

ACID SULFATE SOILS

**farming community
ideas about
the way forward**

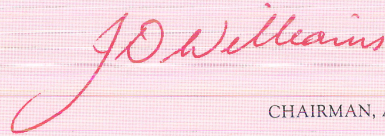
Foreword

Acid sulfate soils (ASS) are an emotional issue, but it is time to move beyond the emotion. It is time to build on the good work already being done by many farmers on our low-lying coastal floodplains.

NSW government, industry and communities are committed to developing and promoting best management practices. This is helping farmers find cost effective ways to include these best practices in their everyday farm management. To do this, we need to understand how farmers see those practices fitting into their farming future. We need to understand their existing knowledge of ASS, and we need to understand their attitudes to the best practices available at the moment.

This benchmarking study provides us with an opportunity to listen to farmers, and to learn from them. It also lets us acknowledge their concerns about existing best management practices, as well as their concerns about the way the community debate over ASS is being conducted.

Beyond that it provides us with a genuine benchmark against which we can measure the changes in community attitudes as the NSW government continues to provide information and to research even better management practices.



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Acknowledgements

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Key words: acid sulfate soil - industry response - catchment management - farmer awareness and attitudes - government employee attitudes - excavator contractor attitudes

For bibliographic purposes, this document may be cited as:

Woodhead, A., (1999) *Acid sulfate soils: farming community attitudes about the way forward* NSW Agriculture and the Acid Sulfate Soils Management Advisory Committee.

ISBN: 0 7347 1079 9

Produced by NSW Agriculture, with support from the Acid Sulfate Soils Management Advisory Committee (ASSMAC). This project was supported by the NSW Agriculture Acid Soil Action Initiative under the Acid Sulfate Soil Program.

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Information in this booklet is derived from the *Benchmarking Acid Sulfate Soils* Technical manual. The survey was conducted during May and June of 1998 under the auspices of NSW Agriculture and with the support of the Acid Sulfate Soils Management Advisory Committee (ASSMAC). The statements made in this booklet are based on the results generated by that survey of 287 farmers, and are not necessarily reflective of views held by the NSW Agriculture or of all farmers in NSW.

This document has been prepared by the author for NSW Agriculture, for and on behalf of the State of New South Wales, in good faith on the basis of available information.

The information contained in this publication is based on knowledge and understanding at the time of writing 1999. However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of NSW Agriculture or the user's independent adviser.

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*The significant problems we face
cannot be solved at the same level of thinking
we were at when we created them.*

ALBERT EINSTEIN

The picture above shows the Bagotville Barrage, built in the late 1960s on the upper Tuckean Broadwater, in the Richmond catchment.

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A summary

Most farmers have some awareness of acid sulfate soils (ASS) in general terms. However, they are less aware of ASS on their own properties. Most cannot tell from existing risk maps whether or not their property is at risk. They want more details. They can better judge how to manage ASS if they know they have it. Cane farmers have had their soils tested by industry organisations, but other farmers have not had this assistance.

Farmers' knowledge of 'best practices' for acid sulfate soils is variable.

Some practices, such as liming are well known. (Many farmers see lime as something that is helping the broader community too, therefore they believe government should provide financial assistance for lime.) Many farmers want to improve on farm drainage.

Farmers' attitudes to 'best practices' for acid sulfate soils are also variable.

Some farmers feel positive about the future management of ASS, but many more feel negative. Farmers feel their ASS management is in control, if they can see existing 'best practices' fitting in with their farm management, or if their industry is supportive. They do not feel their ASS management is under control if they cannot see a financial benefit from existing 'best practices'. Nor do they feel in control if their industry does not see ASS as a priority issue and does not support them with ASS information.

Farmers want to see greater recognition of their positive efforts and their achievements in managing ASS.

They feel persecuted by the media. Partly because of perceived views expressed in the media, they see the public as being ill-informed, therefore they want more education for the general community.

Farmers' attitudes to consultative groups depends on their past experiences

with the effectiveness of these groups, and whether their own agendas could be fulfilled. Many farmers lack faith in these groups and are concerned about them being too political.

Farmers want government to provide more consistent advice across all agencies.

They want a one-stop-shop to provide information to farmers and more education to the public.

Government employees see their primary role as providing information and guidance to farmers and other government personnel.

To do this successfully they need appropriate knowledge themselves. Government employees believe state agencies should encourage community participation in the production of ASS management plans. They believe consultative groups should include state agency and local government representatives.

Excavator contractors are keen to understand their legal obligations.

Seeing ASS in the field, and seeing the environmental effects, helps excavators understand the importance of ASS management. They want to ensure their operations are legally protected by making sure that land holders and farmers gain appropriate approvals for drain clearing.

Farm survey

Of the 287 farmers surveyed for this report:

- 45% are highly aware; 34% have medium awareness and 6% have low awareness of ASS
- one third of farmers know the height of their property above sea level
- 90% of the people surveyed are farming on potential acid sulfate soils
- only 45% of them know they have ASS on their properties
- less than half of the farmers who do know they have ASS, know the depth of their ASS
- 20% of all farmers say they need help in managing ASS
- 57% of farmers know the pH of their soils
- only 20% know the pH of their drainage water.

Farmers want

- more information about the risk of ASS on their properties
- to have sampling done on their properties
- to have financial assistance for lime
- the government to do more research and to provide more information
- the government to develop workable policies that don't hinder farmers ability to make money
- development application (DA) processes surrounding drain cleaning to be streamlined.
- government help in getting correct information to the media
- well informed and balanced groups (not dominated by non-farmers) with government representatives to provide ASS information.

Introduction

Acid sulfate soils (ASS) pose a significant environmental problem. It is a major problem for the people who make their living by farming low-lying coastal floodplains. If we as a community are going to help them meet this challenge, we have to understand how they feel about the best management practices available to them. They are in the best position to understand how these 'best practices' can be applied in their everyday lives.

In May 1998, a total of 287 cane farmers, tea tree growers, beef farmers and dairy farmers from seven catchments on the NSW coast were surveyed by telephone. The aim was to gain an understanding of their knowledge of ASS best practices. Just as importantly, they were also surveyed in an effort to understand their attitudes to these same practices.

As a result of this survey we can now think about these farmers in terms of three groups:

1. Those who are adopting best management practices for ASS;
2. Those who reject these supposed best practices; and
3. Those that would like to adopt best practices but cannot.

More to the point, the survey provided these farmers with an opportunity to voice their opinions on how the issue of ASS can be handled better. It is important that we listen to these ideas. It is important that we acknowledge them. And it is important that we learn from them as we grapple with ASS issues in industry and catchment groups.

Our work is ongoing and the views of other stakeholders are presently being taken into account. We welcome further constructive input.



The farmers surveyed

Farmers are an ageing population. Nearly 30% of dairy farmers surveyed fall in the 'over 60 years old' category. Tea tree farmers have over 40% in the 41-50 age group.

Off-farm income is significant for many farming households. This is especially true for those industries, such as beef, that are suffering low commodity prices.

- beef farmers are most reliant on off-farm income
- dairy farmers are least reliant on off-farm income
- most cane, dairy and tea tree farms are similar sizes, however some tea tree farms are much larger than any of the farms in other industries

Most farmers own or part own and run their own farms. Notable exceptions are tea tree farms, 20% of which are run by managers.

Production levels are a good indicator of the economic viability of an industry and the level of confidence that producers have in future prospects for their industry.

- over 20% of beef farmers are decreasing their production
- most cane and dairy farmers are static
- tea tree is expanding, rapidly

Industry	Average off-farm income (as % of total)	Average years in industry	Median property size (ha)
cane	14	27	80
beef	48	21	68
dairy	5	31	85
tea tree	22	6	81



Understanding acid sulfate soils

Management information

AVOID

The best way to manage ASS is to avoid disturbing or draining iron sulfides.

RECOGNISE

It is important to know the depth of the iron sulfide layer and to know what ASS looks like. If it is uncovered accidentally, it can then be re-covered immediately. The following indicators give even earlier warnings:

- cloudy green-blue water
- excessively clear water
- iron stains
- poor pasture
- scalded soil
- yellow mottled soils

SHALLOW DRAIN

Wide shallow drains allow surface water to drain quickly without exposing iron sulfides. Deep, narrow drains are more likely to expose iron sulfide and leak sulfuric acid into waterways.

LIME

Liming drains can neutralise the spoil. Liming paddocks can maintain the natural pH balance.

ASS management information is available from NSW Agriculture. See page 23 for details

Our understanding of ASS has increased rapidly in the past ten years. But we still have a lot to learn, and our approach will change as new information becomes available. We are dealing with a very complex problem involving soil chemistry, catchment variability, land use and socio-economic issues.

Acid sulfate soils are the common name given to soils containing iron sulfides. They occur on coastal floodplains. If these sulfides are exposed to the air, they oxidise to form sulfuric acid. Hence the name, ASS.

Potential ASS can become actual ASS. Iron sulfides are usually contained in layers of waterlogged soil. These layers of either clay or sand are usually dark grey and soft. While they are waterlogged, oxygen in the air is not able to react with the iron sulfides in the soil. Because they have the potential to oxidise to sulfuric acid, these layers are commonly known as potential ASS.

If these layers are exposed to the air, and sulfuric acid is formed, they are known as actual ASS. These are generally mottled yellow in colour. The soil itself can neutralise some of the sulfuric acid. The rest of the acid moves through the soil, acidifying soil water, groundwater and eventually surface waters.

Drainage and excavation can speed the formation of actual ASS. Drainage and excavation of potential ASS expose the iron sulfides to air. This greatly speeds the natural formation of actual ASS. It can also mean large slugs of acid groundwater are released rapidly into estuarine streams. The concentrated acid can overwhelm the stream's capacity to neutralise it. The acid can then affect the health of fish and other organisms.

Massive fish kills can occur when sulfuric acid is washed into waterways. This is a particular problem after droughts, when the watertable has dropped and the iron sulfide layer has oxidised. Drought-breaking rains can wash substantial quantities of sulfuric acid into waterways.

Fish kills are the most obvious effect of ASS. The chronic, less visible effects such as reduced hatching and decline in growth rates of fish are more common and more widespread. ASS effect entire aquatic ecosystems including plants, crustaceans, and other organisms.



Drainage has improved agricultural production in catchments and also has caused over drainage in some catchments. It enables land to be cleared of water after heavy rain. Without drains many coastal lowlands could not be farmed, or can only be grassed for 40% of the year.

Floodgates control the passage of water and fish in both upstream and downstream directions. They are managed in conjunction with drains. If floodgates remain closed, fish passage to breeding habitat becomes impossible.

Ideally, there should be a coordinated approach to drainage management in each catchment. There are several types of drains in most catchments and, at the moment, responsibility for managing them varies.

- Flood mitigation drains are the largest. They were commissioned by government as part of the flood mitigation schemes over the past century
- Community drains serving agricultural land under a variety of management structures, including: drainage unions; councils; DLWC; and informal groupings
- On-farm drains, created, owned and managed by individual landholders.

Drain depth is very important, as is the density or number of drains. If drains penetrate the iron sulfide layer they can cause oxidisation and acid formation. If land is over drained then ASS exposure is more likely. If land is insufficiently drained, it remains under water for long periods after high rainfall.

Most farmers are happy with existing drainage regimes. But about 10% (mostly from the beef cattle industry in the Macleay catchment) believe their drainage regimes are too efficient, leaving properties too dry for production at some times in the year. These farmers believe that flood mitigation drains were badly designed from the start. Consequently, they struggle to combat ASS because they cannot maintain water levels.

Floodgates

- stop saline water flowing on to agricultural land, especially during high tides
- stop tidal ingress and flood water e.g. tides can cause a backwash effect during upstream flooding on lower level farms
- can retain water

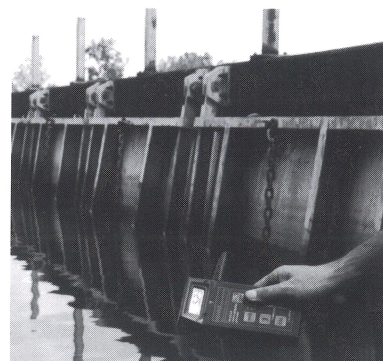
Drainage

Many farmers believe they could improve on-farm drainage by:

- increasing the use of shallow-wide drains
- increasing lazer levelled area and generally reduce drainage
- retaining water with drop boards
- clearing drains chemically rather than mechanically (to avoid having to get development approval)

“It has scared the [union], they want to do a good job, look after land properly but there is much uncertainty. A neighbour lost a lot of income due to red tape getting approval ... to clear drains, so even going through the correct channels hurts the farmer.”

MANNING, BEEF FARMER



The industries surveyed

Cane farmers

60% of cane farmers have 'high' awareness of ASS

80% of cane farmers use lime, the highest of all groups

cane farmers have more soil tests (over 80%) than other groups

get most of their ASS information from their industry body (71%)

Tea tree farmers

60% use lime, 70% use soil tests and 80% are aware of their soil pH

get most of their ASS information from their industry body (66%)

are very critical of media portrayal of the relationships between ASS problems and farming practices

are most likely to believe that other farmers' management practices need improvement

Dairy farmers

60% use soil tests and 60% use lime

nearly 20% of dairy farmers see ASS as very important in farm management and planning

35% get information from their industry body - substantially less than cane and tea tree industries contributed least amounts of negative observations about the rest of their community

Sugar cane

The sugar cane industry has made ASS a focus and is ahead of other industries in awareness and knowledge levels. Cane farmers generally feel in control of ASS management. The geographic closeness of cane farming communities, a cohesive industry body, and relatively stable commodity prices have allowed this industry to grapple with the problems posed by ASS.

The cane community particularly resents 'media negligence' of their positive efforts to address ASS. *Cane farmers are proud of the way their industry has responded to ASS.* They believe the bad old days of having 'the finger pointed' at them for killing fish, are well behind them. They believe their industry is at the 'cutting edge' of achieving 'best management' for ASS. They believe the rest of the community, and identified groups within it, need education about ASS management.

Tea tree

The emerging tea tree industry is widely dispersed from the Manning, north. On average, farmers have been in this industry for only 6 years (the average for other groups is more than 20 years). This group is characterised by a high proportion of manager run farms, relative to owner run farms. Tea tree farmers have the most diversified farm incomes. Tea tree is also the most common secondary crop for beef farmers. This industry is rapidly growing. There has been a relatively large occurrence of inappropriate drain excavations which has resulted in some legal action. *This has been interpreted by growers as unnecessary restrictions by local government on this fledgling industry.*

Dairy

Dairy farmers embody a very traditional farming enterprise. Farmers in this group are on average older, and have been engaged in this type of farming for longer. Their farm income is better than beef farmers, but their ability to respond to ASS is still constrained. They are, however, not likely to have either a diversified on-farm income or to be generating off-farm income. Their industry structure is less visible than that of cane farmers, but more cohesive than that of the beef industry.

Dairy farmers contributed the fewest negative observations about the rest of their community. They did however contribute as strongly as anyone to negative comments about 'the government'. They are proud of their role as primary producers. *Dairy farmers are confused about government policies that they see as harmful to their enterprise.* They are open to learning more about ASS, the problems it poses and the best practices for managing it.



Beef

The beef industry is characterised by a lack of cohesion, low commodity prices and geographic dispersion. This is a direct contrast to the cane industry. Consequently, beef farmers feel less in control of ASS management. Returns from beef production are low, and lime is not seen as a way to generate more income.

Beef farmers would like help in dealing with ASS. Many express a need for government support in purchasing lime for their pastures. They also inquire about getting involved in a program similar to the cane industry's.

Beef farmers are frustrated with their catchment and on-farm drainage regimes. Government policies in declaring wetland areas (SEPP 14), and rumours about catchments being re-inundated with sea water cause great concern in this group.

All farming groups surveyed are characterised by these observations;

- there is a low level of water testing practised by all industry groups
- only one third of farmers know what height their property is above sea level, of these, 80% were less than 2 metres
- perceiving a direct benefit in terms of increased on-farm income is an important factor that motivates both the cane and dairy industry groups in their use of lime
- important information sources across all groups, were newspapers (40%) and colleagues (30%) also important but to a lesser extent, TV and radio (30%)
- there is a lot of frustration over the process of attaining local government development approvals, to clear drains



Beef farmers

35% feel ASS management is a very important farm planning issue

30% feel their ASS management is not under control

10% get ASS information from their industry body (against 70% for cane and 65% for tea tree)

30% have observed scalds on their farm, (more than any other group)

40% have knowledge of ASS (close to cane farmers) but, only 20% know the depth of the ASS



The catchments surveyed



Catchments studied in NSW

All catchments

Most survey participants in all the catchments have observed paper barks and smart weed. Dark grey mud was observed by over 40% of respondents in all catchments. Least observed was jarosite in all catchments.

Most participants apart from those in the Tweed, think community and union drains on properties are not adequately maintained. Also lime is not used on these drains, enough. However, most catchments think their flood gates are in good working order.

The northern most catchments, the Tweed, Richmond and Clarence, are dominated by sugar cane production on the coastal floodplains. Industry diversification increases in the Richmond and the Clarence, with tea tree, beef and dairy becoming more common as the cooler climates make cane less viable.

Tweed

In 1987, the Tweed catchment had a severe fish kill. This drew a lot of media attention and the cane industry was cast as environmentally insensitive. In response, the industry, farmers, and scientists, invested in on-farm trials, soil sampling, education and changed management practices. As a result, *Tweed cane farmers have a high knowledge of ASS.*

Richmond

The Richmond catchment has also had its share of fish kills. The Tuckean sub-catchment is one of five in the Richmond and has had some serious problems. Tuckean farmers have begun tackling the ASS problems. Farmers are positive about the role of catchment management facilitators in providing information and helping to find the way forward. One quarter of Richmond farmers said they feel in control of ASS management. Like the Tweed, there is *strong representation in catchment groups.*

Clarence

The principal industry in the lower Clarence catchment is cane, followed by beef and tea tree. Clarence catchment ASS awareness is lower than the Richmond and the Tweed. It also has the *lowest involvement with drainage unions and the lowest satisfaction with community drains* (inadequate maintenance, not enough liming, and too much vegetation growing on sides).

Hastings and Macleay

The Macleay catchment is a major catchment in terms of size and potential ASS risk. The dominant floodplain industry is beef with minimal cropping. (For the purposes of this survey, the Hastings which is dominated by tea tree is included in the Macleay.) Many farmers in the Macleay are *disgruntled about their catchment's drainage.* They generally believe their farms would not be viable without drainage, but some believe their drainage is not efficient. Others believe their drainage is too efficient, leaving properties too dry for production in parts of the year. Eighty percent of farmers in the Macleay have observed coloured run-off water.

Manning

The Manning is principally a dairy farming area. Like the Macleay, there is hardly any cropping. According to the survey responses, it (along with the Shoalhaven) has the highest area of cleared land. *There is a large involvement in Landcare.*

Hunter

The Hunter is principally dairy and beef. Farmers in this catchment would like their drainage to be more efficient. It also has the second lowest involvement in drainage unions. However, it does hold the *second highest sense of 'feeling in control' of ASS management.*

Shoalhaven

The Shoalhaven has the equal highest area of cleared land. It is principally a dairy farming area, and like the Manning has negligible cropping. This catchment had the most sightings of paperbark trees and smartweed. The Shoalhaven has no drainage unions. *Flood gate and drains are managed by council.*

Farmers' knowledge of 'best practices' for acid sulfate soils

This survey was designed to help us understand how farmers see the issue of ASS. The first step is understanding what they already know about: the soils themselves, the indicators that warn about the possible presence of ASS; and the best practices for managing them.

Most farmers have a high level of ASS awareness. Many have a medium level of ASS awareness (most of these would like to become more informed). Many are also aware that ASS are a problem with potential to cause significant problems on their farms. However, they do not believe they have the ability or knowledge to deal with it.

Farmers' knowledge of the depth of acid sulfate soil on their properties is low. ASS risk maps have been prepared to help farmers determine whether they are likely to have ASS on their farms. Almost half of the cane and beef farmers surveyed said they had ASS on their property. One third of farmers know what height their property is above sea level, and of these, 80% are below 2m.

Farmers were asked whether they had paper barks, smart weed, dark grey mud, buttery yellow soils or coloured water on their properties. (Each is an indicator of potential ASS.)

- paperbarks followed by smart weed are the most observed indicator across all catchments
- presence of dark grey mud represented about 40% of observations in most catchments
- clear or rust coloured run-off water was observed by nearly 80% of Macleay, 50% of Clarence, and 40% of Richmond farmers

If farmers are performing soil tests, measuring soil and water pH and applying lime, it indicates that they are aware of ASS management issues. Soil pH levels were known by 60% of all groups except beef farmers. On the other hand knowledge of water pH was low for all groups.

Lazer levelling improves drainage efficiency, it is often combined with changes to the entire drainage system on a property. It is considered a good tool in the management of ASS as it encourages shallow drains which do not penetrate the acid sulfate layer. Cane and tea tree farmers make most use of this technology.

Further comments about ASS risk maps

- not 'accurate' enough
- scale is too large, inhibiting interpretation at ground level
- not as informative as cane industry maps
- not available from council on request

"We realise it's a problem ... with a careful management plan we can minimise the release of ASS without too much trouble."

TWEED, CANE FARMER

"... we supposedly have some ASS, but don't think [the] maps are accurate ... some areas with plenty of grass [are] killed by salt water after a king tide ... more studies [are] needed before we can accept what's on those maps."

MANNING RIVER, DAIRY



Farmers' attitudes to 'best practices' for acid sulfate soils

"Its a matter of biting the bullet ... shallowing & widening the drains"

RICHMOND, BEEF FARMER

"I know I shouldn't dig down too deep."

TWEED, CANE FARMER

"Most cane growers are pretty strong with it - lazering, removing big drains, filling in big drains. Everyone is trying to do the best they can. If you ignore it you're only going to bring trouble on yourself."

RICHMOND, CANE FARMER

"Can best be fixed by self motivation ... I was involved in a remediation project because I had it on my land - some didn't want to address the issue ... best way to get them involved is to observe remediation on land next door, subtle peer pressure ... talk through the fence ... later they joined - can't force them through government's 'big stick' regulation approach ..."

MACLEAY, BEEF FARMER

"If I had the money drains should be made three times as wide and half as deep"

MACLEAY, BEEF FARMER

This benchmarking study provides us with an opportunity to listen to farmers, and to learn from them. It also lets us acknowledge their concerns about existing best management practices, as well as their concerns about the way the community debate over ASS is being conducted.

When asked how important ASS issues were in their farm management and planning: beef and dairy farmers mostly said it was 'not important'. Cane farmers and tea tree farmers mostly said it was 'very important'.

Within each farming industry there are a range of attitudes to ASS. For the purpose of clarity their attitudes have been grouped together.

Farmers who feel in control of ASS management are confident about their ability to manage the problem. They believe ASS are either; within their control, not an issue on their property, or their industry is attending to the problem adequately.

A small proportion adopt ASS management reluctantly, usually in response to perceived community pressure. Some are simply sceptical that there is any need to change their practices.

Nonetheless, most farmers in this category are aware of ASS best management practices, and clearly indicate that they employ them. Pro-active cane farmers specifically refer to the support and motivation they get from their industry, including:

- developing individual 'Farm Management Plans'
- sampling and testing soils for ASS risk assessment
- guiding and encouraging 'best management practice'
- building management conditions into 'grower's agreement'



Farmers who *don't feel in control of ASS management* feel the whole issue is beyond anyone's control. They feel powerless, and they fear the implications of ASS management regulations. Rumours encourage fear and uncertainty over their future viability. They are not using 'best practices' because they believe:

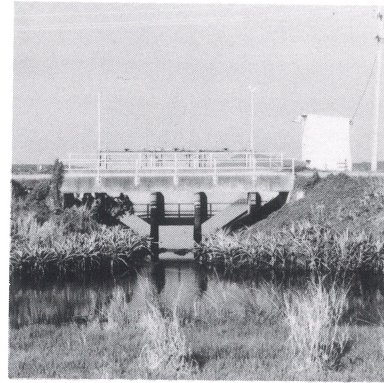
- financial constraints are holding them back
- they lack knowledge or information regarding management of ASS, they don't know how to access help
- the existing catchment drainage is too severe, causing over drying and inhibiting ability to 'hold' water
- external factors, such as poor land use beyond the farm, are causing the problem
- there are bureaucratic blocks to positive practices

Farmers who *feel supported by a cohesive industry* see their industry as organised and effective at communicating ASS information. They are proud of their industry's achievements, and explicitly acknowledge the assistance they get. Farmers in this group believe their industry is encouraging best practices by:

- setting standards and providing a role model
- providing information to individuals
- motivating small groups to take action

Farmers who *don't feel supported by a cohesive industry* do not see their industry as being, organised or effective at communicating information about ASS issues or practices. Consequently, they:

- do not know where to get help or support in ASS management
- see the need for ASS management as an overwhelming burden
- request more education, advice, support, soil tests and personalised assistance



"[Industry] very pro-active. Greenies now onside, were antagonistic in the beginning"

TWEED, CANE FARMER

"We need more education [and] support and to work together. They're doing trials for ASS management in cane areas north of Grafton, I think they're getting support and funding from somewhere for that. I'd like to look into whether the same sort of support/funding might be available for us."

MANNING, BEEF FARMER

"... Having ASS is not a death sentence, learn to live with it ... responsible management with proper guidance"

RICHMOND, TEA TREE FARMER

"Pack of shit - that's my opinion - it's good feeding country so it can't be too bad a problem."

MACLEAY, BEEF FARMER

"The new ones in the area, they reckon since flood mitigation - that's caused the fish kills - but the fish were dying 30 years before that. Flood mitigation has been the best thing since sliced bread. I think they should listen to history from the senior citizens. Some, they're here 12 months and they're running the place."

MACLEAY, BEEF FARMER

"This is just a case of red tape gone mad - if this was private industry, you'd never stand a chance, this is a waste of time and resources, avoiding the issue of fronting new industries and new developments - but they're let off while it's easier to point the finger at the farmers."

HUNTER, DAIRY FARMER

Farmers who feel positive about future ASS management. These farmers reflect a generally positive attitude towards understanding and dealing with ASS issues including regulations:

- highly aware of ASS issues
- willing to comply with regulations, strong sense of personal responsibility, willing to learn new management practices
- faith in the expertise of the government and regulatory measures designed by authorities
- use concept of 'best practice'

Farmers who feel negative about future ASS management. These farmers are the largest group. They are sceptical about the existence of the ASS problem as defined or about its high profile status. They resent regulations and are sceptical of government's role. The most notable grounds cited for this negative attitude to future management are described below;

- **'There have always been fish kills'** This group is sceptical about community focus on alleged negative environmental effects of ASS, such as fish kills. They believe such events happened before current drainage regimes were put in place. They are particularly concerned about proposed changes to drainage regimes, which they see as misguided and ill-informed. They fear significant costs to themselves and their farm productivity.
- **'The media is untrustworthy'** This group is sceptical about the media's role in dealing with ASS issues. They feel the media is projecting a negative image of farmers and sensationalising issues, such as fish kills. They also feel the media does not give enough coverage to farmers' positive efforts to deal with the problem.
- **'It's a government bandwagon'** This group resents being 'targeted' by regulations. Therefore they are rebellious against council ASS regulations. They feel many government departments are causing problems, but they are not being regulated. They often cite their belief that the ASS issue is just a 'bandwagon' generating jobs for bureaucrats, academics and experts.

Farmer attitudes to treatment of ASS issues in the community

Respondents were specifically asked what level of importance they thought their general community placed on ASS.

Farmers who feel positive towards community groups fall into two categories. The first category believes other groups in the community are adequately educated and informed about ASS issues. The second category is willing to view ASS from the perspective of other groups in the community. They are concerned for fisheries and oyster groups, the natural environment, and other farm groups. They are keen for community groups to work together.

Farmers who feel negative towards community groups Many farmers expressed negative attitudes about the role of ASS issues in their communities. This gives some indication of community, or political, disharmony in a region. It also shows some respondents have fears and uncertainties about ASS issues.

They feel that other groups in the community are not informed about ASS issues. They specifically perceive a need for:

- more education on ASS issues for urban communities, to achieve a sense of a 'shared problem' rather than farmers being left with responsibility
- more education of target groups: 'green', 'fisheries', 'media', and community organisations, to reduce sensationalism of 'misinformation'
- more education for other farm groups
- more media emphasis on farmers' positive efforts

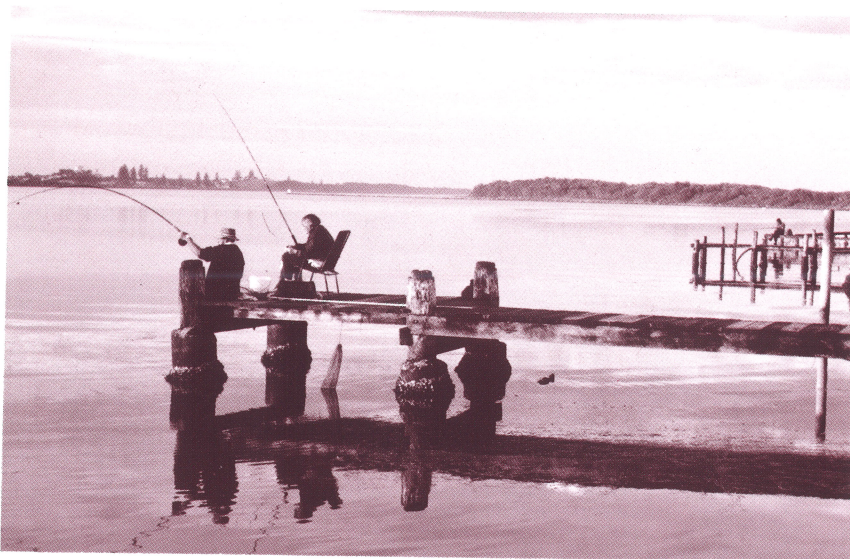


"Farmers are really wary of greens and talk of wetlands. We like wetlands and look after our county, but we're not getting any support - just being told we're the problem. Have our land made into wetlands - we really just want the drains cleared so we can keep producing off our land. It's not just for us, it's for the whole community and country ... we're not just producing for ourselves"

HUNTER, DAIRY FARMER

"... some care, some don't. Some just buy the land for investment, they don't care about ASS. Because they don't have to get a living off of it, so they don't look after it."

MACLEAY, BEEF FARMER



Farmers' attitudes to consultative groups

Reasons to be involved in groups

- whether ASS affected their land or not
- if they had the time
- if it was a 'good' or 'properly organised' group
- if they could get along with others and it didn't get 'too political'
- if the focus of the group also addressed land management issues they felt needed attention, such as arresting river bank erosion

'Better in a group than out of it!'

MACLEAY, DAIRY FARMER

Reasons not to be involved in groups

- ASS did not affect their land
- were not interested in the issue
- had nothing to gain by being involved
- had their own management under control
- their own industry group (cane) had the issue under control
- too old to be involved
- didn't have enough time

Catchment Management Committees (CMC) were established in 1989 under the NSW Catchment Management Act. They try to achieve a balance between resource use and conservation within the constraints of their respective catchments. Landcare groups and ASS action committees try to provide education for land and water users and leadership in initiating rehabilitation projects at a local level.

Farmers who are interested in joining groups showed a general interest, or indicated that they were already involved in such a group. Many farmers indicated that their participation would be based on fulfilling their own agendas, such as:

- correcting what they perceive as misinformation from environment groups
- to eliminate 'scaremongering'
- to keep an eye on what others get up to

Farmers who are not interested in joining groups feel that ASS issues were not relevant to them. A significant proportion lack faith in the operations of such groups. They don't want to be told by people who 'have no experience' how to run their farms. Or they are 'allergic' to meetings. Moreover, they believe such groups:

- are too political
- will cost too much money to be involved
- are run by 'ferals' and 'greenies'
- are just 'stirring up trouble'



Farmers' ideas about the way forward

During the course of the survey, farmers made many constructive suggestions for dealing with ASS. Their suggestions are summarised below.

Ideas for farmer support programs included:

- educating the general public, farmer groups, young farmers, schools, media, fisheries and aquaculture, urban community, to help achieve a 'sensible debate'
- providing 'expertise' and government support in the form of; field days, better coordination between government departments, 'credible and unbiased' advice, 'expert' advice that's easier to understand
- providing financial support (partial or complete) from government for; land remediation, lime, and soil tests
- putting equal emphasis on council drain regulations for; government developments, 'new development' projects, council land management,
- creating a 'central body' to coordinate 'development', council and farmer management issues
- increasing emphasis on water issues; control of flow in catchment

Ideas for government and the general community included:

- using small self motivated groups to tackle ASS issues
- demonstrating the negative effects of ASS on neighbouring farms to motivate interest and response
- encouraging local councils to help local scale farmer groups tackle ASS issues
- using 'subtle peer pressure' because it is more effective than the 'big stick'
- getting private industry to help share the farmer's burden
- looking at ASS issues as a 'total community problem', rather than just 'pointing the finger' at farmers
- using Landcare groups for working out small scale, time and cost effective management strategies
- critically appraising fisheries management practices
- informing new buyers about ASS on a property through the deed to property,
- using different management regulations to address the different problems in each catchment
- consulting indigenous communities about the history of fish kills
- making Development Application (DA) process faster, cheaper, and more logical.

Ideas for flood gate and drain management

- flood gates need to be built above level of tide
- construct secondary, lower, flood gates inside main gates
- edges of drains need to be better quality - cattle destroy them
- drains need to be wide and shallow not 'V', means you can clear them more easily with slasher

"... the government should supply lime to people ... farmers affected by ASS. ... [we] used to be able to get 100 ton for \$20 - before [the] quarry closed down ... [the] 'greenies' found a bat there, now [we] can only get 1 ton for \$105. [It's] too expensive, can't afford it. ... the government should pay because it was the government's drainage policies in the first place that have caused the problem ..."

MACLEAY, BEEF

Ideas from the cane industry

- support construction of individual farm management plan,
- construct 5 year grower agreements incorporating ASS 'best practice';
- use mud from cane mill on soil (has lime in it)



Government employees' attitudes to ASS

Government employees

20% expressed concern about current state of knowledge and management of ASS

Many requested help with specific issues such as:

- remediation techniques
- preparing management plans
- DA assessment of issues
- lime application rates

"Too many people [working] in ASS don't have the depth of understanding required to comprehensively assist clients. Probably a function of the diversity and volume of other environmental management issues needing attention"

GOVERNMENT EMPLOYEE



Government employees were also surveyed in an effort to understand their perceptions of the issues and challenges associated with ASS management. The surveys were completed at a series of workshops in Port Macquarie, Grafton and Moruya. They were advertised specifically for employees of government agencies dealing with ASS related issues. In total there were 48 completed responses to the survey.

The vast majority of the government employees surveyed spend less than 25% of their time on ASS enquiries. They see their primary role as providing information and guidance to help farmers and other government personnel. To do this successfully they need appropriate knowledge themselves.

The survey showed that most government employees would like more information or training about the fundamental aspects of ASS identification and management. They would also like state agencies to make a commitment to educating the general community, landholders, and local councillors about ASS issues.

Government employees would like more details on remediation techniques, clearer 'guidelines' for management plans, and the establishment of 'standards' (for things like drainage excavation and lime application) in those guidelines. (The ASS Manual was released in August 1998, after this survey was undertaken.)

Moreover, they believe state agencies should encourage community participation in the production of ASS management plans. They believe government should assist in the formation of community action groups that include state agency and local government representation.

On the basis of this survey, there is room for improvement in the levels of knowledge and awareness of ASS management issues among government employees. That will translate into significant improvement in the field as that expertise spreads into the broader community.

Excavator contractors' attitudes to ASS

Excavator contractors are responsible for constructing and maintaining many of the drains on ASS. Therefore, they were also surveyed in an effort to understand their views on the issues and challenges associated with ASS management. Seven workshops were conducted during 1998. The 44 excavator contractors who attended were surveyed before and after the workshop.

The excavator contractors' were particularly appreciative of the information the workshop provided regarding ASS, such as identification skills and managing ASS with landowners. After the workshops, the excavator contractors' indicated that seeing ASS, and their environmental effects, demonstrated in the field helped them understand the importance of appropriate ASS management.

Many said that they propose making changes to their operations as a result of the workshop. Of most importance, is to *ensure their operations are legally protected by checking that land holders and farmers had gained appropriate approvals for drain clearance operations from local council authorities.*

These responses show a positive attitude to receiving fundamental information about identifying and managing ASS. They also demonstrate that a significant proportion of excavator contractors are not informed about the fundamental aspects of ASS identification and management. This is most strongly demonstrated by the fact that nearly fifty percent are neither liming the drains themselves or asking landholders about liming. Further, when asked if they had an understanding of the effects of excavating on ground water and ASS only 40% responded positively.

The workshops highlighted the need for continued support in raising awareness of excavators' legal responsibilities. They also highlighted the need for continued support in raising understanding about the importance of appropriate excavation practices in high risk ASS regions in order to avoid environmental damage.

Excavator contractors

86% can recognise ASS
nearly 80% were aware of ASS risk maps

22% lime drains after drain clearing

60% will be changing practices as a result of the workshop

Information sought from land owners prior to excavating:

- 25% ask landholders if they are going to lime drains
- nearly 50% ascertained the water table depth
- 30% ascertained the height of the property
- less than 25% established the depth of the iron sulfide layer

"... I have for the first time seen the effects and can now understand the need to be more conscious in the future"

EXCAVATOR CONTRACTOR

"... I know now what ASS are and what the possible outcome can be. Also the laws involved concerning acid soils"

EXCAVATOR CONTRACTOR



Where to now?

Management of ASS has come a long way; we are starting to see a lot of success stories. If knowledge levels and management practices are to reach their full potential, there is still much to be done.

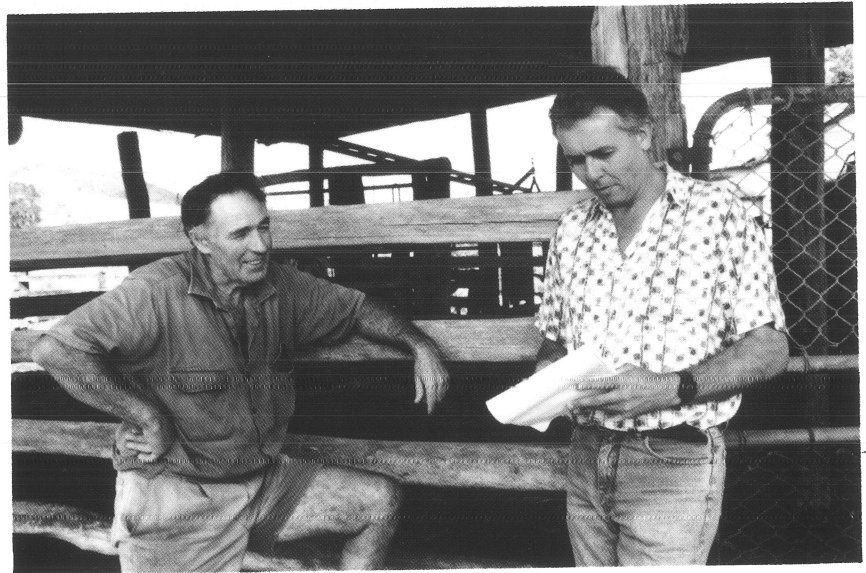
This study provides an indication of where further education, assistance and research efforts might best be directed. The positive role model provided by the sugar cane industry serves as a guide for the industry or catchment groups yet to develop an effective response to the ASS management problem. Farmers in other industries want assistance to have their properties sampled for ASS, and if present to develop management plans. Further, the positive efforts of the sugar cane industry in the Tweed catchment seem to have been instrumental in reducing conflict between social groups.

Government staff are employed to help overcome land management problems, and the social conflict that sometimes involves. They need to be well armed with information and management strategies.

The group of excavators surveyed for this report responded positively and instantaneously when offered access to information regarding not only ASS land management issues, but also the legal implications of working in affected areas.

Follow-up surveys will help us to understand changes in community knowledge and attitudes to ASS. They will help identify actions required, set clear objectives, and quantify the various economic, social, and environmental factors that enter into the decisions of farming communities.

Future monitoring will also assist in further refining the geographical and sociological areas of interest to ASS land management decision makers. This is essential for accurately identifying problems, measuring progress toward solutions, and reproducing good outcomes in other places.



More information

Benchmarking Acid Sulfate Soils, 1998: farming community ideas about the way forward. The full technical report. Results of a benchmarking survey conducted during May and June of 1998. For a copy, contact Alice Woodhead, Wollongbar Agricultural Institute on (02) 6626 1215.

Acid Sulfate Soils Exposed: a video presenting how acid sulfate soils have formed and explaining how NSW government, industry, scientists and local communities are finding better methods to manage acid sulfate soils. Contact NSW ASS Information Officer, Jon Woodworth on (02) 6626 1344.

An Introduction to Acid Sulfate Soils: a booklet by Jes Sammut and Rebecca Lines-Kelly provides an introduction to acid sulfate soil identification and environmental indicators is available through the NSW ASS Information Officer Jon Woodworth.

ASSAY newsletter: a quarterly newsletter about acid sulfate soils. To receive a free printed copy, contact NSW ASS Information Officer, Jon Woodworth.

Acid Sulfate Soil Manual: a detailed technical reference manual on ASS assessment and management is now on sale for \$50.00, plus \$5 for postage. To order a copy please write to: The Information Centre, Dept of Urban Affairs and Planning, GPO Box 3927, Sydney NSW or call (02) 9391 2222.

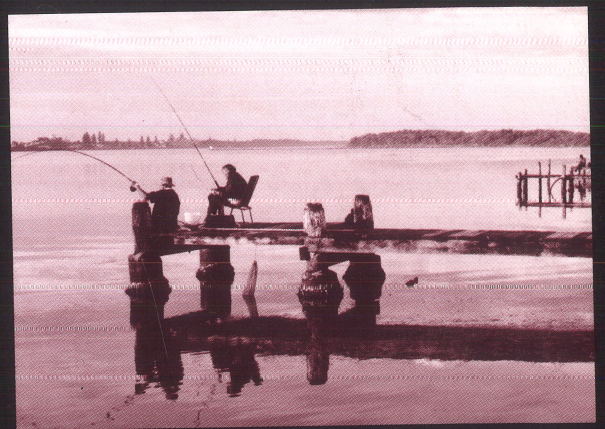
Acid Sulfate Soils: Facing the challenges: a text by Ian White and Mike Melville with contributions by Jes Sammut, Pamela Van Oploo, Ben P Wilson and Xihua Yang. This book is available for \$10 from the Earth Foundation of Australia, PO Box 31, Millers Point NSW 2000

Acid sulfate soil risk maps: these maps of acid sulfate soils in NSW are on the same grid as the 1:25,000 topographical maps and cost \$10 each. They are available for view at local council offices or may be purchased from the Department of Land and Water Conservation, Sydney (02) 9228 6315.

NSW Agriculture ASS web page: NSW Agriculture has a web page on the Internet which can be found at <http://www.agric.nsw.gov.au/Arm/acidss/index.html>. It has further information and support materials.

NSW Acid Sulfate Soil Program (ASSPRO): Acid sulfate soils projects (ASSPRO) in 1997 were allocated a total of \$2.1 million over three years. ASSPRO's main objectives are education, catalytic onground works, development of management technologies and community participation.

ASS Teams: Three ASS Technical Support Teams were established in 1999 in the North, Central, and South coast regions of the State. The teams will be coordinated by the Department of Land and Water Conservation and will be in operation for 3 years. ASS Teams will assist in ensuring that ASS issues are considered in all relevant planning activities on affected lands and associated waterways, and provide support to farmers. For further information contact the Department of Land and Water Conservation.



NSW Agriculture

