

ASSAY

A NEWSLETTER ABOUT ACID SULFATE SOILS

No 20. December 1998

National Strategy update

The public exhibition of the Draft National Strategy for the Management of ASS closed on 30 November 1998. More than 1,000 copies of the draft were distributed to every Australian coastal council, conservation groups, agricultural industries, private consultants, state and Commonwealth Government agencies. A meeting of the National Working Party on Acid Sulfate Soils in February will review all comments and establish a process to finalise the Strategy. Once the Working Party is satisfied with the final draft, it will be submitted through SLWRMC to the Standing Committee on Agricultural Research Management for approval. The draft strategy can be viewed on the Internet at <http://www.dpie.gov.au/dpie/armcanz/pubsinfo/ass/ass.html> or copies can be obtained from Jennifer Grant on 02 66 261346.

Acid Soil Action launch

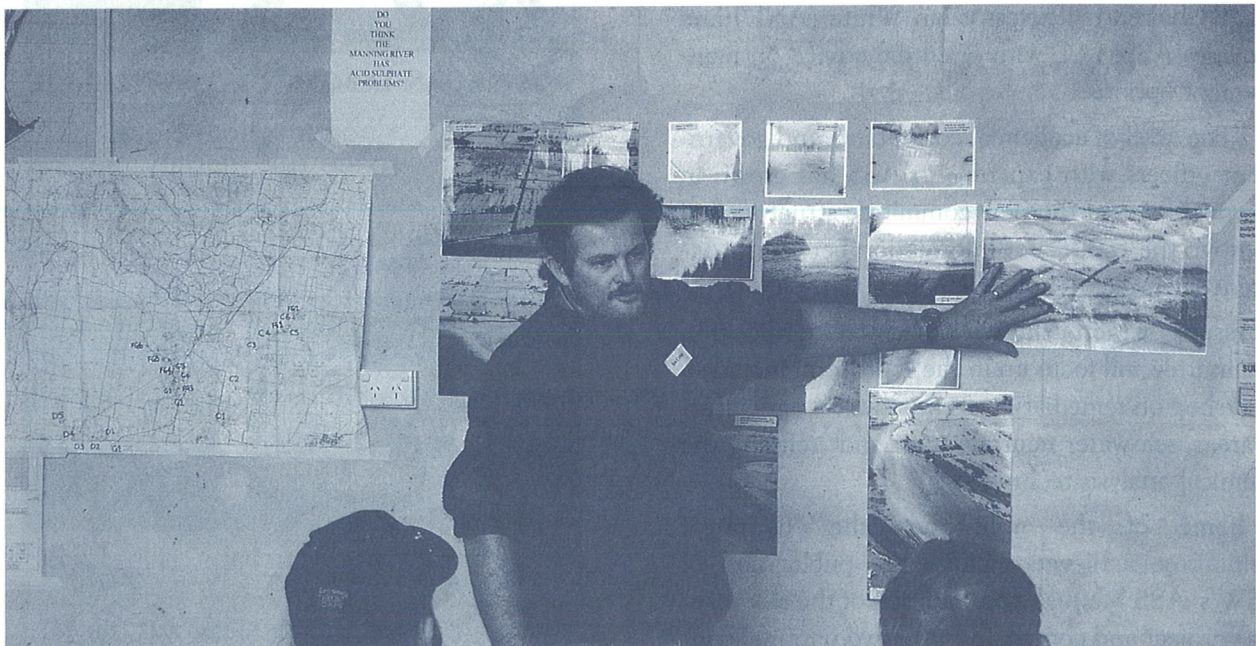
The Director General of NSW Agriculture, Dr

Kevin Sheridan, released an acid sulfate soil video, Acid Sulfate Soils Exposed as part of the official launch of the NSW Government's Acid Soil Action program.

NSW Agriculture is funding a \$7 million Acid Soil Action program aimed at overcoming acidification of agricultural land and the damage caused by drainage from ASS into waterways. A total of \$2.1 million has been allocated to ASS projects.

The video contains animated footage of how ASS forms and oxidises as well as field interviews with key ASS researchers. Dr Sheridan also launched a series of planning risk maps which are suitable for local councils to use as the basis for drafting local environment plans for acid sulfate soils.

For information about the video contact the NSW Acid Sulfate Soil Information Officer, Jon Woodworth on 02 6626 1344 and Yolande Stone on 02 9391 2156 for information on the planning maps.



Manning River Oyster grower, Ian Crisp, recently explained to NSW Acid Sulfate Soil Management Advisory Committee members during a Taree field trip how acid leachate harms oyster production

NSW Acid Sulfate Soil projects

ASSMAC recently voted to fund a wide range of ASS projects through the NSW Governments Acid Soil Action Program.

Acid Sulfate Soils projects (ASSPRO) have been allocated a total of \$2.1 million over three years and this is the second year of funding. ASSPRO's main objectives are education, catalytic onground works, development of management technologies and community participation.

Successful projects this year include projects such as north coast drain mapping, remediation trials using lime and mulch, plans of management, water quality monitoring programs, as well as education and training programs for farmers, landowners and local and government staff.

Nominations for the next round of funding will be called for in the first quarter of 1999. Applications forms can be obtained from ASSPRO Coordinator Greg Fenton on tel 02 69381906. A spreadsheet which lists the 1998/99 projects by title and contact organisation can also be obtained from Greg.

ASSMAC Technical Committee news

The NSW ASSMAC Technical Committee has been restructured to become a State Technical Coordinating Committee which will draw advice from a nationwide panel of experts. The ASSMAC TC is Chaired by Professor Ian White (ANU) and provides ASSMAC with scientific advice on management options.

"The level of academia, consultants and government officers with expertise in ASS has grown in recent years and the new committee structure will improve the transfer of information between different scientific disciplines," Ian says.

Issues which the Technical Coordination Committee will focus on in the short term include a workshop on remediation techniques for agricultural areas, sea water neutralisation and refining the chemical analysis techniques.

Some of the milestones the Technical Committee achieved include the publication of NSW's ASS Manual, coordination of the risk mapping project and contributions to two national conferences on ASS.

ASSMAC membership changes

ASSMAC is to be expanded to incorporate representatives of the sugar industry, tea tree industry and oyster growers. ASSMAC Chairman John Williams has written to organisations requesting nominations for the positions.


Phil March, a long term ASSMAC member representing the seafood industry is leaving and will be replaced by Dr Bruce Standen. Bruce has a PhD in economics and previously worked as the Managing Director of the Australian Meat and Livestock Corporation. He is currently a board member of Oceanwatch Australia.

* ASSMAC meeting dates for 1999 will be February 5, Sydney; May 7, Sydney; August 9 & 10 Kempsey; November 12, Sydney.

ASS economic study

The NSW Acid Sulfate Soils Management Advisory Committee (ASSMAC) has commissioned a major economic study of ASS impacts.

Senior economist with the NSW Department of Land and Water Conservation, Ron Hincks, will coordinate an economic scoping study to quantify both the cost of ASS impacts and the value of agricultural production from drained ASS areas.



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ASSMAC member, Mark Porter (DLWC) is supervising the project and says that the study will estimate the market value of land under cultivation to tea tree, sugar cane, grazing and other land uses, plus the value of fishing and oyster industries

Mark says "The project will help government develop policy for management of ASS and provide data to enable more flexible management tools such as the possible leasing of some low grade pasture areas for reflooding."

"Landowners often comment that much of valuable drought relief areas have been destroyed by over draining and this study will quantify this observation and hopefully find economic models which may enable wetter pasture management," he says.

For further information contact Mark Porter on 02 98955068.

ASS manual

NSW Acid Sulfate Soils Manual is selling well with a second edition expected in early 1999.

The manual contains guidelines on assessment, planning, management, drainage, and laboratory analysis.

ASSMAC compiled the manual which contains the latest technology and best practice methods for dealing with ASS

The manual was coordinated by Yolande Stone,

Dept of Urban Affairs and Planning along with Bruce Blunden (EPA & Wollongong University) and Col Ahern from the Queensland Department of Natural Resources.

How to order an ASS manual

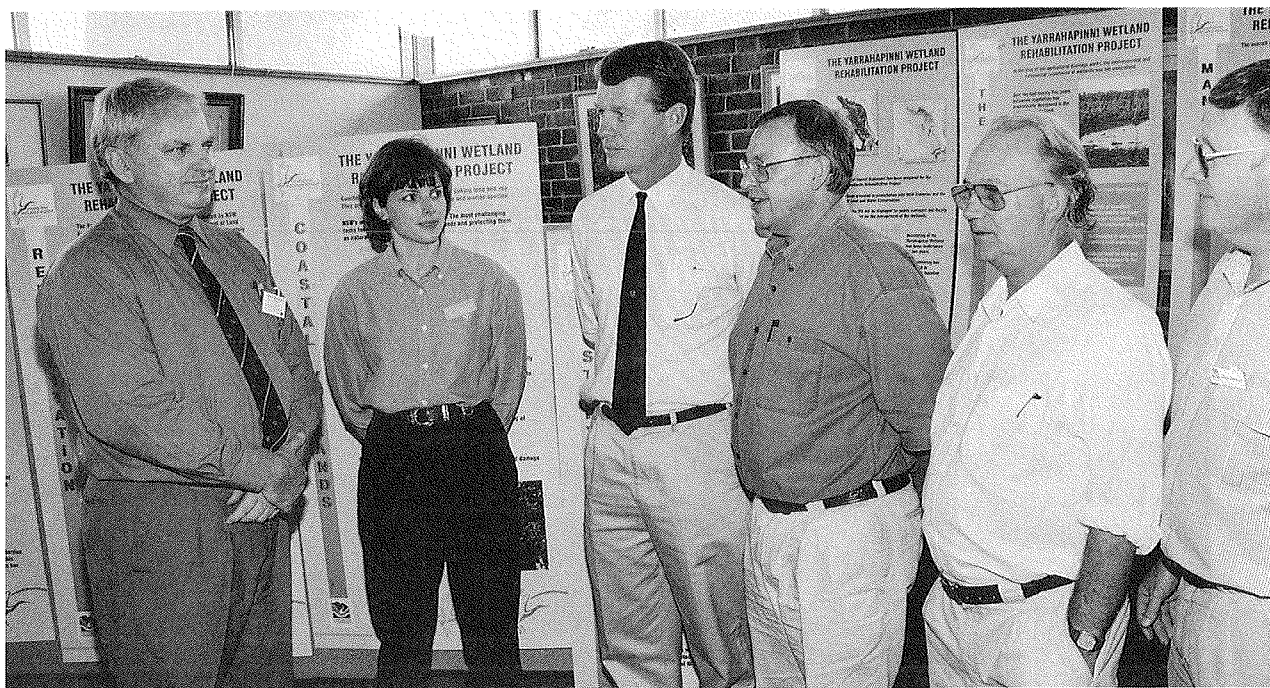
The manual costs \$50 plus \$5 postage and is available from the Department of Urban Affairs and Planning, Governor Macquarie Tower, Sydney 2001; telephone credit card payments are available on 02 9391 2222.

Macleay ASS workshop

Kempsey Shire Council recently showcased a water quality monitoring system that records via radio link the pH and salinity levels on the lower Macleay River.

Council's Mike Dutton detailed the sophisticated monitoring network as well as ASS management strategies at the Kempsey workshop jointly sponsored by the Macleay Acid Sulfate Soils Local Action Group.

Workshop speakers included Ian White (Chairman of ASSMAC Technical Committee), Bob Smith, (Agricultural Consultant), Sarah Fairfull, (NSW Fisheries), Glenn Atkinson (DLWC) and consultant Mark Wolf, Manager of Greenspan Technical Services. The day included a



(from left) Mike Dutton, Sarah Faithfull, bob Smith, Ian White, Terry Parkhouse and Glenn Atkinson at the Macleay ASS workshop at Kempsey. (photo courtesy of the Macleay Argus)

tour of Russell and Georgina Yerbury's property, in the Seven Oaks Drain area, which has a ponded pasture rehabilitation project on an acid scald area.

For further information contact Scott Henderson, ASS Rehabilitation Officer, NSW Agriculture tel 02 656244 or email scott.henderson@agric.nsw.gov.au.

Everlasting Swamp

Consultant Robert Smith is drafting a feasibility study for Clarence River County Council operations in the Everlasting Swamp. The study area adjoins Sportsmans Creek, near Lawrence, and is mainly freehold agricultural land with some SEPP 14 Coastal Wetlands.

Following individual landowner interviews, 40 stakeholders attended a meeting at Yamba to workshop various management options. Coldstream River grazer Roy Bowling outlined how he uses penstocks on his drains to hold back fresh water for improved pasture. Landowners are supportive of strategies that improve the wetlands without harming agricultural production. The options discussed at the meeting included active floodgate management, acid and salt scald rehabilitation, drainage channel design, drain dropboard installation, and drain maintenance. The final report is due in April 1999. For further information contact Alan Cibilic, (CRCC) on 02 6642 3277

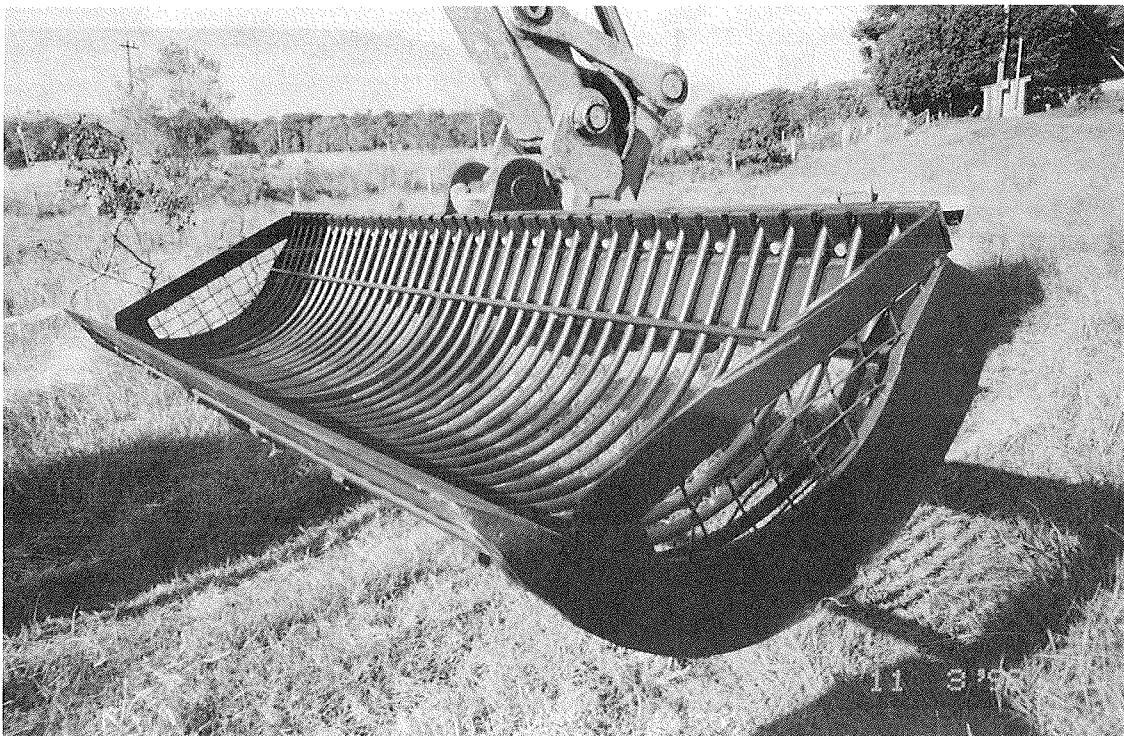
Excavator demonstration

A new excavator bucket designed to reduce the amount of ASS material removed from drains during weed clearing operations was demonstrated working in a cane field drain north of Ballina recently.

Excavator operator Ron Macarthur designed the weed clearing bucket which costs about \$5000. It can clear drains about twice as fast as a traditional excavator bucket and greatly reduces the amount of lime needed to neutralise sediment deposits.

Staff from the Newcastle office of the Department of Land and Water Conservation viewed the bucket in operation and will soon order one for maintenance of large public drains in the Hunter region. Clarence River County Council staff also inspected the bucket. The NSW sugar industry is keen to fit a storage drum and automatic lime slurry dispenser to enable the weed clearing bucket to quickly spread lime during maintenance works. For further information contact Ron Macarthur on tel 02 66862336.

NSW Agriculture's Dave McCoy recently staged an excavator drain clearing field day at Taree. Dave has been working on Natural Heritage Trust project to trial chemical treatments of drain weeds. For a free fact sheet on his findings to date, contact Dave direct on 02 david,mccoy@agri.nsw.



The weed bucket features a front cutting bar with steel tynes which hold plants but not ASS material.

gov.au 02 6552 7299.

Tuckean Swamp floodgates

Landowners will meet on February 1, 1999 to consider a six month managed to the tide of part of the Bagotville Barrage which drains the Tuckean Swamp on NSW's Richmond River.

The floodgate opening will enable occasional inflows of salt water into drains which will help control aquatic weeds which are not salt tolerant, enable fish passage through the floodgates and improve water quality. RRCC spends about \$50,000 annually on weed clearing and management of the drains and floodgates in the Tuckean system

Steve Settle engineer for consultants John Wilson and Partners recently presented the Tuckean Broadwater Estuary Working Party with a computer modelled map showing the possible extension of tidal intrusion with one floodgate open. The company has reviewed the Barrage operations and estimated how far tidal water would reach once a single floodgate is opened.

Richmond River County Council General Manager, Paul O'Sullivan, said data monitoring of downstream water quality, including salinity levels, would ensure the floodgate is closed to protect cane and grazing land from salt inundation during spring

tides..

Consultant Ian Kelly spent six weeks collecting water quality and land height data to help model the former wetland which contains large areas of acidified ASS.

For further information telephone Tuckean Landcare Coordinator Michael Wood on 02 6626 1355.

Victoria adopts interim ASS policy.

The Victorian Environment Protection Agency (EPA) has drafted an interim Industrial Waste Management Policy (Waste Acid Sulfate Soils) to deal with ASS throughout Victoria.

Large volumes of ASS are being removed from Melbourne's Yarra delta as part of an unprecedented level of development in the port area.

The "City Link" project, which involves a tunnel and a new freeway, has involved excavation of about 500,000 cubic metres of ASS material which is being stockpiled and treated or reused on-site by backfilling under the water table.

Environmental officer with the EPA, Steve Cambridge, says soil tests show Coode Island silts contain up to 2% pyritic material but this formation is highly variable in both pyritic content and buffering capacity. Other known deposits in Victoria are the black sands of the Brighton Group in the south east area of Melbourne.

Steve says the identification of ASS in Victoria is still in its infancy and there is a vital need for risk mapping similar to the NSW's program. The interim policy allows ASS to be disposed of at landfills which are licensed to accept ASS. It is recognised that this is not the preferred management method for ASS and special requirements are needed for landfill disposal, such as not allowing ASS to be used as daily cover material.

The interim ASS policy will be replaced by a comprehensive policy which is currently being drafted and will soon be released for public comment. The interim Victorian policy is modelled on NSW ASS Planning guidelines. A Project Manager, Sally Lock, has been appointed by the EPA to formulate the new Industrial Waste Management Policy for ASS. Anybody wishing to receive a draft copy to provide comment should contact Sally on (03) 96285262

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DNR takes lead on ASS

The Department of Natural Resources (DNR) is now Queensland's lead agency to coordinate government activities on ASS following a decision by the State Government.

The government recently considered ASS issues following a joint submission from DNR, the Department of Environment and Heritage and the Department of Primary Industries.

The DNR's Queensland Acid Sulfate Soils Investigation Team (QASSIT) and the Resource Sciences Centre (RSC) are currently mapping the risk of ASS in South East Queensland at a broad scale, developing improved laboratory methods, researching drainage management under sugar cane, producing technical guidelines and providing an information service and training.

DNR helped establish the Queensland Acid Sulfate Soils Management Advisory Committee. (QASSMAC) which produced a Management Strategy which forms the basis of the Government's response to ASS issues.

QASSMAC recently established a Technical Committee to review scientific issues. It is chaired by Bernie Powell and includes representatives from the agricultural and development industry, local and state government, consulting industry, universities and community groups.

For information on this article or the following

Queensland stories please contact the Qld ASS Information Officer Kylie Hey on tel: (07) 3896 9819, or Email: heyk@dnr.qld.gov.au.

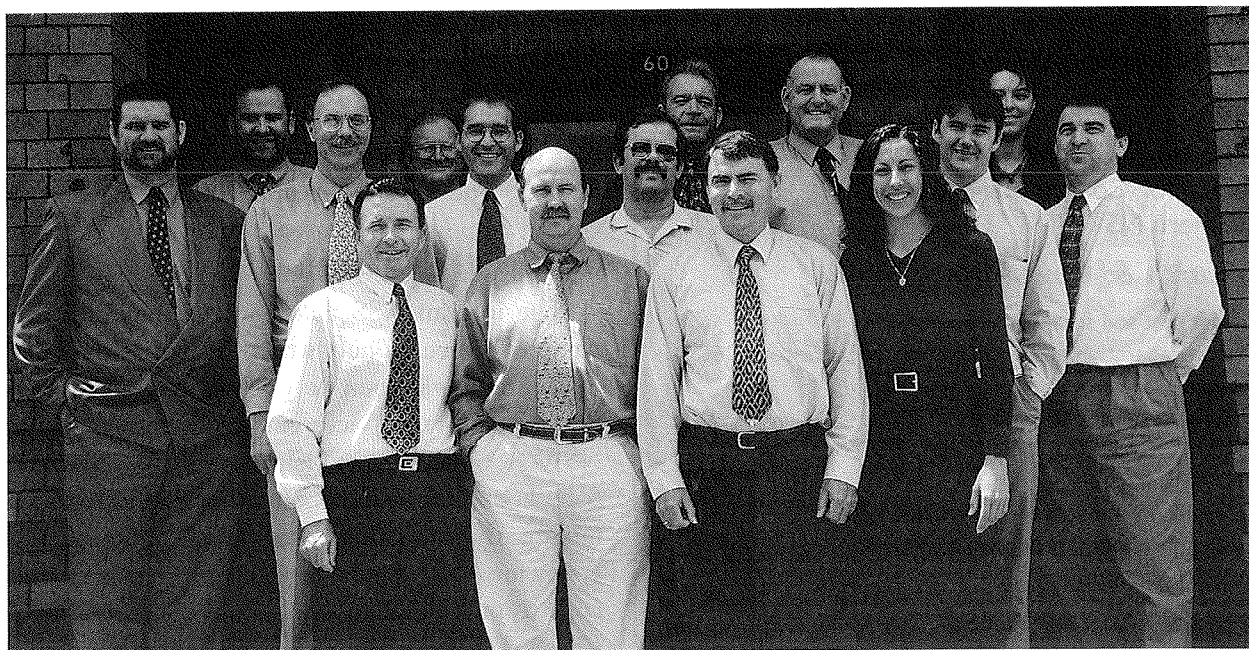
QASSIT sampling guidelines

QASSIT has released "Guidelines for sampling and analysis of lowland acid sulfate soils (ASS) in Queensland 1998" as a final version. Authored by C.R. Ahern, M.R. Ahern, and B. Powell, this version supersedes the previous Version 3.47, Oct 1997. The 34 page guideline covers ASS legislation relevant to Queensland, mapping and sampling, advice and inspection issues, sampling preparation, laboratory analysis as well as reporting and management of ASS. Free copies are available electronically in Word 97 version from the Qld ASS Information Officer, Kylie Hey by email: heyk@dnr.qld.gov.au. A bound hard copy with colour cover costs \$10

ASS prosecution, a first in Queensland

ASS have become a front page issue in Queensland following the prosecution of a Sunshine Coast canegrower in the Noosa Magistrates Court on Tuesday 20 October, 1998. This is the first prosecution involving ASS in Queensland and was taken under the Fisheries Act.

The offender was convicted on two counts of



QASSMAC members at a recent meeting in Brisbane.

unlawfully disturbing a Fish Habitat Area, under Schedule 7. No. 40 of the Fisheries Regulations 1995, and was placed on a \$50,000 bond for three years.

The bond requires remediation to correct environmental impacts caused by clearing and drainage of land for expansion of cane crops. The remediation include treatment of ASS, management of water quality, and restoration of marine plants in Tronson's Canal, on the Noosa River.

Meanwhile, Queensland's Minister for Environment, Heritage and Natural Resources, Rod Welford, has warned developers and landholders to take extreme care when disturbing ASS soils in coastal areas to avoid potential environmental disasters.

ASS workshops North Qld

The Qld Acid Sulfate Soil Investigation Team will hold one-day ASS information days at Ingham and South Johnstone (Innisfail) and a 2 day short course at Townsville in February 1999.

Details: 2 day Short Course, (technical)- Acid Sulfate Soils Monday 1st & Tuesday 2nd Feb 1999, at Townsville City Council (total cost ~ \$200 including lunches, field trips, morning and afternoon teas).

Contact Angelika Hesse Townsville City Council (07) 4727 9313 or DNR Lauren Heritage-Brand tel: (07) 4722 1088 Email: lauren.heritage@dnr.qld.gov.au

1 day ASS information day & field trip

Thursday 4th Feb 1999 Ingham Ripple Creek DNR (cost ~ \$30)

Contact Andrew Petro DNR (07) 4777 2822

1 day ASS information day and field trip

Tuesday 9th Feb 1999 South Johnstone

(cost ~ \$30)

Contact Mal Johnston DNR South Johnstone (07) 4084 3900

Ingham workshop

A total of 46 people attended a ASS workshop at - Ripple Creek , near Ingham, recently conducted by Col Ahern and Doug Smith from the DNR. Participants included canefarmers, Landcare and TCM members, local and state government officers and industry representatives from Canegrowers and BSES. It involved theory lessons plus a field trip to identify ASS. To register for next year's workshop, please contact Andrew Petro, Department of Natural Resources on (07) 4777 2822.

Details of next workshops: 1 day ASS information day & field trip Thursday 4th Feb 1999 Ingham Ripple Creek DNR (cost ~ \$30) Contact Andrew Petro DNR (07) 4777 2822. Tuesday 9th Feb 1999 South Johnstone (cost ~ \$30) Contact Mal Johnston DNR South Johnstone (07) 4084 3900

Review of NQ drainage works

The Queensland Acid Sulfate Soil Investigation Team's Col Ahern and Doug Smith have reviewed plans for drainage works proposals as part of the Sugar Industry Infrastructure Package proposal to service existing caneland in the Ingham and Tully regions.



Col and Doug spent three days in the Ingham and Tully areas inspecting proposed routes for large drains required to protect existing cane lands from flood damage. The multi million dollar project has been nominated for a joint Federal State Government funded infrastructure package.

Doug says he identified areas where drainage could cut through the ASS profile and requires very careful assessment and management. For copies of the report please contact Col Ahern on tel (07)

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ASS mosquito control

Associate Professor Paul Saffigna, Griffith University, and Ms Kylie Hey, QASSIT, Department of Natural Resources, recently presented findings to Logan City Council of research into ASS ditches dug for mosquito control at Carbrook.

In the past 2-3 years the site has been assessed for ASS hydrological investigations (Paul Smith, Waste Solutions), and ecological impacts associated with presence of the selective ditches (Dr Pat Dale, Griffith University).

Kylie says ASS are present at the Ferry Road site, which is located adjacent to Logan River about 10 km from the coast. "Existing selective ditches for mosquito control intersect the potential acid sulfate soils at the northern end of the site," she said.

The report is available in major libraries in Brisbane. (ISBN 0 86857 937 8).

Logan City Council's Vector Control Coordinator, Mr Ken Burmeister will coordinate monitoring of the site over a minimum of 1 year to assess any further potential hydrological, ecological, and ASS impacts in ditches.

Tweed River mosquito report

Clive Easton from Tweed Council has recently written up research results of past trials which have reduced mosquitoes breeding in an acid drain by as much as 99.98%.

The effects of acidity and fish presence on mosquito breeding were assessed following installation of a small leakage port into a drain floodgate to enable tidal flushing. Before the modification, the drain water had pH values as low as 2.7. These water conditions were toxic to fish and continually held acid tolerant mosquito larvae. At four weeks post gate modification, water pH had risen to 6.0 and at least three fish species were inhabiting the drain.

Darwin gas plant

Woodside Energy Ltd. is investigating possible developments in Darwin, based on its Timor Sea gas reserves. This involves assessment of various locations for facilities and pipelines.

Jennifer Brazier, a science undergraduate student from the Northern Territory University is

working as part of Woodside's vacation employment program for university students to collect background information about ASS. Together with Woodside engineers and environmentalists, Jennifer will assess how ASS impacts on site suitability and construction methods.

For further information, please contact Jennifer Brazier on Jennifer.Brazier@woodside.com.au

Sugar industry video

Patricia Kennedy from the Federal Government's Cooperative Research Centre for Sugar has commissioned a video tape about three sugar cane projects that involve ASS.

The \$4000 video will cover the CRC backed program to test of all 700 NSW sugar cane farms for ASS. The two other projects to be covered by the video include a groundwater trial on ASS at Rocky Creek Qld where testing sewage effluent effects on water tables is underway and an education extension program by John Reghenzani for Ingham cane farmers. His work involves explaining ASS and providing advice on how to use lime to neutralise acid.

For further information about CRC contact Patricia Kennedy on tel 07 47 81 5963



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\$114,000 Clarence River study

Manly Hydraulics is doing a \$114,000 Estuary Processes Study of the Clarence River for Maclean Shire Councils.

Council officer, Bruce Blackford says the study will review existing data and undertake some field surveys, will identify a range of management options. The ASS component of the study, will be coordinated by Leigh Sullivan from Southern Cross University.

Maclean Shire Council is currently drafting a local environment plan for ASS.

For further information contact Bruce on 02 66452266.

Farm Forestry

NSW State Forests' Brendan George plans to trial forest timbers on drained and acidified ASS areas of NSW's north coast.

The 10 hectare trial will establish planting techniques required for swampy conditions as well as growth rates and predicted returns for hardwood mill timber. Brendan says some of the species which may grow well on acid, swampy conditions include Swamp mahogany and *Melaleuca leucadendron*. It will take about 18 months before growth rates can be measured and timber production predicted.

Brendan will meet with local government representatives, Qld State Forest officers and ASS-MAC representatives in February to select a trial site. Where existing ASS has been exposed and there is a large store of acidity in the soil profile one management method is to contain the acid on site. This is done in the cane industry on the Tweed by using laser levelled paddocks so that storm surface water doesn't come into contact with acid. The crop also drops the water table to provide a storage area for 1-2 year storms. This model could be adapted for farm forestry. However, care is required to ensure tree transpiration does not lower water tables into the potential ASS layer. Brendan says that NSW's north coast has existing hardwood timber milling infrastructure and plantings on marginal grazing land that could greatly increase forest areas in the region.

Vietnam ASS forestry

Meanwhile, John Simpson from the Queensland Forestry Department at Gympie reports that trials

of Australian hardwood species recorded phenomenal growth rates on ASS with pH 2-2.5 in Vietnam. John undertook a series of trials between 1991 - 1996 as part of an Australian aid program on formerly heavily forested areas which were napalmed during the Vietnam War. He found the Australian red gum which recorded 12 m growth in four years. He says a foreign company is planting about 5000 ha of forestry timber on ASS in Vietnam each year. *Melaleuca leucadendron* also has good growth rate on ASS and can withstand long periods of inundation.

For further information John Simpson on 07 54820883 or Brendan George on 02 98720111.

ASS hotspot reports

The NSW Department of Land and Water Conservation officer Mitch Tulau is currently identifying ASS "hotspots" on the coast from Tweed Heads south to the Manning River. The hotspot reports will be used by the State Government to consider a possible changes in land use and flood-gate management to improve water quality.

Mitch is interviewing councils, state agencies, academics, and industry representatives, as well as reviewing existing soil and water quality data. His catchment reports also cover land use, land tenure and zoning, geomorphology, elevation, history and description of drainage, tidal and fluvial flow information and rehabilitation attempts. So far the Macleay, Manning and Clarence catchments are completed and the Tweed, Brunswick and Richmond are underway. The reports will be published in February with accompanying 1:100,000 scale maps. For more information contact Mitch on 02 65 631212.

Coping with ASS stress

A study of plants which can cope with very acidic or saline soils reveals different adaptations to cope with hostile conditions.

The study by Osaki M. Watanabe T. Ishizawa T. Nilnond C. Nuyim T. Sittibush C. and Tadano T. found that *Melastoma marabathricum* and *Melaleuca cajuputi* well adapted to ASS conditions. *M. marabathricum* accumulates a huge amount of aluminium (Al) in leaves, especially in new growing leaves, and is designated an Al accumulator plant. When growing in high Al and Na concentration, plant species have developed two opposite strategies: (1) Al or Na accumulation in the leaf and (2)

Al or Na exclusion from the leaf. Al concentration in leaves had a negative relationship with the other mineral nutrients except for N and Mn, and Na concentration in leaves also had a negative relationship with P, Zn, Mn, Cu, and Al. Consequently, Al and Na accumulator plants are characterized by their exclusion of other minerals from their leaves. Reference: Nutritional Characteristics In Leaves Of Native Plants Grown In Acid Sulfate, Peat, Sandy Podzolic, And Saline Soils Distributed In Peninsular Thailand.

Source: Plant & Soil. 201(2):175-182, 1998
Apr. English reprint available from:

Osaki M Hokkaido Univ, Fac Agr, Lab Plant Nutrition, Kita Ku, Kita 9.

ASS is a "China syndrome"

Rice paddies more than 200 years old are still experiencing acid problems in parts of the Pearl River Delta in Southern China.

NSW Univeristy's Mike Melville recently visited the area with Ian White (ANU) and Chuxia Lin (UNSW), as guests of Prof Shiming Luo, President of South China Agricultural University.

Mike says that traditionally two crops of rice are grown in paddies. However prolonged dry seasons can cause acidity problems from ASS material, delay planting and reduce the yield of the first crops. Acidity is flushed into rivers at the end of the dry season with no monitoring of consequences. Lime is not economically viable. A monograph of the workshop papers will be published. For further information contact Mike Melville on 02 93854391.

Acid mine drainage update

Greg Summerhayes from the NSW Department of Mineral Resources is using crushed limestone instead of traditional hydrated lime treatments of acid mine drainage. The system involves an anoxic limestone drain and a constructed wetland and has the potential to be utilised for ASS treatment

Normally limestone would quickly coat with oxidised iron particles which would prevent absorption of the limestone by keeping water anaerobic (dissolved oxygen <2mg/l). The treatment however manages to keep limestone dissolving into water.

The drain distance and amount of limestone (20 mm aggregate) required is a measure of the water flow and acidity. In the old Glen Ayr minesite, at Kurri Kurri a drain 1m square, buried 0.5 m below ground and 250 m long at 0.5 % grade is filled with limestone and water flow is 0.5 litre per second. At the outflow end, the treated water is flushed through an artificial wetland which precipitates the iron floc that has oxidised rapidly when the treated water is exposed to air.

Crushed aggregate (\$20 - \$30) is cheaper than lime which costs \$100 per tonne delivered.

The cost of treatment depends on the infrastructure required to intercept water before it reaches air, the amount of limestone required, the excavation costs and the length of drain used.

Aluminium, if presents, is a problems to this treatment (it cannot exceed 25mg/l) as it can precipitate at pH5 and clog the drain

For further information please contact Greg Summerhayes, Principal Environmental Officer, Department of Mineral Resources, ph; 0265721899, email; summerhg@minerals.gov.nsw.au.

The Australian Soil Science Society NSW Branch recently held a training course at the University of Technology Sydney on Soil Technology and Contaminated Land. Included in the workshop was a session by Ian White (ANU) on the identification and management of sulfidic materials and other mine wastes which has some relevance to ASS. Other speakers included consultant Phil Mulvey and Pam Hazelton (UTS).

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

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