

Travel Completion Report
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Summary

During the trip to East Timor, Gordon Tsuji and myself, Patrick Niemeyer, provided two days of training in soil mapping and soil interpretation to 13 East Timorese staff from MAFF/Baucau and Dili and from the Land and Property Division of the Ministry of Justice. Participants were taught to recognize specific soil characteristics and understand their effects on land use. Students practiced the use of topographic maps and aerial photos for the purpose of finding locations on a soil map within soil map units. They related the soil map unit to data specific to the soils within the map unit. The digitized version of the Os Solo de Timor map was delivered to MAFF/ALGIS and to USAID for distribution to interested parties. Work was initiated to georeference and update the taxonomic classification of the profiles found in the Os Solos de Timor manuscript. By locating the profiles and updating the classification, it will be possible to better gauge the accuracy of the map and establish a template for future soil mapping in East Timor.

Purpose

The purpose of traveling to East Timor was to:

- ? Deliver the digitized Os Solos de Timor soil map to the MAFF (Ministry of Agriculture Forestry and Fisheries)/ALGIS (MAFF division of Geographic Information Systems), Ministry of Land and Property, USAID, and interested NGOs
- ? Provide training that would allow MAFF staff to use soil properties to identify similar or dissimilar soils as related to the soil map
- ? Provide training using topographic maps, aerial photos and compass that would allow MAFF staff to locate themselves on the soil map
- ? Encourage staff members of MAFF to georeference the soil pedons in Os Solos de Timor using available topographic maps of the country and ArcView software

Training

Training in the use of the soil map took place 122 km east of Dili in city of Baucau, May 10, 2005 and May 11, 2005. Baucau was selected as the location for this training because we have sampled soils in the area previously and have known sites where students can see specific soil types. Initially the training was planned for 5 participants; however, it was attended by 22 participants the first day and 13 the second. Participants were from MAFF and the Ministry of Land and Property.

Day One

On May 10th the training began at 10:00 am. Gordon Tsuji opened the session by explaining the importance of soil mapping and classification in technology transfer. Using a soil map it may be possible to duplicate agricultural practices successful in one area by implementing them in areas with similar soils. It is hoped that the successful application of the soil test in the Baucau watershed can be duplicated in similar areas.

The remainder of the morning was spent discussing soil characteristics that are key to identifying the soils found in East Timor. The subjects covered included: defining soil, parent material, identifying soil horizons, texture, structure, bulk density, soil depth, pH, CEC, salinity, carbonates, shrink swell, and color. We discussed how to assess these soil characteristics and how they affect soil behavior and performance under different use.

In the afternoon session of the training, we began map-reading exercises. We studied the different parts of a topo map, how they are used and what they tell us. A ruler for measuring latitude and longitude (geodetic ruler) was used to find a geo-referenced soil pedon on the topographic map. The location of the pedon was then found on a soil map that had been superimposed on an aerial photo by comparing easily discernible landmarks from the topographic map to those on the photo. Once the soil pedon was located on the soil map, we looked at the map legend to get information about the map unit. From the legend, we could see soil type, soil surface texture and if soils were rocky or calcareous. We were also able to find a soil pedon in Os Solos de Timor that represented the soils in the map unit. The soil pedon lists soil chemical and physical data specific to the soil.

The use of a compass for navigation was also explained. Specifically, how to find a bearing using compass in conjunction with a topo map or aerial photo and how to navigate with the compass using landmarks on the ground.

Day two

The second day of training was spent in the field. During the day we visited 5 sites with different soils. We assessed the soils by digging small pits and collecting soil samples from surface and subsoil horizons. At each site we discussed soil color, structure, texture and other soil characteristics that had been covered on day one. We also used the aerial photos and topographic maps to locate our position. We then used the compass to navigate from our position to features identified on the aerial photos. In this way we were able to move between soil map units. This skill is necessary for the creation and use of a soil map.

At the last site we arranged the samples that we had collected in a row so it was easy to compare them. We then tested soil pH, EC and reaction to 1NHCl. We also looked at soil color and structure and hand textured each sample. The students were quizzed about the implications of these results for land use.

Training Assessment:

By the end of the second day, the students had a basic understanding of the select soil characteristics and their effect on agriculture and other uses. They understood that by using the soil map and comparing the soils within common map units, they may be able to transfer successful technologies between areas with similar soils. The students were able to use a compass to navigate in conjunction with a topo map or aerial photo in groups or individually. By using these skills, students were able to locate themselves on the map and identify the soil map unit.

Despite the feeling that the training was successful, there were some issues and complications. The greatest challenge was relating technical data to the participants a common language. The instructors speak English while official language of East Timor is Tetun and Portuguese. Most of the East Timorese participants spoke some English and Indonesian. To overcome the language barrier, the instructors used a combination of English and Indonesian and had East Timorese students with stronger English language skills translate more difficult technical terms.

Some of the information about soil may have been too in-depth for some of the participants. The original training was planned for 5 people who had attended a month long course on soil and soil mapping. Due to this, each individual was unable to receive

a study guide. To overcome this, Julio Corriera, MAFF soil scientist, helped to explain some of the more complex soil concepts. At the end of the training, the study guides were distributed so that each office represented received one. Individuals with stronger English skills were asked to translate the document so it could be used as a reference.

Using the geodetic ruler was very difficult to explain to a large group and few of the participants mastered its' use. However, the maps available of East Timor have a 30 second Lat./Long. grid. The grid allows the map user to estimate a geo-referenced location on the map without using the ruler. To accommodate participants interested in mastering this skill, each office represented was given a geodetic ruler, written directions to use the ruler, and a template for photocopying more on a clear plastic overlay.

Additional activities

While visiting East Timor, we visited on separate occasions the East Timorese Agriculture Minister, Estanislau da Silva, and the USAID Economic Growth Officer, Stephen Vance. At these meetings, we discussed the University of Hawaii's no cost extension for the project and delivered digital copies of the soil survey. We specifically requested that the information be freely distributed to interested parties. At the meetings, we demonstrated how the soil map could be used to select areas of interest in national and regional planning.

Following the training, I worked one day with Francisco Sarmiento and Julio Corriera of MAFF to begin geo-referencing the soil profiles described in Os Solos de Timor. Each profile has general directions to the location but no specific georeference. Using ArcView software in conjunction with topographic maps and regional boundary layers, we were able to locate 4 of the profiles in 2 hours. The MAFF staff continued the work the following day. They hope to complete the work in June of this year. By geo-referencing these sites, the associated data will be more easily accessible and applied to projects that may be planned areas close by.

I also spent one day working with Julio Corriera classifying the profiles from Os Solos de Timor using the ninth edition of Keys to Soil Taxonomy. We discussed which portion of the "Keys" would be most applicable to soils in East Timor. Once the soils are updated, it may be possible to apply more accurate USDA Soil Taxonomy classifications

to the Os Solos de Timor map. This could greatly improve the map by reducing the number of soil types for each map unit.

Future activities for soil survey in East Timor

It is hoped that the digitized version of the Os Solos map will establish a good foundation from which to create an improved soil map of East Timor. It is available immediately and ready to use for national and regional planning. It can be and should be improved for more specific application.

By locating the soil profiles and updating the classification MAFF will be creating a soils database. When planning activities in areas close to where soils are described or in areas with similar soils, it will be possible to refer to the Os Solos manuscript for physical and chemical soil data. This data should not be used without verification and it is suggested that a number of the profile locations should be sampled and analyzed and results compared. The location of the profiles will also provide insight into the distribution of the original sampling sites and accuracy of the data. If the classification is updated, it may be possible to update the entire map to the current version of USDA Soil Taxonomy.

While in East Timor, I was told of plans for development of a MAFF soils lab. With a lab, verification of the data from Os Solos could be done in country. Before equipping this lab, the type of analysis, the purpose of the analysis, and conditions under which the lab will be operated should be considered. Most analysis can be done with basic equipment. Equipment that requires maintenance and repair by a technician should be avoided. Soils lab staff will likely need some training to carry out the analysis and will need additional training to interpret the analysis results.

If a soil survey update is to be carried out in the country, a specific watershed should be selected. The area should be one that has the most moisture and temperature data available. The ALGIS branch of MAFF should be used to digitally pre-map the area. Using GIS software they should be able to delineate map units based on landform, elevation, slope, moisture and temperature. East Timor is fortunate in that it has a complete set of good quality aerial photos and topographic maps with which to do this work. Fieldwork and a plan for sampling should be based on the pre-mapping. The delineations would then be field checked and results used to create the final map.