

The Dutch Mapping of Indonesia

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SUMMARY

For centuries, maps have sparked people's imagination of geographical reality. Large changes around 1800, both national and colonial, resulted worldwide in a significant increased demand for reliable maps. The Mapmaking of the Indonesian archipelago has been investigated in the period 1800-1990. Up to the transfer of sovereignty to the Republic of Indonesia in 1949, colonial relations influenced mapmaking. However, the impact of Indonesia's colonial past on mapmaking and the applied geodetic methods is virtually unknown.

A main question is the role and impact of the Netherlands presence in Indonesia in the technical and organizational development of geodesy and geodetic education in the Netherlands from 1850 to 1950. Military and civil experts, sent to the Netherlands Indies, were often engineers. They published their technical results in annual reports, special documents and articles. Here we show that the Dutch presence in Indonesia had large impact on geodesy and the geodetic education in the Netherlands. In the framework of the history of science, the developments in geodesy have been investigated as base for the topographic and hydrographic surveying and mapping. Three areas are chosen where maps were indispensable and many maps emerged: towns and public works, railways and tramways and telecom connections. Population growth and rapid development of infrastructure from 1870 further stimulated the demand for maps. The geodetic challenges, which were the base for maps, are covered by navigation, positioning, hydrography, triangulation and photogrammetry. In some of these areas the Netherlands Indies played a leading role, benefitting the Netherlands with the obtained experience. Disturbing factors on measurements in the tropical environment, differed considerable from those in the Netherlands. The climate and the volcanos, atmospheric refraction, plumb line deflections, gravity anomalies and map projections required a different approach. The results of the Topographic Service, Land Registry and Hydrographic Service in the shape of maps and guides are covered.

Hydrographic activities, including oceanographic expeditions in this archipelago, illustrate the importance of safe shipping routes and deep-sea research. Besides the topographical maps, also nautical maps, aviation maps and atlases are covered. A comparison is made with the initial geodetic activities in France, the Netherlands, Germany, Great Britain and India. India was comparable to the Netherlands Indies. The Topographic Service in Batavia (now Jakarta) followed closely the developments in these countries. A comparison has been made between the Netherlands and the Netherlands Indies using specific fields of interest such as astronomical observation, triangulation, height measurement, photogrammetry and hydrography. People with their limited means have achieved impressive results. The large volume of literature is their witness.

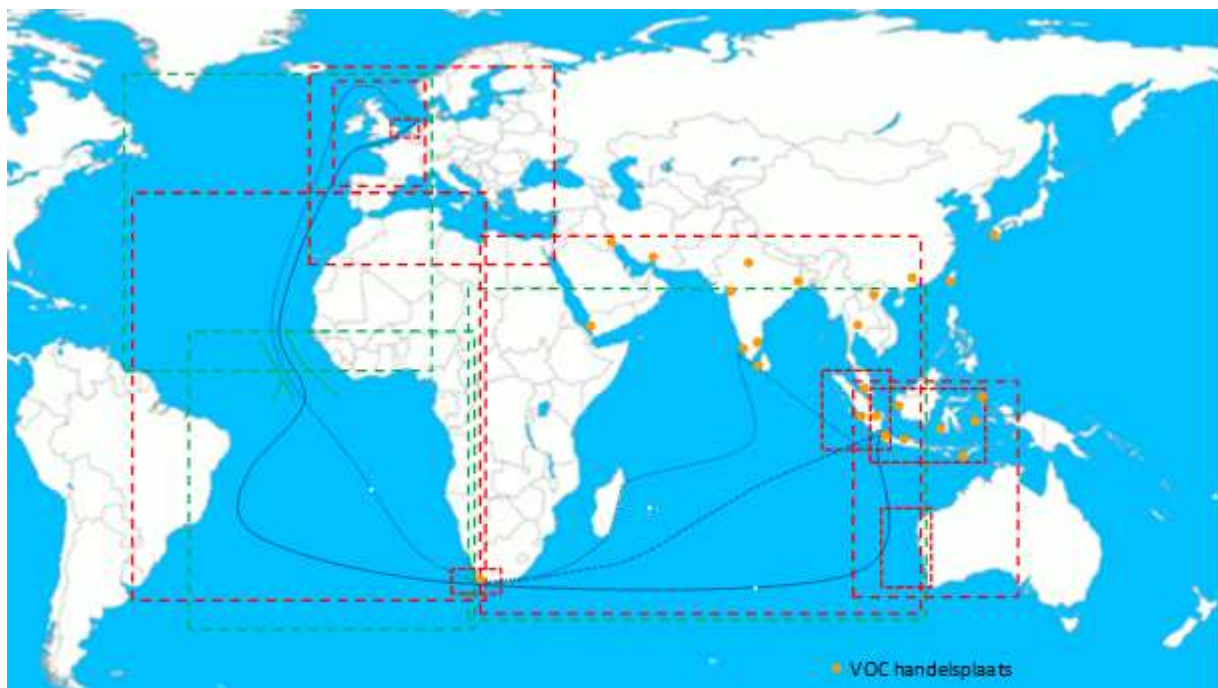
1. INTRODUCTION

Explorations, hydrographic and topographical surveys as a basis for the production of maps have required a great deal of pioneering work. The many islands with mountains and volcanoes, the seas in the archipelago, the culture and the tropical environment, which deviated entirely from the Dutch situation, where most experts initially came from, asked for a completely different approach. The extensive area, the limited available financial resources, expertise and possibilities for transport made the work a real challenge. Even though the send experts were trained as well as possible in the Netherlands, practical experience with instruments, measurements and processing of results gained in the tropics, was needed to map the archipelago. The knowledge and experience before that was still limited in Europe at the beginning of the 19th century. The shape of the Earth was still the subject of research. The influence of the measurement results by the atmosphere, gravity, measurement methods and the personal factor in measuring with the distinction between systematic errors and stochastic errors had not yet been fully recognized. Units of measure differed by country; standards were hardly there. Although the quality of lenses in telescopes, measuring instruments and the paper used for maps limited accuracy, impressive results were achieved. One advantage was that theoretical knowledge, especially that of mathematics, was already well advanced. Famous institutions were also set up, promoting knowledge exchange.

Awarded prizes for the theoretical and practical solution of problems stimulated research. The urge to discover how the world was put together, the challenge of exploring new areas, the expansion of power and the possibility of enrichment by trade and industry have certainly contributed to the demand for maps. The creation of maps cannot therefore be separated from the political and economic circumstances. Safe shipping routes, terrain knowledge for soldiers in the event of unrest and wars, property ownership registration, tax collection in the form of land interest, exploitation of mineral resources, construction of roads, railways and telecommunications connections, each required specific maps. The available map material often proved to be insufficiently detailed or accurate, while with the expansion of government power over an ever-larger area there was also a need for new maps

"Indonesia on the map" focuses on the way Indonesia has been mapped. It includes both hydrographic and topographical reconnaissance, survey and mapping. The maps of the Indonesian archipelago showed the administrative and economic centres and showed the geography and topographical information of settlements, connecting roads and defences of the various islands. Available map material was used for trade, governance and development of areas. The thematic maps displayed the current situation. These could be military situations, but also existing plantations, populations, religions, languages or prosperity. Maps were a source of information or showed the lack of information. In the annual Colonial Reports for the Dutch government, we regularly find these theme maps. It was often found that available maps were inaccurate or incomplete. For example, the reason could be a war, disaster or lack of information, necessary for taxation. This defect had to be remedied with great effort in the shortest possible time. This required well-trained personnel with knowledge of surveying, topographical and hydrographic inclusion and mapping.

The situation in the tropical Indies was quite different from the Netherlands, so specific knowledge of suitable instruments, methods and conditions was needed to obtain maps of sufficient quality and usability. Despite the great distance and long travel time, there was a regular exchange of knowledge and experience between Indonesia, the Netherlands and a number of countries in Europe. This exchange took place from Europe to Indonesia as well as from Indonesia to countries in Europe. Due to the extensive area with completely different conditions, the Netherlands has been able to benefit from the specific knowledge and experience gained in the Indian archipelago. The Dutch presence in Indonesia has contributed to the development of geodesy and geodesy education in the Netherlands. The study identified three areas of focus, for which maps were essential: *cities and public works, railways and tramways, and telecom connections*. These three areas cover a wide range of technical disciplines and partly overlap. After all, the construction of a railway line and a telecom connection was often combined. A road construction, port development or extension often took place with a city expansion. The choice of route between two places was determined by geographical limitations, available expertise and resources, including human resources and costs. Mapping possible routes was a prerequisite for making choices substantiated. The production of a reliable map required a lot of specialist knowledge, which required thorough training. Maps were primarily of strategic importance to the military in their actions. Initially, topographical explorations and mapping were the domain of soldiers, but this changed with the arrival of training for civilian engineers and Netherland-Indies officials from the middle of the 19th century.



Index of VOC-sea charts with different map projections, scales and routes between The Netherlands and Batavia during the presence and trade of the VOC (“Verenigde Oostindische Compagnie” or United East Indies Company)

2. HISTORICAL OVERVIEW, DEVELOPMENTS IN THE ARCHIPELAGO

In the VOC period (1602-1800), governance was a means of promoting trade. The VOC was not after land ownership, unless this could promote trade and profits. It was initially the spices of the Moluccas and pepper of Java and Sumatra that the VOC tried to obtain, later tobacco, indigo (dye), copper, tea, coffee, sugar, saltpetre (base for gunpowder), silk, cotton, textiles and porcelain were added. With the foundation on Java of Batavia in 1619, this centre was expanded by successive Governors-General. The board of the VOC was limited to the places with trading settlements. The map makers from the VOC period made an important contribution to the growth of the VOC. The maps were first of all intended for a safe journey by sailing ship around the Cape to and in the archipelago. In addition, maps of all trading posts and sometimes the surrounding area were created, with which later map makers and topographical service could benefit. Before, during and after the VOC period on the coast of the islands, numerous forts were built that were also important landmarks for orientation and navigation. It was initially the Portuguese and Spaniards who tried to map the world, soon the Dutch, French and English took the initiative and numerous expeditions were equipped to explore unknown areas. After the bankruptcy and acquisition of the VOC at the end of the 18th century by "the Dutch State", the board in Indonesia was changed under the influence of the Batavian-French Republic in the Netherlands. During this French period, the English conquered Java in 1811, and established an intermediate board with Raffles as a governor. Raffles introduced new laws and a new form of taxation, the land interest rate, which required new maps. He also stimulated institutions for the promotion of nature development, such as the botanical garden in Buitenzorg and the study of the natural and cultural sciences. The return of Dutch authority in 1816 resulted in a new form of governance. Now it was the State that had an interest in protecting the population on the one hand, but on the other hand wanted to keep the state's expenditure as low as possible. When this did not work out so well, the Governor-General was instructed to set up the administration in such a way that the colony could provide for its own maintenance and, if possible, make a contribution to the Dutch treasury. The introduction of the "Cultuurstelsel" (compulsory growth and delivery of agricultural products against a fixed price) in 1830 has more than lived up to this. The 19th century was marked by the Java War (1825-1830), the introduction and abolition of the "Cultuurstelsel" (1830-1870), the many wars such as the Padri and Aceh wars on Sumatra, at Boni on Sulawesi and those at Singkawang and Banjarmasin on Borneo. Partly because of these wars, good attention was paid to better maps of Java and Sumatra only in the middle of the 19th century. Systematic reconnaissance, survey, measurement and mapping took place from 1850. At the beginning of the 20th century, Java was well mapped. Sumatra, Borneo and Sulawesi and gradually the other islands of the archipelago also received good maps. In the period 1880-1920, the economy grew rapidly. Railways were built on Java and Sumatra, coal mines and oil wells were operated and plantations were developed for sugarcane, rubber, tea, coffee and tobacco that generated substantial profits. It was also the period when the islands were well mapped. Detailed maps were needed for the expansion of cities and the construction of infrastructure, including irrigation works, bridges and ports in addition to roads, railways and telecommunications facilities. When the Topographic Service was established in 1874, an important basis had already been laid for the further exploration and mapping of the archipelago.

The Land Registry had to register its own land and home ownership, but also carried out land interest withdrawals as tax. As such, the Dutch East Indies was not inferior to the Netherlands. The development of roads, needed by increasing car and bus transport, also required major investments. For shipping, ports were enlarged and newly constructed and waterways deepened. The Second World War (WWII), with the Japanese occupation from March 1942 to August 1945, created a completely new situation. The Dutch government was wiped out and the Japanese took over with the help of Indonesians. For the Indonesians, there was hope for independence, but it soon fell to the bottom. Many Indonesians died as Romushas (forced labourers). Many interned Dutch people were killed by forced labour and poor conditions in camps scattered throughout the archipelago. The Allies made numerous photographic aerial shots, which they combined with the Dutch maps in detailed attack plans for strategic purposes. After WW II, maps were made for the negotiations and the Dutch-Indonesian liberation war (called police actions by the Netherlands). The impending war with Indonesia by the New Guinea question also required maps of a hitherto little-known area. Parts of New Guinea were not properly put on the map until after WWII. After the transfer to the Republic of Indonesia at the end of 1949, Dutch maps were used for a long time. With the application of satellite recordings and digitization, detailed maps of almost the entire archipelago have become available, which now form a basis for the development of the country and tourism.

With the transfer of New Guinea to the Republic in 1963, the maps in Indonesia had to be adjusted again. Dutch topographic names were replaced by Indonesian names. After a period of intense unrest and economic stagnation, the economy and tourism began to develop slowly in the 1970s. Around the turn of the century, a huge construction activity arose, supported by strong economic growth with good prospects. Jakarta's skyline was even more dominated by tall office buildings and hotels. There was a great need for detailed maps all the time. Jakarta with the surrounding area gained 30 million inhabitants. Yudhoyono (2004-2014) and Widodo (from 2014) were elected president by democratic elections; a new phase had arrived.

Although Indonesia has many raw materials in the form of petroleum, natural gas, minerals and wood, almost half of the population lives on the yield of agricultural products such as tea, coffee, tobacco, spices, rice, cocoa, rubber, copra, palm oil, wood and rattan. In addition, the industry is developing faster and faster. With a large internal market and a large number of natural products, Indonesia occupies an important place in the economic development of southeast Asia. Tourism is also an important source of income, so good tourist maps are needed.

The Indonesian archipelago covers a large area of approx. 2000 km north to south and approx. 5300 km from west to east with three different time zones: UTC+7, UTC+8 and UTC+9. The archipelago is located in Asia around the equator between 6° north latitude and 12° south latitude and between 94° and 142° east longitude of Greenwich (see also the map hereafter). The capital Jakarta is located at 107° east longitude. In the Dutch East Indies time, the zero meridian was laid over Batavia and the distances were determined in longitudes compared to this meridian. The equator runs over central Sumatra and Pontianak on Kalimantan, the Indonesian southern part of Borneo (see also the next map). Indonesia is therefore both below and above the equator and has a tropical climate with dry and wet seasons (monsoons). The rainy season around and south of the equator runs from November to February; north of the equator to India it falls a few months later.

The average annual temperature at sea level is around 26-28 degrees Celsius nationwide and the relative humidity is usually higher than 85%. The temperature decreases with an increase in height; on mountain peaks above 3000 m there are temperatures below 10 degrees Celsius. The distance between the Netherlands (Amsterdam) and Indonesia (Jakarta) is approximately 11,500 km, via the Cape the distance is approx. 21,000 km and via the Suez Canal (after 1869) about 13,000 km.



Indonesian archipelago and adjacent countries



West Java, Le Clerck, 39 x 108 cm, 1 map in 2 sheets, scale 1:1.000.000, A.J. Bogaerts Breda 1850. Le Clerck explored large parts of Java and Sumatra. He arrived in Batavia in 1844 with the task of examining the defensive system in the Indies and checking whether it could not be simplified. This was in 1850 one of the best maps.

The Dutch Mapping of Indonesia (11064)
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3 MAPS FOR URBAN AND INFRASTRUCTURE DEVELOPMENT

Until 1800, Indonesia hardly knew cities of any size. The largest cities of Batavia and Surabaya had fewer than 50,000 inhabitants, while the total population in the archipelago was barely 5 million inhabitants. That had risen to more than 250 million in 2016, about half of them on Java and Madura. This expansion of cities with the construction of new homes and facilities, such as schools, offices, hospitals and factories, required good urban planning, for which maps were indispensable. The registration of the property by the Land Registry with data on property, place, size and type or character also became increasingly important. This was reinforced by the possibility of taxing or distributing taxes more evenly. Around 1800, infrastructure in the form of roads, bridges and ports was very limited. The VOC had set up a number of roads for its administrative and commercial activities to transport goods between ships and warehouses. It was only with the arrival of Governor Daendels in 1808 that the “Grote Postweg” along the North coast of Java became the first paved connection between the major cities on Java after 1809. As a result, the travel time from Batavia to Surabaya could be significantly reduced over the distance of 900 km, or 300 hours by foot. As a result, letters took 6-7 days instead of 3 weeks, while passengers could now reduce their travel time from one month to 10 days by horse and carriage. The tropical rainstorms allowed the rivers to swell in a short time to large bodies of water, leading to major flooding. In the dry season there was a lack of sufficient water for the irrigation of agricultural land. Waterworks for regulation of too much and too little water were therefore increasingly given priority. This was reinforced by the increasing influence of the colonial government, which from 1830, with the introduction of the “Cultuurstelsel”, had every interest in increasing the yield of agricultural products. From 1860 onwards, serious research was carried out into the possibility of rail links. In Java, the need for rapidly efficient transport of agricultural products to the ports arose, while transport of people between the major cities also became increasingly important. The railway development first saw the government as a private initiative, for which it provided concessions. Soon, the strategic and economic importance led to state construction and exploitation. Railways on Sumatra were initially used for transporting coal and agricultural products to coastal ports. The first construction of telegraphic connections also took place along the railways. This allowed the arrival of a train to be announced and it was possible to send text messages in the form of telegrams. Railways and telegraphy, later telephony, were closely linked. In addition to the railways, telegraph and telephone lines are indicated on most of the detailed maps. Initially, the PTT used air lines for telegraph and telephone connections in the form of iron or copper wires, suspended from poles along roads and railways. That was a costly investment, which required a lot of maintenance. The air-lines, without amplifying the signal, allowed bridging of distances of 50 to 100 km. In addition, the capacity of the connection was initially limited to one signal or call per wire pair, so that soon, especially in cities, large numbers of wires hung from sturdy masts were needed. With the advent of radio connections for long-distance traffic, new possibilities arose. The wireless connection between the Netherlands and Indonesia in particular, proved to meet a great need. Most of the time, private initiative created infrastructure, such as railways, telecom connections and ports that, once successful, were taken over by the state. The state's traffic companies therefore played a major role in the further development.

3.1 Cities and public facilities

The first voyage of hydrographer Pieter Melvill van Carnbee was to the East Indies in 1835. Back in Holland he immediately started making sea charts. In 1839 he was promoted to lieutenant-commander and left again for the East Indies, where he was placed at the hydrographic office of the Department of The Navy and charged with the production of maps. In 1844 his first map of Java was completed.

He worked on the composition of a general atlas of the Dutch East Indies. The first volume was published in 1853. In 1856 he became director of the Navy on the island of Onrust (shown on the map below) where he succumbed to fevers in 1856. Hereafter impressions of urban development of Batavia (now Jakarta) are given.



West Java, Batavia and surroundings, Pieter Melvill van Cambee, (1816-1856) scale: 1:290.000, 1853.



Jakarta kota (old town), town hall of 1710, now museum,



Jakarta kota, Post- and Telegraph-office 1911



Jakarta view south, volcano Gunung Salak in the background



Jakarta, Welcome monument in Menteng

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Batavia, Tanjung Priok and Weltevreden (Gambir), railways and harbour, scale 1:20.000 in 1945.

3.2 Railways and tramways

The railways and tramways shown on the map of Batavia above in 1945 and on Java below in 1930 indicate their importance for public travel and transport of goods and agricultural products between major cities. Most of the railway lines had a width of 1067 mm (3' 6"), smaller than in Europe to reduce costs.



Main railways and tramways on Java and Madura in 1930.

In mountainous areas, in particular West Java, careful route surveys were required to minimise the number of viaducts, tunnels and excavations. Length profiles indicated the height as a function of the track length and thus the rise and fall of the track. Those slopes were not allowed to exceed certain values in order to be able to deliver sufficient traction with the wheels of the locomotives on the rails and by preventing the tilt of the locomotives on the slopes, the drying of the upper flame pipes in the firebox of the locomotives.



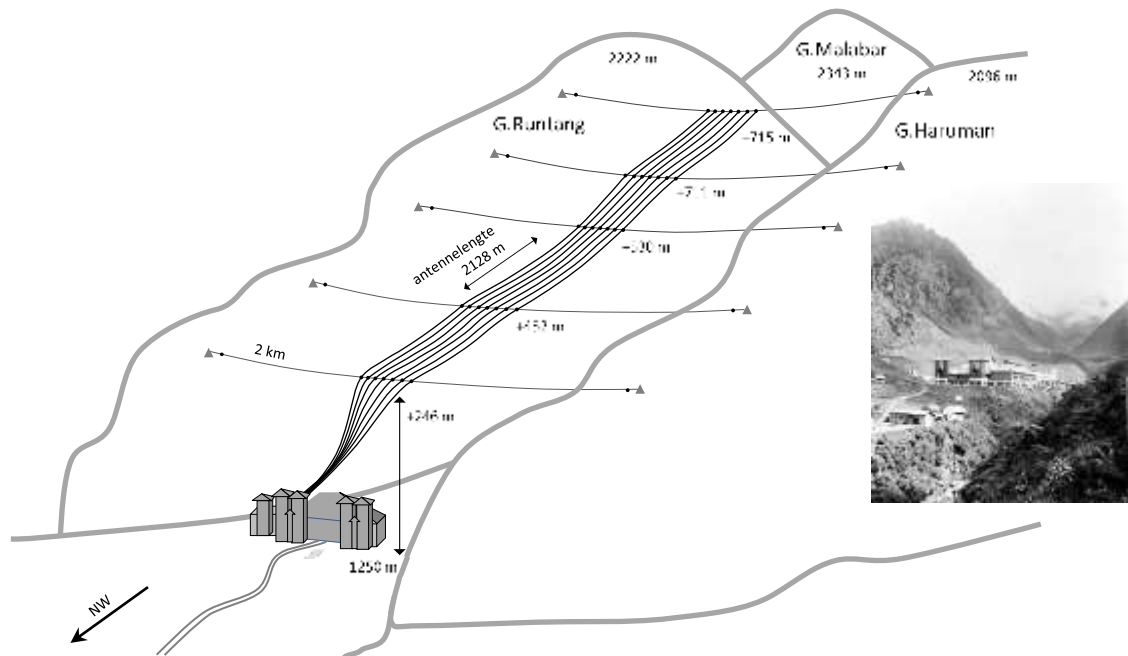
Railways in the Preanger, West Java



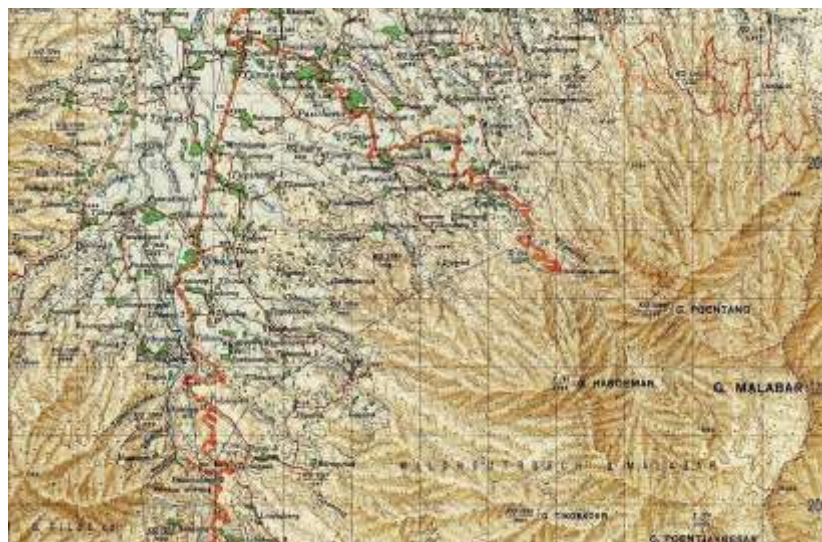
Railways near Padalarang (West of Bandung): junction of the Batavia–Purwakarta–Plered–Padalarang–Bandung railway and the Batavia–Bogor–Sukabumi–Cianjur–Padalarang–Bandung railway, scale 1:50.000 map of 1923.

3.3 Telecom networks

The drawing and topographic map of Radio Malabar (or Radio Bandung) shown below, give a good impression of the importance of maps for planning. The powerful LF sender and antenna of 2,1 km, hung on cables between mountain tops was in 1923 the first and largest long-distance transmitter in the world.



Radio Malabar transmitter station with longwave antenna for communication with The Netherlands in 1923



Transmitter station with antenna at Malabar, near Bandung, scale 1:50.000, grid 1x1 km, map 1908, revised 1934.

4 GEODETIC MEASUREMENTS AND INSTRUMENTS

The geodetic measurements in the East Indies differed from Europe due to different landscapes, climate conditions and available resources. Deployed military experts and engineers had no experience with surveying in tropical mountain country, there was also little literature, so knowledge had to be gained in practice. Moreover, the number of experts was small and local forces had to be called upon, with language problems also causing limitations. In Indonesia, dozens of languages are spoken, while some languages such as Javanese and Sundanese on Java were difficult for the experts to learn. The Leiden astronomer Jean Abraham Crétien Oudemans (1827-1906) was sent to the East Indies in 1857 to capture places in the archipelago with astronomical observations. Fortunately, he recognized in time that triangulation was a better method for an accurate base for mapping. In 1860-1880, triangulation was the first to measure the primary network on Java; 3 baselines were used in West-, Central- and East-Java. The elaboration of these primary measurement results by Oudemans, first in the East Indies and after 1875 in the Netherlands, lasted until 1900.

Then in 1883 triangulation measurements on Sumatra were started with a base measurement at Padang. Batavia was chosen as a zero meridian, taking numerous measurements before the distance between Batavia and Greenwich was sufficiently precise. For the longitude, sea cables and radio connections, including Radio Malabar, were used. Over the western Barisan Mountains, triangulation was used with a new base at Lake Toba, a connection to Java and a base in Aceh in the north. In the sparsely populated eastern flat part, which consisted largely of swamp with many rivers, the fixed points were determined with astronomical measurements. The measurements were influenced by refraction due to the deflecting refraction through the atmosphere and plumb line deviations due to the attraction of the plumb under the instruments by a large mass such as mountains. For this purpose, corrections were always made, so that the measurements were repeated frequently. Some examples of measuring instruments used are shown below. The maintenance was done locally. De triangulation around the base, north of Lake Toba, is shown on the next page. Here the status of triangulation of end 1912 is given with links in red lines.



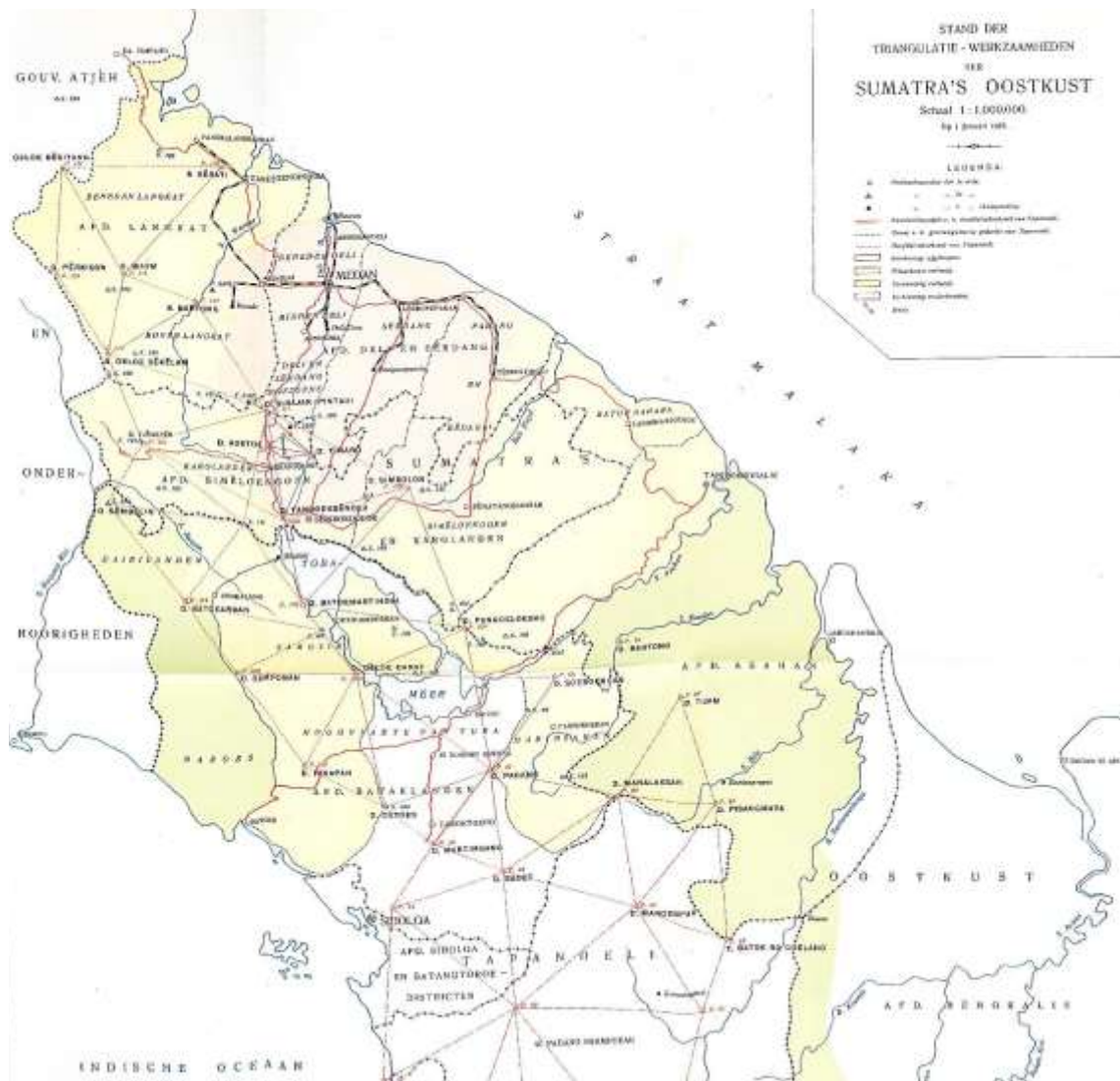
Universal instrument Repsold
for astronomical positioning



Universal theodolite
Pistor & Martins for triangulation



Boussole tranche-montagne
De Koningh for triangulation



Sumatra's East Coast, status of triangulation end of 1912.

The primary triangulation and survey of Sulawesi began in South Sulawesi in 1910 and was not completed until 1939. The TD (Topographical Service) used a baseline at Jeneponto (measured in 1911 south of Makassar), at Tondano (south of Manado) and at Korodolo (in the middle of Sulawesi).

On Kalimantan, the Indonesian part of Borneo, the TD also opted for astronomical positioning. Due to the many rivers in the west and south, vessels could be used for transport of the chronometers, like on Sumatra. From 1922, telegraphic signals, transmitted by Radio Malabar, were also used to determine the longitude more accurately. The Topographical Service was given separate brigades for triangulation and survey. The triangulation brigade, led for years by ir. J.H.G. Schepers was the core. Schepers later became extraordinary professor at the Technical College in Bandung. The TD had a maximum staff of 700 experts, including a drawing and reproduction department and maintenance staff for all instruments.



Netherlands-Indies archipelago (western and central part), status primary triangulation end of 1939.

After World War I, photogrammetry with aerial photographs from airplanes emerged. Many experiments have been carried out in Indonesia for this purpose, especially to map difficult-to-access areas. This was found to produce useful results and, moreover, to speed up surveys and mapping of large areas. After experiments on Java and Banka, some inaccessible areas of New Guinea in the east were mapped by photogrammetry in cooperation with the Netherlands. The result was that in 1939 large parts of western and central Netherlands-Indies obtained a triangulation network supplemented by photogrammetry. Papua New Guinea in the east was only partly mapped, based on photogrammetry after WWII.

With the increase in shipping traffic, the greater required draught for ships and the greater attention to safety, the need arose for the systematic survey of the seas in the archipelago. In the middle of the 19th century, special surveying vessels were used for this purpose, initially sailing ships but soon steamships. A separate service was established, which was part of the "Gouvernements Marine"



Hydrographic surveyed areas in green, end of 1926



Survey vessel *Willebrord Snellius* 1929-1937

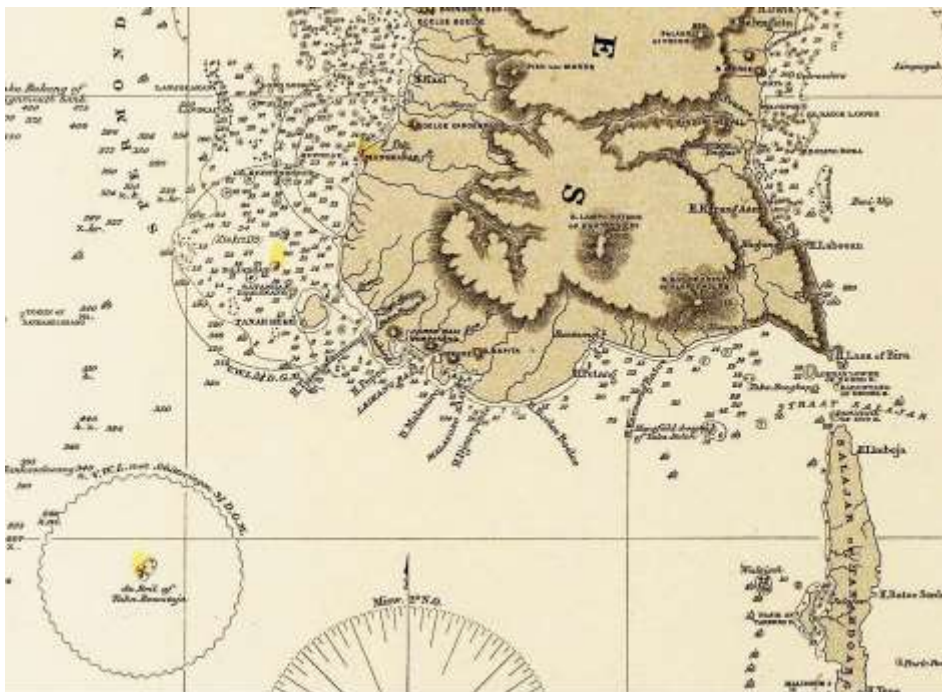
5 GEODETIC ACTIVITIES AND RESULTS

Below some examples of results of geodetic activities are given. From the initial surveys to the final maps all activities were performed by the Topographical Service with a staff of only 400 to 700 employees, excluding local hired people for carrying and provisioning of food.

The result was high-quality maps, resistant to use in the tropics which were not inferior than the maps from Europe so that they won many prizes at international exhibitions and were in great demand by the companies and population in Indonesia and in other countries as well.



Java, part of map Surabaya Residency, scale 1:100.000, 1883-1884.



Sea chart South-West Celebes (Sulawesi), detail Street Makassar with lighthouses, scale 1:1.000.000, 1883.

6 CONCLUSIONS

'Indonesia on the map' refers to the broad field of exploration and geo-measurement by triangulation, altitude measurement, depth measurement and topographical or hydrographic surveys for mapping known and unknown areas. In the period under investigation from 1800 to 1990, this was done with precise measuring instruments and experts with knowledge of the situation, who performed great physical and intellectual performance. They were soldiers, civilian engineers and civil servants, supported by porters and scouts often consisting of poorly paid local residents or forced labourers, who had to do their work under difficult conditions. Their commitment and perseverance deserve great appreciation. They ensured that the basis for the current mapping was laid and that the Netherlands and Indonesia could benefit from this through better maps and greater knowledge of geodesy.

REFERENCES

Annual report of the "Topographischen Dienst" in the Dutch East Indies for 1905-1939 (issued annually in Dutch by the Topographical Service, Batavia 1929-1939).

Colonial Report; annually 1855-1930 and Report of Governance and state of the Dutch East Indies; annually 1931-1938 with attention to:

- Territory, population and administration, Army, Navy and Justice (including Topography, Hydrography and Geodesy).
- Finance (court of auditors, compatibility, banks), Civil management.
- Domestic administration (including agricultural, statistical and topographical inclusions, Land Registry).
- Education, worship and industry (including arts and sciences, charity institutions, medical service).
- Civil Public Works (roads, bridges, ports, irrigation, railways, telegraphy and telephony).
- Industry (outdoor property, agriculture, forestry, animal husbandry, mining, plantations, factories, merchant shipping, shipbuilding).
- The state, financial and economic situation; under 'Traffic' means country roads and bridges, road traffic, rail traffic, port authority and dredging company, demarcation, coastal lighting, pilotage, hydrographic surveys, shipping, air traffic, mail, telegraph, telephone and tourism; 'Water Management' means a policy, flood defences and land buildings; under "Arts and sciences": archaeology service, theatre, dance, music practice, national archive, folk libraries, nature conservation, volcanological research and scientific institutions.
- The cultural and social situation including under "Protection of land ownership": Cadastral and topographical surveys.
- The state establishment containing: government, people's council, administration, judiciary, police, army and navy.

BIOGRAPHICAL NOTES

Dr. Ir. Huib Ekkelenkamp studied electrical engineering and telecommunications at Delft University of Technology. His promotion at Delft University of Technology department of Geodesy in 2019 dealt with "Indonesia on the map", The role of the Dutch presence in Indonesia in the development of geodesy in the Netherlands. During his workable life he researched fibre optic communication at the PTT laboratory and then worked internationally for PTT, later KPN, in the field of telecom network planning for a large number of years, many of which were in Indonesia and Central and Eastern Europe. He held management positions in Telecom Consultancy and IT Business Development at KPN and Atos. Measuring instruments and processing of measurement data, now and in the past, are of particular interest. This is especially true for navigation aids, geodetic measuring instruments and precision clocks. Based on his interest in new technical developments and history of technology, in particular telecommunications, geodesy and cartography, he performs functions at the Royal Institute of Engineers and at the Stichting De Hollandsche Cirkel for the preservation of geodetic heritage in The Netherlands.

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