

A very brief overview of Geospatial Development in Myanmar

Maung Maung Than
Independent Consultant

The Myanmar Forest Department is one of the foremost organizations which used aerial photographs for assessing the vegetative cover of the Ayeyarwady Delta Mangroves back in the 1920s.

Department of Meteorology was the first department to use space satellite data for actual practical purposes. (TIROS) and (NOAA) satellite series. as early as June 1973.

The Myanmar Oil and Gas Enterprise also led in space technology application as early as in 1978 when Landsat 3 and 4 MSS data at 1:1,000,000 scale were purchased for the preparation of geological maps of Myanmar. In the 1990s this enterprise started using 1:250,000 scale SPOT false colour composite photographs

The Myanmar Survey Department prepared the landuse maps of Kabaw Valley, for agricultural development planning in 1996 using 1: 50,000 scale SPOT false colour imageries.

The first introduction of satellite imagery to the Forest Department was in 1980., a quick appraisal of the forest cover of the whole country was carried out using 1: 1,000,000 scale Landsat imagery of the 1972-1979 period.

UNDP funded project BUR/79/011 “National Forest Survey and Inventory” 1981-1986, acquired two sets of Landsat MSS imageries for the period 1974-1980 at 1:1,000,000 and 1:250,000 . The follow up project (MYA/85/003) “National Forest Management and Inventory” provided a set of Landsat TM imagery for the period 1989-90 at 1:500,000 scale and a countrywide landuse map was produced by visual interpretation. This is basic data for FRA 1990.

The two projects provided training for the project staff in the fields of satellite remote sensing, digital image processing, cartography and printing.

The Digital Image Processing system was installed in the Forest Department in early 1996 with financial assistance of the “Watershed Management for Three Critical Areas Project (MYA/93/005)” for its landuse mapping component. Landsat digital data of 5 TM scenes were acquired along with the digital image processing system PCI EASI/PACE. The system incorporates with the GIS system to produce landuse maps for sustainable development of the critical areas. A modest, but at that time modern, RS/GIS laboratory was established together with very important on-the-job training in the 3 S technology, namely Remote Sensing, GIS and Global positioning system (GPS). The training gave very important combinations of biophysical and socio-economical data in GIS. After the completion of the exercise, the Forest Department has acquired the capacity to launch practical applications of satellite imageries on its own.

One important contribution from the Japanese Government is also critical in the development of space technology applications in the Forest Department. The Department together with the Japan Forest Technical Association (JAFTA) mapped a large part of the country starting from 1996 up to 1999, under the Information System Development Project for the Management of Tropical Forest funded by JICA. 68% of the country was covered during 4 successive years. The Forest Department and JAFTA staff worked together in the field, learning from each other. The most important experiences gained were in planning, purchasing and acquisition of materials and equipment, field reconnaissance survey and actual field survey work for forestry mapping. As the digital processing was done back in Japan, only rudimentary knowledge had been gained by the Myanmar counterparts. NASDA and ESCAP also have contributed in the mapping of the Mon State using Japanese satellite data. After that Forest Department changed its aerial photography and mapping section to Remote Sensing and GIS section.

International organisations such as International Centre for Integrated Mountain Development (ICIMOD) and GIS Application Centre (GAC), AIT, have also contributed to the development of RS/GIS applications.

2.1 Potential and Current uses of Space Technology and GIS Applications

Natural Resources Management

Natural resources can be defined as;

- Forest Resources
- Soil Resources
- Water Sources
- Mineral Resources
- Marine Resources
- Land itself as a foundation for infrastructure and housing

Forest, Soil and Water resources

This section deals with many sectors; the most important ones are forestry, agriculture and irrigation. Sustainability, quality and quantity of arable soil and water are the life or death of an agricultural nation like Myanmar. The FAO has now stated that Sustainable Forest Management (SFM) cannot exist if there is no Sustainable Agriculture Management and vice versa. (*Strategic Framework Plan for the Forestry Sector 2000-2015*), FAO report, Seminar on Current International Issues Affecting Forestry and Forest Products, Asean Forest Officers' Meeting, Yangon, July 2000)

Application of space technology and GIS for agricultural and irrigation needs are vast, indeed they are limitless.

Requirements for all related Ministries are presented below:

1. Soil surveys
2. Land Capability and Land Suitability Surveys (To be performed with other sectors)
3. Crop suitability Surveys
4. Crop monitoring, disease and pest monitoring and yield prediction and logistic support management.
5. Run off calculation for reservoir and dam planning. (Irrigation)
6. Flood map for riverbank control, mitigation of flood damage. (Together with Meteorology Department)
7. Water disaster control and mapping.
8. Agricultural cadastral mapping and development planning. (With the Settlement and Land Records Department)

Land capability and land suitability mappings are essential basic surveys necessary for integrated land use planning. It can assuredly be stated that there is no *de facto* landuse policy in Myanmar at the moment. Landuse conflict had been pervasive in all landuse sectors throughout the country. The conflict between agriculture, irrigation, shifting cultivation, livestock and fisheries, and forest shall be ongoing until there is a definitive landuse policy. Lack of co-ordination and co-operation among land users creates a big handicap for the furtherance of environmental conservation and its integrity.

Essential GIS layers for land capability and suitability surveys are:

1. Current Land Use layer in 1:50,000 scale from UTM mapping
2. Soil map (at least with Physical texture) in 1: 50,000 scale. At present 1: 2,000,000-scale maps are available for the public. (Arc/Infor format is available in the Forest Department) 1: 250,000 scale maps had been destroyed during 1988 crisis in the Land Use Division of MAS.
3. Geology and Geomorphology maps in 1: 50,000 scale. (1:1,000,000 scale maps are available for the public. It is available in Arc/Infor format in the Forest Department)
4. Slope and slope aspect maps; from Digital Elevation Model produced during UTM map production

It can be concluded here, that either national land capability and land suitability mappings, or a form of watershed classes mapping performed together by related sectors using space technology and GIS systems is urgently needed for sustainable management of the forest, soil and water resources.

For soil survey mappings in 1:50,000 scale or geology and geomorphology mapping, the related departments normally request Landsat Imagery data. Soil, Geology and Geomorphology data do not change much within a decade, so the present collection of Landsat 5 and Landsat 7 data in the Forest Department can meet their requirements. The cost for new data to be acquired by other departments can be spent on hardware and software development, and minimal costs for plotting of satellite data in required scales will need to be spent. Some elementary training in remote sensing and GIS can be shared locally also. Only advanced training in each special application (e.g. technology for extracting geology features from satellite images, using satellite data to produce soil maps etc.) should be spent. Producing of flood maps also can use the existing data in the same way although the present rate of changes in riverbanks should be taken into account.

Now data is available almost free of charge and feature extracting methods very advance!!!

Importance of DEM data

DEM data is becoming a requisite for space technology applications especially in water and soil resources management. A lot of DEMs are available in the world market and also in the research and development RS/GIS world environment. But Myanmar has difficulties to acquire such data. To produce her own DEM is a tiresome and tedious process in the past. (Year 2000 situation)

Now DEM data produced during the UTM mapping process is readily available in Survey Department's Archives. However data sharing process is so difficult that even such important projects as Myitson Assessment cannot request DEM data.

Crop suitability mapping will follow the land suitability mapping. Once an area has been designated for forestry, agriculture or other land uses; crop (both agriculture and forest) suitability mappings can be followed by respective sectors. Of course more detailed soil mapping, including chemical properties will be needed together with meteorological data and water resource maps (both surface and ground water).

Mineral Resources

According to the Department of Geological Survey and Mineral Exploration (DGSME) mapped to assist countrywide mineral prospecting and exploration. Prospecting, exploration and feasibility studies are being carried out.

Establishing of a GIS database from their survey is a task possible with our own national resources. Only assistance in the form of transfer of technology for professional geology mapping using space technology will be needed from organisations such as NASDA.

Marine Resources

A huge continental shelf area of Myanmar lies within the 200-meter depth contour of about 230,000 sq.km in the Andaman Sea and the Bay of Bengal, with the coastal line of 2832 km from North to South. The fishing grounds of Myanmar are divided into three zones, namely the Rakhine coastal zone, 740 km long from the Nat River to Mawtin point that covers an area of about 367780 sq.km; the Delta zone lies between the Mawtin point and the Gulf of Mottama, the centre of the coastal line with the area of 105000 sq.km; and the Tanintharyi coastal zone lies in the lower part of the main land including more than 800 islands (Myeik Archipelago) at the southern part of Myanmar and the Andaman Sea, with an area of 84000 sq.km. Myanmar's maximum sustainable yield of marine fish has been estimated at approximately 1.05 million tons/year excluding shrimp and other marine fauna.

Temperature and seawater colours are useful in locating marine fishery resources. The state of the sea is governed by physical factors such as sea surface temperature, surface winds, tides, waves, currents, eddies, internal waves and circulation patterns; chemical factors such as salinity, oxygen, water quality, dissolved gases, fertility and contamination of the sea; biological factors such as phytoplankton, zooplankton, fishes and their larvae and various living resources; and geological factors such as topography, sea bed variation and sea mountains etc.

Remote Sensing of Oceans can be useful in many ways:

1. It can observe a global picture of oceans for broad study of basin-wide phenomena.
2. It can detect the regions that are inaccessible or are not easily studied by ships.
3. It can raise fish production by helping in prediction and forecasting of marine fisheries resources.
4. It can assist in Earth climate studies through regular monitoring of the environment, and
5. It can help with weather forecasts, which are routinely made with the help of satellite remote sensing data, so that instructions and warning regarding storm or cyclones can be disseminated to the fishermen and ocean going ships in time.

Sea Fisheries Resources Survey and Research Unit of the Department of Fisheries, the Naval Survey Department and the Department of Marine Science, University of Mawlamyine, are working together on the fisheries resources of Myanmar. All these organisations are keenly interested to collaborate with the related ministries, which have been employing RS/GIS systems, to work on the marine resources of Myanmar, and also keen to acquire the Hi-tech facilities of the GIS system software and other required techniques.

For collaboration among ministries for basic remote sensing, data and experience sharing, there are positive possibilities. GIS issues can definitely be done. Only remote sensing for the marine resources sector needs new inputs of satellite data and technology transfer. Current data available, lacks oceanographic data where there are no landmasses in the Landsat frames because the focus in the past had been on the land cover of the country. Also present expertise and experiences are related mostly to classification of land cover and biomass. New kind of satellite data such as OCTS sensors of NASDA will be needed continuously.

Land itself as a foundation for infrastructure and housing

Infrastructure development has started to use space applications and GIS since year 2000s. The first successful attempt has been railroad alignment searching for Kyaw Ridge performed for the Ministry of Railways by the Forest Department and Suntac International. DEM extracted from topographic maps, aerial photographs are used. Latest IKONOS satellite imageries are applied for field verification and field survey. New railroad alignments are being sought out using the same technologies where conventional methods have failed, because of very difficult terrain and inaccessibility.

The Yangon City Development Committee has started to use GIS for land parcel mapping since year 2000s. Current Yangon City planning extensively use Geospatial technologies. Industrial Zoning projects also rely so much on Geospatial solutions.

When urban cadastral mappings are concerned with respective development councils (municipalities) the rural cadastral mapping is the task of Settlement and Land Records Department. This department is the first department in the Ministry of Agriculture and Irrigation to use Remote Sensing and GIS. The combination of digital 1:4,000 scale cadastral maps with other agriculture data (Number of draft cattle, areas under cropping, area of cultural wastelands etc.) under this department into the GIS system will greatly enhance the development of the country's agricultural sector.

Forestry Applications

Space technology and GIS applications of the Forest Department are in the fields of;

a) Forest Management

Essential data for forest management such as current forest cover status, forest types, deforestation rate etc. now depend mainly on RS/GIS data.

b) Watershed Management

Watersheds of all important reservoirs, dams and weirs are now in GIS format using the latest satellite data. Critical watersheds are being mapped in 3D GIS. Data is distributed to the field staff with required administrative layers.

c) Combating Desertification

Although the Central Dryzone of Myanmar is a semi-arid area, the situation was approaching to the desertification level. The RS/GIS section of the Forest Department has done 1:50,000 scale mapping of current land use, slope information, erosion susceptibility and regeneration planning data for 26 million acres of the area.

d) Biodiversity Management

For the Environment and Wildlife Division of the Forest Department the locations of 24 Protected Areas Systems are available in Arc/Infor format in 1:1,000,000 scale. The vegetation layer for habitat mapping is supplied from current land use satellite data. Detailed GIS mapping for important PAS systems are underway.

e) Environmental Monitoring and Evaluation

The Forest Department performed EIA operations for critical areas such as the Total Gas Pipeline project, Yeywa Hydropower Project, Mekong Water Basin etc. since 1997.

Miscellaneous Applications

Disaster Management

Flood control, flood monitoring, storm-warning etc. are life and death matters for developing countries. Myanmar has a good storm warning system thanks to radar stations and Meteo Satellite data. But in time of crisis like severe floods, optical satellites are almost useless. Now radar data is available from such sources as Sentinel Asia, UNOSAT etc. and successfully used during flood management since 2015. Emergency Operating Center of Resettlement and Rescue Department and DMH are very good Geospatial centers now cooperation radar stations.

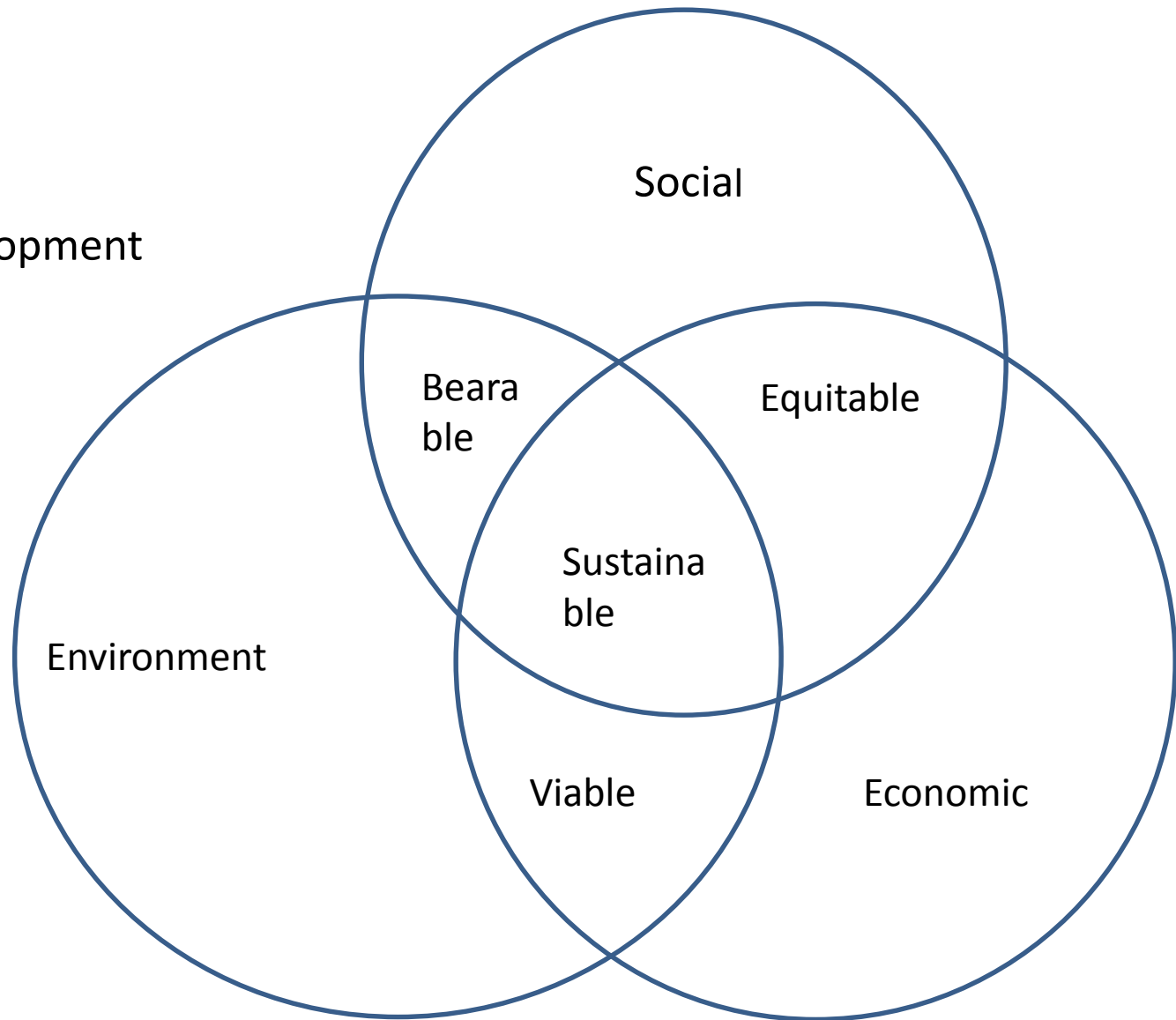
Anti-narcotic activities

Myanmar has successfully performed Geospatial based anti-narcotic activities together with UNODC

Involvement of Private Sector in Remote Sensing and GIS in Myanmar

Involvement of the Private Sector is very important for all technology developments. The private sector, which is market-oriented, has resources and motivation, which the governmental organisations lack, because of their bureaucratic mechanisms. When the Forest Department started using RS/GIS there were no private companies investing in these modern technology fields. The first private company in Myanmar, which actually invested in RS/GIS, was Geocomp, Myanmar, who are distributors of ER Mapper software, one of the primary software this training workshop will be using. Myanmar Intergraph followed with its own Geomedia Pro and associated modules such as ENVI. The next company that entered into the GIS world is Myanmar Computer Company Ltd. (MCC). It started by constructing a LIS database of Yangon City cadastral maps. It is now the vendor of ESRI products (Arc/Infor, Arc View) and Erdas Imaging in Myanmar. A late comer is Suntac International, which represents TNTmips and is also successfully using LH digital photogrammetry workstations. It is hoped that with the co-ordination of governmental organisations and private sector involvement the momentum of development of RS/GIS applications will be much faster than it was in the last decade. Now Mandalay Technologies is also dominant with so many suppliers of Geospatial services.

Environmental
Management
Sustainable Development



Principle 9

Disaster risk management goals for cultural heritage need to be mainstream into climate change and sustainable development agenda.



Current problems of Myanmar

Disasters

The image is a screenshot of the Google Earth application. The main window displays a satellite view of a region with a label 'Kale' and a 'Disast' label. The interface includes a search bar, a 'Places' list with multiple entries for 'Disaster in Chin-Kale', and a 'Layers' panel. A Picasa Web Albums window is overlaid on the right, showing a photo titled 'Disaster in Chin-Kale (4).jpg' with a date of August 17, 2015, and a 'View Photo' link. The photo depicts a flooded street with people, including a woman carrying a child on her back, and a pig wading through the water. The bottom of the screen shows the Windows taskbar with various application icons and the system clock displaying 2:37 PM on 8/21/2015.

Google Earth

File Edit View Tools Add Help

Search

Fly To Find Businesses Directions

Fly to e.g., 37 25.818' N, 122 05.36' W

Places

- Disaster in Chin-Kale (4).jpg
- Disaster in Chin-Kale (38).jpg
- Disaster in Chin-Kale (39).jpg
- Disaster in Chin-Kale (37).jpg
- Disaster in Chin-Kale (36).jpg
- Disaster in Chin-Kale (35).jpg
- Disaster in Chin-Kale (33).jpg
- Disaster in Chin-Kale (32)
- Disaster in Chin-Kale (31)
- Disaster in Chin-Kale (30)

Layers Earth Gallery >>

- Primary Database
- Voyager New!
- Happy 10th Birthday, Go...
- Edition 1
 - Highlight tour
 - Street View highlig...
 - Earth View landsca...
 - 3D cities
 - Satellite imagery up...
- Download
- Borders and Labels

Disast

Kale

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Image © 2015 CNES / Astrium

Imagery Date: 1/6/2014 2008

23° 11' 09.51" N 94° 04' 31.08" E elev. 377 ft

Eye alt 187/3 ft

2:37 PM 8/21/2015

Picasa™ Web Albums

Disaster in Chin-Kale (4).jpg

Date: Aug 17, 2015, 10:42 AM

Number of Comments on Photo: 0

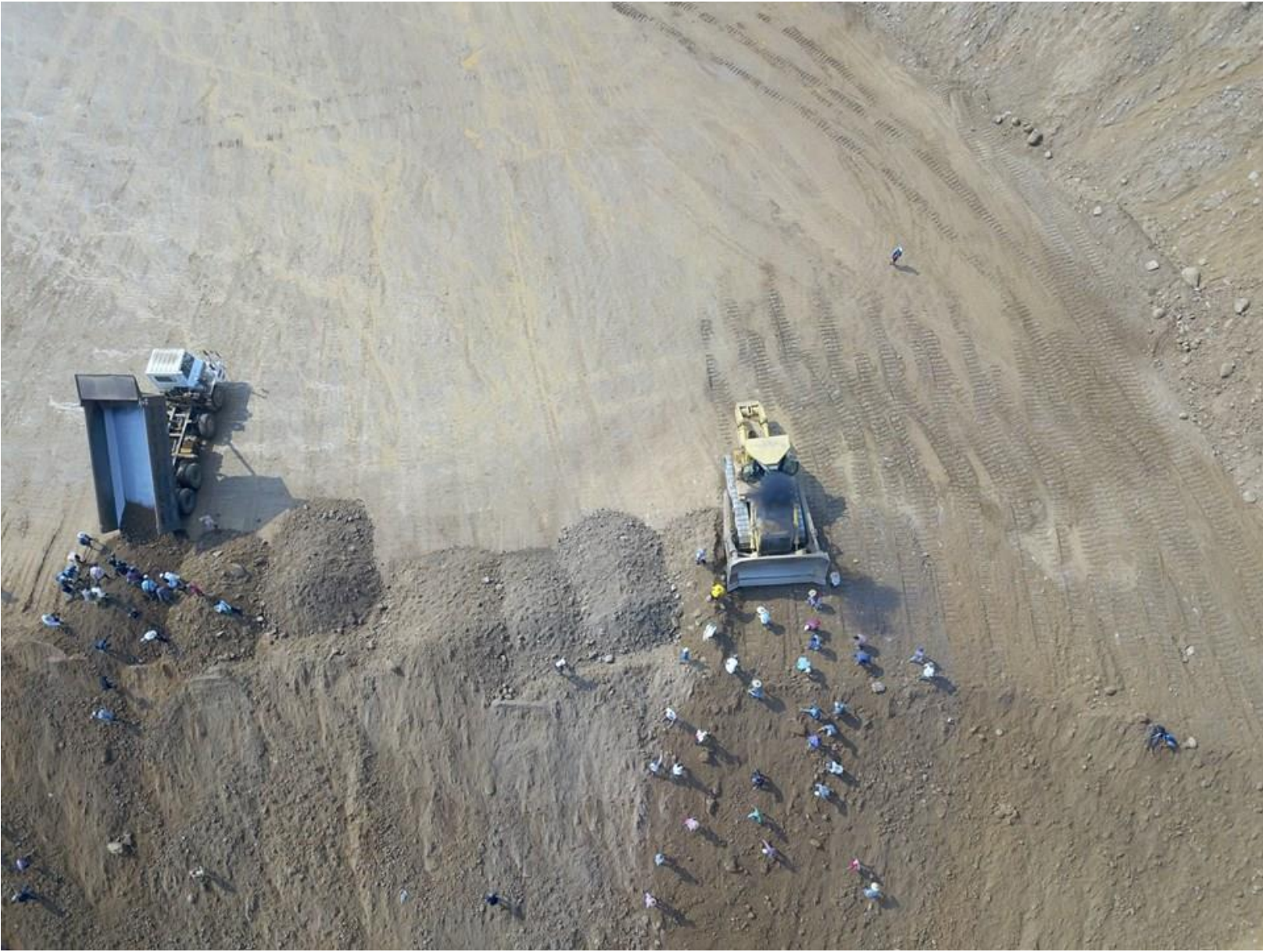
[View Photo](#)

Google earth

Bad Governance



Extractive Industries



Soil Degradations and what?



Illegal landuse



Conclusions

Following conclusions can be made on the current status of application of space technologies and GIS in Myanmar.

1. Basic skills and knowledge for application of RS/GIS is still lacking in most of the sectors although this can be solved locally with the establishment of a National Centre.
2. Basic GIS layers which are instrumental for applications of RS and GIS; sustainable national development and management of natural resources should be established as a priority and with joint co-ordinated efforts of all sectors concerned.
3. It is important to avoid duplication and redundancy of efforts, as it will cause a great deal of cost and time loss.
4. Involvement of the Private Sector in application of space technology is important. Concerted efforts between the government and private sectors, to develop RS/GIS applications should be strengthened.

Thank you