In a nutshell

Disaster monitoring   **Surveying**   **Maritime**

Snapshot of Indonesia

Indonesia has been a major trade region since the 7th century and is now part of the G20 major economies. It has abundant natural resources such as oil, natural gas, tin, copper and gold. Agriculture represents an important economic activity (14% of the GDP) with the cultivation of rice, tea, coffee, spices and rubber. Nonetheless, the archipelago faces many diverse challenges, these being mostly demographic, geographic and environmental. Firstly, with an estimated population of 255 million people, Indonesia is home to more than 40% of the South-East Asian population. These include hundreds of distinct ethnic groups. Secondly, with over 14,000 islands,

Indonesia is the largest island country in the world. Java, the main island, contains more than half of the country's population and is the world's most populated island. Growing urbanisation creates challenges in mega cities as in other Asian countries with limited public infrastructure. Finally, Indonesia is facing a certain number of environmental issues due to both natural disasters and rapid industrialisation. These pose threats to humans but also to the rich fauna and flora – the world's second highest level of biodiversity.

GNSS opportunities for Indonesia

All these challenges translate into opportunities for GNSS stakeholders. The two main applications of GNSS in line with the current government's priorities are surveying and natural hazard monitoring. For what concerns surveying, GNSS is seen as an active way to unify the layers of geospatial information provided by the different institutions (hydrography, cadastral information, roads, etc.) in a single reference. This is part of a larger ambition to develop an Indonesian Geoportal. As a point of comparison, in 2008 less than 50% of land parcels were registered and certified. The growth of the surveying sector is hampered by the lack of a comprehensive land law. Land is administered under a dual system through two different government agencies, the Ministry of Forestry (MoFor) and the National Land Agency (Badan Pertanahan Nasional, BPN) responsible for forestry and non-forestry lands, respectively. Land-tenure legislation struggles to be properly implemented, and most people gain access to land on the basis of local procedures and community acknowledged traditions.

For natural hazard monitoring, GNSS is seen as a key tool to better understand crustal deformation of areas located in the ring of fire (home to over 75% of the world's active and dormant volcanoes) and possibly to develop early warning systems for tsunamis and earthquakes.

As infrastructure develops, heavy construction / road building equipment and technology comes into the limelight including the respective GNSS digital data flow.

Existing GNSS stakeholders

The two main public institutions involved in GNSS and geodesy are the National Land Agency of Indonesia (BPN) and the Geospatial Information Agency (BIG). Since 1963 Indonesia has its own space agency, the National Institute of Aeronautics and Space (LAPAN). It operates a budget of approximately US$50 million to run projects along its core competencies: space and atmospheric science, remote sensing, aerospace technology, and aeronautics & space policy studies. GNSS applications within the agency are limited to space weather and ionospheric studies. There are a few small practices providing (cadastral) surveying solutions populating the Indonesian GNSS landscape. Larger companies include Oceatekno (maritime industry) or Geotronix (survey and maritime industries). Badan Informasi Geospasial (BIG) is the Geospatial Information Agency in the field of surveying and mapping.

As for other international collaborations, China and Indonesia have signed an agreement allowing Indonesia to have access to the BeiDou data. Some GNSS companies in the region (e.g. Brunei) are working also with Indonesia. Also plans were circulating in 2013 to install a GLONASS monitoring station in Indonesia.

Existing PNT systems

Current infrastructure is limited to several institutions hosting Continuously Operating Reference Stations (CORS). Among them are LAPAN, the BPN, the BIG as well as numerous universities. Some of these CORS were installed in collaboration with European entities such as the German Geo Forschungs Zentrum (GFZ) or the University of TU Delft in the Netherlands. These networks serve many purposes including early warning system for natural hazards such as earthquakes and tsunamis, coordinate reference frame for surveying and mapping applications, navigation and transportation, weather monitoring, and scientific studies of geodynamics and tectonics. The broader plan is to integrate over 1,000 stations across to whole country to provide positioning corrections at centimetre level.

Indonesia is represented in the GNSS Implementation Team (GIT) in the context of the inter-governmental forum Asia-Pacific Economic Cooperation (APEC). This group focuses on air traffic control and aviation issues. The group has broadened its focus to the application of GNSS in all transportation sectors.

With Indonesia currently developing its own fleet of regional jet aircraft which will be flying to many not fully equipped airports, the notion of SBAS will sooner or later become relevant.

Opportunities for EU-Indonesian cooperation

▶ Industry observers have indicated that countries with archipelagic geography might benefit from Galileo Commercial Service especially in insular areas where there is no critical mass for a local PPP system

▶ Multi-GNSS is expected to help overcome a typical tropical problem: interference from dense tree canopies

▶ With Jakarta serving as the capital for ASEAN, cooperation with industry and stakeholders could have spill-over effects in other countries of the economic zone

▶ SBAS aircraft receiver oppportunities could be aided through the existing German-Indonesian partnerships in regional jets

Upcoming GNSS events in Indonesia

▶ Indonesian users, R&D institutions and industry will be invited to attend the GNSS.asia Seminar in conjunction with the MGA/APRSAF Conferences in Manila in November 2016

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