



ASSAY

A NEWSLETTER ABOUT ACID SULFATE SOILS

No 26. July 2000

CASSP funding update

Twenty-two applications are currently being assessed for the first round of the Commonwealth Government's \$3 million Coastal Acid Sulfate Soils Program (CASSP).

This funding is available through Environment Australia, as part of the 1998 Ocean's Policy, for community stakeholders working together to demonstrate innovative on-ground techniques to manage coastal ASS.

Stakeholders who have worked together on first round applications include farmers, fishers, local and state government agencies, environmental and community groups and scientific institutions. Approved proposals will be announced in the next issue of ASSAY. A call for second round applications will be advertised in December 2000.

Projects are assessed against the following key criteria:

- proven technical merit;
- innovative or best practice approaches;
- partnership of diverse stakeholders (including industry, government and other community groups); and



front: Col Ahern, Glenys Tewes, Phil Johnston
back: Vern Veitch (SUNFISH), Kristie Watling, Bernie Powell, David Dent (Bureau of esource Sciences), Earl Barry, Dave and Nicki Lyons (DNR Analytical Laboratory) and right John Williams Chair of NatCASS.

- a sound strategy to encourage wider community adoption of the project successes.

A team of ASS experts assess the technical merit, while officers at Environment Australia's Marine Group ensure proposals adhere to general program guidelines. The guidelines for funding can be found at www.environment.gov.au/marine/ocepoly/cassp.html.

Applications from around Australia dealing with land and/or water issues are sought to ensure the projects offer a range of viable options for differing sites. For further information E-mail cassp@ea.gov.au or call Trevor Costa on (02) 6274 1030.

Queensland ASS forum

A total of more than 150 participants attended a three-day workshop in Brisbane last month organised by the Queensland Acid Sulfate Soils Investigation Team (QASSIT).

The Queensland Minister for Environment and Natural Resources, Mr Rod Welford officially opened the workshop which attracted scientists, planners, engineers, consultants, community groups, landholders, state and local government representatives, conservationists, developers and industry associations.

Speakers included Bernie Powell: Introduction to ASS; Andrew Watkinson,- Lyngbya majuscula and possible ASS links; Graham Marshall, Industry significance; Michael Lusi, Local Government perspectives; Vern Veitch, Fishing industry perspective; John Williams, What is NatCASS and the NSW perspective; Kristie Watling, Identification of ASS and David Dent, An international perspective.

Following workshop days were devoted to field assessment, laboratory methods, interpretation of chemical and research results, management principles, case studies and a field trip.

The workshop proceedings which contain 41 papers are available on CD Rom for \$27.50 (GST

and postage included).

Contact QASSIT: (07) 3896 9819 or (07) 3896 9331, or E-mail: anorovj@dnr.qld.gov.au.

Water buffalo may expose ASS

Water buffalo are draining wetlands and increasing oxidation rates in ASS wetlands in parts of the Northern Territory according to the Territory's Office of Supervision Scientist.

The Territory's supervising scientist, Arthur Johnston, says a trial to exclude buffalo from Magela Creek Floodplain near Kakadu National Park greatly increased water levels and length of inundation. Buffalo tracks from the wetland have deepened over years and developed into small drains lowering water levels in the swamps. Oxidation does occur naturally, but it appears the buffalo have increased the rate of acid production through lowering water tables further oxidation of ASS in the dry season".

Buffalo were imported from Indonesia more than 80 years ago. Wetland plants have recolonised the flood plain, reducing evapotranspiration in the dry season.

ASS are close to the surface at Megela Creek and fish kills have been recorded in the area.

Contact Arthur Johnston: ph (08) 8982 9101.

Second round of ASSPRO funding

NSW Agriculture has gained an extension of a special NSW Government enhancement budget for ASS projects for 2000 - 2003. (ASSPRO funding)

ASSMAC chair John Williams said a further \$1.5 million will be allocated over the next three years to assist with the management of ASS in NSW. The Government previously allocated \$2.1 million.

ASSMAC has allocated part of the second round ASSPRO budget to continue existing projects, as well as, establish an additional project officer position for the NSW north coast.

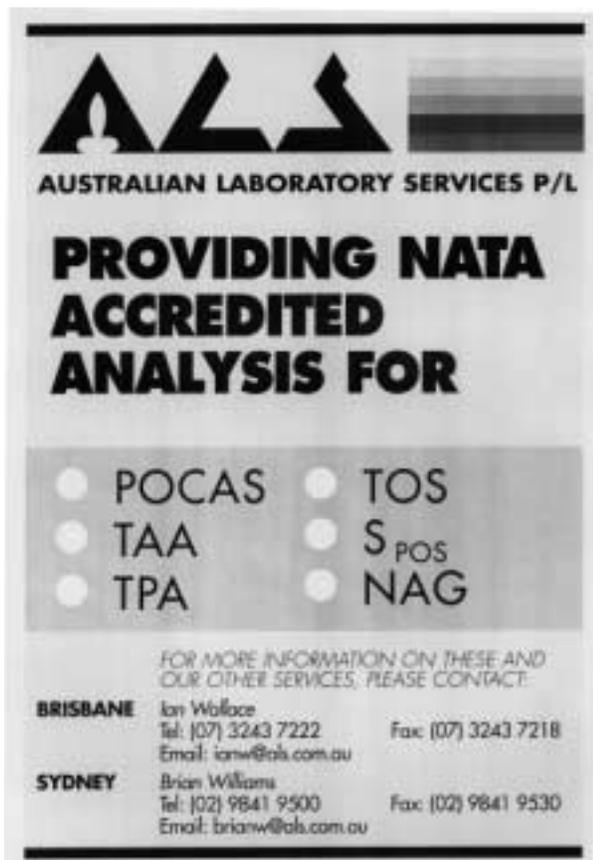
ASSMAC will meet in August to allocate remaining funds to assess a new round of projects. These funds will go to councils, community groups, universities and incorporated groups for rehabilitation works, trials and farm assessment.

Mr Williams said that since 1997 more than 50 projects have been funded for ASS remediation, education, and development of best management practises.

Contact: Greg Fenton Ph: 0269381906

ASS presentation to Coastcare

Oceanwatch Chairman, Phil March, led a discussion on ASS at the Coastcare National Forum 2000 held in Townsville, in July. Phil also launched the second edition of An Introduction to Acid Sulfate Soils booklet at the forum and presented each participant with a detailed ASS information kit. The booklet reprint, which is available for free from ASSAY (see back page) was funded by Agriculture Fisheries and Forestry Australia and Environment Australia.



AUSTRALIAN LABORATORY SERVICES P/L

PROVIDING NATA ACCREDITED ANALYSIS FOR

- POCAS
- TAA
- TPA
- TOS
- S_{POS}
- NAG

FOR MORE INFORMATION ON THESE AND OUR OTHER SERVICES, PLEASE CONTACT:

BRISBANE Ian Wallace
Tel: (07) 3243 7222 Fax: (07) 3243 7218
Email: ianw@als.com.au

SYDNEY Brian Williams
Tel: (02) 9841 9500 Fax: (02) 9841 9530
Email: brianw@als.com.au



Some of the Coastcare Network with Phil March (front).

Coastcare provides opportunities for community, government, business and interest groups to become actively involved in the protection and management of our coastal and marine environments. Contact Coastcare ph: 1800 803 772, or web address: www.environment.gov.au/marine/coastcare.

NSW news

Shark Creek plans

Clarence River County Council (CRCC) has commissioned consultant IGC and Associates to identify the extent and source of the acid problem in Shark Creek, a Clarence River tributary.

The NSW Dept of Land and Water Conservation has listed Shark Creek as an ASS "hotspot".

IGC Principal, Ian Kelly, reports that upland flows were only slightly degraded, but that high levels of acidity with potential large biological impacts dominated inflows from drainage work. The main area of drainage work is in the lower 8 km of Shark Creek.

In stage 2 of this project, Wetland Care Australia, (WCA) will develop a series of seven site-specific management plans in consultation with local landholders. The plans will be based on a model drain and floodgate management plan developed by CRCC. Farmers have already signed a management plan involving three drainage systems in this area. WCA's northern NSW wetland consultant, Bob Smith, will be contacting landholders over the coming months.

Contact Alan Cibilic: ph (02) 6642 3277

Silt curtain prototype

Clarence River County Council (CRCC) is trialing a 'silt curtain' to reduce sediment discharge and turbidity in drains during mechanical cleaning.

Drains are cleaned on the rising tide to prevent discharges, but as the tide drops discharge inevitably occurs. The silt curtain is designed to reduce discharge water velocity resulting in the deposition of sediment in the drain before discharge. The silt curtain is mobile and easy to install. It will release in a controlled fashion should large rainfall events occur, to prevent local flooding and the blocking of floodgates.

CRCC's silt curtain is fabricated from 50% shade cloth (silt fabric was ineffective as it totally pre-

vented discharges) with chain threaded along the bottom to maintain contact with the drain bed. Rope threaded along the top is tied off onto star pickets. The chain is light enough to lift off the bottom to release water if a large rainfall event occurs unexpectedly. It is usually kept in place for four days after works cease. CRCC plans to use two silt curtains in drains where appropriate.

Contact Frank Rasborsek: (02) 6642 3277.

Sponsoring wetland management

Better management of acidified wetlands has moved a step closer with the appointment of Wetland Care Australia (WCA), Ballina office to prepare a 'Model Sponsorship Proposal and Management Agreement' for the rehabilitation of coastal wetlands.

The model agreement seeks to bring landholders and interested stakeholders together to explore financial arrangements to match the management needs of marginal agricultural land that might be more productive as fisheries and wildlife habitat. Stakeholders include various levels of government, local conservation, fishing interest groups or corporations wishing to enhance their conservation image.

CRCC's Alan Cibilic said that there was increas-

GREENSPAN
TECHNOLOGY

**Monitoring
Quality**



pH
Turbidity
Conductivity
Dissolved Oxygen
Depth/Pressure

Quality Endorsed Company
ISO 9001
LIC 3067
Standards Australia

Ph: +61 7 4660 1888
Fax: +61 7 4660 1800
www.greenspan.com.au

ing interest in the Lower Clarence in matching landholders interest in wetland management with sponsorship funding. 'In order to attract potential sponsors, you need a proposal that is technically sound, farmer friendly and attractive to potential sponsors' he said.

WCA's newly appointed Wetland Management Consultant in Ballina, Bob Smith, will be working with Alan on the project. The project has ASSPRO funding through the Clarence River County Council (CRCC).

Contact Alan Cibilic ph: (02) 6642 3277 or Bob Smith (02) 6628 3472.

In collaboration with Ocean Watch, Wetland Care Australia's Chrisy Collins is producing a guide to wetland rehabilitation for community groups. Contact Chrisy Collins ph: (02) 6681 6069.

Definitive database of ASS papers

NSW Agriculture Research Agronomist, Euie Havilah, has listed the titles of over 2,000 scientific papers covering a wide range of ASS scientific and technical issues.

He has now published the list as a Procite bibliography with ASSPRO funding from the NSW Acid Soil Action program.

"I have compiled 200 pages of scientific titles and

hope to back up much of this material with hard copies of papers which will be available for a fee," he said.

"The bibliography lists early Dutch research papers plus most Australian published papers on pyrite, aluminium, iron, vegetation, wetlands, bacteria and other ASS studies," he said.

He is currently developing a separate database of unpublished reports including maps, general publications, environment impact statements, government reports, and other unpublished literature.

ASSAY readers can nominate papers, publications, etc for the unpublished bibliography by emailing : euie.havilah@nsw.gov.au; or Fax (02) 4464 1113.

Alternatively please Contact: Ms Kerry Allan - ph: - (02) 4464 1251.

Coastal floodplains poster

Ocean Watch Australia has produced a poster highlighting the complex links between environmental issues affecting coastal floodplains.

The Natural Heritage Trust (NHT) funded the info-poster which provides a vision of a sustainable coastal floodplain. It covers issues such as land and stock management, ASS, flood mitigation, commercial and recreational fishing, water quality, soil erosion and wetlands.

Nicole Middleton from Ocean Watch is mailing the poster to councils, schools, relevant government departments, environmental organisations, commercial fishing co-operatives and farmer associations.. The poster is free with a postage charge. Contact Nicole Middleton ph: (02) 9660 2262, fax: (02) 9552 3574 or E-mail nicole@ocean-watch.org.au.

Hastings council funding

Hastings Council recently allocated an additional \$150,000 towards ASS management, bringing its ASS budget total to \$210,000 over two years (1999/2000). Council's David Pensinni says the funds will be earmarked for a range of projects yet to be decided by Council staff.

He said Council was keen to set an example in better managing its own ASS assets, including planned active floodgate management and remediation of acidified land. David hopes Council funding can be used to attract matching fundings for

Environmental Analysis Laboratory



Southern Cross University
Centre for Coastal Management
Northern NSW

Consultancy & Research Service
The Developer of and now specialising in the 'Chromium Reducible Sulphur - reduced inorganic sulphur' analysis technique.

- 24hr turnaround time with Chromium Reducible Sulphur analysis
- provide routine analysis of TAA, TPA, Spos, POCAS, TOS, NAGP and ANC
- low cost actual and potential ASS screening techniques
- water acid sulphate leachate analysis
- all reports provide classification and interpretation

For further information contact:
Graham Lancaster
Tel: (02) 6620 3678 Fax: (02) 6620 3957
Email: glancast@scu.edu.au
Net: <http://www.scu.edu.au/schools/rsm/eal/index.html> Lic No. 0052



remediation projects from the Federal and State Governments.

Port Macquarie district has five of the NSW 'hotspots' which threaten an important oyster and commercial fishing industries. It was the first council in NSW to adopt a local environment plan for ASS. Council recently employed an ASS an environmental issues compliance officer.

Yarrahapinni plan approved

Hopes for an improvement to an ASS hot spot area have been revived following approval of a development application (DA) to Council for the first stage of an ambitious wetland rehabilitation project.

The Yarrahapinni Wetland Reserve Trust lodged the DA with Kempsey Shire Council for the first stage of its proposed Yarrahapinni Wetland Rehabilitation Project.

The project involves the opening of a single floodgate at the entrance to the wetland to allow intensive monitoring on its effects. The floodgates, installed in the early 1970's stopped regular tidal entry to the former broadwater, changing it to a fresh water system. Apart from major vegetation and habitats changes, the floodgates increased ASS scalds and sulfuric acid contamination in the lower Macleay estuary.

The DA was required because the three-month trial opening is almost certain to affect vegetation in SEPP 14 wetland areas. The Trust is working to comply with the DA conditions, including preparation of an ASS management plan. As a result it could be some time before the single floodgate is opened. Stage two and three of the rehabilitation project, obviously some years away from implementation, could eventually see the total removal of the flood mitigation structures affecting the Yarrahapinni wetlands.

Contact Mike Hayes: ph (02) 6561 7188.

Technical news - Remediation proceedings published

A major proceedings on remediation of acidified ASS agricultural land has just been published by ASSMAC.

In 1999, more than 45 leading scientists from

around Australia, representing a wide range of scientific disciplines, met to discuss remediation management options for coastal agricultural areas. The proceeding's scientific papers are updated versions of original material presented at the three-day workshop at Southern Cross University.

ASSMAC chairperson, John Williams said, " The ASS Remediation Techniques for Broadacre Agriculture proceedings are an important compilation of current scientific knowledge on the management of ASS to reduce acid outflows."

The 230 page proceedings examines the benefits of raising water levels in drains, manipulating floodgates and using saline water to neutralise acid. Other papers review the use of vegetation and organic matter to treat scald areas, plantation forestry to promote evapotranspiration, bioremediation using sulfur reducing bacteria and drain redesign to reduce interception of acid products.

There is also a section updating laboratory methods for analysis of potential and actual acidity of acid sulfate soils.

To obtain a copy of the proceedings contact: Jennifer Grant on ph: (02) 6626 1346 or E-mail jen-

Environment Information Technology Pty Ltd

Serving Australian Science & Technology since 1979

- ✱ Environmental monitoring, project design and installation
- ✱ Designers and manufacturers of data recorders, sensors and telemetry systems
- ✱ Authorised Citect (SCADA) system integrators and software developers
- ✱ Water monitoring including depth, pH and EC
- ✱ Automatic weather stations and environmental data recording systems
- ✱ Remote "real time" viewing and data recall via cell phone, PSTN and UHF radio

CONTACT:

Col Peak

Phone: 02 6628 3400

Web: www.eitechnology.com.au

Member: Aust. Assoc. Ag. Consultants - Aust. Inst. Science & Technology

nifer.grant@agric.nsw.gov The cost is \$40 including GST and postage.

Copies of First and Second National ASS Conference Proceedings are still available for purchase at the above address.

ASS sodium bicarbonate neutralising

Townsville City Council is trialing sodium bicarbonate to neutralise exposed ASS clays.

Council's Angelika Hesse says that agricultural lime applications failed to work due to difficulty of incorporating lime into heavy marine clays during the region's extended tropical dry season.

"We were applying lime, but due to lack of vegetation to hold the soil on-site and separation of lime and clay during storm events during the following wet season, lime was washing off-site during neutralising treatments," she said.

Angelika says the bicarbonate is slightly more expensive than lime and is not suitable for agricultural lands as it can increase sodium in the soil.

"It is easy to apply as a slurry using a fine nozzle for subdivision land. The bicarbonate is quickly absorbed into the soil preventing any acid generation.

Council is also using bicarbonate in dredging trials where it acts as a rapid flocculant and raises pH to safe levels whilst preventing significant dropping of dissolved oxygen levels in water.

Contact Angelika Hess: (07) 4727 9000.

Gas measure of oxidation rate

Researchers at Pimpama in South East Queensland are measuring oxygen, carbon dioxide, and soil water content in ASS to gauge oxidation rates.

CSIRO's Freeman Cook says that the rate at which gas generation occurs in actual ASS enables estimation of the time taken to generate more acid. "This may provide a simple method of measuring the effectiveness of remediation strategies to control oxidation," he said.

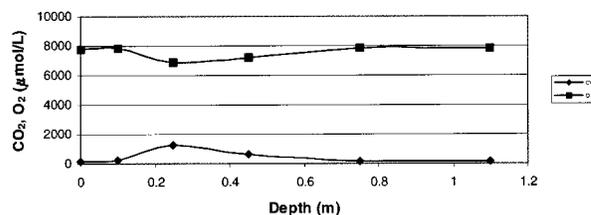
The trial uses a gas chromatograph to test the contents of underground chambers made in ASS.

A typical gas profile is shown in Figure 1. The decrease of oxygen O₂ and increase in carbon dioxide CO₂ to 450 mm is expected. A continuation in these trends towards a plateau is the normal occurrence. The increase in O₂ and decrease in CO₂ at the lower depths is unexpected. "My guess is that

oxidising bacteria are using the carbon dioxide as a carbon source. This is not a transient effect as all the profiles obtained over three months show the same trends.

"If we add the O₂ and CO₂ concentrations together they should add up to a constant value when only biological processes are involved in the use of O₂. Any decrease from this constant value indicates there is another sink for O₂. (ie oxidation is occurring.) When we do this a sink is indicated at a depth of about 450mm. Similarly, at this depth a slight bulge occurs in the jarosite and TOS concentrations. These results suggest that oxidation of pyrite and other sulfides could be occurring at this depth, but we are yet to calculate the rate of oxidation."

Figure 1. Oxygen and Carbon Dioxide Profiles on 5/5/00



Contact Freeman Cook: (07) 3896 9465.

Floodgate projects

Engineering design

A report commissioned by the NSW ASS program (ASSPRO), titled, Design Improvements for Rural Drainage Schemes, has just been released.

Consultants Bill Paterson and Bob Smith com-



The floodgate adaption before installation

piled the report which reviews existing and innovative water control structures that can be adapted to manage acid drainage problems.

The report highlights the need for a combination of both 'primary' (floodgate) and 'secondary' (backswamp) structures to achieve best results.

The report evaluates 15 structures and identifies the 'fractional sluiceway' installed at headworks and the 'movable elbow' culvert installed at the edge of backswamps as the most cost effective, best all-round performers to manage acid drainage.

Further details contact Bill Paterson ph: (02) 6643 1588, or Bob Smith (02) 6628 3472 or Jon Woodworth (02) 6626 1344.

Farmer floodgate design

NSW farmer, Ivan Sillitoe, has had a new type of floodgate window designed for the Kinchela Creek system on the lower Macleay floodplain. It has 3 settings (closed, 1/2 open and fully open) locked in by a spring stop rather than the infinite settings achieved with a traditional thread mechanism.

It allows the landholder to let a controlled amount of water to pass through the floodgate on the rising tide. This maintains water levels upstream of the floodgate between heights of landowner choosing and permits full drainage operation when closed. It would normally be closed when flooding, extra high tides and/or saline tidal water are anticipated.

It is on a drainage union structure and only affects land under control of a single landholder. The design has the potential to be used effectively on drains receiving acid waters from either a distal or

primal source, allowing in-drain dilution of those waters. Alone, or in combination with an upstream dropboard structure, it can be used to maintain ponding levels so that further aeration of potential ASS is eliminated or minimised.

Contact Ivan Sillitoe ph (02) 6567 4003.

Oxley Island preliminary results

Dairy farmer, Peter Neal, has for the past 18 months hosted a trial to manage acid drainage from highly improved pasture land on ASS. The project run by Bob Smith and Mike Dove has evaluated a combination of fresh and salt water management strategies to contain, neutralise and dilute acid drainage. This has involved the installation of dropboard weirs and mini-sluiceways.

Water quality data has been collected hourly (floodgate discharges) and monthly (longitudinal/vertical and piezometers). In addition Mike has data on oyster mortality and condition.

Highlights from a recent field discussion include:

- rainfall / evapotranspiration (as expected) dictate acid export events,
- drainage efficiency declines in periods of prolonged wet weather, necessitating removal of dropboards,
- dropboards can be used to shorten the duration and frequency of runoff events,
- groundwater fluctuates by 1m depending on seasonal conditions,
- there is virtually no groundwater gradient to warrant deep drains,
- drainage times are therefore a function of drainage design (landforming and dish drains)

		DAVID MITCHELL LTD				
		Northern Region				
		PO Box 223, Corinda Qld 4075				
Phone 07 32786322		Fax 07 32786229				
<ul style="list-style-type: none"> ▶ Producers and Suppliers of Ground Limestone ▶ Lime for Correction of Acid Sulphate Soils ▶ Hydrated Lime for Acid Water Neutralisation 						
<i>Further enquiries can be made by phoning our free call number 1800 679 997</i>						
Tamaree Group 07 5483 1300	Riverton 02 6737 5261	Warwick 07 4667 9155	Attunga 02 6769 5501	Woodstock 07 4778 8844	Ootann 07 4094 8322	

and rainfall / evapotranspiration,

- more acid products appear to accumulate in deep drains than dish drains,
- saline backflows through floodgates to raise drain water levels by 0.3m have major beneficial impacts on water quality,
- oyster mortality and growth problems were observed despite the site being regarded as a minor area of ASS.

Some practical considerations arising from the trial include:

- unpredictable tidal variation makes control of salt water levels in drains difficult,
- dropboards are important in preventing salt water moving too far up drains,
- dropboard weirs are difficult to seal and difficult to manipulate (dropboard culverts are more user friendly),
- water level gauges and piezometers surveyed to AHD are an essential communication tool.

ASSPRO and Manning Catchment Management Committee provided funding with in-kind contributions from the Greater Taree City Council. The project has been a collaboration between the Oxley Island Drainage Union and the Manning Oyster Farmers' Association.

Contact Bob Smith ph (02) 6628 3472.



SMEC AUSTRALIA PTY LTD
Snow Mountains Engineering Corporation

Acid Sulfate Soil Assessment and Management
Innovative and Effective Solutions

SMEC Australia provides comprehensive ASS Assessment, Management and Technology Development services through a multi-discipline team of environmental scientists and engineers.

- soil conservation, agriculture • hydrology, hydrogeology, water quality, modelling • stakeholder and government agency liaison & consultation • eco-system studies and research • large and small scale civil designs and project implementation • public and private sector across Australia and overseas • technology development & implementation • advanced rapid field assessment technologies incl. PASSFinder reducing cost and turnaround, improving data resolution • consulting, secondment, contracting

For further information please contact:
Daniel Cramer: Phone: 61/2/9903 4424; Fax:61/2/9955 6113;
e-mail: daniel.cramer@smec.com.au (ACN 065 475 149)

Fisheries floodgate research project

Results of the first field trip of the FRDC funded project, Coastal floodplain management in eastern Australia: barriers to fish and invertebrate recruitment in ASS catchments. (FRDC 1999/228) confirm findings from previous studies, that floodgates are barriers to fish and invertebrates. Frederieke Kroon, Matt Barwick and Graham Housefield report that, in the Clarence River floodplain, species' diversity was lower in drains behind floodgates than in natural creeks without gates. In addition, recreational and commercial species (such as School and Greasyback prawns) were almost absent in gated systems and occurred in high numbers in non-gated creeks. Future fieldwork will include monitoring changes in species' diversity and numbers as floodgates will be opened more regularly. Eventually the project will develop guidelines for floodgate design and management to improve water quality and enhance fish and prawn populations in ASS catchments.

Contact Frederieke Kroon, ph; (02) 4916 3807 or E-mail: kroonf@fisheries.nsw.gov.au.

Farmer news

Tweed cane drain lime dosing

Tweed Shire cane farmer Robert Quirk is planning to trial a lime dispensing technique to neutralise approximately 12 tonnes of acidic water discharged annually in his drains.

Robert has already laser levelled 50 per cent of his property, filling in every second field drain to increase the cane production area and to also reduce the amount of acid discharged via the field drains. Lime cost are about \$70 per ton delivered. It takes 1.5 tonnes of lime to neutralise one tone of sulfuric acid. Robert currently spread lime in his field drains at 5 tonnes per hectare which keeps the water pH neutral most of the year. After harvest however, acid products normally kept in place by crop transpiration and laser levelling of paddocks, can flow into drains.

'This is when I need to boost neutralising ability and I am looking to adapt acid mine drainage techniques of automatic lime dosing at drain floodgates,' he said.

Because paddocks are below mean sea level, he pumps drain water over the river levy bank. This pump outlet will enable lime treatment at one site, mostly with agricultural lime but possibly with a



A group of Tuckean farmers from Richmond Catchment recently visited farms of Robert Quirk (pictured) to view cane land ASS management trials.

concentrated, hydrated lime due large acid outflows.

Researcher Mike Melville will supervise lime calculations and dosing techniques.

Contact Robert Quirk: ph: 0415 454 927.

Tuckean Landcare coordinator Michael Wood, said they inspected laser levelling, use of lime in drains and infilling of field drains to reduce acid export.

The group also examined data monitoring equipment installed by Col Peak to measure weather conditions and acid discharge.

Farming acidified Indonesian prawn ponds

Integrated pond culture and low cost chemical neutralisation of acidified pond dykes is currently being trialed in South Sulawesi, Indonesia by Dr Jes Sammut (UNSW) and Dr Adi Hanafi (Research Institute for Coastal Fisheries).

Formerly unproductive and abandoned ponds in impoverished transmigration areas are now generating income from the integrated culture of milkfish (*Chanos chanos*) and seaweed (*Gracillaria verucosa*), and the rearing of juvenile tiger prawns (*Penaeus monodon*). Prawn larvae are reared in fine mesh cages known as 'hapas'. Milkfish clean the seaweed of algae thereby increasing the value of the seaweed crop by minimising fouling. Survival rates

of prawn post larvae of up to 90% enable farmers to sell juvenile prawns (2-3 weeks old) to farms unaffected by acid;. The profit from prawn rearing is between 100-300% in less than 3 weeks. The milkfish and seaweed also generate significantly higher economic return than previous attempts at prawn monoculture.

Pond pH is improved by liming the exposed dyke surfaces and controlling oxidation of pyrite in acidified ASS through submergence of the pond bottom and most of the dyke surface. The farmed seaweed also improves water quality and provides shelter for milkfish. The need to dry out ponds has been eliminated under this form of production, and pond maintenance is greatly reduced. Grow out of prawn in treated ponds is also showing great promise with some farmers producing their first profit. The work is funded by the Australian Centre for International Agricultural Research (ACIAR) and is part of a larger study on the remediation and management of degraded prawn ponds coordinated by the School of Geography (UNSW).

Contact Dr Jes Sammut, E-mail: j.sammut@unsw.edu.au.

NSW Agriculture WOLLONGBAR ENVIRONMENTAL LABORATORIES

NATA accredited (#14173) testing for Acid Sulfate Soils

- ⊗ Acid trail-TAA, TPA, TSA
- ⊗ Sulfur trail-% S pos
- ⊗ POCAS
- ⊗ Calcium, magnesium and sodium for gypsum saturation
- ⊗ Soil pH, EC and LECO carbon, sulfur and nitrogen
- ⊗ Water chloride and sulfate for ratio calculation

Full range of NATA accredited soil, plant and water analysis for nutrients and heavy metals.

CONTACT:

Enquiries Officer - Kerrie Gray

Phone 02 6626 1103 Fax 02 6626 1133

Email. Kerrie.gray@agric.nsw.gov.au

Farm forestry update

A steering committee, comprising Leigh Sullivan Southern Cross University; Mike Melville UNSW; Ian White ANU and Peter Slavich NSW Agriculture will supervise a major forestry project to control ASS discharge.

The Federal Government Coast and Clean Seas program recently granted NSW State Forests a total of \$183,000 for a two year field trial to evaluate tree planting to control ASS leachate.

State Forest's Brendan George will coordinate the project to evaluate suitable species, planting methods, potential income, hydrological changes and farmer education strategies. Brendan recently toured northern NSW ASS areas to meet landowners and identify existing plantations on ASS lands. He will transfer from Sydney to State Forests Northern Research Centre (Coffs Harbour) in August to concentrate on this project and another dealing with effluent irrigation in coastal areas.

Brendan is still evaluating species and potential sites and is keen to speak with landowners or land-care groups prepared to undertake trial species plantings in ASS.

Contact Brendan George: ph (02) 9872 0136 or E-mail brendan@sf.nsw.gov.au.



Ross Butler from Phoenix Park Estate with Brendan George at a large plantation of three-year old eucalyptus (*E. pilularis*, black-butt) trees at Tintenbar, north of Ballina.

WE CAN HELP YOU WITH ACID SULFATE SOILS

- Inventors of the NAGP soil analysis method
- Inventors of water classification by Cl/SO₄
- Expertise in mining, dredging and other extractions involving iron sulfides
- Assessment for agricultural, leisure and development projects
- Proficiency in management of earthworks involving acid sulfate soils
- Current and previous experience in NSW, Qld, Vic.
- Our specialised soil-coring rig can install up to 40 boreholes per day
- Development of catchment management studies
- Provision of expert witness representation in court

ACN 882 347 971

Environmental & Earth Sciences Pty Ltd



Soil is the Foundation of Life

PO Box 1090
St Kilda VIC 3182
P: (03) 9646 8760
F: (03) 9646 8718

PO Box 380
Nth Sydney NSW 2059
P: (02) 9922 1777
F: (02) 9922 1010

ASSAY is published quarterly for the acid soils information and awareness program which is funded by the Federal Governments Natural Heritage Trust.

Editor: Jon Woodworth

Internet site: <http://www.agric.nsw.gov.au/Arm/acidss/index.html>

Address: C/o Assay Editor
NSW Agriculture
WOLLONGBAR NSW 2477

Phone: 02 66261 344

Fax: 02 66281 744

email: jon.woodworth@agric.nsw.gov.au

Typeset and design by Sharon Bailey