

Histosols is a dynamic entity and spatial variability is extremely complicated. Building a database for soil quality assessment of Histosols under agriculture will need substantial amount of information which is reliable. The objective of this study is to examine the physical, chemical, and biological parameters used in soil quality assessment of Histosols. The parameters selected for this study are pH, organic carbon, total nitrogen, CEC, exchangeable cations, electronic conductivity, available phosphorus, trace elements, bulk density degree of decomposition, rubbed fiber content, soil depth, hydraulic conductivity, and soil respiration. These parameters show variable responses in terms of resilience. Secondly, soil maps of different scales were studied and there were found to be inaccurately in terms of the actual acreage of Histosols in Sarawak. The main reason is that these maps were made more than 25 years ago with the technology available at that time. This causes the maps to be questionable in terms of their reliability. Thirdly, the current soil classification of Histosols shows weakness as the numbers of criteria used for classifying Histosols very limited. Less criteria used in classification means lack of accuracy in classifying Histosols which leads to inefficiency in managing the soil. Besides, the data presented in the soil reports are fragmented and inconsistent. Even with the same soil reports different set of parameters were tested for one Soil Family which means the analysis is incomplete. In addition, lack of soil survey done in collecting more soil sample for analysis leads to lack of data input. The reliability of the data also part of the problem which can be link to how the soil analysis was conducted and which methods were used in the analysis. Thus, the limitation of the current data needs to be addressed prior to constructing a proper database for management system. More efforts have to be put in updating of the existing soil maps, soil classification, soil data, and soil analysis methods are required. Soil sampling should also be taking into consideration in respect of producing good soil maps. Future research in the field of soil quality assessment is greatly needed for sustainable management of soil resource. With the current development, database management is still far-off and more improvement have to be done in the future.

The database will be utilized for formulation of sustainable soil management practices to avoid soil degradation and improve soil quality. The integration of the database into sustainable land management system will assist proper land management and conservation. The database will also provide adequate information on the soil properties for creating the management plans, which will be used based on soil.

Currently there is still a lack of a unified database in a regional sense and this has caused some difficulties in agro-technology transfer (Lachart, 1994). Spatial variability in soil becomes an important factor when agro-technology is transferred. Spatial variability of soil includes variations in soil physical, chemical, and biological properties and processes (Alexander et al., 2001). The reason that it different sampling points there will be changes in soil properties. Thus, for a reliable data, sampling has to be done more frequently at various locations, using sampling points and soil should measure the degree of spatial variability. If sampling is done at only one place by a whole field, then the data collected will be questionable and certainly not reliable.

In recent years, geographical information system (GIS) has become an important tool for environmental related issues. GIS is used as a powerful system to store, analyzing the integration of spatially referenced data as a problem-solving

ABSTRAK

Tanah gambut adalah sesuatu yang dinamik and kepelbagaian ruang yang sangat rumit. Pemubuhan suatu pangkalan data untuk penilaian kualiti tanah gambut bagi pertanian memerlukan banyak maklumat yang boleh dipercayai. Objektif kajian ini adalah untuk menyelidik parameter fizikal, kimia dan biologi untuk digunakan dalam penilaian kualiti tanah gambut. Parameter yang dipilih untuk kajian ini adalah pH, karbon organik, jumlah nitrogen, CEC, kation pemukargantian, konduktiviti elektronik, fosforus yang tersedia, unsure surih, ketumpatan muatan, darjah pereputan, kandungan serat gosok, kedalaman tanah, konduktiviti hidrolik, dan respirasi tanah. Parameter-parameter ini menunjukkan perubahan dari segi daya pelentingnya. Peta tanah dari skala yang berlainan telah dikaji and didapati tidak begitu tepat dari segi keluasan kawasan tanah gambut di Sarawak. Sebab utama adalah peta tanah ini telah dibuat lebih daripada 25 tahun dahulu menggunakan teknologi yang ada pada masa itu. Ini menyebabkan kebolehpercayaan peta-peta ini menjadi persoalan. Klasifikasi tanah gambut yang ada menunjukkan kelemahan dari segi kekurangan kriteria yang digunakan dalam mengklasifikasikan tanah gambut. Kekurangan kriteria dalam klassifikasi menyebabkan ketidaktepatan dalam mengklasifikasikan tanah gambut lalu mengurangkan kecekapan pengurusan tanah. Di samping itu, data yang ditunjukkan dalam laporan tanah adalah tidak konsisten dan tidak lengkap. Malah dalam laporan yang sama parameter yang diuji untuk satu famili tanah adalah berlainan menyebabkan maklumat tidak lengkap. Tambahan pula kekurangan survei tanah untuk mengumpul sampel untuk analisis menyebabkan kekurangan input data. Kebolehpercayaan data yang diperolehi juga berkaitan dengan kaedah analisis tanah dijalankan dan langkah yang digunakan. Oleh yang demikian, kelemahan data yang sedia ada perlu diatasi sebelum menubuhkan suatu pangkalan data untuk sistem pengurusan. Usaha harus ditumpukan untuk mengemaskini peta tanah, klasifikasi tanah, data tanah, dan kaedah analisis tanah. Mengumpulan sampel tanah juga harus dititikberatkan supaya dapat menghasilkan peta tanah yang baik. Penyelidikan pada masa depan dalam bidang penilaian kualiti tanah adalah diperlukan untuk mengurus sumber tanah secara berkekalan. Dengan perkembangan sekarang, pengurusan pangkalan data masih belum tercapai and lebih usaha diperlukan kelak.

Figure 4.11 Variation of CEC of Andeasid Family at Different Soil Depth (9 profiles)

Figure 4.12 Variation of CEC of Makah Family at Different Soil Depth (9 profiles)

Figure 4.13 Correlation Between CEC and pH of Andeasid Family (4 profiles)

Figure 4.14 Bulked Fiber Content of Andeasid Family (9 profiles)

Figure 4.15 The nitroen cycle of typical peat system.

Figure 4.16 Degradation of 100g of organic residues one year after they were incorporated into the soil.

Figure 4.17 Key steps of the nitrogen cycle in flooded soils and sediments.