



ASSAY

A NEWSLETTER ABOUT ACID SULPHATE SOILS

No. 3 May 93

ASS near Kakadu

Acid sulphate and potential acid sulphate soils have been found on the East Alligator flood plain, Northern Territory, adjacent to the Kakadu National Park. These soils were investigated during a field study related to uranium mining.

Research lead by Dr Ian Willett, Australian Centre for International Agricultural Research, found soluble iron and sulphate concentrations in these soils increased directly with the oxidation of pyrite (iron sulphide). Furthermore, up to 4% aluminium becomes soluble from the acid weathering of clay minerals.

It was concluded that pyrite oxidation and acidification were the primary factors affecting soil morphology on the East Alligator floodplain. This research and other papers have been collected into the book "*Bio-mineralisation Processes of Iron and Manganese*", edited by Skinner and Fitzpatrick. Contact Ian Willett on phone - (06) 2488588.

Fish in deep water

Fish that have survived kills from acid sulphate soil runoff are avoiding their preferred habitats, which are contaminated with acid and aluminium long after storm events. Significant long-term changes to the ecology could be taking place under these conditions, largely undetected.

Fish have been observed evacuating part of the Richmond River, North Coast NSW, on low tide when acid conditions become dominant. PhD student Jesmond Sammut has made the observation while collecting water samples for his research on the environmental factors linked with the fish disease EUS.

The fish are forced into less protected, downstream areas of the estuary. Jes says this

Hurry! Closing date for registration is June 10.

NATIONAL CONFERENCE ON ACID SULPHATE SOILS

Gold Coast

June 24-25, 1993

KEYNOTE SPEAKER:

Dr David Dent, lecturer in soil science at the University of East Anglia.

Contact: Jan Edwards (066) 240 345

may result in localised overcrowding, greater competition for food and increased instance of disease. Juvenile fish suffer most, with less protection from predators in the often deeper, and faster flowing non-acidic water.

Total population decline, altered balance between species populations and the localised extinction of species could result from phases of estuary acidification.

Gudgeons, *Hypseleotris spp.*, have been seen at the site, migrating into and living happily in extremely acidic water. This unusual tolerance to acidic conditions has enabled these fish to live free from competition and predation.

Barrier Reef concern

The Great Barrier Reef may be at risk from toxic concentrations of acid and aluminium flushed from near-by acid sulphate soils (ASS).

Concern has been raised by Bob Smith, NSW Agricultural Environmental Officer, following his inspection of ASS near Cairns.

There has been much talk about linking reef degradation to phosphates washed from

farms, but similar processes could transport elements toxic to aquatic life from ASS.

Bob Smith has discussed the issue with international expert Dr David Dent, who will be in Australia to talk at the National Conference on ASS in June. Dr Dent will travel to Cairns after the conference and investigate the possible link of ASS with the degradation of the reef.

Heavy metal hazard

Pollution of our waterways with hazardous heavy metals could result from the disturbance and oxidation of potential acid sulphate soils (PASS).

High concentrations of cadmium and other heavy metals have been measured in potential acid sulphate soil under mangroves and salt marsh near Brisbane by UNE Northern Rivers scientists, David McCouchie, Mark Clark and Peter Saenger.

The heavy metals pose no threat to the environment as long as the soil remains under water, existing as insoluble sulphides or attached to organic matter. However, when the soil is oxidised, the metals become soluble and are easily flushed into near-by waterways.

The potential release of heavy metals and formation of ASS is a serious problem for the management of dump sites, where marine dredge spoil is disposed of on land.

Historical evidence

Large fish kills have plagued the rivers of Northern NSW since at least the 1800's and may have occurred before white settlement, according to anecdotal evidence collected by Tony Hayes, NSW Sugar Milling Co-op.

A major kill in the Tweed River, North Coast NSW, was reported in the late 1800's from dairymen and fishermen, alive at the time. Dray loads of fish were scooped from the river and used as fertiliser around fruit trees. The smell was reported to be unbearable.

The river was so badly affected, fishermen transferred their operations to the beaches for several months. Other large fish kills were reported on the Richmond in the mid 1950's.

Aborigines were seen harvesting the dead and dying fish on both occasions, which Tony

believes is evidence that their ancestors had been familiar with fish kills, and knew the fish were safe to eat.

Although historical records indicate fish kills long before the drainage of large areas of low lying coastal land, resulting in ASS, they tell us little about changes in the magnitude and frequency of such events.

Dredging plan derailed

NSW State Rail is approaching dredging on the Hawkesbury River with great caution, demonstrating its awareness of the problems linked with acid sulphate soil.

An investigation by Mary Diab, former student of the University of NSW, showed that the soil State Rail intended to dredge and store on land would become severely acidic.

One meter of soil was to be dredged from the mouth of Seymours Creek, a small tributary of the Hawkesbury River. The upper 40 cm of this soil was recently deposited sand overlying potential ASS.

Dredging has been delayed pending further investigations into management options that will avoid potential acid problems.

Sugar cane research

Sugar cane growing on acid soils appears tolerant of high levels of acidity and aluminium. Based on soil chemistry principles, it is expected that soil nutrients like phosphorous, calcium and potassium are less available to plants under these conditions.

The effect of acid soil conditions on nutrient availability and sugar cane growth is the focus of a Sugar Research and Development Corporation funded study by University of NSW scientists, Dr Mike Melville and PhD Student, Richard Bush.

The Tweed floodplain, North Coast NSW, has been selected for the study, as a large proportion of cane in this region is grown on acid soils, some overlying acid sulphate soil.

The relationship between cane land management, soil and crop characteristics is being studied at four contrasting sites to assess the impact of ASS on cane production.