6. Other soil issues

In the short term soil salinity will be the main limiting factor for agriculture after a tsunami or seawater inundation. However the effects of salinity and sediments on soil chemistry and the availability of nutrients in the longer term will require attention. Particular attention needs to be paid to coastal peat soils that are often potential acid sulfate soils if exposed by drainage. It is important that rehabilitation of agriculture focuses on areas already established, rather than clearing coastal vegetation and peat land.

Sodicity

After the 2004 tsunami soil scientists expected sodium in the salt water to attach to clay particles, making the soil sodic and highly susceptible to erosion. However, soil sodicity proved infrequent, possibly because most soils were sandy, and the puddled and compacted clay rice soils prevented the sea water infiltrating to any depth. However, sodicity may be a problem in clay soils that are not compacted.

A simple test for sodicity is to drop a pea-sized lump of soil into some rainwater and see if it forms a milky ring in the water. The milkiness is the particles of soil disintegrating as the sodium makes it difficult for them to stick together in water.

> Slaking and dispersion in soil – Vegetable SOILpak
>
> http://www.dpi.nsw.gov.au/agriculture/horticulture/vegetables/soil/soilpak/soil-testing/Slaking-and-dispersion.pdf

Acid sulfate soils

Tropical floodplains such as those in Aceh may overlie acid sulfate soils. These soils are harmless while covered in water, but when they dry out, produce sulphuric acid which acidifies soils and surrounding waterways. The acidity produced by these soils is often so high plants cannot grow. Indicators of acid sulfate soils include red staining from iron particles on the soil surface and stream banks.

> Acid sulfate soils
>
> http://www.dpi.nsw.gov.au/agriculture/resources/soils/ass

Seawater inundation mobilises the iron in these soils and releases it into surface and groundwater. One Aceh site at Lapang Timu, Bireuen, had a thin 2mm orange iron oxide crust (pH 3.7) over a highly saline clay soil.

A creek in Meulaboh, Aceh Barat, where 5m of tsunami water had passed through had high EC and thick red iron flocs. Ten months after the tsunami, well water at Desa Jeumpa in Bireuen was still highly saline, yellow with an oily appearance on the surface, indicating iron.

On the west coast farmers displaced by the tsunami moved inland onto peat soils with varying degrees of success depending on acidity levels released when the soils were drained and dried out. Some soils became so acid that very little would grow. A basic pH kit can assist farmers and advisors in assessing acidity.

Lime can help reduce acidity but can be prohibitively expensive for farmers. Mulches and organic matter can also help reduce acidity levels.

Soil structure

Soil structure is the arrangement of soil particles and spaces. Soil that is well structured has soil aggregates comprising soil particles and organic matter. These aggregates store moisture and nutrients for plant roots, while the spaces between the aggregates allow drainage and airflow. Soil structure can be improved by adding organic matter to the soil because this provides food for soil organisms and their activities help bind soil particles into aggregates.

Peat soils

Rieley and Page Eds. (2005) Wise Use of Tropical Peatlands: Focus on Southeast Asia ISBN: 90327 0347 1

http://www.restorpeat.alterra.wur.nl/download/WUG.pdf

Riely, J (2006) Wise Use of Tropical peatlands. A new approach to old problems

http://www.restorpeat.alterra.wur.nl/download/Wosten/Rieley-Wise%20use%20of%20tropical%20peatland.pdf

Rice soils have poor structure because the soil has to be puddled and compacted to hold water. They have to be cultivated before following dryland crops can grow in them. For this reason it is preferable better to have separate areas for rice and palawija crops, but the small size of many landholdings makes this difficult. If this is not possible, it is important to add organic matter to encourage biological activity as the activities of soil organisms improve soil structure and fertility. There is a need for training to identify soil structure in soil and crop assessments, to assess its role in crop losses.

Visual soil structure assessment link (FAO)

ftp://ftp.fao.org/agl/agll/lada/vsfast_methodology.pdf