



ASSAY

A NEWSLETTER ABOUT ACID SULFATE SOILS

No 24. December 1999

National ASS news

National ASS Group formed

The National Coastal Acid Sulfate Soil Coordinating Group (NatCASS) agreed at its inaugural meeting in Canberra in October to officially launch the National Strategy for the Management of Coastal ASS early in 2000.

The National Strategy contains key objectives such as mapping, education/awareness, controls, management of acidified areas and funding. NatCASS - includes members of peak industry bodies and members of key state agencies from around Australia as well as Environment Australia (EA).

NatCASS replaces the National Working Party on Acid Sulfate Soils which developed the draft National Strategy. The inaugural Chairman of

NatCass is John Williams, who is also Chairman of the NSW Acid Sulfate Soil Management Advisory Committee.

Also at the meeting, Margaret Tailby, Director of the EA Coast and Clean Seas section outlined the proposed new Federal Coastal ASS Program (CASSP) (see next story) Bernie Powel, Queensland Acid Sulfate Soil Investigation Team will develop the ASS research priorities recommended to universities as well as draft a Coastal Engineering Guidelines ASS section.

For further information contact NATCASS secretary - Jennifer Grant - on 02 6626 1346. Electronic copies of the National Strategy are available at <http://www.dpie.gov.au/dpie/armcanz/pub-sinfo/ass/ass.html>

\$3 million acid sulfate soil program

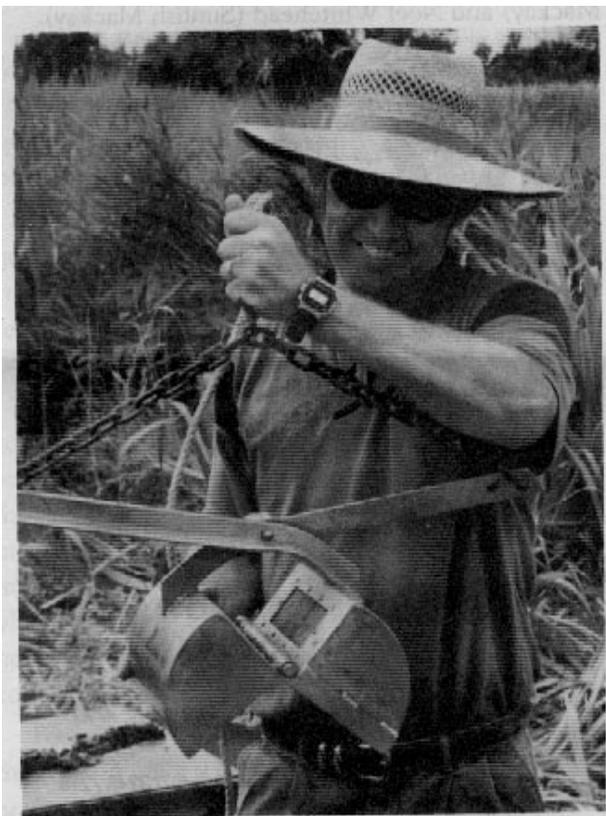
The deadline for funding applications for the Federal Government's Coastal Acid Sulfate Soils Program (CASSP) is March 31, 2000.

Under Australia's Oceans Policy, the Coastal Acid Sulfate Soils Program (CASSP) specifically addresses water quality issues caused by ASS. The Federal Government has allocated more than \$3 million under the CASSP for on-ground projects which enable community groups, industry and governments to better manage coastal acid sulfate soils.

Individuals and organisations with appropriate expertise are invited to submit applications for funding in the 2000-2001 financial year. Ideally, projects should involve partnerships of key stakeholders in the community, industry and local and state government agencies.

To get a copy of the 'Coastal Acid Sulfate Soils Program Guide to Project Applications' telephone Environment Australia toll free on 1800-803-772, or on the Internet at: http://www.environment.gov.au/marine/frameset/oceans/fs_ocean_main.html

For further information e-mail: cassp@ea.gov.au .



Southern Cross University's Grahame Lancaster displays a new ASS drain grab sampler at a recent field day - see pg 10

Hinchinbrook Senate Inquiry report

The Senate inquiry into a major development at Hinchinbrook Channel in North Queensland has published a detailed report which lists a number of concerns about ASS management.

The inquiry received 166 primary submissions and heard 60 witnesses at hearings in Cardwell, Townsville and Canberra. During its visit to Cardwell the committee inspected the Port Hinchinbrook development site by invitation of the developer, Mr Keith Williams.

The committee received evidence that there was a significant acid sulfate problem on site with doubts cast about the adequacy of its management. Concerns about liability and potential compensation have been raised for any governments which give building approvals as a result. The committee believes that concerns highlighted so far by the Queensland Acid Sulfate Soils Inspection Team and by Professor Ian White raise serious questions about the short and long term management of acid sulfate soil on site. For further information about the report please contact Geoff Dawson, Senate Environment, Communications, Information Technology and the Arts Committee - tel: 02 6277 3527. Email: Geoffrey.Dawson@aph.gov.au

Victoria - Waste Management Policy for Acid Sulfate Soils

The Victorian Government declared an Industrial Waste Management Policy (Waste Acid Sulfate Soils) in August 1999 replacing an interim policy. The Policy provides a broad and flexible statutory framework for the management of ASS and imposes a general obligation to apply current ASS best practice management.

Disposing of, or reusing, ASS waste now requires either a licence granted under the Environment Protection Act 1970 or an environment management plan (EMP) approved by the Environment Protection Authority.

The definition of ASS under the Policy is extended to cover sulfidic rock material in addition to sulfidic soils and sediments. EMPs must describe the objectives, strategies, actions and targets to prevent, mitigate or manage potential impacts due to the handling of ASS on a site specific basis.

Further further information please contact Sally Lock at email: Sally.Lock@epa.vic.gov.au

Queensland ASS news

QASSIT wins planning award

Queensland Acid Sulfate Soils Investigation Team (QASSIT) recently achieved a Certificate of Merit from the Royal Australian Planning Institute (RAPI).

QASSIT won the award for its brochures, maps, reports and electronic information on CD suited to different client groups. The Team was also nominated recently for a Department of Natural Resources Achievement Award for encouraging economically sustainable development and its training services for industry.

Julie Anorov and Kristie Watling recently addressed the Wildlife Preservation Society of Queensland to explain ASS impacts on wildlife. QASSIT recently held a workshop at Yeppoon with John Ross from DNR Rockhampton. Staff from DNR, EPA, Main Roads, private consultants and local coastal councils attended the course. QASSIT also held a two day short course on ASS at Mackay, organised by Ross Gooley (DNR Mackay). Presenters included Col Ahern and Kylie Hey (QASSIT), Kylie Dodds (DPI Fisheries Mackay) and Noel Whitehead (Sunfish Mackay).

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Coffee rock discovery 'rocks' geomorphology

'Holocene era' (<10,000 years old) ASS marine mud was recently discovered underlying coffee rock in various locations on the Sunshine Coast. The discovery was the result of a DNR, Natural Heritage Trust and local government mapping project.

Those involved included QASSIT officers Don Malcolm, Justin Adams, Ian Hall, Doug Smith, Col Ahern as well as coastal geomorphologist, Trevor Graham from GeoCoastal Pty Ltd.

Their discovery may revise accepted geomorphic soil genesis theories about the time-frame for the formation of coffee rock or indurated sands. To date, coffee rock overlying marine ASS mud has been encountered at more than 10 sites on the Sunshine Coast. At these sites, coffee rock was usually encountered at 1–2 metres below the surface and in some cases was several metres thick and extremely hard.

Doug Smith of QASSIT said, "During previous mapping exercises we would stop drilling once we hit hard coffee rock, assuming that we had hit Pleistocene material (10,000–1,800,000 years old) which was very unlikely to contain ASS material."

Coffee rock is a hard, cemented organic sand to loamy sand with high iron content. "One theory is that coffee rock may be able to form much more quickly than we had previously thought possible, but this idea clearly requires further research," said

QASSIT Soil Scientist Bernie Powell. He suggests the discovery raises the question, "Is this relatively rapid formation of coffee rock related to high levels of iron in groundwater caused from oxidation of iron sulfides in the marine mud?"

This discovery has led to a revision of some of the earlier broadscale mapping (1:100,000 scale) which only assessed soils to the depth of coffee rock. It is not uncommon for coastal development to disturb soils to beyond 4m deep and hence impact on underlying ASS. Therefore, QASSIT plans to revisit several areas previously mapped as non-acid sulfate soils, to check if material below the coffee rock layer is ASS.

For further information please contact Doug Smith (07) 3896 9792, Col Ahern (07) 3896 9510 or Trevor Graham 0417 487 968.

NSW ASS news

Minister launches Clarence research project

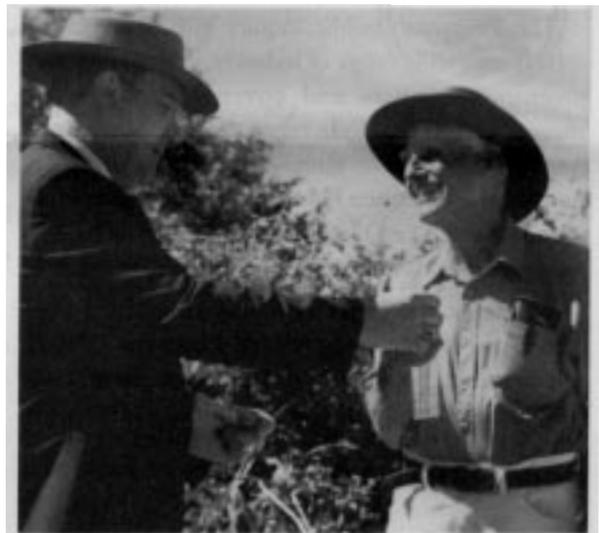
NSW Minister for Agriculture and Minister for Land and Water Conservation Richard Amery recently inspected several modified floodgate structures designed to improve water quality on the Clarence River.

The floodgates which are periodically opened to tidal waters, enable fish passage and the bicarbonate in saltwater to increase water pH in drains affected by ASS runoff.

Speaking later during a visit to Grafton Agricultural Research and Advisory Station, (GARAS), Mr Amery said landowner involvement in managing floodgates and modifications to other landuse activities was the key to solving the ASS problem. He applauded the Clarence River County Council (CRCC) and local landowners for improving coastal floodplain management as a model for management of other natural resource issues in NSW.

While in Grafton, Mr Amery also announced the appointment of two researchers to support a five-year, salt water seepage and wet grazing management systems research project. The Grafton based researchers, Scott Johnstone and Phil Hirst will utilise NSW Agriculture's research, advisory and education experience to support the project.

The Clarence Integrated Floodplain project is



Mr Amery (left) officially launches the Blanchies Drain management plan and hands local farmer Frank Clark the key to unlock floodgates to the tide.

funded by the Sugar Research and Development Corporation and the Land and Water Resources Development Corporation as well as NSW Agriculture. A linked project - studying fish passage and habitat in drains - is funded by the federal Fisheries Research and Development Corporation and NSW Fisheries.

Underground power avoids acid

NorthPower is liming ASS as part of a comprehensive ASS management plan for a new \$120 million underground powerline linking Queensland to the NSW power grid.

The trenching line runs from the state border at Terranora, on the Tweed River, south to Mullumbimby. This is one of the first large underground electricity lines built in the world and ASS management and prevention of corrosion of the line was an important issue flagged in a consultant report for the project. NorthPower's Wayne Nowlan said that trenching was dug to only 80 cm to minimise ASS disturbance and lime treatment costs. The project is due to finish in October, 2000. Contact Wayne Nowlan on tel 02 6686 1705.

Healthy Rivers Commission report

The Healthy Rivers Commission's Inquiry into the Shoalhaven River has recommended improved management of ASS to protect river health.

The 18 month public inquiry included submissions from a wide range of industry, community and government groups and covered various ASS impacts as well as a wide range of other of environmental and landuse issues. The report recommended the Clarence Floodplain Project - an integrated research and implementation approach - as a possible model for other catchments.

Commissioner Dr Peter Crawford said the final report is being considered by the NSW Government. For copies of the report please contact Santina Depalo 02 9231 2 977.

Farmer ASS news

Cane farm drain study

Brian Green is the NSW Sugar industry's recently appointed coordinator of a major water quality testing program.

He will use dataloggers to test for pH, dissolved

oxygen, temperature, salinity and nutrient levels in a total of six major drains across the three NSW sugarcane catchments.

"Through this project the 80 participating farmers will realise the direct relationship between their everyday farm activities and water quality in adjacent drains," Brian said.

The drains include the Tweeds Rivers' Mooball Creek and Bartlett's Creek drains; the Richmond's Empirevale and Dungarubba drains and the Clarence's Strangers Drain at Chatsworth Island East and Marsh Drain No2 in Palmers Channel.

The Sugar Research and Development Corporation and CRC for Sustainable Sugar Production will fund the project which is managed through NSW Sugar Milling Cooperative and the Queensland Department of Natural Resources.

Agricultural manager at sugar mill

The new Manager Agricultural Services for the NSW Sugar Milling Co-op is Rick Beattie who replaces Peter Nielsen who is now working in Vietnam.

Rick was with the Bureau of Sugar Experiment Stations (BSES) for 17 years, the last eight of which were in Ingham as Officer in Charge and Senior Extension Officer at the Herbert Sugar Experiment Station.

He will manage ASS issues, as well as the provision of extension services to all NSW cane growers.

Rick will also supervise development of ASS farm management acid hazard and drain management plans, and progress the industry's push for self regulation for routine drain maintenance and farm works.

Rick said he was encouraged that Lismore City Council recently amended its ASS Local Environment Plan to grant sugar industry self regulation.

Tweed and Maclean Councils adopted a similar provision which will need ratification by the Department of Urban Affairs and Planning.

Scald revegetation may improve pH

NSW Clybucca grazier, Russell Yerbury, has revegetated more than 150 hectares of acid scalds with water couch - a valuable native pasture - and initial reports show increased pH of surface water.

PhD student, Mark Rosicky, who is studying

acid scald remediation recently reported that while water on an adjacent scalded area is pH 2.7, the pH in the revegetated area ranges from 5.8 to 6.5.

Mark says the site has been able to revegetate because of 'drop' boards used in drains to slow the fall of water and maintain water depth for longer.

The site was understocked with cattle which allowed water couch (*Paspalum distichum*) to flourish.

In some places the water couch is forming a thick mat covering 95% of the surface, either floating or rooted in grey, former marine mud material. Past analysis of the protein content reveals water couch has 19% protein. Russell achieved the revegetation by manipulating water (to a maximum of 15 cm depth) and did not use any fertiliser.

By comparison, deeper ponding of water does not appear to be as successful. A separate scald area which has been inundated for longer period with deeper water (approximately 45cm) has only about 10% pin rush regrowth and a small area of swamp couch around its perimeter.

For further information Mark Rosicky on tel 0418 495 714.

Hastings local action committee

The NSW Hastings River Catchment Management Committee has formed a subcommittee to address local ASS issues.

The local ASS Action Committee aims to improve floodgate and drain management on Hastings floodplain, (ASSPRO); Camden Haven catchment and Stuarts River.

The Committee Chairman is Peter Wall while the tea tree industry representatives are Lachlan Hollis and Anthony Sarks; others include Neil Ellis (oyster growers); Josine Mill (cut flowers); Don MacPhail - grazier; Hastings Council, Mat Rodgers; Department of Land and Water Conservation, Glenn Atkinson; NSW Ag, Scott Henderson; EPA, Dave Hebblethwaite; Phil March, Scott Carter, consultant Bob Smith and Maurice Smith from State and Regional Development.

* Meanwhile, Hastings Shire Council has advertised for a regulatory officer, starting early this year, to monitor the compliance of development applications.

Floodgate projects

The North Coast Regional Catchment Committee and NSW Fisheries floodgate project is progressing with seven floodgate structures in the Tweed catchment being actively managed - and negotiations are underway for several more to be opened to the tide.

Project officer, John Huegill says that one floodgate structure in the Macleay catchment is now actively managed - and several others are being examined by landholders.

A desktop survey of watercourses and floodgate structures is almost completed

John says that he is receiving a lot of interest from Richmond River farmers who are keen to trial floodgate openings as the project moves into the Richmond River catchment. The project complements similar initiatives on the Clarence under the Clarence Floodplain Project.

New floodgate flow structure

North Oxley Drainage Union and the Manning River Oyster Farmers Association, in NSW's mid north coast region, have developed an innovative floodgate to control acid drainage.

Dairy farmer, Peter Neal, said the floodgate can be used with drain 'dropboards' to minimise acid

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For further information contact:

Graham Lancaster

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drainage and also prevent over drainage in dry periods.

Oyster grower, Ian Crisp said that the new flood-gate would allow the local drainage union to flush the drain with tidal water, neutralising acid water before it enters the estuary. Greater Taree City Council is assisting by installing 'dropboards' in roadside drains and tidal gauges.

ASSMAC is funding the project through the ASSPRO program.

Wetland conference

ASS management received some attention at the National Wetland Conference organised by Wetland Care Australia in Canberra in November.

Cane farmer Robert Quirk spoke on his experiences in managing floodgates and drains on the Tweed, and Sarah Fairfull from NSW Fisheries, Ballina, outlined the NSW North Coast Floodgate Project. Alan Cibilic from Clarence River County Council reported on the Clarence Floodplain Project, and Laura Dwyer, Yarrahapinni Wetlands Trust, covered the Yarrahappini Wetland Rehabilitation Project.

The theme of all their presentations matched the underlying theme of the conference, that landholders must direct their own actions if wetland

management is to be successful.

The conference, attended by 110 people, was designed specifically to enable farmers, community groups, managers and scientists to share their on-ground experiences in managing wetlands, and to network with people from around Australia. Feedback was extremely positive, with several people commenting that it was one of the best conferences they had attended for a long time.

To encourage further networking Wetland Care has established WetlandLink which has just published its first quarterly newsletter, and is establishing a website. If you'd like to be on the mailing list for WetlandLink Bulletin, contact Heather Shearer, 02 6681 6069, email wca@linknet.com.au, or mail PO Box 154 Ballina 2478.

Tourist wetland tours

A Richmond River farmer has fenced off his ASS swamp area from cattle and is restoring a melaleuca rainforest area as an outdoor educational facility.

Garry Owers and his spouse Angela are planting swamp mahogany as koala food trees on their 30 ha property in the Tuckean Swamp, NSW.

The Tuckean Landcare Group is supporting the project with fencing, plants and voluntary labour. The Federal Government Green Corp is using the project as a training exercise.

Early European reports of the Tuckean Swamp noted large areas of rainforest timber and rich habitat. A walking track starting in a littoral rainforest area and progressing down through a melaleuca swamp to ASS scald areas has interpretive signs.

Tea tree watertable trial

A project to determine how a large tea tree plantation affects ground water levels near the Maria River has shown that the crop can drop the watertable to just above the potential ASS (PASS) layer located at approx 1.3 metres.

During one dry spell the water table fell to the PASS layer but no further. Subsequent heavy rain prevented the trial on the Oceania Tea Tree Plantation just north of Port Macquarie, from determining if the crop can dry the PASS layer and create conditions that could generate sulfuric acid. Based on other research work, it is thought that the tea tree roots will lay on top of, rather than penetrate the heavy clay PASS layer.

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Oceania director and trial coordinator, agronomist John Murtagh says that further monitoring will show whether tea trees can penetrate the PASS layer and dry it through (transpiration) during drought conditions.

"One of the aims of the trial is to experiment with drop board weirs in nearby drains to keep water levels above the PASS layer if the crop threatens to dry unoxidised ASS material. The two year old crop grows on the laser levelled paddocks. Interpretation of results is complicated by the fact that the water-table height reflects both plant transpiration and lateral drainage through the sandy loam subsoil.

ASSMAC supports this ASSPRO project with Oceania providing substantial in-kind support. For further information please contact John Murtagh on 02 6625 1510.

Forestry trial

A trial planting of 1800 swamp mahogany trees on a scald area at Gumma near Macksville is proving successful according to the project coordinator Ron Kemsley.

Ron says the private forestry trial will provide organic cover for the previously salt and acid scalded two hectare site as well as improve the property value. Swamp mahogany trees are used because of an existing healthy specimen growing on site. Swamp mahogany is a valuable cabinet timber and its flowers provide a very high grade honey.

Establishment involved importing soil and a bulking agent (oyster shells which also supply calcium) to create 60 cm high planting mounds.

Earlier experiments on the one hectare site using 18 month old, larger trees from an inland area proved unsuccessful due to transplant shock. The site abuts a previously floodgated wetland which is now open to the tide.

For further information please contact Ron on 0265 6617 212 or on 0266 4232 77 bh.

Oyster research update

A joint study by Jes Sammut, Mike Dove (UNSW) and Dick Callinan (NSW Fisheries) has provided further evidence that ASS runoff impacts oyster production. Mike Dove's most recent field and laboratory studies again have shown that acid and aluminium cause degenerative changes, poor growth and shell damage in oysters. There was moderate to severe inflammatory response as well as necrosis and other degenerative changes observed in oyster tissue. In many cases growth is stunted or slowed because acid-stressed oysters shed new shell growth and reduce or stop feeding. Control group oysters, exposed to saline and freshwater conditions, experienced normal growth and no significant degenerative changes either to the shell or tissue. Oysters also ingest iron transported over large distances and well away from the point of acid discharge. Iron accumulates on gill surfaces and along the gut lining. The toxic effects of ingested iron are currently being studied. The studies have clearly shown that oyster production is a high risk activity in estuaries affected by regular and widespread acidification. For more information contact Jes Sammut on 0293 856211.

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Overseas prawn farm studies

Jes Sammut (UNSW) recently completed a seven week and two week study leave visit to Thailand and Indonesia respectively, to investigate methods of managing sediments in shrimp farms.

In Indonesia ASS are one of the main causes of farm abandonment but it is still dug up in remote areas which have low awareness of ASS problems. In Thailand, better site selection and shrimp farmer education has reduced the development of ASS-affected lands.

The primary impacts of ASS are high shrimp mortality, poor growth rates, an inability to maintain useful plankton blooms, pond wall leakage, and iron precipitation. Seawater flushing has been ineffective in neutralising severe pond acidity in Thailand. Over 100 flushes and additional liming temporarily improves water pH in recently constructed ponds, but the acid problem persists for years and requires repeated treatments. ASS-affected ponds continue to produce lower yields even after years of oxidation and leaching. The off-site effects of seawater flushing have not been measured. Dyke pHs increase in older ponds but fresh pyrite-bearing soils are often used to repair dykes.

Jes Sammut's study visits are tied to an existing UNSW project on the restoration of degraded ponds in Indonesia. The core project, funded by ACIAR, is developing low cost technology to ameliorate ASS-affected ponds or to replace them with alternative land uses. Site selection criteria and land capability assessment will be incorporated into shrimp farm management manuals. For more information contact Jes Sammut on 02 93856211.

ASS manual update

ASSMAC published the NSW Acid Sulfate Soil Manual in 1998 to assist the management of ASS. ASSMAC recently decided to review the ASS Manual.

Suggestions on content or presentation can be forwarded to Mitch Tulau at the Department of Land and Water Conservation, PO Box 149 West Kempsey, NSW 2440.

Alternatively, telephone Mitch on 02 6563 1212 (or email: mtulau@dlwc.nsw.gov.au) to discuss the manual.

Floodgate fish study report

NSW Fisheries Office of Conservation officer, Philip Gibbs says floodplain drains with 'leaking' floodgates have much richer fisheries habitat than normal floodgate drains.

Phil recently released a paper Utilisation of Restored Wetlands by Fish and Invertebrates with Tracey McVea and Brett Loudon at an information day at the Yarrahappini Wetlands Project near Kempsey, NSW. His research project was funded by the Fisheries Research and Development Corporation, and industry.

Philip says drained estuarine wetlands which were highly productive with seagrass, mangrove and shallow mud flats are now largely vegetated by rushes and have reduced faunal diversity. Modification of floodgates to increase tidal flow improves water quality, partly neutralising acid soil drainage while restoring a more estuarine environment.

"We collected fish and invertebrates from estuaries with, and without, restored wetlands while measuring salinity, temperature and pH as well as nutrient levels," he said.

The study areas included:

- the Macleay River's Yarrahappini Broadwater floodgated for over 20 years. The Yarrahappini



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Land Trust proposes floodgates modifications (see following story).

- the Hunter River's Hexham Swamp (Ironbark Creek) floodgated during the early 1970's. Due to reduced tidal exchange, water quality in Ironbark Creek contained high nutrient levels, low dissolved oxygen and low pH from acid sulfate soils. Controlled opening of the floodgates improved these conditions.
- the Rockdale Wetlands Corridor connected to Botany Bay by a 700m underground channel. The channel allows tidal exchange and a modified access route for fish and invertebrates.

This study showed the fish diversity above and below the tidal barriers to estuarine wetlands varied due to the amount of tidal exchange. Where floodgates were completely closed (Yarrahappinni), the upstream community was dominated by freshwater species with very few invertebrate species, commercial or recreational fish species. "We found that commercial fish species dominated the samples collected from Rockdale wetlands, with significantly more biomass of juvenile commercial fish than in Botany Bay," he said

Overall, the community structure in Ironbark

Creek was comparable to the main channel of the Hunter River but actually supported a greater number of juvenile sea mullet, yellowfin bream and school prawns than the main river channel.

Contact: Philip Gibbs on tel 02 9527 8420 or email: gibbs@fisheries.nsw.gov.au.

Yarrahappinni information day

The Yarrahappinni Wetlands Trust recently held a information day for councillors, landholders and stakeholders interested in remediating acidified wetlands.

Project coordinator for the Yarrahappinni Wetlands Reserve Trust Mike Hayes says a development application lodged recently with Kempsey Shire Council seeks approval for a trial opening single floodgate. Data from the trial may lead to a further application to open all five floodgates.

Peter Haskins (DLWC) and oyster researcher Michael Dove (UNSW) presented findings at the information day. For further information please contact Mike Hayes on 02 6561 7198 or mobile 014 417687.

ASS on the 'nose'

Scientists are 'sniffing' out sulfur dioxide gas to measure how much of the pyrite oxidation reaction is released as a gas.

The Australian National University's Ian White is currently using 'fern tubes' and a fluoro-spectrometer to test for sulfur dioxide emissions in cane paddocks at McLeods Creek on NSW's Tweed River. "We are testing the energy flux and the water flux to see how much transfer of material is given off as gas," Ian said.

Tom Denmead (CSIRO), Ben Macdonald (UNSW) and Mike Melville (UNSW) are also working on the project which is funded by the Australian Research Council (ARC).

"We are testing the theory that up to a third of the reaction (oxidation) goes up in a gas and this will affect calculations of the amount of actual acidity released," he said. "There may also be some health implications as the gas is linked to respiratory problems and even acid rain," Ian said.

For further information please contact Mike

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Thick AVS in swamp soil profile

Researchers Mike Melville and Cameron McArthur have discovered very high concentration acid volatile sulfur (AVS) in a wetland soil profile at Ross Glenn near Port Macquarie, NSW.

The AVS is an unstable organic gel which forms in anaerobic conditions and can generate acid within minutes or hours of drying. Mike says that drained wetlands need to be managed carefully to prevent remediated areas re-oxidising during droughts and subsequently releasing large amounts of acid.

The 30 cm layer was found at one metre depth in the wetland which was formerly drained and has been re-inundated for more than 30 years.

Mike hopes to do carbon dating of the AVS soon to estimate its age.

Origin of acid in drains

Most of the acidity reaching drains in a cane field study in NSW's Tweed Valley is leaching from soil within five metres of the drain banks, researcher Mike Melville says.

He says that a two-year honours project by Rachel Patterson used transects of soil profiles spaced at right angles to drains to measure total acidity. Collaborator, honours student Jodie Smith found approx 50 tonnes of sulfuric acid per hectare. Her 27 soil profiles found higher concentrations of

acid along former natural creek lines which were now located in paddocks.

"Farmers are filling in field drains and laser levelling the soil to remove most of the stormwater quickly and substantially reduce acid discharge," Mike said. He warns however that this management method is suited to this particular soil and hydrological conditions and may not be advisable on other catchments.

In nearby Cudgen catchment, honours student Phil Johnston soil profiled a wide range of landuse types and found existing acidity varied from 20 to 50 tonnes (averaging 40 tonnes) per hectare under drained pastureland and some sugarcane.

Field day for field test

The hydrogen peroxide field test for ASS gives only a 50-60 percent accuracy in determining lime requirement rates for treating disturbed soil, according to Graham Lancaster from Southern Cross University.

Speaking at field day at Harwood on the Clarence River organised by Clarence River County Council Graham said that the peroxide test still has a role as a "first cut" tool in determining the need for further laboratory testing for sites.

"While the peroxide (fizz) test is not that good at determining lime requirement for treating earth works or drain cleaning it is 80 per cent accurate in determining if ASS is present," he said.

Graham said the peroxide test generated a lot of



The ASS field day at Harwood with Graham Lancaster (centre) and Bob Aitken demonstrating vigour of the so-called 'fizz' test.

heat which could affect the accuracy of pH meters. "It is important to keep peroxide in a fridge or esky to prevent it overheating during travelling," he said. Peroxide is highly caustic and requires gloves and eye protection.

CRCC officer Allan Cibilic says that a rapid assessment method is vital to enable drain maintenance works to be carried out quickly by field staff. "The peroxide method needs to be further developed while we wait for alternative field testing methods to come on line," he said.

CRCC has developed a work sheet to record peroxide test results with gradings for reaction vigour, colour, texture, and pH.

Contact: Allan Cibilic - tel: 02 6642 3277

Drain cleaning guidelines

Clarence River Country Council (CRCC) recently released a comprehensive drain maintenance procedures sheet which deals with ASS management, dissolved oxygen levels, turbidity and other water quality issues.

CRCC is a flood mitigation authority which maintains more than 23kms of drains (160 in total) and approx 300 major floodgate structures.

Consultant Bob Smith prepared the information sheet in consultation with CRCC staff and a representative of the sugar cane industry after an audit of CRCC drain and floodgate maintenance works. The project was funded via the ASSPRO program.

CRCC's Allan Cibilic says the procedures cover practical ways to protect water quality during drain weed and sediment cleaning as well as guidelines for routine maintenance works on major drains. "Works staff will test sediment from drains for potential acidity, use lime to neutralise the material and monitor the water quality in the drains," he said.

For an electronic copy of the guidelines please contact Allan Cibilic on email: crcc@hotmail.net.au.

Underliming ASS spoil may spur acid production?

Applying too little lime in ASS treatments can speed up the rate of acid production in the short term according to Nick Ward from the Centre of ASS Research at NSW's Southern Cross University (SCU).

Nick has underlimed and overlimed a range of

ASS samples based on the NSW ASS Manual's recommended treatment rate. "I am testing them over time as they incubate to plot the exact acid production rate of the ASS," he said

Although the tests are still preliminary, it is clear that with some soil types (peaty soil) underliming can actually increase the rate of acidification (in the short term) compared to unlimed, oxidised soil material. "A calcium carbonate complex appears to accelerate the oxygen rate in the soil and lead to more acid being produced, at least in the first 400 days until an iron coating gradually slows the rate of calcium dissolution," he said.

"This phenomenon has been noted in acid mine drainage treatments and further research is required to fully understand the dynamics," he said.

Contact: Nick Ward on tel - 02 66 203494.

SCU 'ready to roll' on red mud.

Researchers at SCU hope that the NSW EPA will soon classify red mud as an 'inert bulk material' enabling farmers and miners to use it without the need for red tape.

The seawater-neutralised bauxite refinery residue (red mud) is available in large quantities from Gladstone Queensland and has an excellent acid neutralising capacity plus the ability to tie up heavy metals. The soil reaction pH of the red mud is only about 8.4.

David McConchie recently presented a summary on red mud at a Lismore remediation workshop on broadacre agricultural lands sponsored by ASSMAC.

"We plan to trial red mud in drains as a reactive subsurface barrier system to intercept acid water and acid products that cause environmental damage to rivers," David said. The red mud can also be applied directly to agricultural soil, and mixed in with a rotary hoe, to neutralise surface acidity.

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Cheap, accurate field ASS analysis

Southern Cross University researchers have designed an instrument that can be used in the field or in the laboratory to analyse ASS accurately in about five minutes. The instrument is based on the

chromium reduction of sulfide analysis method that was recently accepted by ASSMAC.

David McConchie says the Reduced Inorganic Sulfur Analyser (RISA) is about the size of an air-line pilot's bag, operates on 12 volt and 240 volts and will cost from \$20,000 to \$25,000. Current laboratory equipment takes about an hour to get a reliable result, but the new technology in the RISA instrument reduces the time substantially.

"To use the instrument you simply load a sample, wait a short time, read the result and empty the reaction cell," he said. In-built electronics will control the operation of the instrument and its computer will present data in several different forms to calculate liming requirements.

The RISA also does acid volatile sulfur measurement. "The ability to get reliable data in the field will be particularly useful for calculating on the spot the liming requirements for drain cleaning and excavation work," he said.

About \$350,000 was raised from private investors to develop the RISA and the first fully operational prototypes are expected to be ready by March 2000. The instrument will be developed and marketed by a newly formed company called RISATEC.

Collaborators on the project include Richard Bush, Leigh Sullivan, David McConchie and

Southern Cross University. Contact: David McConchie ph +61-02-66203632 fax +61-02-66212669 or e-mail dmconch@scu.edu.au

ASS diary

Seminar - Optimising Your Acid Sulfate Soil Investigation

Wednesday, February 16, 2000 Goonellabah Community Centre, Lismore

Contact Suzanne Walker Coffey Geosciences 07 3274 4411

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