FOUR YEARS ON—WHY NEW SOUTH WALES CANE GROWERS STILL LEAD IN THE MANAGEMENT OF ACID SULFATE SOILS

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Abstract

ACID sulfate soils are a feature of coastal lowlands and they affect farmers through acidification of the soil and water, which degrades farmland and adjoining wetlands. The first social benchmarking survey of attitudes to management of acid sulfate soils was undertaken in 1998 across 287 farmers, from four industry groups (cane, beef, dairy and tea tree), in seven catchments prone to acid sulfate soils. Four years later, 125 farmers were re-surveyed in 2002 to assess the extent of change in understanding and management practices along with assessing the impact of industry and government policies. All farmers were asked about socio-economics, acid sulfate soil indicators, knowledge, awareness and sources of information about acid sulfate soils and their management practices. Sustainability performance indicators were developed for the second benchmarking survey to measure behavioural change based on current best management practices that provide better water quality. These water management techniques included the length of drains reshaped and infilled, the use of weirs and floodgates and remediation techniques. Results showed that, over the 4 year period, knowledge in the cane industry had increased by 25% and that the cane industry continued to lead other industries in implementation of acid sulfate soil management techniques. Indeed the industry, in conjunction with local and state government, had developed a self-regulatory auditing system based on current best practices. This paper explores the results of this survey.

Introduction

No industry, agricultural or otherwise, exists in isolation of the ecosystems within which it operates. Farm businesses in northern NSW are on acid sulfate soils (ASS) that are upstream from coastal catchments where oysters are grown, prawns are harvested, and fish are caught. Acid sulfate soils are formed on pyritic marine muds that contain iron sulfides, which oxidise to release sulfuric acid after drainage and creation of an aerobic environment. Fish-kills in some NSW rivers have been associated with acid-induced injury to gills from the damaging impact of ASS (Sammut et al., 1996).

The sugarcane industry in New South Wales (NSW) is a farmer-owned cooperative that has continued to make acid sulfate soils a focus. But, building partnerships between stakeholder groups takes time and ongoing commitment. It is reliant on institutions to encourage and facilitate this process. Social benchmarking (Woodhead, 2003) is concerned with measuring the capacity of communities to change and manage the change process.

The aim of the first survey was to develop a broad overview of landholder's attitudes and management practices on the coastal floodplains with acid sulfate soils. The second benchmarking survey sets out to measure the change and to understand if policies had been successful. Do farmers have the skills to manage acid sulfate soils? This paper discusses the changes in the cane industry and looks at the reasons why they are still leaders in the management of acid sulfate soils.

Methodology

One hundred and twenty five farmers were re-surveyed in 2002, four years after the 1998 first social benchmarking survey (Woodhead and Hughes, 1999), when 287 farmers in seven catchments from four industry groups (cane, beef, dairy and tea tree) prone to acid sulfate soils were surveyed.

The 2002 sub-sample represented between 40% and 50% of respondents for each industry of the total 1998 sample, except for tea tree (17%). The aim of the first survey was to develop a broad overview
of landholders' attitudes and management practices on the coastal floodplains with acid sulfate soils. In addition to repeating many of the original questions from the first survey, new questions were developed (Woodhead, 2003).

These questions included sustainability performance indicator questions based on drain modifications and new attitude and knowledge questions arising from the results of the first benchmarking survey and from new knowledge about acid sulfate soils management. Such qualitative data provided further information and contributed to a more holistic understanding of the processes that contributed to differences between the two surveys.

The survey respondents were targeted with two sources of information. In 1998, all survey respondents received the results of the first benchmark survey, 'Farming community ideas about the way forward' (Woodhead, 1998). Since June 2000, they were included on the distribution list (over 2000 people) for ASSAY, a quarterly newsletter about acid sulfate soils.

However, the identity of those surveyed has remained confidential, in line with privacy laws, and no government employee has access to their contact details except the author. The survey respondents were not targeted with any other acid sulfate soils information by any government agency or industry body.

Results of the second survey

Social data revealed that more than 50% of the landholders were over 50 years old and 75% of the landholders had no more than secondary education. These parameters did not differ significantly between industry groups or catchments. Therefore, age and education did not account for the differences between the industry and catchment groups.

Quantitative economic data from the second survey revealed that cane farmers were fairly static with their production levels, whereas tea tree production was in decline (data not shown) and 25% of beef farmers and 40% of dairy had a more positive outlook about their industry’s future production. Cane farmers believed their industry was not as viable as in 1998 and was at the mercy of world prices.

Sustainability performance indicators for measuring changed management practices were based on the removal (reduced density) and/or reshaping (wide and shallow) of drains. This indicated the volume and speed of water removal, and aims to raise the drains above the acid sulfate soil layer. It therefore required knowledge about the depth of acid sulfate soils by the excavator contractor and the landholder. Removing and reshaping drains was an agreed industry Best Practice Environmental Management (BPEM) (NSW Sugar Industry, 2000).

Table 1 shows the industries and number of kilometres of drains that had been modified. Some 57% of cane farmers had filled in drains, averaging 2 km, with a range between 0.1 and 15 km. Dairy and beef farmers had filled in considerably less. There were similar results for the reshaping of drains, although there were some farmers in the beef industry who were very active. Beef farmers discussing the cane industry said: 'Look we know they've got their act together, but we can't do it in the same way because we haven't got the same industry structure, haven't got the budget'.

Table 1—Percentage of landholders within industries using drain management practices.

<table>
<thead>
<tr>
<th>Management indicator</th>
<th>% of landholders by industry</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beef</td>
<td>Cane</td>
<td>Dairy</td>
<td>All landholders</td>
<td></td>
</tr>
<tr>
<td>Lime on drain banks</td>
<td>17</td>
<td>62</td>
<td>6</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Lime in drain water</td>
<td>0</td>
<td>17</td>
<td>0</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Drains filled in</td>
<td>9</td>
<td>57</td>
<td>6</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Km of drains filled (*)</td>
<td>0.26 (0.2, 5)</td>
<td>2.88 (0.1, 15)</td>
<td>0.5 (one farm)</td>
<td>2.5 (0.1, 15)</td>
<td></td>
</tr>
<tr>
<td>Drains reshaped</td>
<td>19</td>
<td>34</td>
<td>19</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Km of drains reshaped (*)</td>
<td>15.9 (0.1, 10)</td>
<td>1.3 (0.2, 4)</td>
<td>0.7 (0.2, 1)</td>
<td>4.9 (0.1, 10)</td>
<td></td>
</tr>
</tbody>
</table>

Where bracketed, values (*) are average and range (km) of drains.

Regulatory controls are another tool that governments use to enforce changed management practices. Landholders were asked to say whether they believed regulations were too strict or too lax, or whether they knew what the regulations were. Those who believed regulations were about right were more likely to be modifying drains.

The majority of beef and dairy farmers either believed the regulations were too strict or did not know what they were. They were prone to ask: 'What regulations?' and 'Why regulate drains?' The majority of cane farmers believed the regulations were about right. Although they frequently said that they
did not know what the government regulations were, they knew the cane industry’s BPEM. Indeed they were proud of their NSW Sugar’s auditing program (NSW Sugar Industry, 2000) and self-regulation program and confident that their industry had acid sulfate soils under control.

**Discussion**

Generally, cane farmers were extremely confident about their industry’s ability to manage acid sulfate soils. They also appeared to have a better understanding than other groups of how their management practices can contribute to the ecosystem and water quality.

Landholders saw the cane industry as taking a practical land management orientated approach focussed at the farm levels and developing specific guidelines for BPEM, such as how much lime to put on drain banks. Landholders in other industries believed that they were doing BPEM but it didn’t matter because the regulatory framework did not complement it. The cane industry has managed to marry BPEM with the regulatory framework.

Although cane farmers were generally very confident with managing acid sulfate soils, they believed their ongoing ability to manage the soils depended on their financial position and on the price of inputs used for environmental management, e.g. lime. The implication from the cane farmers was that, if lime is not subsidised, it would be the first farm management practice to stop. Landholders expressed strong opinions about subsidies and believed that they should be subsidised for providing environmental benefit.

The cane industry has developed an industry approach that incorporates both the need for environmental benefits with society’s need for assurances that industry is trustworthy and is producing food in a sustainable manner. It demonstrates successful vertical communication within the cane industry and horizontal collaboration between government agencies, stakeholder groups and the industry. However, building horizontal communication is the primary challenge for successful impact on a broader group of people and is considerably more difficult than vertical communication within the same discipline groups. This will require ongoing commitment by the industry.

**Conclusions**

The broad conclusion to be drawn from the comparison of industries is that the cane industry continues to have higher levels of human and social capital as indicated by the cane farmer’s higher levels of knowledge and the industry’s strong networks, levels of trust and shared vision of the future. But the ongoing capacity of cane farmers to keep managing the land for environmental benefits as well as production is dependent on them receiving reasonable economic returns for their crops.

**REFERENCES**


QUATRE ANNEES APRES—POURQUOI LES PRODUCTEURS DE LA CANNE A SUCRE DE LA NEW SOUTH WALES RESTENT TOUJOURS LE LEADER DANS LA GESTION DES SOLS SULFATES ACIDES

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Résumé
LES SOLS sulfatés acides sont caractéristiques des régions côtières à basse altitude et ils affectent les agriculteurs en acidifiant le sol et l’eau, dégradant ainsi les terres agricoles et les marécages avoisinants. Le premier sondage de référence sur la gestion des sols sulfatés acides avait été entrepris en 1998 auprès des 287 fermiers venant de quatre secteurs de l’industrie (canne à sucre, bétail, laiterie et le thé), et de sept zones susceptibles à développer des sols sulfatés acides. Quatre années plus tard, en 2002, 125 fermiers ont été de nouveau sondé pour évaluer le degré de changement au niveau de la compréhension et de gestion, de même que sur l’évaluation des effets de l’industrialisation et de la politique gouvernementale. Tous les fermiers ont été interrogés sur les aspects socio-économiques, les indicateurs des sols sulfatés acides, la connaissance acquise, la conscientisation et les sources d’informations concernant les sols sulfatés acides et leur gestion. Des indicateurs de performance de durabilité ont été développés durant le deuxième sondage pour mesurer le changement dans le comportement en se basant sur les meilleures pratiques courantes fournissant la meilleure qualité de l’eau. Ces techniques de gestion de l’eau ont englobé la longueur des drains restructurés et comblés, l’utilisation de déversements et de barrages, et des techniques d’assainissement. Les résultats ont démontré que, au cours de ces quatre années, la connaissance dans l’industrie de la canne a augmenté de 25% et que cette industrie a continué à devancer d’autres industries dans l’implémentation des techniques d’entretien des sols sulfatés acides. En effet, l’industrie, avec la collaboration des autorités locales et gouvernementales, a développé un système d’audit autorégulateur basé sur les meilleures pratiques en vigueur. Cette communication examine les résultats de ce sondage.

TRAS CUATRO AÑOS - POR QUÉ LOS PLANTADORES DE CAÑA DE NEW SOUTH WALES AÚN TIENEN LA DELANTERA EN LA GESTIÓN DE SUELOS CON SULFATOS ÁCIDOS

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PALABRAS CLAVES: Investigación, Comparaciones del Sector, Política Institucional, Prácticas de Gestión

Resumen
LOS SUELOS de sulfatos ácidos son una característica de tierras bajas costeras y afectan productores a través de la acidificación de la tierra y del agua, lo que degradó las tierras cultivables y las tierras húmedas adyacentes. La primera investigación social comparativa de las actitudes de gestión de suelos de sulfatos ácidos se emprendió en 1998 con 287 productores, de cuatro grupos de sectores (caña, carne, lechería, y producción de té), en siete muestras con probabilidad de presentar suelos con sulfatos ácidos. Cuatro años después, se re-investigaron 125 productores en 2002 para evaluar la magnitud del cambio en comprensión y prácticas de gestión, junto con la evaluación del impacto de políticas del sector y del gobierno. A todos los productores se preguntó sobre cuestiones socio-económicas, indicadores de suelos de sulfatos ácidos, conocimiento, conocimiento, y fuentes de información sobre los suelos con sulfatos ácidos y sus prácticas de gestión. Se desarrollaron indicadores de desempeño de mantenimiento para la segunda investigación de comparación, para medir el cambio de comportamiento basado en prácticas actuales de gestión más buenas que proporcionan mejor calidad de agua. Estas técnicas de gestión de agua incluyeron la reforma de la longitud de desagües y el relleno, el uso de azudes y compuertas y técnicas de remediación. Los resultados mostraron que, después de un periodo de 4 años, el conocimiento en la industria de caña había aumentado de 25% y que el sector de caña continuaba a liderar sobre los otros sectores en la implementación de técnicas de gestión de suelos con sulfatos ácidos. De hecho, el sector, junto con el gobierno local y estatal, había desarrollado un sistema de auditoría autorreguladora basado en las mejores prácticas actuales. Este trabajo explora los resultados de este estudio.