

## 4. Sediment deposited by the tsunami

The tsunami deposited sediment over the floodplain, filling in irrigation channels and agricultural drains and rice paddy fields. In many areas, digging out channels and restoring the structure of rice paddy fields had to be completed before any agriculture could be established. Some agricultural land took months or even years to return to production because farmers could not channel irrigation water in the dry season, or drain floodwaters in the wet season. Removing sediment from these channels and drains is a high priority after a tsunami, but needs to be coordinated with land surveys in case changed land elevations have altered the drainage patterns.

At workshops two years after the tsunami, farmers said they would have liked information immediately after the tsunami on sediment removal techniques and priorities for removal. However, managing sediment is a complex issue that needs assessment at each site. Removing sediment is a labour intensive and expensive operation and may not be necessary in all instances. Some sediments can be left in place, and others can be incorporated into the topsoil. In some cases sediments gradually dissipated without any intervention, mainly due to self-seeding vegetation that helped improve the soil structure. Where sediment needs removal, particularly deep sediments, assistance from government reconstruction and aid groups may be needed.

The decision to remove sediment from fields depends on one or more of the factors outlined below.

### Sediment types

Aceh tsunami sediments ranged from sand and clay to peaty organic matter. Peaty sediments scoured out of coastal wetlands by the tsunami and deposited inland proved very fertile and productive so could be left in situ. It is important that the fertility of this sediment be monitored and managed to ensure long term benefits.

The decision to remove sand or clay sediments was determined by the depth and underlying soil type. In some cases the tsunami mud provided a layer over acid peat soils; the layer buffered the soil acidity and provided minerals to assist crop growth, so these sediments were initially very fertile.



Figure 6: A variety of sediments were deposited by the 2004 tsunami in Aceh (clockwise from top left, acidic iron, sand, organic peat, seafloor mud)

### Underlying soil type

The soil under the sediment will affect how quickly the salt will leach from the sediment above. Highly permeable sandy soils are able to leach salts that leach from the sediments above. Clay soils, particularly compacted rice paddy soils, do not leach easily so there is higher risk of salinity from the sediment salts collecting in the clay unless the sediment is removed.

### Depth of sediment

Farmers interviewed two years after the tsunami said thin layers of sediment were not a problem for their farming because they could be easily incorporated into the soil below. Farmers did not attempt to grow rice in deeper sediments because their cultivation implements could not go deeper than 20cm. The Bureau of Reconstruction and Rehabilitation (BRR) found that sandy sediment greater than 25cm was too deep to grow rice, although some sandy sediment did not affect peanut crops away from the coast. A sediment depth greater than 10 cm could be difficult to incorporate especially where the underlying soil texture is coarse.

Shallow sediments were also of less concern than deep sediments because salt levels were low and plant roots could grow through the shallow layer to the soil below. Deep sand or clay sediments posed more of a problem as they could be very saline, and difficult for plant roots to move through. On the west coast rice paddies located a short distance inland were not subjected to the same rate of coarse sediment deposition as coastal paddies on the east coast.

### **Salinity levels**

In the 2004 tsunami, sediments varied in their salinity levels, so sediments need to be assessed for salinity before any crops are planted in them.

### **Farming options**

When assessing whether to remove sediments, the BRR in Aceh first checked whether villagers had other areas where they could grow crops. Sediment was removed only if the villagers had no other available land.

### **Social factors**

Two years after the tsunami farmers identified physical activity as very important in regaining a sense of control after the tsunami, so small-scale sediment removal may be a useful therapeutic activity as well as practical enterprise. Mapping of sediment depths was also suggested as a possible activity for farmers, but requires resources and coordination that might have taken too much time to achieve practical outcomes for farming groups.

### **References**

FAO 2005 Tsunami infrastructure damage  
<http://www.fao.org/ag/tsunami/home/indo-infra.html>