includes the presentation of an overview of studies conducted abroad, at various scales ranging from national to global and current commonly-used atmospheric sensing approaches in Malaysia.

Keywords: *ground-based atmospheric sounding method, GPS radio occultation (RO)*

Introduction

Variability of weather conditions is inevitable, continuous and all-pervasive on the Earth's surface. It influences to not only the agricultural cycle and human well-being, but also to many economic and societal activities. Prolonged and destructive droughts over the grain and paddy belts, for example, lead to shortages of food. Heavy precipitation, thunderstorms, floods and hurricanes on the other hand, account for huge losses of farmland and crops, housing and man-made infrastructures (Figure 1). To accurately monitor and predict the state of the weather, knowledge of the quantitative state of the ever-changing atmosphere is of paramount importance. In order to remotely sense the spatial and temporal variability of the Earth's atmosphere, a variety of atmospheric sensing techniques have been developed over the past decades.

Figure 1: Impacts of severe weather in Malaysia

Atmospheric Sensing – The Malaysian Perspective

Malaysian Meteorological Department (MMD) is responsible to fulfil the needs for meteorological, climatological and geophysical services for national security, societal well-being and sustainable socio-economic development in Malaysia. At present, among the most commonly-used atmospheric sensing approaches in Malaysia are:

1. Radiosonde (weather balloons);
2. Surface observation stations;
3. Radio Detection and Ranging (RADAR); and
4. Satellite images.

Radiosonde – The radiosonde is a package of miniature electronic meteorological devices (i.e. thermometer, hygrometer and barometer) attached to a helium-filled neoprene balloon that is allowed to ascend into the lower atmosphere at a rate of about 5 ms-1. Capable of measuring atmospheric parameters up to at an approximate altitude of 30 km (before the balloon bursts), presently there are only 8 sparsely distributed radiosonde observatory sites in Malaysia. These so-called upper air stations include 4 (Kuala Lumpur, Bayan Lepas, Kota Bharu and Kuantan) in Peninsular Malaysia and 4 other stations (Kuching, Bintulu, Kota Kinabalu and Tawau) in East Malaysia.

Surface observation stations – Surface observation stations mainly consist of Stevenson screens, evaporation pan, rain gauge, rain recorder and sunshine recorder. These stations however are only located at major cities in Malaysia; with some equipped with weather camera system.

Radio Detection and Ranging (RADAR) - RADAR output generally comes in a form of reflectivity and velocity. Reflectivity is a measure of how much precipitation exists in a particular area. Velocity is a measure of the speed and direction of the precipitation from the RADAR. MMD operates 2 integrated RADAR networks nationwide. These RADAR are used to monitor rain and thunderstorms activity in Malaysia (Figure 2). Currently, the Peninsular

network consists of 6 RADAR located in Kluang, Subang, Kuantan, Kota Bharu, Butterworth and Alor Star. The East Malaysia network integrates 4 RADAR located in Kuching, Bintulu, Kota Kinabalu and Sandakan.

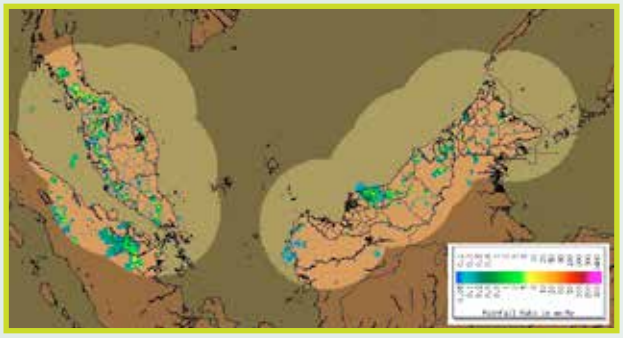
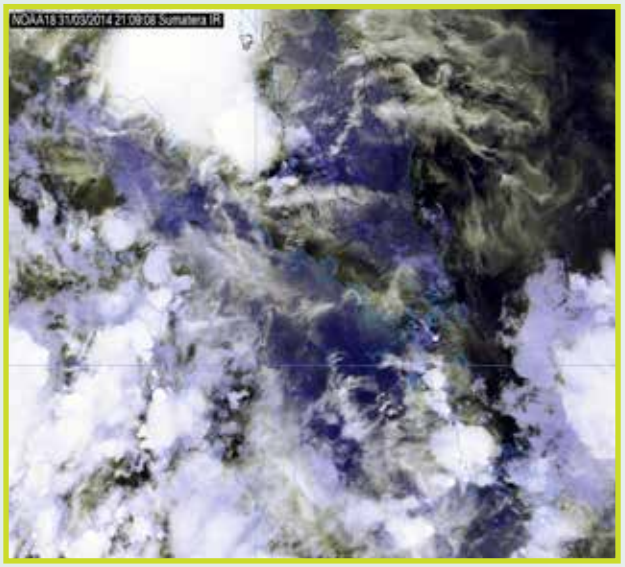


Figure 2: Rainfall rate estimation using RADAR

Satellite Images – MMD uses both geostationary meteorological satellites (i.e. Japan's Multi-Functional Transport Satellite (MTSAT-1R) and China's FENG YUN (FY-2C) satellites) and polar orbiting meteorological satellites (i.e. NASA's National Oceanic and Atmospheric Administration (NOAA) Series (NOAA-12, NOAA-15, NOAA-16 and NOAA-17) and FY – 1 Series). The raw data from these various channels of different satellite wave band will be processed to produce useful satellite images and other meteorological parameters. At present, a number of images related to atmospheric and terrestrial parameters can be developed from these raw data. Among others include cloud image, sea surface temperature, chlorophyll, hotspots, wind vector, accumulated rainfall estimation, ATOVS HRPT data, aerosol, atmospheric profile and vegetation index (Figure 3).



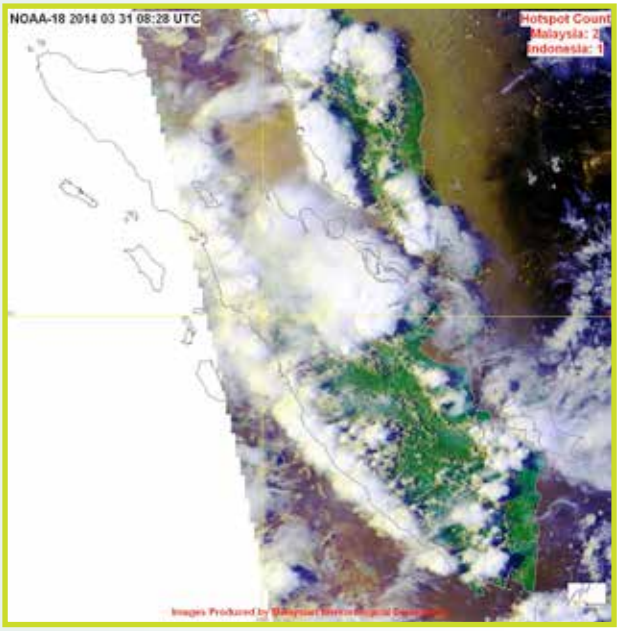


Figure 3: NOAA satellite images and hotspots over Peninsular Malaysia and Sumatera

It is noted that, however, there are certain limitations with the current suite of atmospheric sensors. Radiosonde for example provides insufficient spatial and temporal coverage, labour intensive, expensive, poor accuracy at low temperatures and subjects to systematic and random errors. The accuracy of surface observation reading depends highly on sites selection and sensors placement, providing either a homogeneous or inhomogeneous spatial coverage. Similarly, RADAR is a labour intensive instrument and very expensive to run. Because of the problem related to beam wavelength and raindrop size, lighter precipitation may not be detected, giving a false estimation of rainfall rate. It is also susceptible to errors due to obstructions caused by surrounding buildings, hills and trees. Satellite image on the other hand is limited to cloud-free region (infrared sensors). In addition to its restricted spatial resolution, satellite image also provides inadequate coverage due to limited orbiting path. Predictability of the weather several days in advance is significantly influenced by the definition of the initial conditions based on the reliability of the atmospheric profiling as input into the numerical weather prediction (NWP). At present, the uncertainties in the initial conditions based solely on traditional / conventional sensing methods do not permit meaningful forecasts more than 5~6 days in advance.

GPS Meteorology

GPS is an emerging satellite-based radio navigation technology for weather and environmental studies. While other Global Navigation Satellite System (GNSS) like GLONASS, Galileo and Compass are expected to increase each coverage worldwide, GPS has now being used to serve many different purposes including navigation, surveying and mapping, geodesy and recreational uses. Currently, there are 32 operational GPS satellites in near-circular orbits of approximately 26,560 km radius (12 hr sidereal periods). As GPS signals propagate through the atmosphere, they are affected by changes in the refractive indices within the signal path caused by moisture, pressure and temperature. Atmospheric refractive indices in general cause an excess group delay of the GPS signal in relation to free-space propagation. Resolving the delay in terms of atmospheric parameters using data collected by geodetic-quality GPS receivers is the basis for GPS meteorology.

Atmospheric remote sensing approach using GPS is relatively new to the Malaysian weather forecasting community. There are two approaches to remotely sensing the spatial and temporal variability of the Earth's atmosphere using GPS: the ground-based atmospheric sounding approach and the GPS radio occultation. Both techniques in general aim to improve NWP, climate analysis and space weather forecasting. As ground-based atmospheric sounding is capable of sensing the Integrated Water Vapour (IWV) along the GPS signal path, the atmospheric parameters obtained from RO observations extend from the fundamental variables (e.g., temperature, density, pressure, water vapour, trace gases, aerosols and cloud liquid water) to ionospheric electron density.

GPS Ground –Based Atmospheric Sounding

Ground-based atmospheric sounding takes advantage of the dual-frequency signals (L1 and L2) collected by a GPS receiver at a fixed point on the ground. By using existing continuously operating reference stations (CORS), the observations made on these signals can then be assimilated to quantify the water vapour along the path from the GPS satellites to the receiver. Despite of its networks are generally land-based, i.e. there is no ocean surface coverage, CORS networks of reasonable size and varying receiver heights can provide unattended, continuous, independent, frequent, and accurate observations of IWV at very low cost.

Water vapour is a greenhouse gas that plays a decisive role in the balance of planetary radiation. Being one of the most significant yet poorly understood atmospheric constituents, improving the ability to monitor water vapour will lead to more accurate forecasts of extreme weather events and a better understanding of environmental processes. Dual-frequency GPS measurements over a CORS network can be processed to extract the slant IWV values along the signal paths from the GPS satellites to the ground receivers, or alternatively the vertical IWV over the CORS stations, with an accuracy of about 1mm. IWV retrieval error budget can expected below 0.5 mm if the GPS measurements are integrated with surface pressure measurements with accuracy of about 0.5 hPa and surface temperature measurements with an accuracy of about 2˚. A number of extensive experiments have been conducted at national to global scales. Many of these studies have assessed the accuracy of IWV estimation and investigated the degree

of improvement in near-real-time weather prediction. Other studies have focused on the development and refinement of the observation techniques, data processing and assimilation of the GPS results into NWP. Examples of ground-based atmospheric sounding projects include:

1. GPS Earth Observing Network (GEONET);
2. NOAA GPS-Met Project; and
3. GPS Atmosphere Sounding Project (GASP).

GPS Earth Observing Network (GEONET) - GEONET is a Global Navigation Satellite System (GNSS) CORS network operated by the Geographical Survey Institute (GSI) of Japan (Figure 4). Located in one of the most active seismic and volcanic zones in the world, it was principally developed in 1994 for crustal motion and deformation studies. GEONET has been responsible in monitoring seismic and volcanic activity throughout the country, and issuing relevant warnings and information to mitigate damage caused by disasters related to earthquakes, tsunamis and volcanic eruptions. As far as GPS meteorology is concerned, ground-based atmospheric sounding in Japan has been developed along with GEONET. Equipped with high accuracy dual-frequency receivers, there are about 1230 GEONET stations with a mean separation of 17 km. Providing good spatial and temporal coverage nationwide, studies show that the GPS-IWV retrieval for assimilation into NWP has been of high accuracy and in reasonable agreement with radiosonde data.

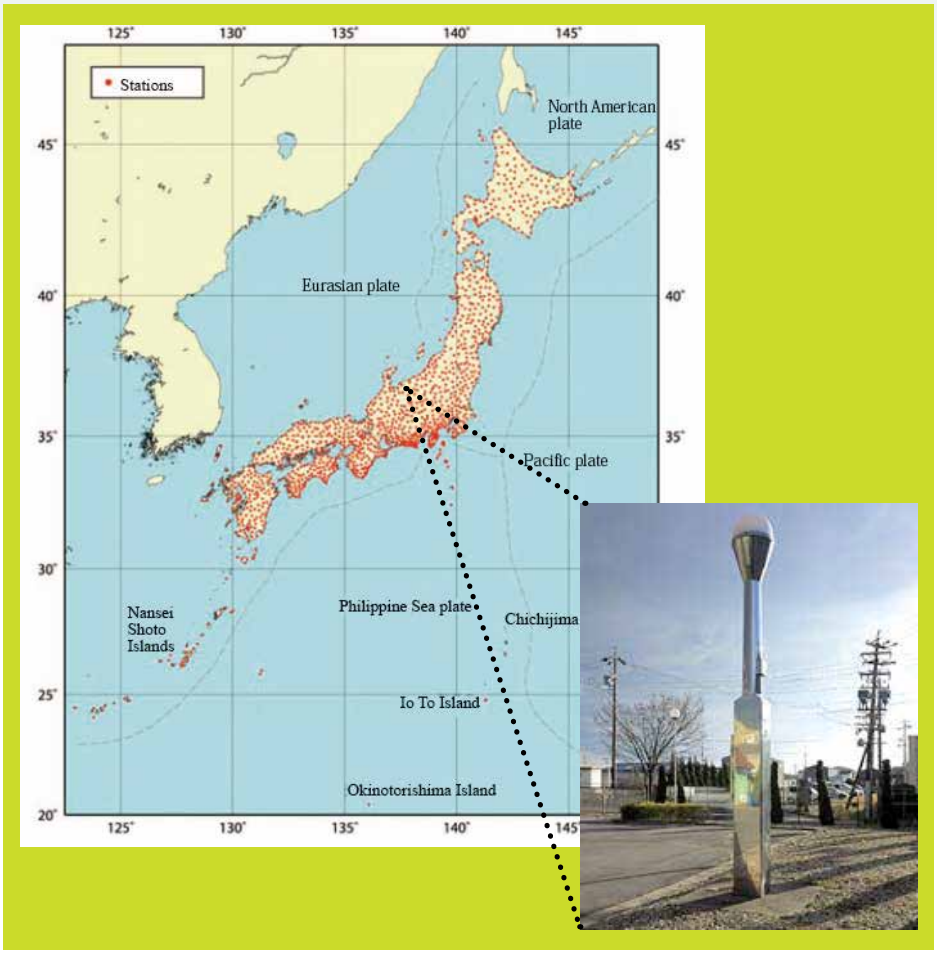


Figure 4: Distribution of GEONET stations

NOAA GPS-Met Project - NOAA GPS-Met Project comprises of a network of about 500 CORS sites across the U.S., Canada, Mexico and the Caribbean. The purpose of this project is to evaluate the engineering and scientific bases for ground-based atmospheric sensing. NOAA GPS-Met Project aims to demonstrate the feasibility of using ground-based atmospheric sensing for improved weather forecasting, climate monitoring and satellite sensor calibration/validation; and to transform the observing system technology into operational use. Unlike Japan's GEONET, the NOAA GPS-Met network not only consists of geodetic-grade GPS receivers but also integrated surface meteorological sensors. This project utilizes GPS receivers co-located with surface meteorological sensors to calculate the total IWV directly above the site.

GPS Atmosphere Sounding Project (GASP) - GASP project is moderated by the GeoForschungsZentrum (GFZ) and financed by the Helmholtz Association of German Research Center. Currently there are over 200 sites mostly from the Satellite Positioning Service (SAPOS) of the German National Survey, with an average separation of about

50 km nationwide. The GASP project consists of data generation, transmission and analysis components that supports operational determination of IWV and to assimilate these data into NWP models. For some stations, surface meteorological data are available. For most of the sites, the required pressure and temperature data have to be interpolated using the synoptic sites of the German Weather Service (about 200 sites) with an accuracy ranging from 0.3 hPa to 1.0 hPa. In addition to ground-based atmospheric sensing, GASP also supports RO projects such as the Challenging Minisatellite Payload (CHAMP).

GPS Radio Occultation (RO)

Space-borne RO exploits the GPS signals bending and being delayed by atmospheric refraction, as observed from Low Earth Orbiting (LEO) satellites (see Figure 5). With a GPS receiver on board a LEO satellite, the setting or rising radio occultation events (ROEs) are observed by the RO antenna(s) as the transmitted GPS signals pass through the Earth's atmosphere. Unlike GPS ground-based atmospheric sounding, the signal phase and amplitude variations are recorded by the space-borne receiver. The excess phase delays of the signals introduced by the Earth's atmosphere is extracted from the phase measurements after the precise orbit of the LEO satellite and the clock errors of both the LEO and GPS satellites are determined. The bending angle profiles over the RO points are then derived from the excess phase, amplitude, and positions and velocities of LEO and GPS satellites, from which corresponding refractivity profiles are inverted and water vapour profiles are retrieved using auxiliary atmospheric information (from other independent methods such as NWP models and radiosonde observations).

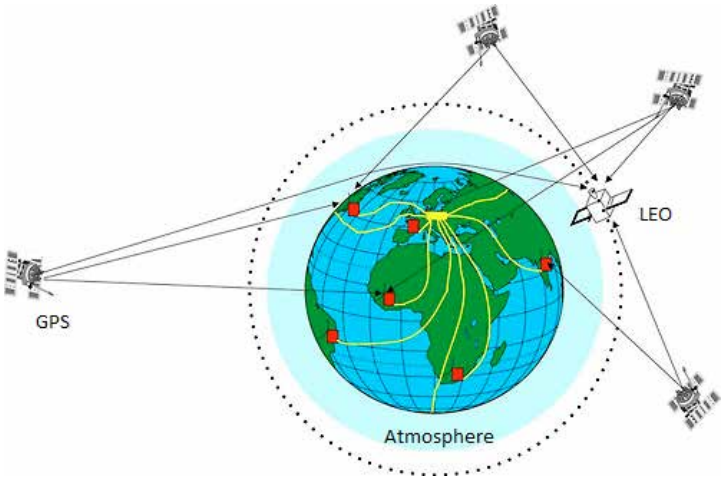


Figure 5: GPS-RO sounding

The quality of GPS-RO sounding is independent of geographical location. It utilizes the highly coherent radio signals that have many unique characteristics, including high accuracy, high vertical resolution, all-weather sounding capability, independent of radiosonde or other calibration, no instrument drift and no satellite-to-satellite bias. Launched at Vandenberg Air Force Base, California, in 1995, GPS/MET was the first occultation proof-of-concept experiment. Following the success of the GPS/MET experiment, several other RO missions have been launched. These include:

1. German-U.S. Challenging Minisatellite Payload (CHAMP),
2. U.S.-European Gravity Recovery and Climate Experiment (GRACE)
3. U.S.-Taiwan Constellation Observing System for Meteorology Ionosphere and Climate (COSMIC)

Challenging Minisatellite Payload (CHAMP) - CHAMP project aims to perform atmospheric sounding and to determine Earth's gravity and magnetic fields. CHAMP also focuses on accurate monitoring of ocean circulation, global sea level changes and short-term changes in the global water balance. Carrying a Jet Propulsion Laboratory (JPL) state-of-the-art Blackjack GPS receiver, the occulting LEO satellite was launched into an almost circular, near-polar orbit (inclination 87.2°) with an initial altitude of 454 km. In addition to the LEO satellite, CHAMP also comprises of ground infrastructure: raw data center, fiducial GPS ground network (GASP), precise orbit determination facility and occultation processing system. The CHAMP occultation data and the results of the operational data analyses can be retrieved via the CHAMP Information System and Data Center (ISDC) at http://isdc.gfz-potsdam.de.

Gravity Recovery and Climate Experiment (GRACE) - The U.S.-German GRACE project is the first mission in NASA's Earth System Science Pathfinder series. GRACE aims to map the global gravity field with unprecedented accuracy, with the integration of the GRACE-derived time-varying gravity information and altimetry data over oceans. Over recent years, GRACE has contributed significantly to our understanding of anthropogenic climate change. Similar to CHAMP, GRACE has a JPL Blackjack GPS receiver embedded in the carbon fibre reinforced plastic body panels' twin satellites. Both GRACE occulting satellites are in an almost circular, near-polar orbit (inclination 89°) with an initial altitude of 500 km and a 200 km along-track separation.

Constellation Observing System for Meteorology Ionosphere and Climate (COSMIC) - The COSMIC project aims to measure pressure, temperature, humidity, refractivity and ionospheric parameters using data from a constellation of six microsatellites equipped with GPS receivers. Operated by the Satellite Operations Control Center (SOCC) at the National Space Organization (NSPO) in Hsin-Chu, Taiwan, these microsatellites enable GPS-RO observations to be made. A global ground fiducial network based on existing NASA and international CORS networks has been established to support the mission. The COSMIC Data Analysis and Archive Center (CDAAC) was established in order to process not only COSMIC RO data but also SAC-C and CHAMP data. To support its use in operational NWP, the COSMIC data are available in near real-time (within 2 hours of observation). For the purpose of climate research applications, high quality COSMIC data are available with about two weeks latency.

Conclusion

The environment is the sum of many factors including weather phenomena and climatic influences. An examination of factors influencing the supplies of food and water, life cycle, human well-being, economic growth and societal activities brings into immediate focus the crucial role played by weather and climate. Accurate predictions on the state of the weather are useful in planning a great variety of human endeavours. Based on a series of comprehensive studies carried out abroad, GPS represents an alternative and promising tool to remotely sense the spatial and temporal variability of the Earth's atmosphere via both ground atmospheric sounding and RO technique. Significant research however is still required to assess its full potential, to understand the observational error characteristics and to develop appropriate data processing procedures. As the GPS meteorology technology matures and becomes more common, it is suggested that GPS is capable of being implemented as an alternative and promising tool to remotely sense the spatial and temporal variability of the Earth's atmosphere.

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TOWARDS THE UNIFICATION OF TWILIGHT PARAMETERS FOR DETERMINATION OF FAJR AND ISHA IN MALAYSIA

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ABSTRACT

Twilight is fundamental parameter determining in Fajr and Isha prayer time calculations as stated in the Holy al-Quran and Hadith. Presently, the twilight parameters adopted are based on the previous study of Muslim astronomers. This paper views the differences in twilight parameters implementation in Kelantan and other states. Malaysia adopted 20 and 18 degrees for morning and evening twilight parameters; except for Kelantan who adopted 19 and 17 degrees.

Keywords: *Fajr, Isha, twilight parameters, morning twilight, evening twilight*

INTRODUCTION

The daily prayers are the integral part of Muslim life. In order to fulfill their religious obligation, it is important for all Muslims to know the timings of the prayers. According to Niweateh (2002) in his paper, Al Falak, these prayers time define as; "Fajr starts with the dawn or morning twilight and ends just before sunrises. Zuhr begins after midday when the trailing limb of the sun has passed the meridian and ends at the start of Asr time, while Asr depends on the length of the shadow cast by an object. According to the Shafi School of jurisprudence, Asr begins when the length of the shadow of an object exceeds the length of the object. Whereas, according to the Hanafi School of jurisprudence, Asr begins when the length of the shadow exceeds twice the length of the object. Maghrib begins at sunset and ends at the start of Isha. Lastly, Isha starts after dusk when the evening twilight disappears".

Unlike the other prayers time, Fajr and Isha need to be determined based on the twilight appearance and disappearance. In the past, people only determine it by naked eyes, but nowadays with the help of equipments, the determination of prayer time based on astronomical technique has been used which is become more accurate. This paper is discussing on the twilight for Fajr and Isha and its implementation in Malaysia.

DETERMNING DAWN AND NIGHT TWILIGHT FOR FAJR AND ISHA PRAYER TIMES

Generally, Fajr is defined as the time of 'dawn' which refers to the time when daylight begins to appear. Miftahi (2005) states that there are two dawns that agreed by the Ulama which are the false dawn (Fajr Khathib) which when the light appears vertically above the horizon; and the true dawn (Fajr Sadiq) which starts when the rays of the sun change its direction and begin to spread over the horizon. (Sultan, 2004)

Many Scholars have described the onset of Fajr from their interpretation of the al-Quran and Hadith and on this point the Ulama are generally united. Below are some of Hadith on Fajr:

> And the Prophet SallallahuAlaihiWasallam said: "There are two dawns. With regard to the dawn which is like the tail of a wolf, this does not make it permissible to pray and haraam to eat. With regard to the dawn which appears horizontally in the sky, this makes it permissible to pray and forbidden to eat"
>
> (Narrated by Al-Hakim and Al-Bayhaqi from the Hadith of Jaabir)

> Yahya RA have said related to me from Malik from Zayd Ibn Aslam that Ata Ibn Yasar said, "A man came to the Messenger of Allah(Peace be upon him) and asked him about the time of the Fajar prayer (Salat). The Messenger of Allah did not answer him, but in the morning he prayed Fajar at first light. The following morning he prayed Fajar when it was much lighter, and then said, "Where is the man who was asking about the time of the Salat?" The man replied, "Here I am, Messenger of Allah". He said, "The time is between these two."
>
> (Narrated by Maliks Muwatta)

As for the beginning of Isha, all Islamic scholars agree the time begins when Shafaq (twilight) has disappeared. According to the Hadith, the word Shafaq, is referring to Shafaq Ahmar and Shafaq Abyadh. These phenomena occur at different time and represent two distinct levels of illumination in the night sky. Shafaq Ahmar occurs before Shafaq Abyadh. (Katiya, 2007)

i. Shafaq Ahmar: under the clear sky, when the redness in the western sky disappearance. It roughly corresponds to nautical twilight.
ii. Shafaq Abyadh: under the clear sky, when the western sky begins to darken into one colour and when almost darkness occurs or there is no trace of light left in the sky. It roughly corresponds to astronomical twilight.

Some selected Hadith which also related to the time of Isha are given below:

> Narrated Jabir Bin Abdullah: The Prophet SallallahuAlaihiWasallam used to pray the Zuhar at mid-day, and the Asr at a time when the sun was still bright, the Maghrib after sunset (at its stated time) and the Isha at a variable time. Whenever he saw the people assembled (for Isha Salat), he would pray earlier and if the people delayed, he would delay the Salat. Prophet (SallallahuAlaihiWasallam) used to offer the Fajar Salat when it was still dark.
>
> (Narrated by Bukhari)

> Narrated Muadh Ibn Jabal: We waited for the Prophet SallallahuAlaihiWasallam to offer the night prayer. He delayed until people thought that he would not come out and some of us said that he had offered the prayer. At the moment when we were in this condition the Prophet SallallahuAlaihiWasallam came out. People said to him as they were already saying. He said: Observe this prayer when it is dark, for by it you have been made superior to all the peoples, no people having observed it before you.
>
> (Sunan Abu Dawud)

Imam Malik, may Allah be please with him said "This is what I have found the people and men of knowledge doing in our community". Malik explained that shafaq was the redness in the sky after the sun had set, and said "When the redness has gone then the Isha is due and you have left the time of Maghrib"

(Maliks Muwatta)

In Malaysia, Jabatan Mufti Negeri will interpret and issue a fatwa based on the Holy al-Quran and Hadith, which needs to be accepted and practiced by the Muslim. Every state has Islamic religious authority that is responsible for religious matters which causes the differences in the implementation of fatwa between the states.

THE CONCEPT OF TWILIGHT

Twilight is the parameter used in the astronomical calculation to determine the Fajr and Isha prayer time. Rizvi (1989) in his paper, Beliefs and Practices defined twilight as the light that appears before sunrise and remains after sunset. It also refers to as the light between the two that is, the transition between dawn and dusk. The scientists have divided it into three types of twilight; (1) The Astronomical Twilight which begins when the Sun's center is 18 degree below the horizon, (2) The Nautical Twilight which occurs when the Sun's center is at 12 degree below the horizon and (3) The Civil Twilight when the Sun's center is at 6 degree below the horizon.

In Islamic countries, Fajr and Isha times are usually calculated using fixed twilight angles. This fix twilight angles are known as AIT (Astronomical-Islamic Twilight Angle). The values used by Islamic Organizations are summarized in the following Table 1. (Hamid Zarrabi-Zadeh, 2011)

Table 1: Summary of Astronomical-Islamic Twilight Angle (AIT)

Organisation	Twilight Angle		Region
	Fajr	Isha	
University of Islamic Sciences, Karachi	18	18	Pakistan, Bangladesh, India, Afganistan, parts of Europe
Islamic Society of North America (ISNA)	15	15	Parts of USA & Canada, parts of UK
World Islamic League	18	17	Europe, Far East, parts of USA
Um Ul-Qura, Makkah	19	90 mins after Maghrib, 120 mins during Ramadhan	Arabian Peninsula
Egyptian General Organisation of Surveying	19.5	17.5	Africa, Syria, Iraq, Lebanon, Malaysia, parts of USA

Table 2: Solar Depression Levels by Famous Muslim Astronomers (Miftahi, 2005)

Astronomers	Fajr	Isha
Abu Rayhan Al Biruni	15° - 18°	16° - 18°
Al Qaini	17°	17°
Ibn Yunus, Al Khalili, Ibn Al Shatir, Tusi, Mardeni, All Muwaqits of Syria,Maghreb, Egypt, Turkey, since 15th Century	19°	17°
Habash, Muadh, Ibn Al Haithim	18°	18°
Al Marrakushi, Makkah, Tunis, Yemen	20°	16°
Abu Abdullah Al Sayyid Al Moeti	19°	18°
Abu Abdullah Ibn Ibrahim Ibn Riqam	19°	19°
Chagmini, Barjandi, Kamili	15°	15°

In addition, Yallop and Hohenkerk (1996) in their paper, note on Sunrise, Sunset and Twilight Times and on The Illumination Conditions During Twilight stated that the sky brightness condition for the disappearance of twilight at western horizon basically depend on the solar depression and the brightness of the sky tends to vary considerably due to several influencing factors as follow:

1) the geographical latitude and the season of the site;
2) the elevation of the site above sea level;
3) the atmospheric or meteorological conditions such as clouds, haze, aerosol, air pollution and dusts, this factor causes the sky gets darker earlier than usual;
4) the local conditions such as light pollution from the ground topography and the nearby trees and buildings; and
5) other astronomical factors such as thunder, moon brightness and zodiacal light.

TWILIGHT PARAMETERS IN MALAYSIA

Mohammad Saupi (2001) in his paper, *Kriteria Zon Waktu Solat: Kajian Kes Negeri Kelantan,* stated that Malaysia use 20 and 18 degree below the horizon to determine Fajr and Isha, except for Kelantan who use 19 and 17 degree below the horizon. Kelantan insists on using these values because aside from referring to al-Quran and Hadith, they are adopting the values based on the previous studies by Ibn Yunus, as shown in Table 2. As for the other states, they refer to the Table 1. The differences in opinion on these parameters causes inconsistencies between the states which lead the authors to wonder why is Kelantan cannot accept 20 and 18 degree as their parameters or vice- versa. Is the values adopted by the Kelantan or Malaysia is wrong?

There are several studies had been done by researchers in order to review the values of adopted twilight in Malaysia.

Niri et al. (2012) had conducted the observation at Pantai Tanjung Aru, Kota Kinabalu, Sabah. They used Sky Quality Meter (SQM) SQM-LE meter to collect sky brightness data. From the observation, they obtained the sky brightness magnitude for the disappearance of Shafaq Al-Abyad is averagely at 20.79 ± 0.36 mag/arcsec2 and the mean solar depression for the disappearance of Shafaq Al-Abyad, the lower limit of astronomical dusk is at 107.99° ± 0.16 as shown in Figure 1. Their results are considered to be still consistent with the theoretical value, 108°. Nur Nafhatun et al. (2012) had also carried out a similar study on sky brightness for Isha times at Port Klang, Selangor; using SQM. Based on Figure 2, they concluded that the solar depression for Isha is within the range from 17.3° to 19.5°.

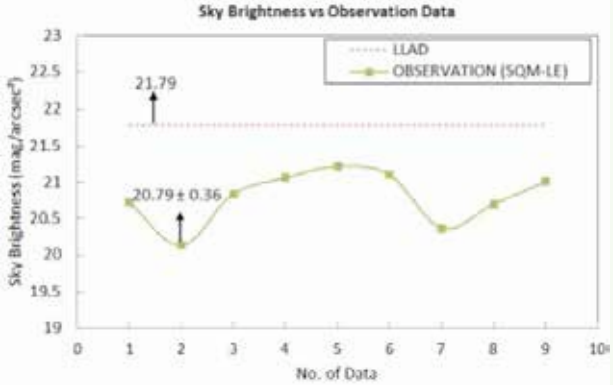

Figure 1(a): Graph of Sky brightness distribution or the disappearance of Shafaq Al-Abyad

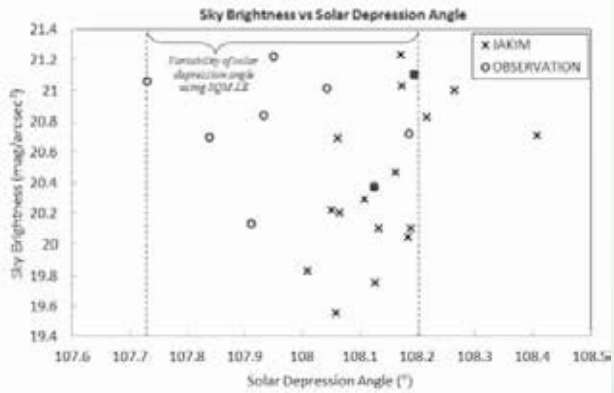

Figure 1(b): Graph of Sky brightness distribution of Shafaq Al-Abyad at different solar depression (Niri et al. 2012)

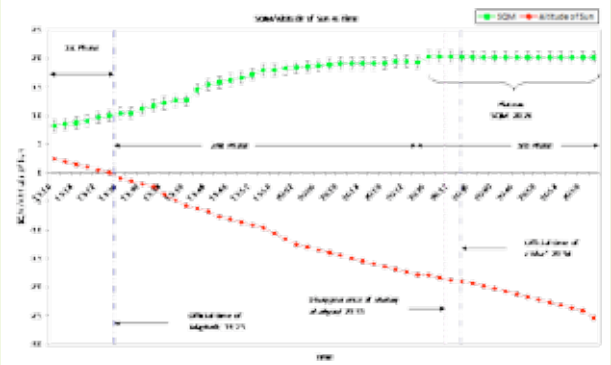

Figure 2: Graph of Sky brightness magnitude for the disappearance of Shafaq Al-Abyad (Nur Nafhatun et al. 2012)

Siti Asma' and Mohd Zambri (2012) have also conducted the studies of sky brightness for evening and morning twilight at Teluk Kemang, Negeri Sembilan, Pantai Cahaya Bulan, Kelantan and Kuala Terengganu, Terengganu. The study was carried out to ensure the time for beginning and ending of astronomical twilight. The finding of the study was; at Fajr time, the altitude of the sun was at the 20 degree below the east horizon and the magnitude of the sky was 20 mag/m^2. While for Isha prayer time, the sun is at the 17 degree below the west horizon and the sky magnitude was 20.09 mag/m^2. From the observation, they concluded that the theoretical twilight parameters in Malaysia are the same as the measurement findings.

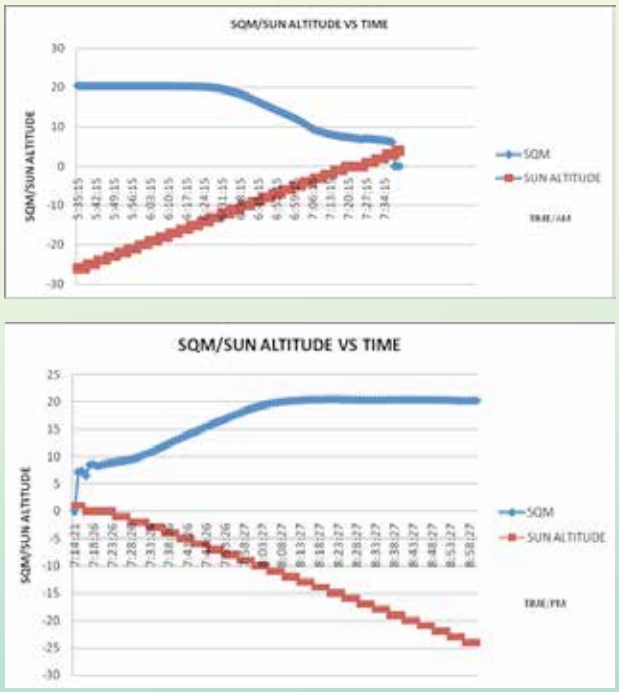

Figure 3: Graph of the result taken during the morning before the sunrise; and (Right) The result taken during the evening twilight. (Siti Asma' and Mohd Zambri, 2012)

As mentioned, the study of the sky brightness has been widely carried out in Malaysia. However, they only carry out a review survey to ensure that the twilight parameter which has been used suitably had justified the theory. Unfortunately until now there is no particular studies conducted to study the differences of twilight parameters particularly in Kelantan and the other states.

RECOMMENDATION AND CONCLUSION

In order to fulfill Islamic obligation, it is important for all Muslims to know the timings of the daily prayers. Zuhr, Asr and Maghrib times may be calculated unambiguously. However for Fajr and Isha prayer times, it depends on twilight and requires the adoption of a suitable twilight angle. To avoid muslims being confused, most country adopted the same twilight parameter. However, Malaysia adopted two parameters. Therefore, a detailed study should be done on the states to identify the factors which might contribute to the differences in twilight parameters, and to implementation methods that can be applied to standardize the twilight parameters in Malaysia as a whole.

ACKNOWLEDGEMENT

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DEVELOPMENT OF WEB GIS FOR MULTIPURPOSE CADASTRE

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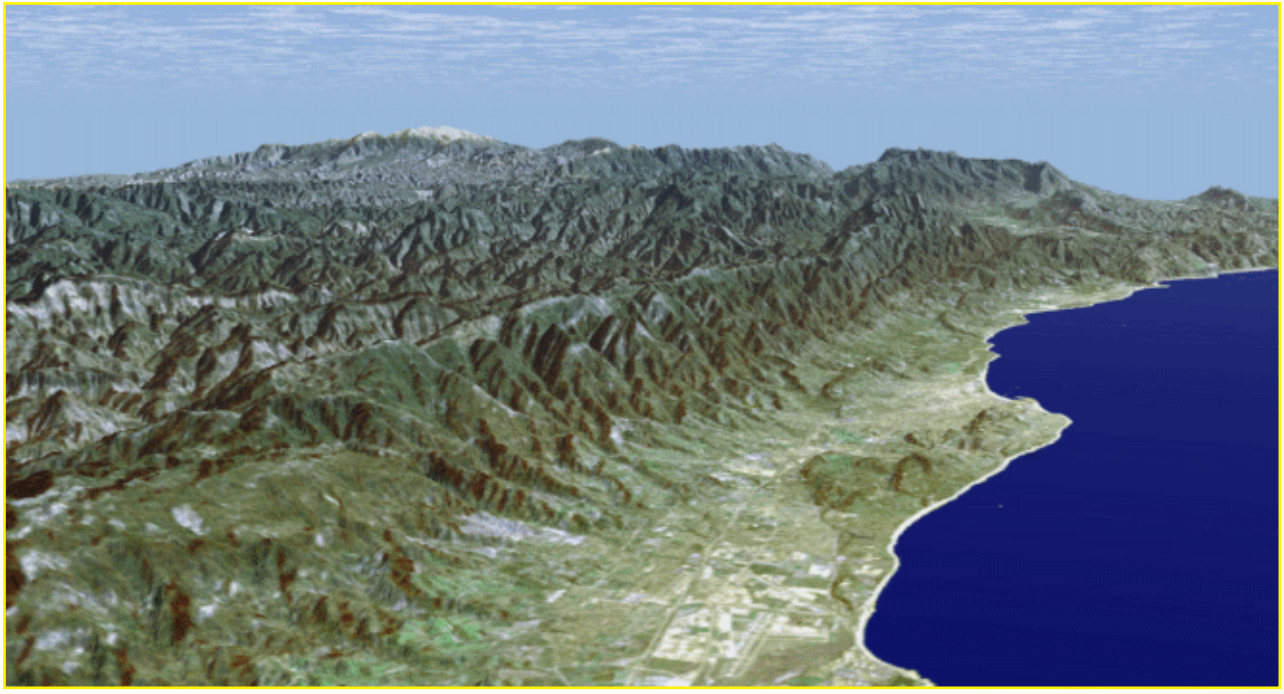
ABSTRACT

Web GIS capabilities go beyond mapping while the internet is the massive network of networks that connects millions of computer worldwide. The internet mapping for Multipurpose Cadastre is the way of data sharing that have flexible application to provide basic needs for referencing. Staying on course with the updated computerized - technology in Malaysia, an online information network system based on the geographical information service server has currently going places in the government and private companies. The system which is known as 'Web-Based GIS' functioned to ease people seeking information, processing and to manipulate spatial data via online. This can also encourage sharing information among the Government Department and organizations as well as the local communities. To cater the needs of people nowadays, a research has been done to design and develop the GIS applications by using 'MapGuide Open Source' software that will benefit to the communities. Thus, the areas of Wilayah Persekutuan Putrajaya have been chosen as trial to dictate the effectiveness of this study. The objective of this study is to design and develop a Web GIS for Multipurpose Cadastre. The outcomes of the study hopefully can provide better service to the local government and the communities in term of the gaining and sharing information process.

Keywords: *Web GIS, Multipurpose Cadastre, MapGuide Open Source*



INTRODUCTION

Availability of spatial data in digital form integrated to a database refers to as Geographic Information System (GIS) that provides widespreads of interdisciplinary applications. Web GIS could provide interactive mapping and spatial analysis capabilities reducing the problem of data ownership as data providers could open their sources for online mapping and analysis.The internet has for a long time been an important technology used for information dissemination. The rise of the internet and the World Wide Web (WWW) over the past decade has created many opportunities for its use in local, regional and national level. It is a medium used to access and gain information from a variety of places. In addition, the internet is a modern information relay system that connects hundreds of thousands of telecommunication networks and creates an 'internetworking' framework. On the other hand, internet GIS is a framework of network-based geographic information services that utilize both wired and wireless internet to access geographic information, spatial analytical tools, and GIS web services.

GIS is being widely used as a standalone or a supporting technology in solving a variety of problem. It has a wide range of application and one of it is generating a platform for viewing, storing, managing and updating information in a database. GIS enabled web applications can utilise any of a number of technologies and database platforms, the choice of which can impact on the performance of the web application.

The Multipurpose Cadastre (MPC) concept was introduced in 1983 as a conceptual model for a land information system that is versatile, with a multitude of function and capabilities to serve the society. In other to do so, the term web is used to represent a simple that allows user to interact with documents stored on computers across the mapping functionality across the internet. Simplistically, a MapGuide Maestro Open Source is using to design and develop Web GIS for MPC and test the functionality such as query, zooming scale and analysis function. Open source software is free and full of functionality for organization right to modify the software. In addition, the web-based develop is going to help the user to query about cadastre and land information. Web-based GIS provides a user friendly interface where the user can easily select or query the information described on map. Web-based GIS can provide cheaper, faster and more frequently updated data information for user.

WEB GIS

The use of GIS with web services as the major component of the planning support system is therefore significant as spatial information concerning planning and development needs to be organized and updates frequently (Ahris Yaakup, 2006). The development of information technology and GIS technology has triggered the evolution of traditional GIS system to distributed GIS which is based on internet platform. At this point in the Web GIS development process the idea of Web GIS is able to overcome the problem, especially for data distribution and sharing information.

With Internet technology, GIS was now able to make its concepts more open, accessible, and mobile to everyone thereby facilitating notions such as democratization of spatial data, open accessibility, and effective dissemination. The Web is now therefore literally everywhere, and can be used by almost any purpose. Information on the Web is largely unrestricted and unregulated (Noradilah Yahya, 2011). Consequently, the database provider with access to a website can add any document they choose to the Web, and link it to any other existing document. Thus, the Web forms a global and inter-linked information source.

Furthermore, distributing geospatial information on the internet is an enforcing factor for information providers. Internet allows all levels of society to access geospatial information, and provides a media for processing geo-related information with no location restriction (Helali, 2001). Typically, Web GIS model works when some computers act as a server and the others act as clients. To communicate between client and the proprietry GIS software, a client interface is add at the client side and at the middleware of the server side. There are consisting of Web Server, Web GIS software and database for the server side while a client is a Web browser. The Web GIS model works are shown in the Figure 1 below.

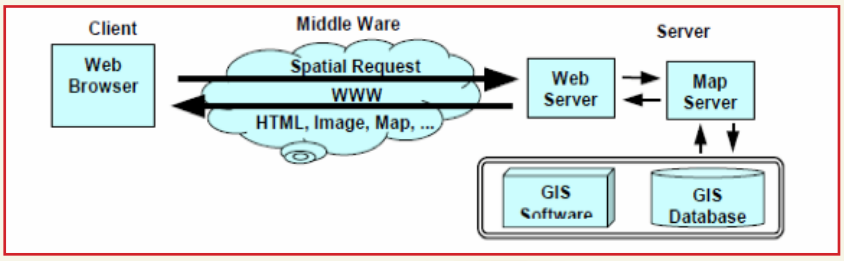


Figure 1: Web GIS Model Works (Source : Helali, 2001)

METHODOLOGY

To ensure that this study could achieve goals and objectives as planned, Figure 2 illustrates is a brief overview of methodology stages.

Preliminary study
- Literature review
- Work planning

User Requirement Analysis
- Discussion and understanding of the thesis

Phase 1

System, Database and Web GIS Design
- Conceptual Design
- Logical Design
- Physical Design

Data collection and Preparation
- Collect the data
- Data Processing

Phase 2

Web-based Interface Design
- Design and develop web-based application
- Develop user interface webpage

Web-based Development
- User Interface and System Development

Phase 3

System Testing

Functionality (query, searching, zooming, buffering)

Phase 4

Figure 2: The Flow Chart for the Methodology

3.1 Preliminary Study

A preliminary study was carried out to establish some knowledge of the research topic. Preliminary study is the first phase in study in order to develop a required system. This is to ensure the study meets the requirements and specifications required. Literature review is needed to investigate to related research that has been undertaken. The literature review referred from various sources such as previous journals, thesis, articles, books and internet. Next step involves research planning which includes understanding of function, role and identifying problem statement of the current Web GIS. Based on the problem statement, the objectives, scope and software involved in study are determined. The software is explored to know how it functions that going to be used for implementing this study. Besides, User Requirement Analysis is identified first to develop a system that serves the need of target users. This step plays a crucial part to determine the data and detailed study of the needs of potential system users.

3.2 System, Web GIS Design, Data Collection and Preparation

System design is a stage to determine how the Web GIS to be design and fulfill the user requirement. This stage includes the conceptual design, logical design and physical design. These requirements are very important to produce a good and systematic system to the user. The design of the Web GIS refers to the development of the Web GIS and database structure where involves the conceptual design, logical design and physical design. Data in personal geodatabase format was collected from *Jabatan Ukur dan Pemetaan Malaysia* (JUPEM). The data obtained should be processed using MapGuide Maestro 4.0.0 and HTML for display on the Web GIS applications to be developed.

3.2.1 Conceptual Design

Conceptual design is the process of integrating the overall user requirements as determined in the need assessment stage to develop a conceptual scheme and it shows clearly relation between entities in the model. Conceptual design will show clearly the relation between the entities in the model called Entity E Relation Diagram (ER-Diagram) shown in Figure 3.

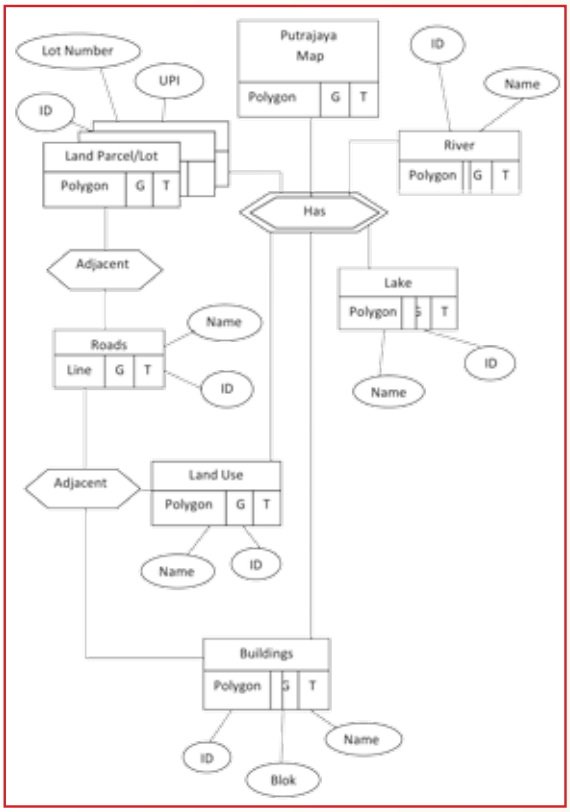


Figure 3: ER-Diagram of Multipurpose Cadastre Spatial Database

3.2.2 Logical Design

Logical design is more focus on the logical relationship among the objects and more abstract than the physical design, the logical design transformed conceptual model to suit the specific design for this web-based application in which table structure will include the entity name, geometry type, field name, description and data type. The table structure as shown in Table 1.

Table 1: Part of Logical Design Table Structure

Entity Name	Geometry Type	Field Name	Description	Data Type
Land Parcel	Polygon	Object ID	Object ID	Number
		Negeri	State code	Number
		Daerah	District code	Number
		Mukim	Sub-district code	Number
		Seksyen	Section code	Number
		Lot	Lot Number	Number
		UPI	Unique Parcel Identifier	Number
		Diukur	Area	Number
		PA	PA Number	Number

3.2.3 Physical Design

The physical design of the database specifies the physical configuration of the database on the storage media. This includes detailed specification of data elements, data types, indexing options and other parameters residing in the DBMS data dictionary. It is the detailed design of a system that includes modules and the database's hardware and software specifications of the system. The geodatabase storage for MPC is shown in Table 2.

Table 2: The geodatabase storage for MPC

Entity Name	Data Storage
Demarcation	1787 KB
Built Environment	688 KB
Hydrography	500 KB
Transportation	464 MB

3.3 Web-based Design and System Development

Web-based design is important to identify the contents of the web-based. The user interface was developed to make sure the interaction between users and web-based worked well. Figure 4 shows the web-based interface design concept. At this stage, programming languages election and medium used is important role to display all the information needed. The design of the web interface is created using HTML coding while the medium used to produce the map is using MapGuide Maestro 4.0.0 software.

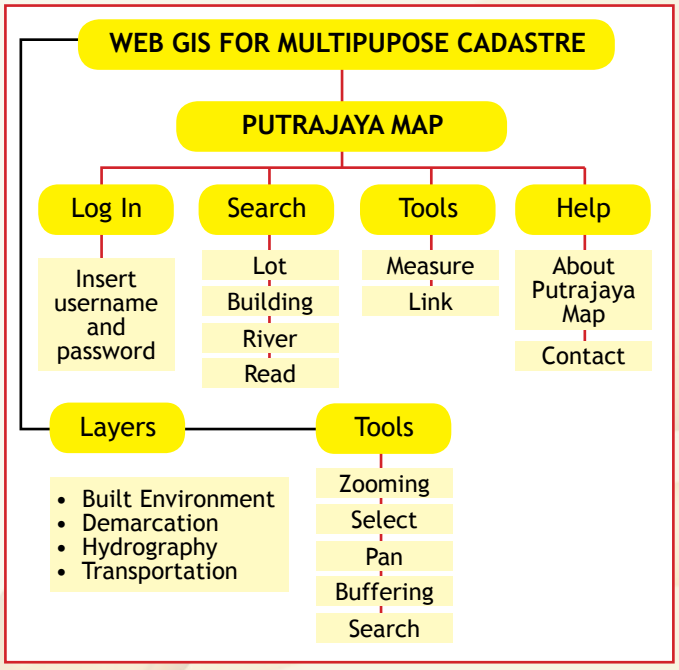


Figure 4: Web GIS Interface Design

3.4 System Testing

System testing is the last phase in developing Web GIS for MPC. The functionality of web-based such as query, zooming, pan was tested to ensure they fulfill the user requirement. It is important to make sure that map display having the ability for user to search the detail information.

RESULTS AND ANALYSIS

The result of developing web-based for MPC is discussed and illustrated. User can obtain the information at query function and the analysis from this study will show as follows:

4.1 Security Menu

To ensure that the database was used by certain user, the developing of interface require user to log in first before the application can be used. Figure 5 shows the page which is need to "LOG IN" before go to the homepage.

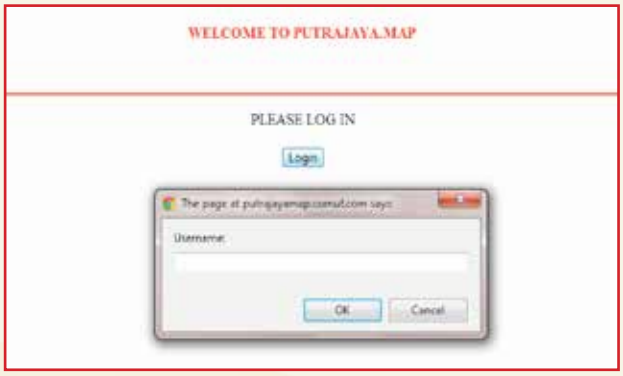


Figure 5: Security Menu

4.1 Homepage

Figure 6 shows the main interface applications. This web page provides a map and the information of the database.

Figure 6: Homepage Web GIS for Multipurpose Cadastre

4.3 Query Search Function

User can use the query function to search the lot number, building name, lake name and road name to get the information and location. The search function is shown in Figure 7.

Figure 7: Search Function

Query function is basically shown the result after performing the query search. The result will show on the right side of the task pane. By double clicking the result, the location of the area will automatically zoom to the feature.

Figure 8 to Figure 14 are show query search functions and the highlight purple area show the selected area.

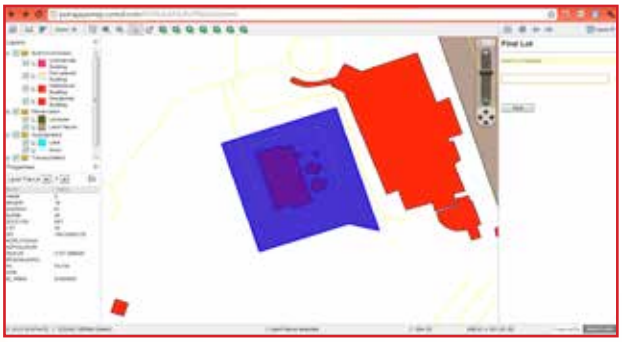


Figure 8: Query Search Zoom to the Land Parcel/Lot Number

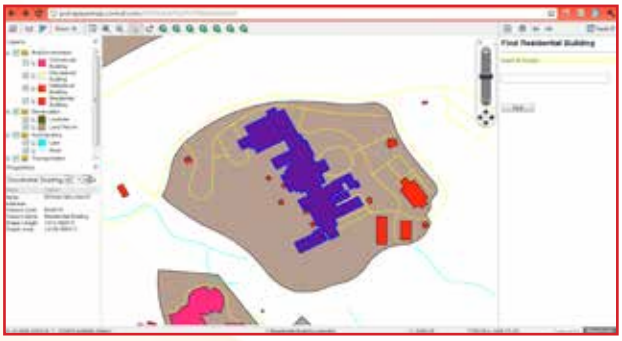


Figure 9: Query Search Zoom to the Residential Building

Figure 10: Query Search Zoom to the Educational Building

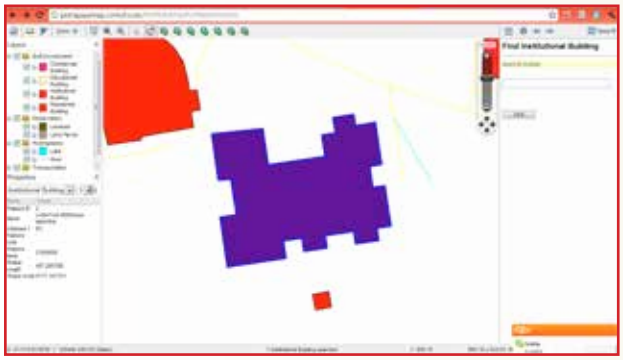


Figure 11: Query Search Zoom to the Institutional Building

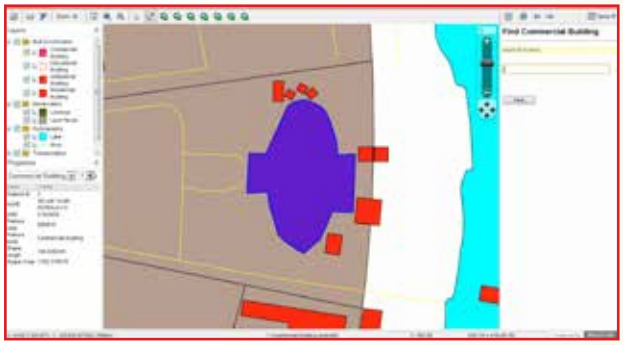


Figure 12: Query Search Zoom to the Commercial Building

Figure 13: Query Search Zoom to the Lake

Figure 14: Query Search Zoom to the Road

4.4 Display Attribute Data on Tooltips

Develop the user-friendly for user to know the asset information point immediately. In this context, user just need to move the mouse to the feature, and the information of the feature will be shown automatically on tooltips without any clicking as shown in Figure 15.

Figure 15: Attribute data shown on tooltips of feature

4.5 Zoom Functions

There are several zooming functions provided in this system such as zoom to rectangle, zoom in, zoom out, zoom to previous view and zoom to next view. (See Figure 16). Figure 17 shows user zoom to rectangle to particular area.

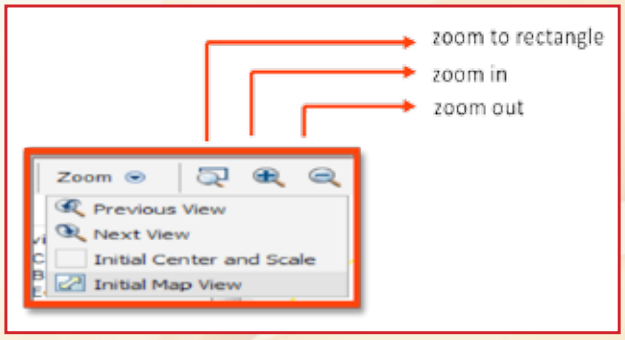


Figure 16: Zooming Function

Figure 17: Zoom to Rectangle Function

4.6 Distance Measurement Function

User can use distance measurement

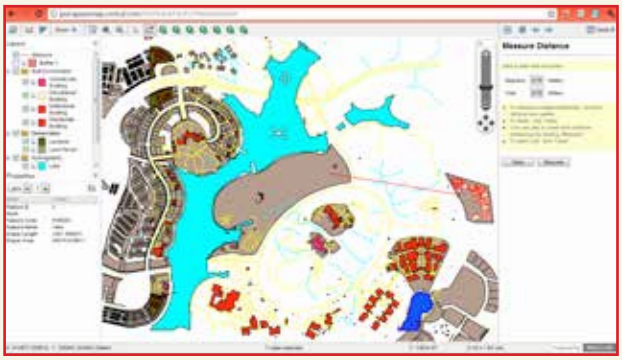


Figure 18: Distance Measurement Function

4.6 Buffering Analysis Function

The user can use the buffering analysis function to know the other feature within the buffer distance from the selected feature. For example distance within 1 km around the Educational Building as shown in Figure 19.

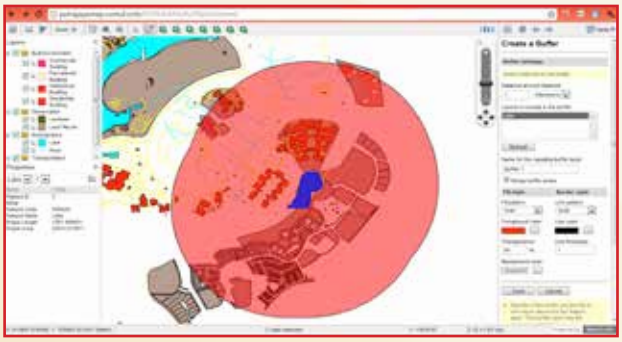


Figure 19 : Buffering 1 km from Lake

CONCLUSION AND RECOMMENDATION

As a conclusion, the objectives of the study were achieved with proper design and user friendly map of Web GIS for MPC. From the result, there are several aspects can be improved such as the structure and content of the user interface. The animation effect or flash and 3 Dimensional Visualization also can be added to make it looks even lively. Besides the information in the database should always be updated to ensure that the information is accurate and up-to-date.

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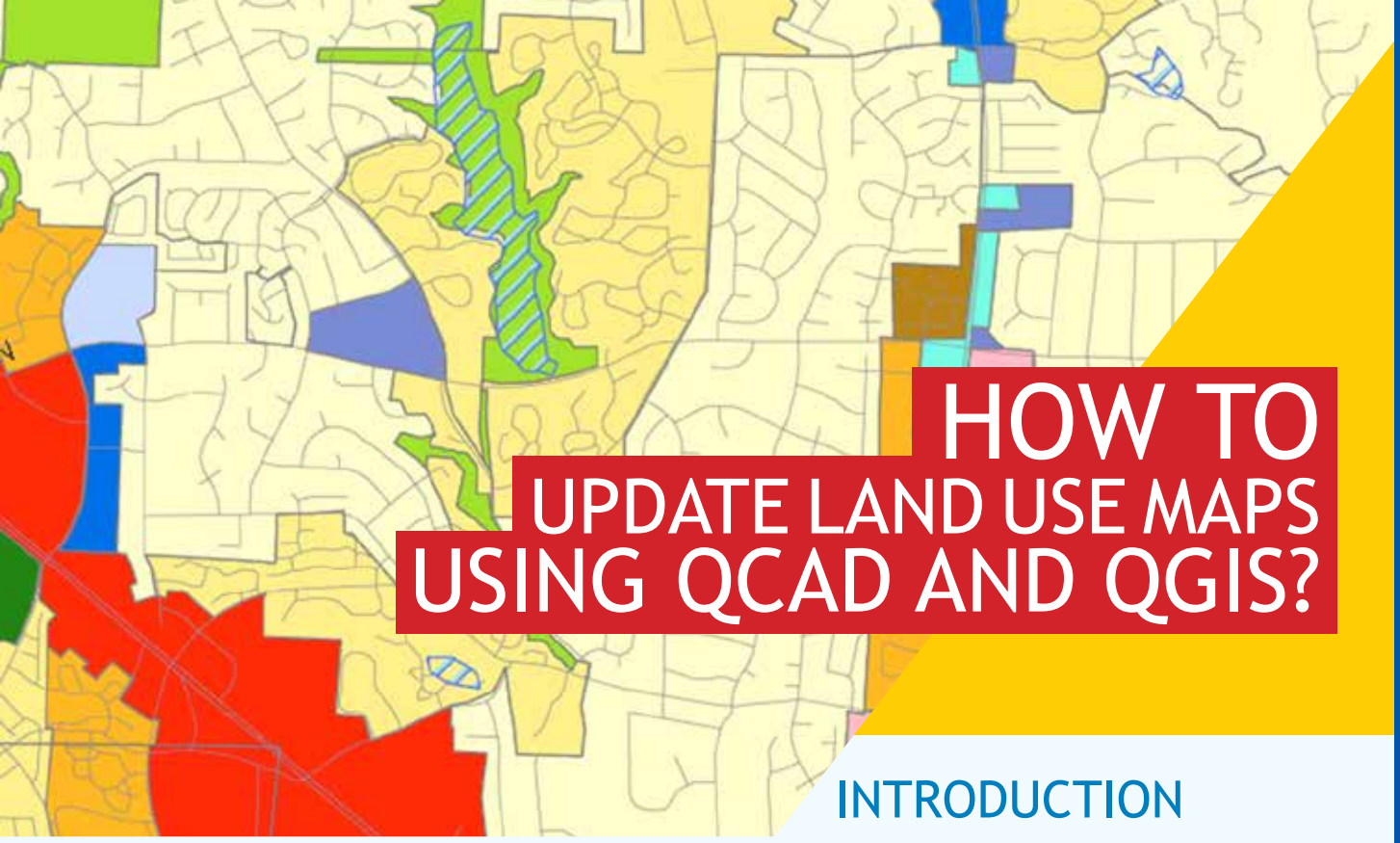

HOW TO UPDATE LAND USE MAPS USING QCAD AND QGIS?

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ABSTRACT

Local authority traditionally use proprietary Computer Aided Design (CAD) and Geographical Information System (GIS) software to process applications for planning permission as well as update their GIS maps. However, these specialized IT tools are expensive and can range around RM 25,000 for both licences per computer making it difficult for the majority of local authorities whom are poor to update their GIS maps such as zoning, committed and existing land use to aid better decision-making. The practical solution is for them to optimize on Open Source Software (OSS) as they can then reinvested their limited funds on upgrading IT hardware which is also an expensive task. Here, "QCAD" is the OSS CAD and "Quantum GIS (QGIS)" is the GIS software to exploit. This paper goes to prove that the use of OSS CAD and GIS is free, simple, user-friendly and can deliver the same output as proprietary software in the field of town and country planning.

Keywords: *Quantum GIS (QGIS), Quantum CAD (QCAD)*

INTRODUCTION

As local authorities advance in the use of digital software, they now impose a requirement that relevant plans for planning permission must be submitted in Computer Aided Design (CAD) format. The plan is sent as a *.dwg file. At the same time, the local authorities also require to update their zoning, committed and existing land use maps prepared in Geographical Information System (GIS) format. To make effective use of the CAD drawing to aid better decision-making, the *.dwg file needs to be converted into a GIS file. Here, the *.shp format is recommended as it is the most popular GIS format in the GIS community. Unfortunately, both CAD and GIS software are specialized software. Proprietary CAD and GIS software are expensive ranging around RM 25,000 for both licenses per computer. Many local authorities are also poor meaning they will find it difficult to update GIS plans. The more practical solution is for them to use of Open Source Software (OSS) as they are free to acquire. Any financial saving gained would best be invested upgrading IT hardware. The popular OSS CAD software "QCAD" and GIS software "Quantum GIS (QGIS)" are used here to prove that OSS can still deliver the same output as proprietary software in the field of town and country planning.

HOW TO GO ABOUT IT

Fundamentally, it requires various layers in the *.dwg file to be filtered leaving just the lot boundary. This is converted into a *.dxf file with QCAD. Next, it is converted into a *.shp file with QGIS. The polyline lot is then converted into a polygon. After the relevant polygon in the existing land use map is deleted, it is merged with the polygon lot. Manual adjustments shift and properly attach the polygon lot into the gap of the existing land use map. Lastly, unwanted fields carried over are deleted and lot acerage calculated. The map has been updated.

TASK 1:
Activate the *.dwg file and filter unwanted layers

QCAD is used to activate the *.dwg file.

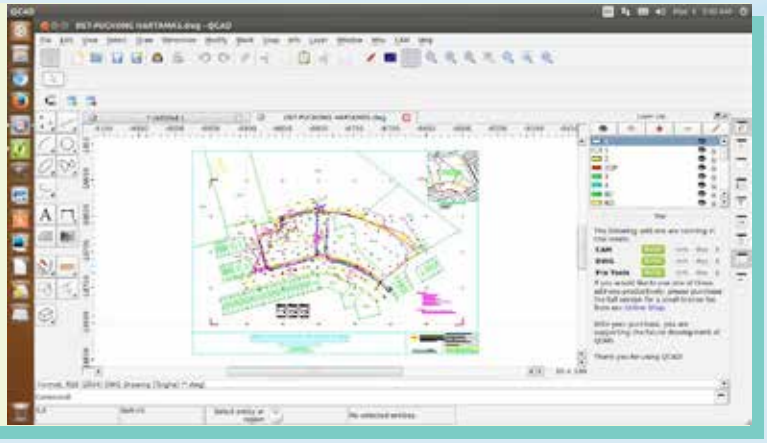

Figure 1: *.dwg file activated

TASK 2:
Identify the lot of the planning application

Unwanted layers are unselected in the Layer List Window leaving only the boundary layer. Next, QCAD is used to convert the *.dwg file into a *.dxf file.

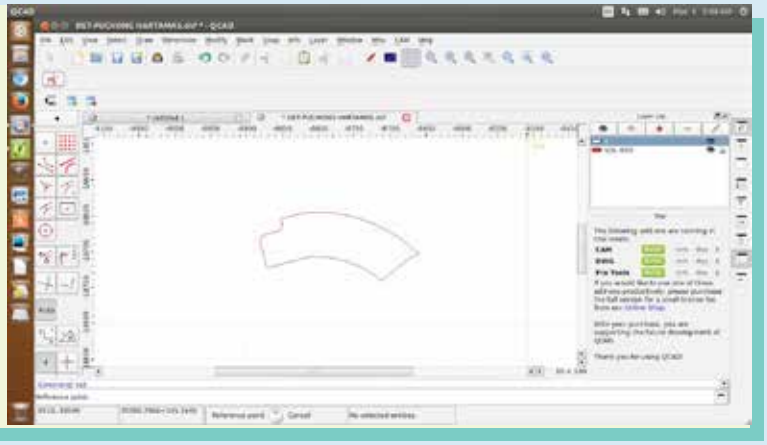

Figure 2: The boundary of the lot has been converted into a *.dxf file

TASK 3:
Convert polylines into polygon

QGIS is activated and the *.dxf file is converted into a shp file. Next, polylines are converted into a polygon.

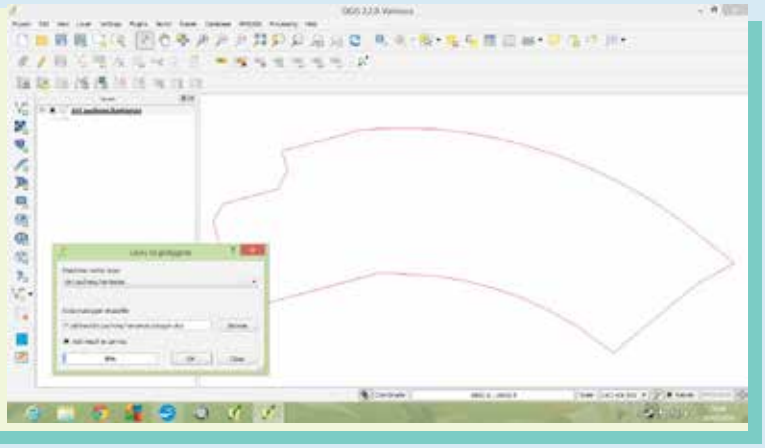

Figure 3: Converting polylines to a polygon

Task 4:

Merge the lot layer with the existing land use layer

The relevant polygon in the existing land use layer is deleted to prevent the overlay of similar polygons and double-counting of lot acerage. Next, both layers merge to become the updated existing land use map.

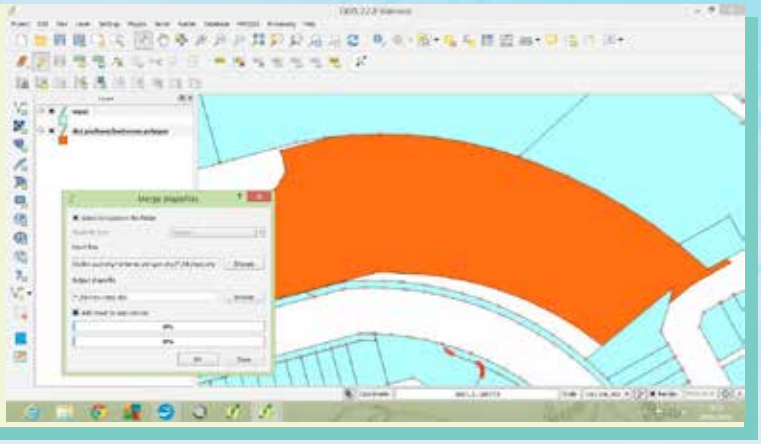

Figure 4: The lot layer and the existing land use layers are made to merge together

Task 5:

Adjust the location of the lot to the existing land use layer

The polygon is manually moved to fit into place as best as possible.

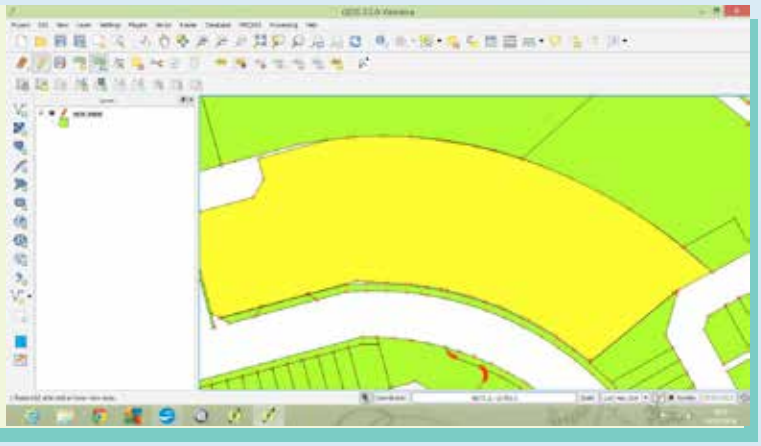

Figure 5: The lot is highlighted then moved to enable updating of the existing land use layer

Task 6:

Attach vertex of polygon to vertex of lot in the existing land use layer

The vertex of the polygon is moved to the appropriate vertex in the existing land use layer, not vice versa, to ensure that the accuracy of the lot boundary is maintained.

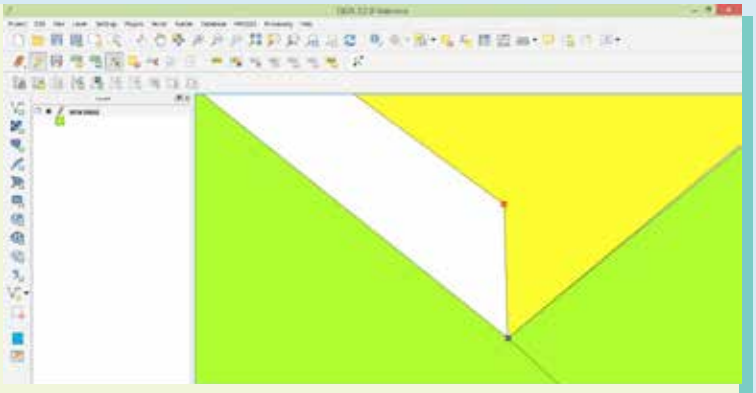

Figure 6: A vertex of the polygon before it is attached to the vertex of the existing land use layer

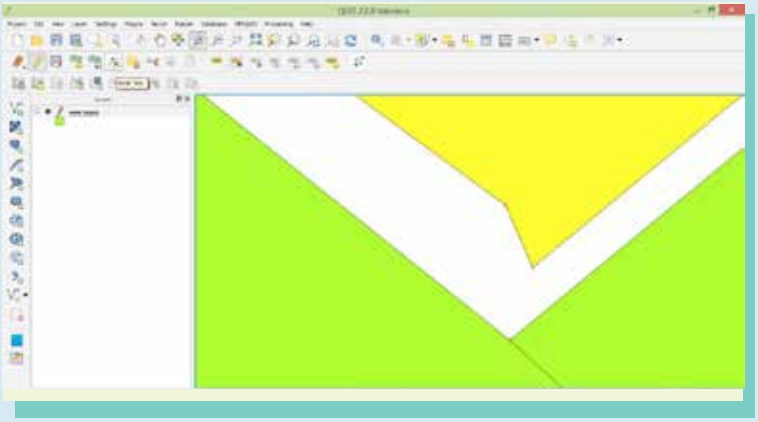

Figure 7 : A vertex of the polygon after it is attached to the vertex of the existing land use layer

Task 7:
Deleting unnecessary attributes

Unnecessary fields carried over are highlighted and deleted to confirm to a standard land use format.

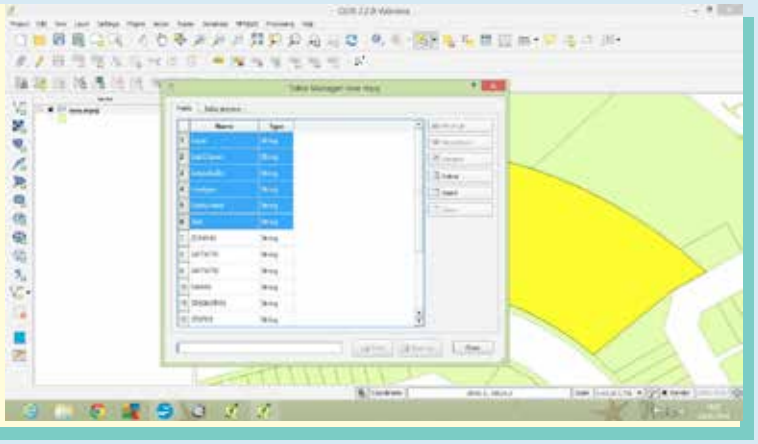

Figure 8: Unecessary fields are highlighted to be deleted with the Table Manager

Task 8:
Calculate lot area

An expression is configured with the Field Calculator to calculate and set lot area in hectares.

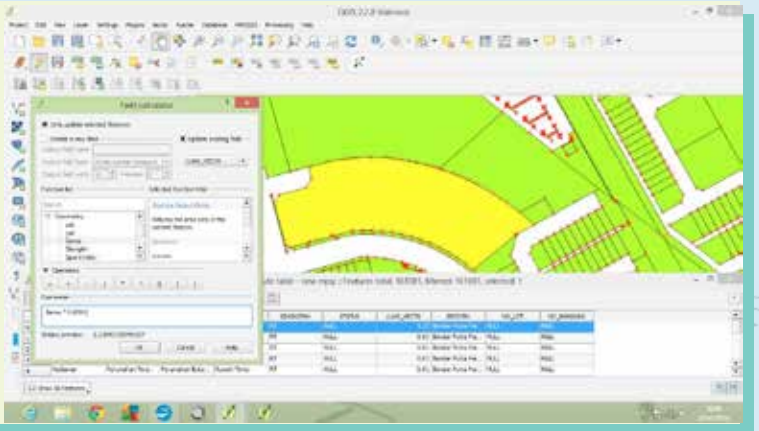

Figure 9: The Field Calculator also functions as a tool for calculating area

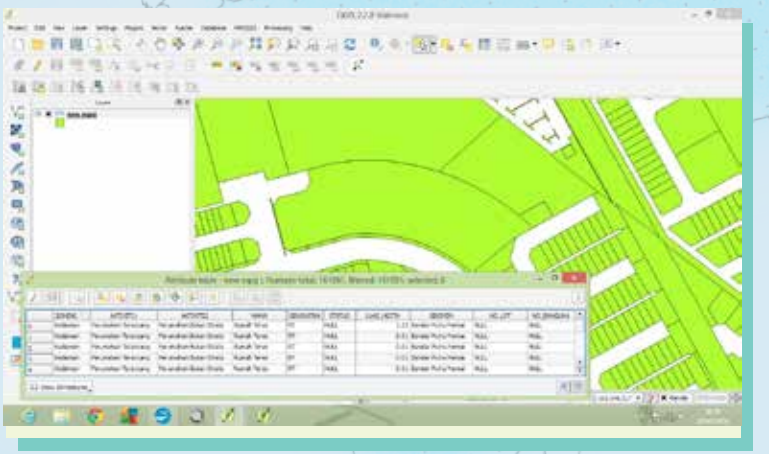

Figure 10: The final output shows the existing land use map has been updated

CONCLUSION

The use of QCAD and QGIS shows that local authorities can optimize on OSS to procure CAD and GIS software and carry out their daily responsibilities of updating their GIS maps and this cost them nothing and any potential savings can be better invested in upgrading hardware.

REFERENCES

Quantum GIS Ver. 2.2

QCAD Ver. 3.4.5

GIS DAY Sana-Sini

MINGGU GEOGRAFI
@ SEK. MEN. PUTRAJAYA PRESINT 11

Tempat :
BILIK PPSMI, SEK. MEN. PUTRAJAYA PRESINT 11, PUTRAJAYA

Tarikh :
22 OGOS 2013

Minggu Geografi Sekolah Menengah Putrajaya Presint 11 (1) telah diadakan pada 19 Ogos 2013 hingga 23 Ogos 2013. Bersempena dengan Minggu Geografi tersebut, Pusat Infrastruktur Data Geospatial Negara (MaCGDI) telah dijemput untuk memberi ceramah berkaitan Alam Sekitar kepada pelajar Tingkatan 2 bertempat di Bilik PPSMI.

Dalam sesi ceramah selama satu jam ini, para pelajar telah didedahkan serba sedikit berkenaan kepentingan menjaga alam sekitar, jenis-jenis pencemaran alam sekitar serta kesan yang dihadapi jika berlakunya pencemaran. Selain itu, sesi soal jawab turut diadakan bagi memberi peluang kepada para pelajar untuk mengajukan sebarang persoalan berkaitan alam sekitar.

Sebelum berakhirnya sesi ceramah, satu sesi kuiz berkaitan topik ini juga telah diadakan dan sambutan yang diberikan sangat menggalakkan. Ceramah alam sekitar ini diharap dapat memberikan kesedaran tentang kepentingan penjagaan alam sekitar kepada generasi yang akan datang amnya dan memberi impak positif kepada pelajar yang menghadiri sesi ceramah ini akan peranan dan tanggungjawab mereka dalam menjaga alam sekitar.

LAWATAN TEKNIKAL DELEGASI DARI INTERNATIONAL CARTOGRAPHIC ASSOCIATION

Tempat :
BILIK MESYUARAT PERMATA, ARAS 7, NRE

Tarikh :
23 OGOS 2013

Bertempat di Bilik Mesyuarat Permata, Aras 7, satu lawatan teknikal telah diadakan oleh delegasi dari *International Cartographic Association* (ICA) ke Pusat Infrastruktur Data Geospatial Negara (MaCGDI). Antara ahli delegasi yang hadir ialah Prof. RNDr. Milan Konecny dari Faculty of Science, *Institute Geography, Laboratory on Geoinformatics & Cartography, University Masaryk*, Czech Republic dan Prof. Temenoujka Bandrova dari University of Geodesy, Bulgaria. Pihak delegasi telah diiringi oleh wakil dari Jabatan Ukur dan Pemetaan Malaysia (JUPEM) iaitu Sr Azlim Khan bin Abdul Raof Khan. Lawatan ini telah dipengerusikan oleh Puan Fuziah binti Haji Abu Hanifah, Pengarah MaCGDI.

Lawatan ini dimulakan dengan sesi perkenalan antara pihak delegasi dan MaCGDI. Sesi taklimat ringkas berkaitan penubuhan MaCGDI dan Malaysia Geospatial Data Infrastructure (MyGDI) telah disampaikan oleh Pengarah MaCGDI. Kedua-dua belah pihak telah bertukar-tukar pendapat mengenai perkembangan teknologi geospatial di negara masing-masing dalam sesi perbincangan.

MaCGDI juga berbesar hati berkongsi idea dan pengalaman bagaimana teknologi GIS dilaksanakan di dalam pembangunan geospatial di Malaysia. Selain itu, penerangan berkaitan penyebaran maklumat geospatial dalam usaha mengelakkan pertindihan aktiviti geospatial juga turut dibincangkan. Di akhir sesi lawatan, kedua-dua belah pihak telah bertukar cenderahati.

PAMERAN SEMINAR PEMETAAN UTILITI KEBANGSAAN 2013

Tempat :
HOTEL ISTANA JALAN RAJA CHULAN, KUALA LUMPUR

Tarikh :
29 OGOS 2013

Bertemakan "Pemacu Pembangunan Lestari", Jabatan Ukur dan Pemetaan Malaysia (JUPEM), Kementerian Sumber Asli dan Alam Sekitar telah menganjurkan Seminar Pemetaan Utiliti Kebangsaan 2013. Seminar ini telah dirasmikan oleh Menteri Sumber Asli dan Alam Sekitar, YB Datuk Seri G. Palanivel.

Seminar yang dihadiri oleh pegawai kerajaan, pihak berkuasa tempatan, agensi pemilik utiliti, Jurukur tanah bertauliah dan pemaju hartanah dapat memberi kesedaran mengenai keperluan pemetaan utiliti bawah tanah kepada pihak-pihak yang terlibat di dalam perolehan, pengukuran dan pengurusan data/maklumat utiliti bawah tanah.

Seminar yang dianjurkan ini telah mendapat sambutan yang menggalakkan daripada hadirin sekaligus mencapai objektif yang disasarkan.

KARNIVAL JALUR LEBAR 1MALAYSIA PERINGKAT NEGERI KEDAH

Tempat :
PADANG UMUM, KULIM, KEDAH

Tarikh :
27 - 29 SEPT 2013

Karnival Jalur Lebar 1Malaysia peringkat Negeri Kedah Darul Aman telah diadakan buat julung kalinya. Objektif utama karnival ini adalah bagi meningkatkan kesedaran kepentingan teknologi ICT dan penggunaan jalur lebar sekali gus bertindak sebagai pencetus kepada minat orang ramai untuk mengetahui, mengguna dan melanggan perkhidmatan ini. Selain itu, kesedaran kepentingan penggunaan perkhidmatan ini akan dapat mengurangkan jurang antara masyarakat bandar, pinggir bandar dan luar bandar melalui penyampaian maklumat jalur lebar kerana masih ramai tidak mengetahui tentang kelebihan perkhidmatan ini.

Karnival tiga hari anjuran Kementerian Komunikasi dan Multimedia bersama Suruhanjaya Komunikasi dan Multimedia, Kerajaan Kedah dan Telekom Malaysia ini dirasmikan oleh Pengerusi Jawatankuasa Sains, Inovasi dan Teknologi Maklumat dan Teknologi Tinggi, YB Norsabrina binti Mohd Noor.

Lebih 30 *booth* pameran dari pelbagai agensi mengambil bahagian, antaranya ialah Pusat Infrastruktur Data Geospatial Negara (MaCGDI), Kementerian Komunikasi dan Multimedia, Suruhanjaya Komunikasi dan Multimedia Malaysia, Perbadanan Pembangunan Multimedia, Telekom Malaysia, Maxis, Celcom, Digi, Pos Malaysia dan Jabatan Penerangan Malaysia.

GIS@SCHOOL DI KULIM KEDAH

Tempat :
PADANG UMUM, KULIM, KEDAH

Tarikh :
29 SEPT 2013

Karnival Jalur Lebar 1Malaysia peringkat Negeri Kedah Darul Aman telah diadakan bertempat di Padang Umum, Kulim, Kedah. Karnival tiga hari yang dianjurkan oleh Kementerian Komunikasi dan Multimedia bersama Suruhanjaya Komunikasi dan Multimedia, Kerajaan Kedah dan Telekom Malaysia turut mempelawa Pusat Infrastruktur Data Geospatial Negara (MaCGDI) untuk turut serta dalam aktiviti yang dirancang dengan mengadakan program *GIS@School*. Program ini telah dirasmikan oleh Encik Ridwan bin Mat Naim, Pegawai Pendidikan Daerah Kulim, Kedah.

Objektif bagi program *GIS@School* antara lainnya ialah untuk memberikan pendedahan awal kepada pelajar-pelajar sekolah tentang kepentingan maklumat geospatial dan kaitannya terhadap alam sekitar. Aktiviti-aktiviti yang dijalankan termasuklah :

1- Pertandingan melukis poster
2- Pertandingan *Explore Race*
3- Pertandingan *Jigsaw Puzzle* (Individu)
4- Pertandingan *Mix, Match and Map*
5- Pertandingan *Crossword Puzzle*

Aktiviti seperti ini dapat memupuk minat dan memberi kesedaran kepada para pelajar betapa pentingnya pengetahuan berkaitan geografi dengan kehidupan seharian.

Program *GIS@School* kali ini melibatkan 10 buah sekolah di sekitar Kulim Kedah dan kumpulan sasaran adalah pelajar tahun 6. Sekolah-sekolah yang terlibat adalah seperti berikut:

1- Sekolah Kebangsaan Taman Hi-Tech
2- Sekolah Kebangsaan Taman Selasih
3- Sekolah Kebangsaan Air Merah
4- Sekolah Kebangsaan Taman Kenari
5- Sekolah Kebangsaan Tunku Abdul Malik
6- Sekolah Kebangsaan Sungai Ular
7- Sekolah Kebangsaan Kulim
8- Sekolah Kebangsaan Kulim (Bandar)
9- Sekolah Jenis Kebangsaan (T) Kulim
10- Sekolah Jenis Kebangsaan (C) Chong Cheng

PAMERAN *INTERNATIONAL SYMPOSIUM AND EXHIBITION ON GEOINFORMATION (ISG 2013)*

Tempat :
UNIVERSITI TEKNOLOGI MALAYSIA (UTM), KUALA LUMPUR

Tarikh :
24-25 OKT 2013

Pada 24 - 25 Oktober 2013 yang lalu, bertempat di Universiti Teknologi Malaysia (UTM), Jalan Semarak, Kuala Lumpur telah diadakan *International Symposium and Exhibition on Geoinformation 2013* (ISG2013). Objektif Simposium ini adalah untuk menghimpunkan golongan profesional yang terlibat dengan Teknologi Geoinformasi yang merangkumi teknologi GIS, GPS, *Remote Sensing, Automated Mapping/Facilities Management* (AM/FM), *Supervisory Control and Data Acquisition* (SCADA) dan teknologi geospatial yang berkaitan. Selain itu, simposium ini juga menjadi medium para saintis dari pelbagai institusi, industri-industri dan badan-badan kerajaan dalam menganalisis dan menerokai hala tuju baru teknologi Geoinformasi ini.

Satu bengkel juga telah diadakan pada simposium ini yang bertajuk ***Land Administration Domain Model*** (LADM) dimana beberapa topik menarik telah dipilih untuk dibentangkan oleh *speaker-speaker* yang terpilih. MaCGDI telah menyertai pameran ini untuk mempromosikan program MyGDI di peringkat kebangsaan kepada peserta-peserta simposium yang terdiri daripada pelbagai agensi iaitu agensi kerajaan, badan berkanun, sektor awam dan para akademia. Antara aktiviti yang dijalankan di booth MaCGDI adalah penerangan berkenaan dengan program MyGDI dan aplikasi yang dibangunkan oleh MaCGDI. Projek pembangunan data geospatial menggunakan cerapan data imej udara beresolusi tinggi menggunakan *Unmanned Aerial Vehicle* (UAV) turut diterangkan.

17th ESRI Malaysia User Conference 2013

Tempat :
PUSAT ANTARABANGSA KONVENSYEN PUTRAJAYA (PICC)

Tarikh :
29 - 30 OCT 2013

17th ESRI Malaysia User Conference 2013 telah dihadiri oleh peserta daripada pelbagai sektor dan vendor yang terlibat dalam bidang geospatial. Persidangan ini telah dihadiri oleh 11 pegawai MaCGDI. Pelbagai program telah dijalankan oleh pihak penganjur sebagai pengisian 2 hari persidangan ini termasuk pembentangan kertas kerja, *hands-on* program, pameran, sesi demonstrasi dan sebagainya. Pengarah MaCGDI, Puan Fuziah binti Hj Abu Hanifah telah diberi penghormatan untuk menyampaikan pembentangan semasa sesi *plenary* bertajuk *'MyGOS by MaCGDI'*. Persidangan ini memberi peluang kepada peserta untuk mengetahui dengan lebih dekat lagi produk dan perkhidmatan yang disediakan oleh pihak ESRI Malaysia disamping dapat berkongsi aktiviti geospatial dikalangan komuniti geospatial. Pegawai MaCGDI yang hadir berpeluang mengetahui dengan lebih dekat lagi produk-produk terbaru dari pihak ESRI. Disamping itu, pegawai juga berpeluang melibatkan diri dalam sesi *hands-on* bagi memberi pengalaman dan pemahaman yang mendalam bagi sesuatu produk.

PAMERAN BAGI PERTANDINGAN REKAAN & HIASAN SEMPENA HARI INOVASI
KEMENTERIAN SUMBER ASLI & ALAM SEKITAR 2013

Tempat :
DEWAN BAIDURI, WISMA SUMBER ASLI, PUTRAJAYA

Tarikh :
29 - 30 OCT 2013

Penganjuran Sambutan Hari Inovasi 2013 bertujuan untuk menyemarakkan budaya inovasi di kalangan warga NRE dan Jabatan serta agensi-agensi di bawahnya di samping memberi pengiktirafan dan penghargaan kepada semua yang telah berusaha dalam menyumbangkan idea-idea yang bernas dan unik. MaCGDI telah mewakili Kementerian Sumber Asli dan Alam Sekitar dalam pertandingan Rekaan dan Hiasan Sempena Hari Inovasi 2013.

Antara aktiviti-aktiviti yang dilaksanakan sepanjang sambutan Hari Inovasi ini adalah pameran inovasi, kuiz, pertandingan poster propaganda, pertandingan mencipta slogan dan beberapa lagi aktiviti lain. Beberapa anugerah inovasi juga dipertandingkan dengan penglibatan semua bahagian, jabatan dan agensi di bawahnya. Jabatan Pengairan dan Saliran telah dinobatkan sebagai juara keseluruhan daripada 9 anugerah yang dipertandingkan pada tahun ini.

LAWATAN DARI ICSU WDS-IPO

Tempat :
BILIK MESYUARAT PERMATA, ARAS 7, NRE

Tarikh :
14 NOV 2013

MaCGDI telah menerima kunjungan daripada warganegara Jepun iaitu Encik Takashi Watanabe dari ICSU WDS-IPO. Lawatan teknikal ini dipengerusikan oleh Puan Hajjah Norizam binti Che Noh, Timbalan Pengarah Cawangan Khidmat ICT.

Lawatan ini dimulakan dengan sesi perkenalan antara Encik Takashi Watanabe dan wakil MaCGDI. Selepas itu, sesi taklimat ringkas berkaitan penubuhan MaCGDI dan MyGDI telah disampaikan oleh pengerusi. Pengerusi juga menegaskan mengenai akta perlindungan data dan maklumat negara sentiasa dilindungi sebagai rahsia negara di mana ia tidak boleh dijual atau dikongsi kepada mana-mana pihak luar.

Sesi perkongsian ilmu oleh Encik Takashi Watanabe berkaitan pengalaman beliau di dalam pelaksanaan pembangunan aktiviti geospatial di negara Jepun dan beberapa negara yang dilawati oleh beliau. Beliau juga diberi pendedahan mengenai pelaksanaan pembangunan aktiviti geospatial di Malaysia. Di akhir sesi lawatan, pihak MaCGDI telah menyerahkan cenderahati sebagai penghargaan tanda hubungan dua hala yang telah terjalin.

LAWATAN SAMBIL BELAJAR MAHASISWA KURSUS PENDERIAAN JAUH DAN GIS, UNIVERSITI MALAYSIA TERENGGANU (UMT)

Tempat :
BILIK MESYUARAT MUTIARA, ARAS 13, NRE

Tarikh :
22 NOV 2013

Pusat Infrastruktur Data Geospatial Negara (MaCGDI) telah menerima lawatan sambil belajar dari mahasiswa Kursus Penderiaan Jauh dan GIS dari Universiti Malaysia Terengganu (UMT). Lawatan disertai seramai 96 orang mahasiswa bersama seorang pensyarah, iaitu Dr. Razak bin Zakariya dan dua (2) orang pegawai universiti.

Lawatan ini telah dipengerusikan oleh Encik Hamdan bin Ab Aziz, Timbalan Pengarah Cawangan Polisi dan Pembangunan Standard. Objektif lawatan antaranya ialah memberi pendedahan berkaitan peranan dan kepentingan teknologi GIS yang telah diguna pakai sejajar dengan perkembangan teknologi terkini di seluruh dunia khususnya di Malaysia. Mahasiswa juga dapat menghubung kaitkan ilmu yang dipelajari secara teori dengan situasi kerja sebenar. Ini dapat memupuk minat mahasiswa terhadap teknologi GIS yang semakin berkembang maju.

Sehubungan itu, satu sesi taklimat telah diadakan bagi memberi penerangan berkenaan aplikasi teknologi GIS yang diguna pakai dalam pembangunan data sedia ada. Di samping itu, taklimat berkaitan visi dan misi serta peranan MaCGDI dalam membangunkan infrastruktur bagi memudahkan carian dan perkongsian maklumat geospatial di sektor awam dan sektor swasta. Selain itu, aplikasi *Malaysia Geospatial Online Services* (MyGOS) juga turut dibentangkan kepada mahasiswa sebagai pendedahan awal kepada teknologi GIS.

LAWATAN TEKNIKAL DARI PCI GEOMATICS INC. (CANADA)

Tempat :
BILIK MESYUARAT PERMATA, ARAS 7, NRE

Tarikh :
12 DIS 2013

Delegasi dari PCI Geomatics Inc. (Canada) yang diwakili oleh Mr. Allan Place, *Director Sales - Asia Pacific PCI Geomatics Inc.* dan wakil dari Syarikat Jurupro Sdn. Bhd. iaitu Encik Khairul Nizar bin Badaruddin, telah mengadakan lawatan teknikal ke MaCGDI.

Lawatan ini dipengerusikan oleh Pengarah MaCGDI, Puan Fuziah binti Haji Abu Hanifah yang bertujuan untuk berkongsi maklumat mengenai teknologi-teknologi terkini berkaitan geospatial yang digunapakai oleh Syarikat PCI Inc. dan Syarikat Jurupro.

Satu taklimat ringkas mengenai penubuhan MaCGDI dan aplikasi MyGDI telah disampaikan. Pengisian taklimat adalah berkaitan pembangunan dan pelaksanaan aktiviti penyebaran serta perkongsian data geospatial di Malaysia yang melibatkan susur galur pembangunan Spatial Data Infrastructure (SDI) yang telah dibangunkan oleh pihak MaCGDI.

Sesi perbincangan membincangkan halatuju MaCGDI ke arah penggunaan maklumat geospatial yang lebih global dan penggunaan teknologi terkini yang digunapakai di Malaysia. Sesi lawatan ini diakhiri dengan penyampaian cenderahati oleh Pengarah MaCGDI kepada wakil PCI Geomatics Inc. dan wakil Jurupro.

LAWATAN SAMBIL BELAJAR PELAJAR TAHUN 1,

SARJANA MUDA KEJURUTERAAN GEOMATIK, UNIVERSITI TEKNOLOGI MALAYSIA (UTM)

Tempat :
BILIK MESYUARAT PERMATA, ARAS 7, NRE

Tarikh :
12 DIS 2013

MaCGDI telah menerima lawatan sambil belajar dari Pelajar Tahun 1, Sarjana Muda Kejuruteraan Geomatik, Universiti Teknologi Malaysia (UTM) yang disertai seramai 37 orang mahasiswa. Lawatan ini telah diketuai oleh, Tuan Haji Shaharudin bin Mohd Said, Pensyarah Kanan, Fakulti Geoinformasi dan Harta Tanah.

Lawatan ini telah dipengerusikan oleh Puan Hajah Mariyam binti Mohamad, Timbalan Pengarah Cawangan Pembangunan Sistem. Objektif lawatan adalah bagi mendapatkan pendedahan kaedah perkongsian maklumat geospatial antara agensi yang menggunakan teknologi ICT bagi penyebaran maklumat yang tepat dan terkini. Disamping itu, manfaat yang diperolehi daripada lawatan ini adalah informasi-informasi tambahan berkaitan pelaksanaan teknologi GIS di sektor awam dan mengetahui dengan lebih lanjut aktiviti-aktiviti GIS di Malaysia.

Satu sesi taklimat telah diadakan bagi menerangkan peranan dan fungsi MaCGDI di dalam perkongsian data di antara agensi. Taklimat asas ini diselitkan dengan sesi soal jawab daripada mahasiswa yang hadir. Taklimat dan demo seterusnya adalah berkaitan aplikasi MyGOS yang merupakan salah satu produk yang dihasilkan oleh MaCGDI. Aplikasi ini berjaya menarik minat mahasiswa yang menerangkan bagaimana maklumat-maklumat geospatial dikongsikan di dalam web portal MaCGDI.

LAWATAN MaCGDI KE PUSAT KAWALAN KECEMASAN, AGENSI MAJLIS KESELAMATAN NEGARA (MKN) DI PULAU MERANTI

Tempat :
PUSAT KAWALAN KECEMASAN

Tarikh :
18 DIS 2013

MaCGDI telah mengadakan lawatan ke Agensi Majlis Keselamatan Negara (MKN) di Pulau Meranti (Markas Smart) yang diketuai oleh Pengarah MaCGDI, Pn Fuziah binti Hj Abu Hanifah. Lawatan ini turut disertai seramai 9 orang pegawai MaCGDI dan 10 orang wakil agensi. Wakil MKN telah memberikan penerangan berkaitan peranan-peranan dan tugas yang dimainkan oleh pihak MKN serta pemantauan yang dilakukan oleh pihak MKN.

Selain itu para pegawai turut diberi penerangan berkaitan Arahan MKN No. 20: Dasar dan Mekanisme Pengurusan Bencana Negara. Para pegawai juga turut dibawa melawat ke Bilik Operasi bagi menyaksikan sendiri kerja-kerja pemantauan dilakukan oleh kakitangan di Markas Smart.

Arahan ini mula diwujudkan pada 11 Mei 1997 oleh Majlis Keselamatan Negara (MKN), Jabatan Perdana Menteri (JPM) ekoran daripada tragedi keruntuhan Pangsapuri Highland Towers di Hulu Klang, Selangor pada 11 Disember 1993. Bagi memperkemas dan memperluaskan skop pengurusan Bencana yang semakin rumit dan kompleks, Arahan ini telah disemak semula pada 30 Mac 2012 bagi menerangkan peranan pihak-pihak yang berkaitan supaya ianya lebih menyeluruh dan bersepadu.

Arahan ini disediakan bertujuan untuk menggariskan dasar dan mekanisme pengurusan bencana secara menyeluruh termasuk peranan dan tanggungjawab Agensi Kerajaan, badan berkanun, pihak swasta dan badan-badan sukarela meliputi peringkat sebelum, semasa dan selepas berlaku sesuatu bencana supaya pengemblengan sumber dapat disepadukan bagi mengelakkan pembaziran, konflik serta pertindihan peranan.

Terdapat 11 jenis bencana yang akan diurus di bawah Arahan ini iaitu:

a. bencana alam (banjir, ribut/taufan, gempa bumi, tsunami, ombak besar, kemarau dan tanah runtuh);
b. bencana industri (letupan, kebakaran, pencemaran, kebocoran bahan berbahaya di kilang/loji/depot yang memproses, mengeluar dan menyimpan bahan ini);
c. kemalangan melibatkan pengangkutan/ penyaluran/pemindahan bahan berbahaya);
d. keruntuhan bangunan/struktur khas;
e. kemalangan udara (yang berlaku di kawasan berpendudukan tinggi);
f. pelanggaran/gelinciran keretapi/lain-lain sistem pengangkutan rel yang melibatkan jumlah mangsa/kemusnahan harta benda yang besar;
g. kebakaran (melibatkan kawasan yang luas termasuklah kebakaran bangunan tinggi/ struktur khas yang mempunyai ramai orang);
h. empangan/takungan air pecah;
i. kemalangan kimia, biologi, radiologi dan nuklear;
j. kejadian jerebu;
k. penularan wabak penyakit berjangkit yang tidak terkawal/pandemik; dan
l. lain-lain kejadian Bencana yang akan diisytihar/ ditetapkan Kerajaan.

Kejadian yang tidak tersenarai di atas akan ditakrifkan sebagai Kejadian Bukan Bencana dan tidak tertakluk di bawah Arahan ini. Lawatan sebegini diharap dapat memberi pendedahan dan perkongsian maklumat antara kedua-dua agensi.

LAWATAN TEKNIKAL DARI RESTEC JAPAN

Tempat :
BILIK MESYUARAT PERMATA, ARAS 7, NRE

Tarikh :
26 DIS 2013

MaCGDI telah menerima lawatan dari Encik Toshi Kamei dari Restec Japan. Sesi lawatan telah dipengerusikan oleh Puan Fuziah binti Haji Abu Hanifah, Pengarah MaCGDI.

Tujuan lawatan diadakan untuk berkongsi dan bertukar pandangan mengenai pembangunan GIS di Malaysia. Antara perkara yang dibincangkan adalah perkongsian dan penyebaran maklumat geospatial di kalangan agensi kerajaan, swasta, badan berkanun dan orang awam. Ini amat penting bagi mengelakkan pertindihan dan pembaziran dalam pengutipan dan penyenggaraan maklumat geospatial.

Encik Toshi Kamei juga berbesar hati untuk berkongsi maklumat perkembangan GIS di negaranya. Beliau turut memberikan beberapa khidmat nasihat dan pandangan bagi menyokong pembangunan geospatial negara.

LAWATAN DARI DELEGASI OMAN

Tempat :
BILIK MESYUARAT PERMATA, ARAS 7, NRE

Tarikh :
30 DIS 2013

Satu lawatan dari Delegasi Oman telah diadakan pada 30 Disember 2013, bertempat di Bilik Permata, Aras 7, NRE.

Lawatan diketuai oleh Encik Yaqoob Saud Al Toobi, H*ead of National Survey Authority* bersama Encik Saleem Abdullah Al Hashnu, Pengarah, Maklumat Geospatial Oman. Puan Fuziah binti Haji Abu Hanifah, Pengarah Pusat Infrastruktur Data Geospatial Negara (MaCGDI) telah mempengerusikan lawatan.

Objektif lawatan adalah penerangan berkaitan perkongsian teknologi GIS yang digunakan di negara masing-masing. Pihak Oman juga telah membuat perbentangan berkaitan perkongsian data di negara tersebut.

Selain itu, penerangan berkaitan lapisan-lapisan data dan kaedah perkongsian antara agensi yang digunakan di Malaysia juga dikongsi bagi memudahkan perkongsian maklumat dilakukan.

Pihak MaCGDI juga telah menerangkan teknologi terkini yang digunakan dalam pembangunan GIS antara agensi khasnya dan kepada pengguna awam amnya.

Majlis Sambutan Hari Raya Aidilfitri MaCGDI 2013

Tempat : **MaCGDI**

Tarikh : **6 SEPT 2013**

BULETIN GEOSPATIAL SEKTOR AWAM

Format Dan Garis Panduan Sumbangan Artikel

Buletin Geospatial Sektor Awam diterbitkan dua (2) kali setahun oleh Pusat Infrastruktur Data Geospatial Negara (MaCGDI). Sidang Pengarang amat mengalu-alukan sumbangan sama ada berbentuk artikel atau laporan bergambar mengenai perkembangan Sistem Maklumat Geografi (GIS) di Agensi Kerajaan, Badan Berkanun dan Institusi Pengajian Tinggi.

Garis Panduan Untuk Penulis

1. **Manuskrip boleh ditulis dalam Bahasa Melayu atau Bahasa Inggeris.**
2. **Setiap artikel perlu mempunyai abstrak dan perlu ditulis dengan huruf condong (*italic*).**
3. **Format manuskrip adalah seperti berikut:**

Jenis huruf (*font*)	**:**	**Arial**
Saiz huruf bagi tajuk	**:**	**12**
Saiz huruf	**:**	**10**
Langkau (*spacing*)	**:**	***single***
Margin	**:**	**Atas, bawah, kiri dan kanan = 2.5 cm**
Justifikasi teks	**:**	**Kiri**
Lajur (*column*)	**:**	**Satu lajur setiap muka surat**

4. **Sumbangan hendaklah dikemukakan dalam bentuk *softcopy* dalam format *Microsoft Word*.**
5. **Semua imej grafik hendaklah dibekalkan dalam format .tif atau .jpg dengan resolusi tidak kurang daripada 150 d.p.i.**
6. **Segala pertanyaan dan sumbangan hendaklah dikemukakan kepada :**

Ketua Editor
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