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A regional partnership approach to developing a sustainable sugar cane system

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A regional partnership approach to developing a sustainable sugar cane system

MAS001

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Mossman Agricultural Services is not a partner, joint venturer, employee or agent of SRDC and has no authority to legally bind SRDC, in any publication of substantive details or results of this Project.

Mossman Agricultural Services wish to acknowledge receipt of project funding from the Australian Government and the Australian Sugarcane Industry as provided by the Sugar Research and Development Corporation.
Executive Summary:

The Mossman milling area has a unique place in the Australian sugar industry; not only is it the most northern of all mill areas but the Mossman Central Mill is one of the oldest independent milling companies and still substantially owned by its cane suppliers. It also has also established a reputation for innovation in both the processing and growing of sugarcane. By 2002 Mossman and most of the Australian sugar industry was suffering significant financial difficulties following a decade of expansion.

In 2002 a unique Joint Venture Partnership (JVP) was established with membership comprising the Douglas Shire Council, CSIRO, Mossman Central Mill, Mossman Canegrowers and Mossman Agricultural Services to develop strategic responses to the sustainability issues facing the sugar industry. In addition to the formal membership, input from state and federal government service providers and community and environmental groups was also sought.

The JVP was able to secure funding from the Federal Department of Environment and Heritage to develop Queensland’s first Water Quality Improvement Plan (WQIP). The MAS001 project was also developed through the JVP to address sustainability issues facing the Mossman sugar industry.

In 2002 Mossman Central Mill was in the final stages of securing financial partners for an ethanol plant and cogeneration. The JVP was also able to secure some funding from the Federal Greenhouse Gas Abatement Programme for plantation forestry and plantings for biodiversity and habitat value in conjunction with the mill projects. MAS001 was seen as a vehicle for promoting the plantations with Mossman farmers.

The project was developed around four major themes:

**1. Best Management Practice and Sustainability**

A BMP self-assessment scorecard was developed using a range of 20 management practices as indicators. These practices were chosen to reflect the range of practices which had an impact on nutrient and sediment loss to the environment from cane farming. Four levels of management were defined for each practice on a hierarchy with current industry best practice as the highest level. Growers were invited to complete the scorecards at a series of shed meetings with the collated results presented back to the group at the meeting.

A facilitated discussion of the results with the participating growers followed. This discussion progressed through a number of stages:

- Validation of the hierarchy of management practices for each indicator
- Identification of the impediments stopping growers from adopting best practice for each indicator
- Defining actions that would assist in overcoming the impediments for each indicator
- Prioritising the actions on the basis of impact and effect across all indicators.

An extension program was then developed based on the prioritised actions.

The initial self-assessment survey was undertaken in 2003 and the extension program commenced for the 2004 crush. The survey was repeated after the 2005 and 2007 crushing seasons. These subsequent surveys gave a picture of changes that had occurred across the Mossman industry over this time period.
Significant changes have occurred with growers moving to wider row spacings, using managed legume fallows planted zero-till, the adoption of zonal tillage techniques and the use of split-stool fertiliser applicators for urea.

A series of Business Planning workshops were undertaken in 2004 with 11 farming families completing business plans. In addition another ten farming families were also helped with developing business plans.

2. Harvest and Transport Optimisation

A harvest working group was established in 2003 with representation from all sectors of the Mossman sugar industry. This was established as a forum for planning changes to the harvest and transport sector. The role of the group was expanded in 2006 to develop a model for harvest and transport arrangements in Mossman for 2010.

The group considered operational changes for each of the seasons from 2003 to 2008. In 2003 the mode of operation of the mill changed from continuous crushing to a five day crush and transport of cane from Mareeba ceased in 2005. In the 2007 season, direct transport of cane by road into the mill was introduced. All these changes impacted on harvesting operations and these impacts were considered by the group.

Harvesting efficiency was considered with the number of harvest operators in the mill area decreasing from 20 in 2003 to 17 in 2007 with two contractors using two harvesters each.

A group of harvesters was monitored in 2006 under MAS002 project. This was a direct result of the need for local information to support changes to improve harvesting efficiency.

3. Farm Aggregation

In 2003 the Douglas Shire Council approved a variation to the town plan to allow for the excision of homestead blocks from farming land which was a proposal of the JVP. However, the main mechanism for the aggregation of farming land was through more conventional leasing arrangements. Since 2003 the number of farming entities supplying cane to the Mossman Central Mill, excluding the Mareeba district, has decreased from 103 to 78 with the average area changing from 90 hectares to 108 hectares.

4. Community Involvement

Sugar Awareness Days for community and environment groups were held in 2003, 2004 and 2007. The format involved field trips and informal discussion sessions of cane farming practices in the field. These were aimed at providing information on current management practices in Mossman and how management practices were focussing on reducing sediment and nutrient loads in water draining into the Great Barrier Reef. Between 20 and 25 attended each of these days with good positive feedback.
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Background:

The downturn in the sugar industry in the latter part of the 1990’s and early years of the 2000’s significantly affected the Australian Sugar Industry. Over this same period the industry also saw declining productivity levels. This downturn was particularly significant in the Mossman area following as it did on a significant expansion of production into the Mareeba Dimbulah Irrigation Area in the 1990’s. In February 2002 the federal minister for Agriculture, Fisheries and Forestry commissioned Dr Hildebrand to conduct an independent assessment of the sugar industry which led to the release of what is known in the industry as the Hildebrand Report in June 2002 (Hildebrand, 2002).

At a local level an intensive community consultation process was undertaken leading to the release of the Douglas Shire Sustainable Futures Draft Strategy in December 2001 (Douglas Shire Council, 2001). This extensive document set out the case for a sustainable community for the Douglas Shire and this included the agricultural sector of which the sugar industry is the major economic and land use segment. The consultation also involved the formation of the Douglas Shire Joint Venture Partnership (JVP) with responsibilities including overseeing the sustainable development of the sugar industry in the Douglas Shire. The members of this were representatives from CSIRO, Douglas Shire Council (DSC), Mossman Central Mill (MCM), Canegrowers Mossman and Mossman Agricultural Services (MAS).

Over the four year period to 2002 the MCM went from being a profitable enterprise with a positive bank balance to a company operating with a negative cash flow and a bank facility approaching $9.5m. In addition all sectors in the regional sugar industries value chain also found themselves in a similar position to MCM; operating at a deficit and moving further into debt.

On the positive side, a number of projects for income diversification and value adding were under final planning. Project funding had been secured through the JVP for a proposed ethanol plant, cogeneration and Greenhouse Gas Abatement (G-GAP) plantations.

The JVP also prepared a regional submission to government documenting areas of change and redirection for the sugar industry covering change at the farm level, the factory level and the community level. Project MAS001 was developed during 2002 and commenced in July 2003. The project was seen as a vehicle for change at the farm level to improve the efficiency of cane production and the sustainability of the local sugar industry and to complement and secure some of the outcomes related to the diversification projects.

The Hildebrand report had highlighted a number of areas in which structural changes to the Australian Sugar Industry were important for long term sustainability. These were recognised in the MAS001 project which had an overall objective of improving the sustainability of the Mossman sugar industry through four core areas of focus. These were:

*Best Practice/Sustainability.* Actions were focussed around identifying and targeting areas of low adoption of best management practice in cane production.

*Harvest and transport optimisation.* Actions were directed at improving the efficiency of the harvest/transport chain from farm to mill with emphasis on cost effective recovery of sugar produced in cane from the farm. In addition the number and size of harvesting groups were considered with a reduction in the number of harvesting groups and a consequent increase in the size of the remaining groups.
**Partnership for Sustainable Sugar**

*Farm aggregation.* The scope of this part of the project was to examine possible means of increasing the effective size of individual cane production areas. A number of mechanisms were considered to achieve this including looking at the excision of homestead blocks.

*Community involvement.* This aspect of the project was initially directed at promoting farm forestry in the Douglas Shire to achieve the targets set for planting under the G-GAP funding. The project also developed a program to engage environmental and community groups with the Mossman sugar industry and to ensure the industry was engaged with the Douglas Sustainable Futures Initiative.

The project was aimed at improving the sustainability of the Mossman sugar industry. Project activities were directed at achieving this overall objective as well as the detailed objectives defined for the project. However, the project did not operate in isolation and was significantly influenced by external factors. These required a reassessment and in some cases realignment of project activities, timelines and objectives to reflect the changes impacting on the Mossman sugar industry.

During the early phase of MAS001 the proposed ethanol plant and cogeneration plans collapsed due to withdrawal of the commercial partners and this threatened and eventually led to the loss of the G-GAP funding. The cane supply from the Tablelands area also reduced significantly over the period eventually ceasing altogether at the end of the 2004 crush. This saw throughput at MCM decline from a high of 1.016m tonnes in 2002 to a low of 452k tonnes in 2006.

Also during this period, mill operations changed from continuous crushing to a 5-day crush, significant rationalisation was applied to the workforce particularly the off-season workforce and a severe curtailing of the maintenance program was enforced. MCM also changed financial institutions.

Industry structural arrangements were also altered with the removal of statutes under state legislation over the period of the project. This led to more freedom for cane farmers in their contractual arrangements with sugar mills and the loss of the monopoly export market role of Queensland Sugar Limited (QSL). This allowed the Mossman industry to market their own sugar and growers were able to sign individual contracts with MCM.

Over the same period the world price of sugar fluctuated dramatically due to operating market forces with direct effect on the local cane price to growers. A major funding package was also developed and deployed by the federal government to enable reform in the Australian sugar industry.

The Mossman industry recognised through a strategic planning process that the local industry would not survive if it relied solely on the production of bulk raw sugar. MCM investigated a number of value-adding initiatives and established commercial partnerships to produce and market a low-glycaemic index (low-GI) sugar product, produce an Australian-first all locally produced chocolate, produce an edible fibre product for the Japanese market and has installed a sugar bagging plant.

A sugar mill at Mossman is intrinsic to a sugar industry in the Mossman area; the area is isolated from all other mill areas and transport of cane for processing to other areas is cost prohibitive. In addition the area is at a significant freight disadvantage for broad scale production of alternative agricultural or horticultural crops and the size of farms is too small for commercial cattle production.
In addition there is significant demand for land for rural residential purposes and for more intensive residential development. However, the current local town plan precludes the development of land currently zoned as agricultural for more intensive development.

Much of the background presented here identified conditions which impacted on the outcomes of MAS001, but are all factors outside the influence of this project. The project team worked to achieve the objectives of the project and the progress towards that end is documented in this final report.

Finally, the project was primarily concerned with managing change in the Mossman area. As such it had a strong focus on dealing with the human element of change management rather than the transfer of technology.
Objectives:

The objectives for the project were developed at the commencement of the project in 2003. In mid-2005 a review of the project was undertaken by representatives of all Mossman investors and SRDC. The recommendations of this review panel included the establishment of Key Performance Indicators (KPI’s) for this project to allow for a more objective assessment of the effectiveness of this project. A discussion paper dealing with this included as Appendix 1. In preparing the figures for this assessment the project team was mindful of the long term nature of change in agricultural systems and the relatively short timeframe for this project.

Key Performance Indicators

Table 1 shows the values in 2003, 2005 and the actual and target values for 2007 against each KPI.

**Table 1: Key Performance Indicators for Project Objectives.**

<table>
<thead>
<tr>
<th>Key Performance Indicator</th>
<th>2003 Actual</th>
<th>2005 Actual</th>
<th>Target</th>
<th>2007 Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yield (tonnes cane per hectare)</td>
<td>71</td>
<td>71</td>
<td>80</td>
<td>71</td>
</tr>
<tr>
<td><strong>Objective 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size of entities (hectare)</td>
<td>78.6</td>
<td>71.4</td>
<td>77</td>
<td>107</td>
</tr>
<tr>
<td><strong>Objective 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adoption of Farming BMP</td>
<td>13 of 19</td>
<td>All</td>
<td>18 of 20</td>
<td></td>
</tr>
<tr>
<td><strong>Objective 4</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benchmarking group (number)</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Objective 5</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time lost - cane supply (hours/100k tonne crushed)</td>
<td>4.5</td>
<td>14.0</td>
<td>&lt;8.0</td>
<td>5.3</td>
</tr>
<tr>
<td>Operating efficiency (%)</td>
<td>60 to 78</td>
<td>&gt;80</td>
<td>69 and 78</td>
<td></td>
</tr>
<tr>
<td>Field efficiency (%)</td>
<td>67 to 77</td>
<td>&gt;75</td>
<td>66 and 73</td>
<td></td>
</tr>
<tr>
<td>Pour rates (tonnes/hr)</td>
<td>67 - 93</td>
<td>&lt;100</td>
<td>93 and 108</td>
<td></td>
</tr>
<tr>
<td><strong>Objective 6</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Achieved</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Objective 7</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar Awareness Day</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Working with DSC Water Quality Improvement Plan</td>
<td>Continuing</td>
<td>Continuing</td>
<td>Continuing</td>
<td></td>
</tr>
</tbody>
</table>

**Objective 1: To improve the overall sustainability of the Mossman sugar industry, by implementing the Mossman Strategic Plan, which enhances socio-economic and environmental viability and guided by the Joint Venture Partnership.**

Yield figures presented are three year running averages which give a clearer picture of trends than yearly figures. The figures indicate that there has been very little change over the period of the project. Table 2 shows the Average Yield for each of the years 2000 to 2007 as well as the running average for each of three year periods up to the years 2000 through to 2007. This is the figure for the Mossman area without the Mareeba district which supplied cane to Mossman Central Mill up until 2004 season.
The first set of figures show a market volatility reflecting the seasonal conditions while the second evens out some of this volatility. However this is only over a very short time frame and shows no clear trend. Indeed if this was the sole indicator of sustainability the conclusion could be drawn that no improvement has been made.

**Table 2: Average yield of cane in Mossman 2000 to 2007**

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Yield</td>
<td>61.8</td>
<td>58.4</td>
<td>81.1</td>
<td>77.0</td>
<td>65.7</td>
<td>75.2</td>
<td>61.8</td>
<td>75.7</td>
</tr>
<tr>
<td>3 Year Average</td>
<td>67.0</td>
<td>72.0</td>
<td>74.7</td>
<td>72.5</td>
<td>67.4</td>
<td>70.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The initial reaction of many growers in the Mossman area to the downturn in the sugar industry and the financial difficulties suffered by the Mossman Central Mill was to reduce the amount of area planted thus effectively increasing the average ratoon age of the crop and reduce fertiliser and chemical inputs. As previously stated, one theme of the extension program developed through this project was to address this reduction in management inputs.

The extension program developed with the Mossman cane farmers in 2004 and reported in Milestone four report of this project identified four major extension themes to enhance the sustainability of the Mossman cane farming system. These were:

- Nutrient management and particularly nitrogen
- Controlled traffic farming system incorporating minimum tillage and managed legume fallows
- Management of drains (particularly deep drains), headlands and riparian areas
- Record keeping and business management.

The program developed to address these themes has been well documented in previous milestone reports and included shed meetings, field days, demonstrations and group tours. SRDC funding through this project supported all these activities.

In addition to the extension program the project team has been actively involved in:

- The *Douglas Shire Joint Venture Partnership* during the life of the partnership
- The *Douglas Shire Water Quality Improvement Program* and the subsequent *Water Quality Improvement Plan* implementation program through a local steering committee
- A Mossman regional planning group under the Federal Government’s Regional Advisory Group which developed the Mossman Strategic Plan ‘Survive to Thrive 2010’
- Managing the two year ‘Driving the changes essential to achieving sustainable productivity’ project funded through the *Regional and Community Projects (RCP)* under the federal Government’s *Federal Sugar Industry Reform Package*.

Once again SRDC funding supported all these activities through financial support for the management team. The last project provided direct funding to growers for:

- Soil sampling, analysis and interpretation
- Seed and equipment hire for planting legume fallows
- Modifications to machinery to enable planting at wider row spacings (1.65m or greater).

This was funded by a levy paid by growers with matching federal funds.

All of the above have contributed to the improvement of the sustainability of the Mossman Sugar Industry. However this is not reflected in the indicator of *Yield*. 
Table 3 gives a more complete picture of changes in the production area of Mossman over the period from 2000 to 2007. The first line of data shows the total area of cane harvested in Mossman in each of the years over the period. This shows a fairly significant decrease for the 2005 harvest with areas having marginally increased since then.

**Table 3: Areas of cane in the Mossman area 2000 to 2007**

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Area (Ha)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant cane</td>
<td>15%</td>
<td>21%</td>
<td>14%</td>
<td>12%</td>
<td>12%</td>
<td>11%</td>
<td>13%</td>
<td>19%</td>
</tr>
<tr>
<td>Older than 4th Ratoon</td>
<td>31%</td>
<td>28%</td>
<td>31%</td>
<td>33%</td>
<td>34%</td>
<td>29%</td>
<td>32%</td>
<td>33%</td>
</tr>
</tbody>
</table>

The second line of data in Table 3 shows the proportion on the area harvested as plant cane. Once again this declined from 2001 to 2005 and has recovered slightly since then. The final line of data shows the proportion of the crop harvested that is fourth ratoon or older and this has remained relatively constant over the period.

In terms of sustainability, Mossman is in a unique position in that without a mill there will not be a cane industry. Transport of cane to other mills is impractical and uneconomic. In addition the productive area as a base for the sugar industry will not increase as all arable land is now utilised if not for cane then for other agricultural enterprises or for residential purposes. Hence it is vital that not only is the area maintained but that the maximum sustainable production is achieved from this area.

The figures in Table 3 are indicating that:
- The area has stabilised at just over 7,000 hectares of cane harvested
- The area of plant cane has increased as a proportion of the total area harvested although this is still below the ideal level of around 20% to 25%
- The proportion of older ratoons is constant but above the ideal level of 20 to 25%.

The overriding issue for a sustainable sugar industry in the Mossman area is the fate of the mill. This has been an issue outside the direct influence of this project. The move from the traditional product/marketing arrangements was identified through the 2005 strategic planning exercise as essential for the survival of the Mossman Sugar Industry. Implementation and particularly financing the infrastructure to be able to change, has been the responsibility and focus of MCM since that time.

The mill has pursued a program of change to diversify production and establish marketing arrangements separate to the QSL pool system. The mill has now been accredited as a food grade production facility and has established a plant for bagging sugar. They have developed commercial partnerships to:
- Produce the world’s first low GI sugar
- Establish the first commercial plantings of cocoa in Australia and in future produce an all Australian chocolate
- Produce an edible fibre product for the Japanese market
- Establish direct trading relationship for sale of bagged food grade sugar products and with bulk raw sugar buyers

This will allow them to move, over time, from being a commodity supplier of raw sugar on the world market to become a producer of a range of food grade products and supply to niche markets. This has also been undertaken under severe financial constraints. Success in these ventures and a sustainable sugar industry will depend on maintaining sufficient cane production to support the mill.
based initiatives. This has been the main area of influence from efforts undertaken through this project.

**Objective 2: To progress farm amalgamation in the Mossman Central Mill Co. Ltd. (MCM) supply area.**

Changes that have occurred in farm size and farming entity sizes during the life of this project are given in Table 4. For the purposes of this analysis, Farm is defined as a productive unit that has been assigned a separate farm number in the mill receival system and Farming Entity is defined as a farming unit that has a single ABN. In this analysis the areas include areas of fallow. The figures used in the presentation of KPI’s in 2005 did not include fallow but they have been included in this analysis.

**Table 4. Average Size of Farms and Farming entities in Mossman 2003 to 2007**

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2005</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farms</td>
<td>179</td>
<td>179</td>
<td>177</td>
</tr>
<tr>
<td>Area (Ha)</td>
<td>9306</td>
<td>8769</td>
<td>8403</td>
</tr>
<tr>
<td>Average Farm Area (Ha)</td>
<td>52.0</td>
<td>49.0</td>
<td>47.5</td>
</tr>
<tr>
<td>Farming Entities</td>
<td>103</td>
<td>95</td>
<td>78</td>
</tr>
<tr>
<td>Average Entity Area (Ha)</td>
<td>90.3</td>
<td>92.3</td>
<td>107.7</td>
</tr>
</tbody>
</table>

The number of Farms has remained constant over this period even though the average area per farm has decreased marginally. The most dramatic change has been in the number of Farming Entities and the average size per Farming Entity. This change has been largely as a result of growers leasing rather than buying farms.

The survey of farm financial position undertaken in 2003 detailed a picture of an aging farm population, many of whom are looking to retirement and who have used the farm as their superannuation. We have not undertaken a detailed assessment of the current farm population demographics but anecdotal evidence would suggest that the overall situation has not changed markedly. Some growers have retired from farming and an active Next Generation group has been established at Mossman. This would indicate there has been some generational shift in the farming population although this has not been quantified. The data available does however indicate an increase in average farm entity area.

This project team through MAS has actively supported the Next Generation group with direct financial support, providing staff time for Next Generation activities and sponsoring efforts through this group at fostering positive intergeneration transfer arrangements. This has included workshops on succession and business planning and visits to other areas for information transfer and networking. The business planning process undertaken directly through this project, also enabled farm business and family priorities to be explored and financial implications assessed. In addition the farming best management practice and extension program allowed considered changes to be made to farming operations through the difficult financial conditions of the last five years.

In summary, MAS001 project has provided positive support for growers assessing their futures in the cane industry and in the transfer of farming property between generations. Through this project direct assistance was provided to growers wishing to explore options for increasing the size of their farming entities. The project team also undertook a direct role in strategic planning at an industry level and in maintaining positive links between all industry partners which is important when growers are deciding on their future in the industry.
Objective 3: To extend the rate and extent of adoption of best practice in cane production.

Table 5 compares the results from the 2003 self-assessment results with the 2007 results. This table gives the percentage response rates for each of the indicators at each of the levels of performance as per the self-assessment statements. The last row gives a summary of response rate and totals the number of indicators for which the greatest number of growers has nominated that they are at that level. The summarised results from 2003 compared with the results from 2007 indicate that there has been a degree of success with the program or improvement in the adoption of BMP in cane production.

Table 5. Summarised results of 2003 and 2007 Self-assessments (expressed as % of total responses).

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nutrient Requirements Assessment</td>
<td>10%</td>
<td>21%</td>
<td>24%</td>
<td>45%</td>
<td>4%</td>
<td>29%</td>
<td>29%</td>
<td>38%</td>
</tr>
<tr>
<td>2. Nitrogen Rates</td>
<td>10%</td>
<td>7%</td>
<td>55%</td>
<td>29%</td>
<td>8%</td>
<td>21%</td>
<td>42%</td>
<td>29%</td>
</tr>
<tr>
<td>3. Urea Application on ratoons</td>
<td>20%</td>
<td>5%</td>
<td>71%</td>
<td>5%</td>
<td>17%</td>
<td>0%</td>
<td>57%</td>
<td>26%</td>
</tr>
<tr>
<td>4. Minimum Tillage Planting</td>
<td>50%</td>
<td>31%</td>
<td>19%</td>
<td>0%</td>
<td>50%</td>
<td>29%</td>
<td>21%</td>
<td>0%</td>
</tr>
<tr>
<td>5. Green Cane Trash Blanket</td>
<td>0%</td>
<td>0%</td>
<td>76%</td>
<td>4%</td>
<td>0%</td>
<td>4%</td>
<td>63%</td>
<td>33%</td>
</tr>
<tr>
<td>6. Fallowing</td>
<td>21%</td>
<td>46%</td>
<td>19%</td>
<td>14%</td>
<td>13%</td>
<td>33%</td>
<td>33%</td>
<td>21%</td>
</tr>
<tr>
<td>7. Fallow Practice</td>
<td>14%</td>
<td>50%</td>
<td>25%</td>
<td>11%</td>
<td>18%</td>
<td>14%</td>
<td>32%</td>
<td>36%</td>
</tr>
<tr>
<td>8. Controlled Traffic Strategies</td>
<td>2%</td>
<td>90%</td>
<td>2%</td>
<td>5%</td>
<td>0%</td>
<td>25%</td>
<td>71%</td>
<td>4%</td>
</tr>
<tr>
<td>9. Irrigation Scheduling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Irrigation Systems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Drain Profile and Vegetation</td>
<td>8%</td>
<td>33%</td>
<td>33%</td>
<td>26%</td>
<td>8%</td>
<td>25%</td>
<td>25%</td>
<td>42%</td>
</tr>
<tr>
<td>11.1 Drain Profile and Vegetation for Deep Drains</td>
<td>38%</td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td>25%</td>
<td>38%</td>
<td>38%</td>
</tr>
<tr>
<td>12. Block Drainage</td>
<td>0%</td>
<td>12%</td>
<td>59%</td>
<td>29%</td>
<td>0%</td>
<td>8%</td>
<td>75%</td>
<td>17%</td>
</tr>
<tr>
<td>13. Record Keeping</td>
<td>7%</td>
<td>63%</td>
<td>17%</td>
<td>12%</td>
<td>4%</td>
<td>65%</td>
<td>22%</td>
<td>9%</td>
</tr>
<tr>
<td>14. Business Planning</td>
<td>41%</td>
<td>2%</td>
<td>34%</td>
<td>22%</td>
<td>33%</td>
<td>8%</td>
<td>33%</td>
<td>25%</td>
</tr>
<tr>
<td>15. Riparian and wetland vegetation</td>
<td>2%</td>
<td>36%</td>
<td>57%</td>
<td>5%</td>
<td>4%</td>
<td>36%</td>
<td>57%</td>
<td>0%</td>
</tr>
<tr>
<td>16. Headland Vegetation Management</td>
<td>2%</td>
<td>24%</td>
<td>17%</td>
<td>57%</td>
<td>4%</td>
<td>29%</td>
<td>8%</td>
<td>58%</td>
</tr>
<tr>
<td>17. Cane Grub Management</td>
<td>9%</td>
<td>52%</td>
<td>39%</td>
<td>0%</td>
<td>9%</td>
<td>41%</td>
<td>50%</td>
<td>0%</td>
</tr>
<tr>
<td>18. Rat Management</td>
<td>11%</td>
<td>24%</td>
<td>38%</td>
<td>27%</td>
<td>18%</td>
<td>18%</td>
<td>55%</td>
<td>9%</td>
</tr>
<tr>
<td>19. RSD Management</td>
<td>7%</td>
<td>7%</td>
<td>31%</td>
<td>55%</td>
<td>0%</td>
<td>21%</td>
<td>21%</td>
<td>58%</td>
</tr>
<tr>
<td>20. Chemicals Storage and Handling</td>
<td>19%</td>
<td>17%</td>
<td>38%</td>
<td>29%</td>
<td>17%</td>
<td>0%</td>
<td>36%</td>
<td>46%</td>
</tr>
<tr>
<td>21. Farm layout for BMP Harvesting</td>
<td>5%</td>
<td>10%</td>
<td>45%</td>
<td>40%</td>
<td>0%</td>
<td>17%</td>
<td>50%</td>
<td>33%</td>
</tr>
<tr>
<td>Number of indicators ranked by the most (greatest % of growers at each practice level)</td>
<td>2 6 8 3</td>
<td>2 2 11 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The KPI for this objective is the sum of respondents at levels three or four being more than the sum of respondents at levels one and two. In 2003 13 of the 19 BMP indicators met the criteria and in 2007 the result was 18 of the 20 indicators. The target for 2007 was for all indicators to have at least 50% of responses at levels three and four. The final survey results were 18 of the 20 indicators meeting the indicator measure which means the target was not met.

However, significant changes have been made to management practices in cane production as documented in the table above. Fallowing, fallow practice, control traffic strategies and drain management have all shown increases in responses at the higher levels. Cane grub management has also shown a shift from level two to level three as the highest response level. These have all been areas of particular focus within the extension program and the team believes the project has had a significant impact on this outcome.

Business planning results will be discussed in the next section. Record Keeping and Minimum Tillage Planting are the two areas where the responses at levels one and two are greater than the response rate for levels three and four. At the first round of self-assessments in 2004 the Mossman sugar industry did not believe the technology had been proven for minimum tillage billet planting at
a commercial level under local conditions. This opinion still has not changed and no zero-tillage planters are in use in the area and hence no responses to level four. A number of growers have adopted ‘zonal tillage’ practices where only the strip in the field where cane is to be planted is cultivated but there has been no effective shift in the responses to levels two or three between the 2003 and 2007.

The performance for the Record Keeping indicator was noted as a concern to the project team with some discussion on growers understating the extent of their record keeping. The project team offered growers pro-forma maps of their farms with room for keeping fertiliser and spraying records. Several have continued to use these forms but the uptake was never significant.

A computer based system to integrate with the current cane planting, variety and productivity information maintained through MAS has been considered by the project team on a number of occasions. A number of the more progressive growers have expressed an interest in this type of system. However, the cost of establishment has been prohibitive to date and applications for project funding unsuccessful.

Overall the project team feels that the BMP self-assessment process leading to the extension program has been one of the most successful features of this project. The results to date, despite the continuing economic difficulties with the Mossman Sugar Industry, have justified this opinion.

Objective 4: To progress the use of business plans by cane farmers.

The KPI for business planning was for the establishment of a financial benchmarking group in Mossman. This has not been achieved. Programs and achievements undertaken to meet this objective have been documented in this report. Data from the 2007 self-assessment support a similar conclusion to that reached from the 2006 survey; with a response of 58% to level three and four of the indicator for business planning and another 8% at level two, it is reasonable to assume that nearly 70% of Mossman Growers have undertaken some business planning.

The concern with the project team was that the business plan should not be the main focus. The more important aspect was undertaking the process, that the planning process should be ongoing and the preparation of a business planning document should not be the end of the process. The team set a target of performance as being the establishment of a benchmarking group by the end of the project. This did not occur but the team still feels that this part of the project has been successful and of influence in and benefit to the Mossman sugar industry.

Through the project, 31 farming families were directly assisted in undertaking a business planning process. The follow on has been through a variety of activities undertaken outside this project such as succession planning and economic analysis workshops and seminars. The project team also worked with a number of individuals to assess financial options for their farming operations.

Objective 5: To optimise the harvest and transport system within the MCM supply area.

The KPI’s for this objective were looking at transport and harvesting efficiency separately. The ‘Time lost – cane supply out (hours/100k tonnes cane crushed)’ measures the efficiency of the transport sector to deliver a continuous supply of cane. The target for this indicator was < eight hours. The value of 5.3 achieves this target.

Through this project a harvest working group was established in 2004 to provide a forum, with representatives from all sectors of the industry, to discuss and plan for change to improve efficiency
in the harvest and transport sector. In 2005 this group was given a more strategic objective and the Vision 2010 group was established. This group was then asked to develop an optimum model for the harvest transport system in Mossman in 2010.

A group tour of Northern Rivers region was undertaken in late 2005 and following this visit the group developed a proposal for changing the road transport arrangements from the transfer bin system with all rail delivery to the mill to direct delivery of road cane to the mill. The project team feels that the improvement in the KPI for 2007 is largely as a result of this change and the planning for this change was through the Vision 2010 group.

The other KPI’s are measures of efficiency in the harvest sector. The data for these indicators was collected through the MAS002 project which commenced in 2005 and collected further data in 2007. The project team felt that comparison between the two data sets was difficult due to the following factors:

- A reduced number of harvesters monitored in 2007; only two compared with the original six monitored in 2005.
- Data was collected using different equipment. The analysis of data collected in 2005 was problematic for the project team with incompatible GIS datasets and equipment malfunctions. In 2007 the same GIS projection was used for monitoring and productivity datasets but the project team had to develop software routines for efficient analysis of the data. Data elements were captured every 30 seconds in 2005 and every five seconds in 2007. This meant that although the same machine parameters were monitored in the two seasons the capture frequency was different as were the analysis protocols.
- Data was only collected for a limited period during the 2007 season; no data was collected before week seven of the crush and some data was lost in weeks 10 and 11.

Table 6. Harvester Groups 34 and 62 - comparison of Pour Rate, Field Efficiency and Operating Efficiency

<table>
<thead>
<tr>
<th>Year</th>
<th>Harvesting Group</th>
<th>Pouring Rate</th>
<th>Field Efficiency</th>
<th>Operating Efficiency</th>
<th>Average Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>34</td>
<td>80.90</td>
<td>67%</td>
<td>78%</td>
<td>75.34</td>
</tr>
<tr>
<td>2007</td>
<td>34</td>
<td>108.09</td>
<td>66%</td>
<td>69%</td>
<td>83.41</td>
</tr>
<tr>
<td>2005</td>
<td>62</td>
<td>98.22</td>
<td>68%</td>
<td>60%</td>
<td>72.85</td>
</tr>
<tr>
<td>2007</td>
<td>62</td>
<td>93.30</td>
<td>73%</td>
<td>78%</td>
<td>85.78</td>
</tr>
</tbody>
</table>

Table 6 shows the comparative data for the two groups in 2005 and 2007. The project team felt that this data did not show a clear trend across groups. Both groups had a better average yield in the second year and while the data for Group 62 appeared to indicate an improvement in efficiency, the opposite appeared to be the case for Group 34.

In looking at the KPI’s for 2007 against the targets, the project team feels that the data does not support a view that KPI’s for Field Efficiency, Operating Efficiency and Pouring Rate have been achieved. However, this may not be attributed to any lack of success with the program of monitoring and feedback to contractors but rather an issue with two different datasets.
Objective 6: To develop and implement a tenure system which allows for the excision of homestead blocks from existing cane farm titles.

This objective was met in 2004. Douglas Shire Council fully appreciated the economic and social importance of a viable sustainable sugar industry and was extremely supportive of the work involved with the JVP. Through this forum the proposal for homestead excisions was developed and tabled at a meeting of the DSC for consideration. Subsequently the framework was developed for the consideration of excision requests under the shire planning scheme.

Objective 7: To involve the cane growing community in the Douglas Shire Sustainable Futures Strategy and Water Control Plan.

The target KPI’s for this objective have both been achieved with another successful Sugar Awareness Day held in 2007 and a representative of the project team still actively involved in a working group overseeing the implementation of the Water Quality Improvement Plan.
Methodology:

The overall project was managed by a Project Officer appointed for the task in July 2003 reporting directly to the Chief Executive Officer of MAS. The small team at MAS were responsible for the daily planning and management of project activities. At the commencement of the project an industry reference group with representatives from MCM, CANEGROWERS Mossman, and MAS provided oversight of the initial work program with formal reporting to all local stakeholders through the JVP.

The project was developed around four key focus areas:
1. Best practice in cane farming and Sustainability
2. Harvest and transport optimisation
3. Farm aggregation

1. Best Practice in Cane Farming and Sustainability

Self Assessment scorecards and Extension program

The COMPASS self-assessment workbook was designed to create awareness among canegrowers of what is considered current Best Management Practice (BMP) within the sugar industry. This program involved growers attending an interactive group workshop during which they progress through a self-assessment workbook. This process enables them to define their current management practices and assess these practices against industry accepted best management practice.

The self-assessment process leads growers to complete a series of Action Plans at the end of the workbook. These action plans define how individual growers intend to change their current management practices and move towards best management practice.

The focus of the COMPASS program is on the self-assessment by individuals for themselves within an interactive workshop situation leading to the development of individual action plans. The workshop also provided access to information to assist growers develop and implement their action plans.

At the end of the workshop the grower left with his workbook with the completed self-assessment of current practice and action plan, and knowledge gained on industry accepted best management practice. The grower was then in a position where he could as an individual work through his action plans for self-improvement. There are no follow-up processes within the COMPASS program to assist growers in the implementation phase of the action plans.

In 2003 an evaluation of COMPASS in the Douglas Shire was undertaken through MAS001 as part of the Douglas Shire Council Water Quality Improvement Program (WQIP). In part this identified that 38 Mossman mill area growers representing 26 farm enterprises had completed a COMPASS workshop. In total they managed 46% of the land under cane production in the Douglas Shire.

Table 7: Uptake of BMP factors by landholders who have undertaken a COMPASS workshop in the Douglas Shire.

<table>
<thead>
<tr>
<th>BMP Factor</th>
<th>Trash Retention</th>
<th>Reduced Fertiliser</th>
<th>Reduced Tillage</th>
<th>Drain Design</th>
<th>Revegetation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>100</td>
<td>65</td>
<td>19</td>
<td>46</td>
<td>35</td>
</tr>
</tbody>
</table>
Mossman Agricultural Services (MAS) also conducted an initial survey of landholders who had undertaken a COMPASS workshop to assess their uptake of a range of (BMP). Results of this survey appear in Table 7.

This evaluation and review of COMPASS in the Douglas Shire led to the documentation of a cane farming system for the Mossman area that reflected the currently recognised BMP for cane production. The system adopted a triple bottom line approach to minimise the negative environmental and social impacts while maximising economic benefit to producers. It also recognised that flexibility and adaptability to change was required in the system as improved practices are recognised.

This BMP cane farming system was then developed into a self-assessment worksheet for growers. Key indicators of sustainability were defined on the scoresheet and four simple statements used to describe levels of compliance for each of the key indicators of sustainability. The first statement for each practice describes the zero level and the fourth statement the complete level of compliance or the current BMP. The other two statements describe intermediate levels.

This scorecard was peer reviewed by industry through several iterations before it was pilot tested with a group of producers. The revised sheet was then presented at four shed meetings held in December 2003 and completed on a voluntary basis by attending growers. The self-assessment forms were reviewed in 2005 with several changes to wording to improve the clarity of the statements. The process was repeated at a series of shed meetings in early April 2006 and a final single shed meeting in 2007.

The majority of BMP indicators in the self-assessment survey were directly related to water quality issues and impacts with several more directly related to economic and social sustainability at a farm level with indirect environmental implications.

The scorecard was the first part of a larger process. Once the results of the scorecards were collated, the collated results were presented to the growers and validated at the meeting as representing best management practice in the Mossman area. Once the levels of management were validated, the participating growers were then asked to identify the impediments to them adopting higher order management practices. The growers were then asked to identify actions that they can take or asked to consider what would be required for them to overcome these impediments. Finally these actions were prioritised on an individual and group basis with growers responding to the questions of what is most important and what would have the greatest impact on their businesses. This was then used in developing an extension program with the growers to target areas of low adoption of BMP.

The Project Officer attended the Australasia Pacific Extension Network (APEN) Conference in March 2006 and the Australian Society of Sugar Cane Technologists (ASSCT) conferences in 2005 and 2006. This larger BMP process was presented as a poster at both the APEN and the ASSCT conferences in 2006. This poster is included as Appendix 2. In addition a discussion paper dealing with the development of the extension program is included as Appendix 3.

The extension program developed with the growers, concentrated on four main areas:

i. **Nitrogen rate demonstrations including cost-effectiveness analysis.** Under this program the following activities took place:

- Presentation of CSIRO research on Nitrogen Replacement theory at shed meetings held in December 2003, March and June 2004.
- A field day in September 2004 with relevant local information presented on N Fertilizer rates. A split-stool fertiliser box was also demonstrated in operation.
Further demonstrations and presentations of the CSIRO Nitrogen Replacement program continued in 2005 and 2006.

Presentation on Calcium and Magnesium nutrition to growers at a shed meeting in December 2005.

The extension program was broadened to broaden the focus from purely Nitrogen management to Nutrient Management in 2005. In 2006 MAS commenced a project with Sugar Industry Reform Package (SIRP) funding to increase the level of soil analysis and interpretation for nutrient management and planting legume fallows. The SIRP funding covered the cost for commercial soil analysis services, the cost of legume seed and subsidised the planting of legume fallows in 2006 and 2007. It did not cover the cost associated with soil sampling and sample preparation, interpretation of results or project administration. These areas were covered under MAS001. The Sugar Industry Reform Package (SIRP) funding also had matching grower contributions. A field walk to inspect fallow crops was also undertaken in each year of the project.

In 2005 and 2006 two additional split stool fertilizer boxes were purchased by growers in the Mossman area with the MAS001 project officer providing administrative support with the funding applications.

ii. Controlled traffic farming systems incorporating minimum tillage and managed legume fallows. Under this section of the extension program the following activities were undertaken:

- A field trip to Mulgrave, Tully, Herbert and Burdekin areas was organised in mid-2004.
- A Farming Systems field day with a presentation of the benefits of reduced tillage and legume fallows in November 2004.
- MAS also purchased a zero-tillage planter for soybeans with financial assistance from a local farmer and the Rural Water Use Efficiency project in 2005. MAS001 project officer provided administrative support for this application and purchase. A field day and demonstration of this machine was undertaken in November 2006.
- The Project Officer attended the Australian Controlled Traffic Farming Systems Conference in July 2005. An overview of steering guidance and the base station network was presented to growers at shed meetings in December 2005.
- A GPS Base station network was established in the area in 2005 and steering guidance equipment installed on three tractors and one harvester in the Mossman area with partial Queensland Government funding (Appendix 4). This network will give all growers access to a corrected GPS signal so that they can install steering guidance equipment on their machinery at a minimal cost. All cane areas supplying Mossman mill, including Julatten and Daintree, are covered by this network. MAS001 project officer devoted time to administration of this project. In addition considerable project time was devoted to the installation and subsequent upgrade of the network and the resolution of performance issues with the mobile guidance equipment on the farm machinery during 2005 and 2006.

iii. Management of deep drains. This work was undertaken in conjunction with the WQIP. It was recognised that the private benefit for drainage rehabilitation was generally less than the public benefit in terms of improved water quality from rehabilitation of eroding drains. In other words significant funding (more than 50%) is needed to induce growers to rehabilitate eroding drains. Several funding packages were offered through Douglas Shire Council under the WQIP, EPA and Far North NRM board for growers to undertake rehabilitation projects over the life of the MAS001 project. To get a better understanding of local drainage issues, MAS undertook to develop an integrated drainage plan in concert with growers in the Saltwater/Miallo area. MAS001 project...
iv. **Record keeping and business management.** Farm Map sheets were prepared for interested growers to keep spraying, planting and fertilizer records. In April 2004 a survey of the financial position of Mossman growers was undertaken. The information was collected on the basis that all personally identifiable information would be destroyed once collated and only collated information would be used in any reporting or publication of results. The growers also agreed to provide the information on the basis that it would only be used in support of financial assistance to the district.

MAS undertook an intensive series of Business Planning workshops with growers during late 2004. This proposed workshop series is discussed in detail in the paper included as Appendix 5. In addition two information papers were prepared for growers dealing with strategic business planning (Appendix 6) and the business workshop series (Appendix 7).

Activities under this section of the extension program included:

- Proposal of a survey of the current financial position of Mossman growers presented at a series of shed meetings in February 2004 followed by the survey in March 2004 and presentation of results at shed meeting in June 2004.
- Presentations of farm record sheets at shed meetings in 2004.
- Business planning workshops from August to December 2004. A series of five workshops for groups of growers were conducted with individual follow-up to assist in completing business plans in 2005.
- Preparation of farm map record sheets for growers in 2006 and 2007.

In addition to this direct assistance to growers with developing business plans the project officer was heavily involved with the regional planning process in 2004 and 2005 and follow up reporting requirements.

v. **Revise BMP’s.** Best Management Practice in cane farming is continuing to evolve and in recognition of this the extension program is considered to be a process of continuous improvement. As practices change with advances in knowledge or technology so the definition of *Best Management Practice* will also change. The extension program recognises that growers and extension staff will both contribute to this change in a local area and that contact with ideas from other cane areas, other farming enterprises and other primary industries is an important part of this process for change. As such grower tours were organised to look at a number of farming and harvesting operations:

The growers visited research sites and commercial properties looking at the use of legume rotations, fertilizer application strategies and equipment, strategic tillage equipment and operations, harvest and transport arrangements and monitoring for harvesting best practice. These groups went to Innisfail, Tully and Ingham in July 2004, the Mulgrave, Ingham, Prosepine, Mackay and Burdekin areas in February 2005 and the Northern Rivers in November 2005.

In addition to the definitions of best management practice changing, the project team also revised the self-assessment scorecards.
The 2003 self assessment results suggested that some BMP indicators were unclear or needed some revision. Minor changes were made to the scorecards by the project team before the 2005 and 2007 surveys. The 2003 and 2005 survey results for the Cane Grub Management indicator suggested a poor understanding of the principals of Integrated Pest Management (IPM) as it applies to cane grub management. In October 2006 a GrubPlan workshop was held to address this issue.

The indicators for irrigation systems and scheduling were deleted from the scorecard after the loss of all cane from Mareeba following the 2004 crush. No cane is irrigated in the Mossman area.

An indicator for Drain profile and vegetation for deep drains was included in the 2005 and 2007 surveys. This was included in response to the issue being raised in the development of the extension process. This is in recognition of the need for some deep drains in the landscape and the fact that not all deep drains are suitable for conversion to shallow drains.

The project team considered increasing the number of indicators as the original scorecard focussed on management practices that had most impact on sediment and nutrient movements. The team felt that the issue of pesticide management was not adequately addressed. However, the team also considered that for the purposes of measuring change over the term of the project fundamental changes to the scorecard should be avoided.

Farm Accreditation process

The BMP self-assessment process was developed to articulate into a Farm Accreditation scheme. This was largely developed by the project team in consultation with Neil Sing from QDPI Kairi as part of the DSC Water Quality Improvement Plan. The levels of performance as defined in the self-assessment scores were described so that they were quantifiable. This would then allow for the levels to be validated by an independent auditor through the farm accreditation process. Once again several iterations of the farm accreditation process were documented and peer reviewed by a Mossman industry panel.

2. Harvest and Transport Optimisation.

Harvest Working Group/Vision 2010 group

Dr Andrew Higgins from CSIRO worked with the Mossman Sugar Industry between September 2002 and March 2003 through project CSE00005 “Integrating and optimising farm-to-mill decisions to maximise industry profitability”. The focus of this work was to reduce the transport costs for the 2003 harvest with particular emphasis on reducing the number of loco shifts. A number of transport scenarios were produced using a transport capacity planning model developed by the project team.

Greatest cost savings were achieved through modelled with 24 hour harvesting but this was not favoured by industry and a compromise model was adopted for the 2003 harvest. This involved:

- Extending the harvest window from 4:00 am to 8:00 pm
- Harvesters paired as “early starters” and “late finishers”
- Harvesters aggregated so that they were delivering to adjacent sidings
- A harvester was only allowed to deliver to one siding per day.
- No “taxi” service or only running locos to deliver a rake of empties and pick up a rake of fulls in the one trip.
i. **Activities for 2004 harvest.** These changes resulted in some dissatisfaction from principally the harvest and farming sector of the Mossman sugar industry. In October 2003 a workshop was organised through MAS001 with representatives from all industry sectors to consider the changes implemented for the 2003 harvest and plan for the 2004 harvest. The emphasis of this meeting was on dealing with some of the human issues resulting from the changes imposed on the Mossman sugar industry in 2003 by the decisions of MCM.

An assessment of the age of the harvesting fleet in Mossman was undertaken in April 2004. In addition a comparison of estimate block data for 2004 for the Mossman coastal area and the Mareeba area was undertaken. This looked at harvesting group costs and block size and the differences between the two areas. In 2004 the transport capacity modelling of the CSE0005 project group was again used for harvester and transport movement planning.

A revised harvest and transport plan for the 2004 season was adopted by the industry.

A meeting of the group in November looked at the performance and management of the harvest and transport arrangements for the 2004 season and set this as a background for planning the 2005 season.

ii. **Activities for the 2005 harvest.** Much of the work of the harvest working group in 2005 was undertaken through project MAS002. Options for a cane payments system based on a Cane Quality Index and a system of even fortnightly payments to all growers over the season were considered. Harvest and transport plans for the 2005 season were also developed and adopted with transport capacity modelling again undertaken by the CSE005 project group.

In addition to farming practices, the Mackay area trip in February 2005 also looked at harvesting groups and rationalisation of the harvest and transport system along with the proposed changes to the cane payment arrangements. The tour in November 2005 also considered harvest and transport arrangements in the Northern Rivers region. Information gathered on these tours were considered in the planning for the 2004 and 2005 seasons and in the longer term planning of harvest and transport arrangements in Mossman to the year 2010.

The role of the group was also expanded during this period and given a more strategic focus looking at the ideal model for harvest and transport arrangements in 2010 and the steps to be taken to turn the model into reality.

iii. **Activities for the 2006 season.** The group formally met as the Vision 2010 group in 2006 and developed the framework of a harvest and transport model for 2010 through a series of facilitated discussion meetings. The group membership was increased with several of the younger generation of farmers and harvest operators becoming actively involved in the discussions and planning. A report of the November study tour was prepared and considered by the working group. Group members also presented their findings to growers at two shed meetings. Arrangements for the 2006 harvest were developed and adopted and the working group also held a meeting with all harvest operators to get industry agreement for the arrangements.
iv. **Activities for the 2007 season.** The Vision 2010 group continued to meet and discuss harvesting and transport arrangements. Major changes to the transport arrangements for 2007 were initiated through discussions of this group.

### Harvesting Efficiency

This element of the MAS001 project sought to complement the earlier work of project MCB001 (James, 2003). MCB001 was initiated to improve the long-term viability of the Mossman sugar industry through better harvesting techniques. A significant outcome was the widespread adoption of a process called “Feed-Train Optimisation” in the Mossman cane production area. This work was shown to significantly reduce sugar loss and improve billet quality through mechanical harvesting. However, the project encountered significant barriers to the adoption of best-practice harvesting that were not successfully addressed.

MAS001 also focussed effort on the adoption of best-practice harvesting. Some of the issues MCB001 encountered with establishing a functional group with representatives from the growing, harvesting and milling sector were overcome in MAS001 through the activities of the Harvest Working Group as outlined in the previous section. It became obvious that there was a need for some local data to support discussion of this group on harvesting best practice and harvesting efficiency in the Mossman sugar industry.

The project team undertook analyses of several aspects of the Mossman sugar industry harvesting sector between 2003 and 2005. The need for definitive data on harvesting best practice in the Mossman area led to the monitoring of six harvesters in the Mossman area in 2005 and scaling this back to two harvesters in 2007 and 2008. The monitoring was undertaken through project MAS002 but provided data used in this MAS001 project.

### 3. Farm Aggregation

The original JVP funding submission ‘Mossman Sugar Industry – A Regional Initiative’ contained a number of possible actions to increase effective farm area per farming entity. Included in these were initiatives for:

i. aggregation of farms through leasing, share farming or other commercial arrangements

ii. ‘One off’ variations to the town planning scheme to allow for the excision of homesteads from farming parcels to allow for retiring farmers to retain their homes and a small area of land while allowing the larger area to be sold as broad acre farming land.

iii. Exchange of cane allocations between mills particularly the Tablelands Mill and Mossman Central Mill

iv. Setting up a business register of farms for lease or sale for the use of the grower community

The second proposal was formally taken to Douglas Shire Council for consideration from the JVP. DSC returned with in-principal agreement to the proposal provided that there was no net increase in number of lots; requests would be considered where existing titles held by one grower could be combined and a new title issued for the excision. In 2003 through MAS001 a survey was carried out to determine the willingness of growers to excise homestead blocks where the subdivision would not result in an increase in total lots. At that time no growers were prepared to excise farm areas under the DSC proposal. The MAS001 project team considered that pursuing this option further was not warranted. The DSC had provided guidelines under which they would consider excision requests and the growers were aware of these.
In 2004 the project team believed that aggregation would primarily occur through commercial arrangements if there was grower confidence in the long term sustainability of the Mossman Sugar Industry. Hence, from that time the role for this part of the project was seen as being through a number of measures to actively support and promote industry sustainability and this would only indirectly influence farm aggregation. These measures would complement the other activities within the project and included:

- Equipment pooling, and other hire or sharing arrangements. MAS had several items of equipment available for the use of local growers. These include a laser grader for levelling cane blocks, zero-till planter for soybeans and Suscon applicator. MAS was and still is looking at other equipment and financing options. This equipment is either items that small landholders would not normally be able to justify for their own outright purchase or new technology that is still being developed to suit local conditions.

- Support and in some cases facilitating the adoption of efficient industry practices. Activities here were largely covered through activities previously described under ‘Best Practice in Cane Farming and Sustainability’ and ‘Harvest and Transport Optimisation’. A number of initiatives here also developed into the MAS002 project including alternative options for timing of grower payments during the season, payments for harvesting and an alternative cane payment formula based on a cane quality index. The project team was also heavily involved with industry partners in the development of a regional strategic plan, ‘Survive to Thrive 2010’.

- Providing advice and information for individual grower requests on productivity, business management and economic issues related to cane production. This was often used in evaluating management decisions such as purchase or leasing of equipment or land.

- Sourcing information and funding for grower activities that would improve their sustainability. This included several field trips previously described. The team also assisted individual growers access funding from Environment Protection Agency and terrainNRM Ltd to purchase equipment or undertake works that delivered improved environmental outcomes.

- General industry promotion activities. These include promotion of the sustainable farming practices to growers as well tourist and environmental groups and the general public. This has been through workshops, field days and other promotional activities.

Points iii and iv (above) were primarily undertaken by Mossman Canegrowers with only secondary input from this project. Cane allocations ceased to be an issue with changes to marketing arrangements at the end of 2005.

An analysis of farming area per farming entity was undertaken for the period 2003 to 2007 to document changes to farm size during the time of this project.

4. Community Involvement

Farm Forestry

The original focus for this part of the project was associated with the GGAP funding and associated establishment of 3,000 hectares of plantations for carbon sequestration and a further 300 hectares for biodiversity and habitat value. These were tied to the proposed ethanol and co-generation projects at MCM. Forestry plantations were targeted for some of the more marginal cane blocks to offer some long term income diversification to cane farmers without significantly affecting the total cane area.
The concept was raised with cane farmers at shed meetings in December 2003 and February 2004 during discussions on diversification options. A growers meeting was then organised in April 2004 to discuss issues involved with farm forestry in more detail. The program for the day was organised by the project team in conjunction with the Mossman Branch of the Australian Forest Growers and the NQ Timber Cooperative. The key issues addressed during the day were:

- Rights to harvest
- Rates of return – yields, markets, prices
- Time to get return on investment – investment proposal to get staged income stream
- Species and silvicultural techniques.

The idea with the program was to present enough information to farmers such that they would be able to make an informed decision about farm forestry. The day involved both workshop presentations and field visits to farm forestry plots. Additional items dealing with the Commercial Agroforestry Production System (CAPS) program, multiple-use forest concept and the current status of the GGAP program in the Douglas shire were also included to broaden the range of issues raised on the day.

The program included a range of speakers representing research and commercial interests to reflect the subjects covered. Two commercial forestry investment models were presented to the growers.

i. **Northern Resources Management Pty Ltd (NRM)** is a private forestry company involved in project development, plantation establishment, revegetation and other services. They presented an investment model whereby:

- Farmers are paid a fee for access to their land and a management fee to farm the trees as well as a share of the profits at the end of the project
- Outside investors are given the opportunity to invest in forestry on private land
- NRM provide establishment services, training and maintenance advice over the life of the plantation.

The main benefit for farmers from this model is the opportunity for a regular income stream from a forestry plantation over the life of the crop thereby providing them with a diversification of their income. In addition the model is based on relatively small individual areas (minimum of five ha) being part of a larger project across a region allowing for more marginal land to be taken out of production and producing a mosaic of forestry plantations across the landscape.

ii. **Cape York Forest Management Pty Ltd (CYFM)**. CYFM proposed several more conventional forestry models:

- Farmers lease or sell land to a plantation company
- Farmers enter into joint venture arrangements with a plantation company but must be prepared to commit money for establishment and on-going maintenance
- Farmers ‘do their own thing’ and establish small plots themselves with the associated risks of small lots for sale. It was suggested that four – five ha/yr for four or five years would be the minimum required size for this approach.

The NRM forestry model created some interest with growers present and a further meeting to explore the options in depth was organised for May 2004 with eight farmers attending. It was suggested that for viability a forestry project based on this model would need 3,000 to 5,000 hectares. Some growers expressed concern about the effects of a scheme of that size on the local sugar industry even with some of the plantations being in the Julatten or Mareeba areas. None of the growers attending the meeting were prepared to invest the money required to produce a
prospectus to attract the outside investment required to enable the scheme to proceed. There was no follow up on this proposal.

Loss of commercial investment in the Ethanol and Co-generation projects at MCM led to the collapse of this venture in 2003. Despite this the DSC sought to retain the GGAP funding and developed a number of plantation forestry projects proposals based on this funding source in 2004 and 2005. However, eventually the federal government withdrew the funding and in consequence the forestry plantation proposals faltered through lack of either government or private funding coupled with low levels of interest from cane growers.

Revegetation for Environmental Benefits

During 2004 and 2005 funding was available for private landholders to install strategic wetlands and sediment traps. This funding came from the federal Department of Environment and Heritage (DEH) and the Queensland Environment Protection Agency (EPA) through the Douglas Shire Water Quality Improvement Plan (WQIP). The objective was to reduce the impact of agricultural practices on sediment and nutrient movement from agricultural landscapes to the Great Barrier Reef. The project team worked closely with landholders and the other JVP partners to identify suitable sites and facilitate, and in several cases project manage, the ground works.

Work undertaken through the WQIP identified eroding drains passing through cane lands as a source of sediment and nutrient movement. In 2006 and 2007 some funding under the implementation phase of the plan was made available for an extension of this previous work. In this phase the focus extended to the rehabilitation of cane drains with targeted funding. Again the project team was involved in facilitating this work by assisting the funding bodies to identify rehabilitation sites and the growers to access funding.

Sugar Awareness Days

Through MAS001 the Mossman sugar industry adopted a pro-active approach to addressing environmental concerns. The aim was to develop ongoing communication linkages with community and environmental groups in the Douglas Shire and to adopt an “engage not defend” approach to environmental issues. A program was developed for a Sugar Awareness Day in September 2003 for environmental and community groups by MAS, the Low Isles Preservation Society and the Douglas Shire Council Water Quality Improvement Program.

The program involved a field trip and aimed to:

- Provide an update on the long term viability of Mossman Central Mill
- Demonstrate current growing practices
- Describe how losses can occur from current practices
- Discuss progress towards Best Management Practices
- Advise on Douglas Shire water quality projects
- Inspect artificial wetlands
- View river bank erosion control
- Discuss the future over BBQ lunch

The focus was on having cane farmers actively involved in the presentations and discussions with the environmental and community representatives. MAS and staff from other partners in the JVP provided some technical support for the growers.

25 people consisting of representatives from community and environmental groups, Douglas Shire Council, CSIRO and the Mossman sugar industry attended. It provided an opportunity for the sugar industry and groups working with the sugar industry to address a range of issues of concerns to the
environmental groups in a positive and informal setting. The success of the day encouraged the organisers to program a day following a similar format in September 2004.

The 2004 day was a joint effort between MAS, Canegrowers Mossman, MCM, Earthwatch, Environment Protection Agency, the Low Isles Preservation Society and the Douglas Shire Council Water Quality Improvement Program. The format and program was very similar to the 2003 day with more than 20 participants many of whom had attended the 2003 day.

A third day was planned for March/April 2006 with the timing during the wet season in an attempt to address a different range of issues and also to try and attract more interest from tourist operators. Unfortunately there was insufficient interest from this sector to justify holding the event.

A third Sugar Awareness Day was held on 24th October 2007. Dr Suzanne Jenkins from Earthwatch Institute who had attended the first two days helped with the organisation of this event. The format of the day was changed from the previous events although the focus on highlighting sustainable cane farming practices to representatives from community and conservation groups remained. The program was as follows:
- A short video of the Mossman Sugar Industry produced in the late 1990’s
- Facilitated discussion of practice changes to enhance sustainability
- Inspection of a stream bank rehabilitation site
- Inspection of farming equipment and discussion.
- Lunch and informal discussion

Approximately 25 people attended with representatives from Terrain Natural Resource Management Ltd, James Cook University, CSIRO, Wet Tropics Management Authority, Douglas Shire Council and community representatives as well as industry representatives from Mossman Central Mill, Canegrowers and several individual farmers.

The project team was also involved in two annual visits by groups of students from University of Michigan who were interested in sustainable farming practices with particular emphasis on cane farming in the wet tropics. The University of Michigan and the Low Isles Preservation Society planned an accredited course for American college students based on these visits. The course was to include sustainable farming systems in the Douglas Shire and the Mossman sugar industry through the MAS001 project team was asked to become involved in the delivery of this course. This demonstrated the positive relationship and good communication linkages between the sugar industry and tourism and environmental interests in the Douglas Shire. However, funding and logistic issues has prevented the course from being fully developed to date.

Involvement in Douglas Shire Sustainable Futures and water control plan

An extensive strategic planning exercise to determine and document community priorities and aspirations towards future sustainable development in the Douglas Shire was undertaken through the JVP. Results were published as the draft Douglas Shire Sustainable Futures document of 2002. The Douglas Shire Water Quality Improvement Plan (WQIP) was funded by the federal Department of Environment and Heritage following the release this document. The WQIP aimed to provide base data on volumes and sources of nutrient and sediment movement onto the Great Barrier Reef and to develop a plan for reducing the impacts from land based activities on the reef. This work was supervised by the JVP.

The local community recognised that the sugar industry as the dominant primary industry in the Douglas Shire should have close active involvement in the activities resulting from the Douglas Shire Sustainable Futures document and in particular the WQIP. Consequently the MAS001
project team worked closely with the other partners in undertaking the work program of the WQIP. Involvement with this project included:

- Member of the WQIP steering committee
- Leader for Projects one and two – Adoption of Agricultural BMP’s for sediment and nutrient reduction in Douglas Shire and Determination and demonstration of agricultural BMP’s in Saltwater creek catchment of Douglas Shire
- Prepared milestone reports for several elements of these projects
- Assisted growers with applications for funding of activities under the WQIP

Much of the work under these projects directly complemented the best practice in cane farming work of MAS001.
Outputs:
(Including knowledge, skills, processes, practices, products and technology developed)

Financial Position of Mossman Cane Farmers – April 2004

20 growers participated in the survey of their financial position in April 2004 representing approximately 25% of the cane farming population in Mossman. The project team felt that the respondents were a good cross section of the Mossman farming community and that the results could be extrapolated to the wider Mossman farming community. The information gathered was based on 2002/2003 taxation and other information supplied by the participating farmers and anticipated costs of $20/tonne of cane and returns of $16/tonne of cane were used in projections for the 2003/2004 financial year. A full report of the findings of this survey is included as Appendix 8.

In summary the information collated from this survey indicated that:

- Most businesses were single family units (81%) and in the majority of cases (71%) only one generation was involved in the business and most (70%) were run as partnerships
- Only 23% of growers were less than 50 years old and 18% were over 70
- Most (74%) were farming less than 150 ha and 90% produced less than 15,000 tonne in 2003, 63% produced less than 10,000 tonne and 37% produced less than 5,000 tonne
- Based on a cane price of $16/tonne, all growers relying on cane were looking at a farm cash deficit in the 2003/2004 financial year, with 30% having a deficit of more than $40,000
- Most growers (over 79%) had more that 80% equity in their businesses and the rest had more than 60%
- 53% had debt levels of less than $50,000 with 21% having debt of $100,000 to $200,000
- Most growers (63%) had less than $40,000 of off-farm income with nearly half (47%) earning less than $20,000 off-farm. (Off-farm income included income from contract harvesting and other contract farming operations)
- Most growers had limited cash reserves (less than $10,000) held as cash (68%) or term deposits (58%)
- All growers had Sugar Terminal Ltd shares but most (88%) had less than $10,000 invested in other shares including Mossman Central Mill and most (63%) had no real estate investments other than their farms.

Overall this gave a picture of an aging farmer population, with small to medium size operations. They had good equity levels and low levels of debt but were facing negative returns in the 2003/2004 financial year with very little reserves or off-farm income. This meant that they needed to either increase their levels of debt or sell assets, including some of the core farming assets, to survive for the following 12 months.

For the longer term growers needed to look at diversification options to increase farm income either complementing or replacing part or all of their cane operations or consider alternative off-farm sources of income. Most growers were looking at reducing costs in their cane operations and looked at reducing inputs, most notably fertilizer and planting.

The survey results also highlighted the fact that in the next 15 years following this survey, 75% of those completing the survey would be of retirement age or have retired from farming. In most cases they did not have a second generation working on the farm or involved in the farming business. This then presented the Mossman Sugar Industry with a considerable challenge to retain the productive cane land.
The information collected also enabled a profile of an average Mossman cane farmer (Joe Farmer) to be developed. This profile was then used in the business planning workshop series. A business plan for Joe Farmer was developed as a working example during the business planning workshops.

**Business Planning.**

A Powerpoint slide presentation and proforma workbooks were developed for the workshop series. The presentation is included as Appendix nine and the workbook as Appendix 10. The workshop series was developed from a number of reference sources and tailored for farmers in the Mossman sugar industry. These included:

- National Bank ‘Farm Business Planning’ workbook and instruction book
- The Queensland Rural Adjustment ‘Authority Business Planning Guide’
- RIRDC ‘Sustainability Indicators for Agriculture’
- ‘BizCheck for Meat’ prepared by Rendell McGuckian for Meat and Livestock Australia
- Australian Bankers’ Association ‘Financing Your Farm’
- Strategic business planning guides from the Property Management Planning programs of the Queensland and NT governments

39 people representing 28 farm businesses attended the first workshop however only 16 people representing 11 farming businesses completed the workshop series. Most dropped out between the first and second workshops. Eight of these farming families asked for individual assistance in preparing or completing business plans after these meetings. The level of assistance varied from being asked for comments on draft plans to intensive assistance in developing the plans. Three families completed their plans with no further assistance from MAS.

In addition to the 11 farming families that attended the workshops, a further ten farm families asked for some level of assistance in developing a business plan. Several of these had attended the first of the business planning workshops. Two growers had requested a daytime meeting to cover the material presented in the workshop. This was organised and the overview material was presented. They were also given copies of the business planning proforma with the offer of further individual assistance if required.

A second workshop series was organised in late November 2004 with no interest. A second meeting under the Department of Primary Industries and Fisheries (DPIF) Business Planning for Re-structuring program was advertised for mid-May but was cancelled due to insufficient interest. Following this no further business planning workshops were organised.

In total 21 farming families have had some direct assistance through MAS001 project in developing business plans since the initial workshop series. This is unlikely to be the total number of farming families in the Mossman Mill supply area who have developed business plans in the last two years. The total number of suppliers to MCM in 2005 is approximately 102 farming businesses involving approximately 83 farming families. The number of families directly assisted with developing business plans through this initiative represents 25% of the total cane farming families supplying MCM.

**BMP Self Assessment Survey**

Surveys of cane farming practices in Mossman were undertaken in 2003, 2005 and 2007 using the BMP scorecard. The scorecard is included as Appendix 11. The scorecards as presented to the growers were scrambled with the individual practices not presented in an ascending hierarchy as in Appendix 11. This was to discourage growers giving pre-emptive answers based on trying to guess
the right answer. The scorecard was modified slightly for the 2005 and 2007 surveys to improve clarity and to include a set of practices for management of deep drains. The questions on irrigation were dropped as no growers in the Mossman area were irrigating. Despite these minor changes the basic form and phrasing was retained for most of the statements so that comparisons could be made between the surveys across time.

The surveys were voluntary with growers attending the meeting invited to complete the survey without compulsion. The individual responses were anonymous with the returned forms not having any identification. The results from the surveys were collated and presented back to the group for discussion.

2003 survey results

The scorecard and extended process for defining impediments to change, actions to overcome the impediments and prioritization of the actions was pilot tested on the members of the MAS board before being undertaken with the wider grower community at shed meetings. This was to assist the project team in identifying issues with the scorecard and the processes employed in undertaking the survey.

A total of 42 growers completed the scorecard including those attending the shed meetings and in the pilot group. Only one grower from all the meetings did not complete a scorecard. This total group represented approximately 40% of the total growers in the Mossman coastal area covering nearly 60% of the total number of Cane Production Areas (CPA’s) and just over 60% of the total area under cane in the Mossman area. In individual districts the percentage of total area ranged from 26% in the Julatten district to nearly 75% in the Daintree district. A full breakdown of the participating growers in each district within the Mossman Cane Production Area is included in Table 8 (below).

This demographic profile of the survey respondents suggested that they were representative of the wider cane growing community in Mossman excluding Mareeba. As such the project team felt that the responses gave an accurate picture of management practices in the Mossman coastal cane growing area.

Table 8: Growers participating in the 2003 BMP self assessment process.

<table>
<thead>
<tr>
<th>District</th>
<th>All Farms</th>
<th>Self Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of farms</td>
<td>Total area</td>
</tr>
<tr>
<td>1 Daintree</td>
<td>23</td>
<td>1,186.34</td>
</tr>
<tr>
<td>2 Bamboo</td>
<td>27</td>
<td>1,223.46</td>
</tr>
<tr>
<td>3 Miallo</td>
<td>34</td>
<td>1,390.99</td>
</tr>
<tr>
<td>4 Mossman</td>
<td>37</td>
<td>1,853.92</td>
</tr>
<tr>
<td>5 Cassowary</td>
<td>25</td>
<td>940.40</td>
</tr>
<tr>
<td>6 Mowbray</td>
<td>33</td>
<td>1,534.83</td>
</tr>
<tr>
<td>7 Julatten</td>
<td>20</td>
<td>1,355.59</td>
</tr>
<tr>
<td>8 Mareeba</td>
<td>38</td>
<td>4,374.56</td>
</tr>
<tr>
<td>Mossman all Districts</td>
<td>237</td>
<td>13,860.09</td>
</tr>
<tr>
<td>Mossman Coastal</td>
<td>179</td>
<td>8,129.94</td>
</tr>
</tbody>
</table>
When filling in the scoresheet growers were asked to nominate the one statement that best described the practice they adopted or best applied to the majority of their cane farms. If the practice was not applicable to them, such as with irrigation, then they did not need to respond to that section, or if they did not believe they had a problem such as with rats or cane grubs then they would also not need to respond. This meant some variations to the total number of responses in some sections.

The collated responses from the survey are in Table 9 (below). The results are expressed as percentage of responses at the various levels for each of the indicator practices.

### Table 9. Summary of BMP scorecard responses - 2003 Survey

<table>
<thead>
<tr>
<th>BMP Indicator</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nutrient Requirements Assessment</td>
<td>10%</td>
<td>21%</td>
<td>24%</td>
<td>45%</td>
<td>100%</td>
</tr>
<tr>
<td>2. Nitrogen Rates</td>
<td>10%</td>
<td>7%</td>
<td>55%</td>
<td>29%</td>
<td>100%</td>
</tr>
<tr>
<td>3. Urea Application on ratoons</td>
<td>20%</td>
<td>5%</td>
<td>71%</td>
<td>5%</td>
<td>98%</td>
</tr>
<tr>
<td>4. Minimum Tillage Planting</td>
<td>50%</td>
<td>31%</td>
<td>19%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>5. Green Cane Trash Blanket</td>
<td>0%</td>
<td>0%</td>
<td>76%</td>
<td>24%</td>
<td>100%</td>
</tr>
<tr>
<td>6. Fallowing</td>
<td>21%</td>
<td>45%</td>
<td>19%</td>
<td>14%</td>
<td>100%</td>
</tr>
<tr>
<td>7. Fallow Practice</td>
<td>14%</td>
<td>50%</td>
<td>25%</td>
<td>11%</td>
<td>86%</td>
</tr>
<tr>
<td>8. Controlled Traffic Strategies</td>
<td>2%</td>
<td>90%</td>
<td>2%</td>
<td>5%</td>
<td>98%</td>
</tr>
<tr>
<td>9. Drain Profile and Vegetation</td>
<td>8%</td>
<td>33%</td>
<td>33%</td>
<td>28%</td>
<td>93%</td>
</tr>
<tr>
<td>10. Drain Profile and Vegetation for deep drains</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>11. Block Drainage</td>
<td>0%</td>
<td>12%</td>
<td>59%</td>
<td>29%</td>
<td>98%</td>
</tr>
<tr>
<td>12. Record Keeping</td>
<td>7%</td>
<td>63%</td>
<td>17%</td>
<td>12%</td>
<td>98%</td>
</tr>
<tr>
<td>13. Business Planning</td>
<td>41%</td>
<td>2%</td>
<td>34%</td>
<td>22%</td>
<td>98%</td>
</tr>
<tr>
<td>14. Riparian and Wetland Vegetation</td>
<td>2%</td>
<td>36%</td>
<td>57%</td>
<td>5%</td>
<td>100%</td>
</tr>
<tr>
<td>15. Headland Vegetation Management</td>
<td>2%</td>
<td>24%</td>
<td>17%</td>
<td>57%</td>
<td>100%</td>
</tr>
<tr>
<td>16. Cane Grub Management</td>
<td>9%</td>
<td>52%</td>
<td>39%</td>
<td>0%</td>
<td>55%</td>
</tr>
<tr>
<td>17. Rat Management</td>
<td>11%</td>
<td>24%</td>
<td>38%</td>
<td>27%</td>
<td>88%</td>
</tr>
<tr>
<td>18. RSD Management</td>
<td>7%</td>
<td>7%</td>
<td>31%</td>
<td>55%</td>
<td>100%</td>
</tr>
<tr>
<td>19. Chemicals Storage and Handling</td>
<td>19%</td>
<td>17%</td>
<td>36%</td>
<td>29%</td>
<td>100%</td>
</tr>
<tr>
<td>20. Farm layout for BMP Harvesting</td>
<td>5%</td>
<td>10%</td>
<td>45%</td>
<td>40%</td>
<td>100%</td>
</tr>
</tbody>
</table>

The collated results from the meeting scorecard evaluations follow the same trend as the original COMPASS evaluation in Mossman.

- **Trash Retention.** Green Cane Trash blanketing has been almost universally adopted as a management practice. 24% of growers nominated that they would never burn trash and the rest indicated that they would only burn blocks to be replanted. However no growers intentionally burn standing cane or any blocks other than blocks to be replanted. The question did not gather information on the proportion of replant blocks that are burnt merely that it was only replant blocks that were burnt.

- **Reduced Fertiliser.** Nitrogen fertiliser and particularly Urea is the main potential source of nutrient contamination in water from cane production and as such was used as the key indicator of nutrient management. 55% of growers nominated that they never exceeded 160 kg/ha N, which is the BSES recommended rate for this area, and a further 29% indicated that they adjusted this rate to account for other inputs such as from legumes or mill mud. When using urea over 75% were applying the product using the level three BMP. In addition nearly 70% were soil sampling most of their cane blocks at least once per crop cycle.

- **Reduced Tillage.** The uptake of minimum or zero-tillage planting has been slow with less than 20% tilling only the planting zone and no direct planting. This is also associated with practices involved with fallowing and controlled traffic strategies. 25% of growers nominated that they had more fallow plant area than plough-out/replant area with a further 11% nominating that all cane was planted into fallow ground. Only 14% nominated that they never fallowed. Of those
responding on the question of fallow practice, 36% were using a legume fallow with 11% of this number indicating that they planted the legume using zero-till. 90% of growers were using row spacing of between 1.52 and 1.65 m.

- **Drain Design.** 59% of growers estimated that on the majority of their farms at least 70% of the drains were wide, shallow and well grassed with 26% indicated this description applied to all their drains. three of the 42 growers did not give a response to this issue. In terms of drainage within blocks, only 12% nominated that the majority of their blocks had wet sections while nearly 30% indicated that all their blocks were well drained.

- **Revegetation.** This issue was not directly addressed in this recent survey but the condition of riparian areas was addressed. Over 60% of growers indicated that, in relation to the majority of stream banks on their properties, the banks were vegetated and had trees, shrubs and grass extending beyond the top of the bank with 5% nominating that this cover extended at least 10m from the top of the bank.
  57% of growers regularly (at least five times per year) slashed their headlands but no lower than 10cm while a further 17% slashed less than five times per year. Another 24% maintained headlands to less than 10cm in height.

The scorecard considered a number of key sustainability indicators not considered in the initial survey but were covered in the COMPASS program.

- **Business management.** 7% of growers indicated that they kept no records while 63% maintained only basic financial records. Of the remainder, 12% nominated that they maintained a comprehensive record system suitable for accreditation. Over 60% of growers had developed a business plan with 22% nominating that they had prepared it in consultation with all main participants and that it was regularly reviewed and amended. 34% indicated that their business plan needed review and amendment.

- **Pest management.** 55% of growers surveyed indicated that they had a cane grub problem and of those 9% indicated that they did not use any control measures and 52% used chemical control on all plant cane. No-one nominated that they had an IPM plan for grub control.

  88% of growers considered that they had a rat problem with 11% indicating that they undertook no management actions for rats. A further 24% relied solely on baiting for control and 27% had adopted an IPM program for rat management.

  For RSD management 55% indicated that they sourced all plant cane from cane that had been hot water treated in the last four years while another 31% had sourced the majority of their planting material from cane that had been hot water treated in the last four years. Only 7% used planting material from any source.

- **Chemical storage and handling.** 65% of growers completing the scorecards had current Chemcert accreditation but 36% of these still had to bring all their storage and mixing facilities up to prescribed standards. Another 17% had allowed their accreditation to lapse.

- **Farm layout for BMP harvesting.** 85% of growers had the majority of their headlands more than 4m wide with 40% of these indicating that all their headlands were greater than this width. 5% indicated that all their headlands were less than 4m wide.

### 1. Process and Grower participation.

At the start of the meeting growers were told that participation was voluntary and the individual responses would be treated in confidence but all response would be collated and presented back to the groups. They were also told that the survey would be used as a benchmark of current industry management practices. The information collected would be used to help them identify areas for improvement in their management practices and to identify things they would need to do to make
Partnership for Sustainable Sugar

those improvements. Through this process we could better tailor our extension program to reflect their needs.

Participation rates at the meetings were excellent with only one producer declining to fill in the scoresheet. At the end of the meeting the collated information was presented back to the group. We discussed our intention to continue the process of identifying impediments to them making changes to improve their practices and finally developing actions to overcome those impediments at future meetings.

2. Scoresheet content

The scorecard was not intended to be as comprehensive as the COMPASS scorecard. It was only intended to cover a range of key indicators of sustainability. The COMPASS workshop was prepared as an awareness raising tool or process. The identified weaknesses within the program were with the development of action plans and the lack of a follow up program. This BMP process was designed to have the scorecard as a benchmarking exercise with the focus on continuous improvement through an extended process.

In selecting the key indicators, the focus was on environmental sustainability and in particular water quality in relation to sediment and nutrients. As a result the sections dealing with pest management and chemical usage could be strengthened particularly with the addition of a section dealing with weed control.

The project team felt that some questions may have still been somewhat ambiguous, particularly the sections dealing with business management. This was reflected in the higher than expected response to the question of developed Business Plans. The process was intended to allow for more complete discussions at subsequent meetings than was possible at the initial meeting.

During the pilot testing, the process was taken through all stages to develop priority actions as a group. During the latter stages of the process, discussions in the business management sections covered some clarification of the statements. In addition there was some discussion on the more ‘technical’ aspects of what was involved in developing a business plan and outlines of some record keeping systems. The team felt that although this may have created some problems with interpreting the statements giving an incorrect estimate of management practice at the initial survey, the outcome of improving management practices with the whole process would not be adversely affected.

3. Management Practices

- Nutrient rate assessment, nitrogen rates and urea application on ratoons. Generally the results indicated a good level of uptake of BMP. Some of this reduction in rates may have been a response to the current poor returns from sugar. Some further work was considered necessary to increase the uptake of sub-surface application of urea and to ensure that with better returns, rates do not once again increase above optimal levels.

- Reduced tillage, fallow and fallow management and controlled traffic strategies. The results of the survey indicated that there was a relatively low uptake of reduced tillage, fallowing and particularly legume fallows and wider row spacings. All these factors are closely related in a farming systems approach and were the subject of much of the work of the Sugar Cane Yield Decline Joint Venture Partnership. This survey result indicated that an extension program that would identify and work to overcome the impediments to uptake of elements of an improved farming system was required.

- Irrigation. In the Mossman coastal area there is no irrigated cane and so no growers responded to these areas.
Drain profile and vegetation. There was a general agreement that in some areas deep drains were necessary. It was recognised that deep, bare drains could contribute significantly to sediment loads. The main issue then became how to best manage these drains to minimise sediment movement.

Block drainage. Many paddocks have been laser-levelled around the district. As time and money permits, and the need has been recognised, more will be levelled.

Record keeping and business planning. There were some unexpected results with these sections. The need for better business management has been recognised generally with farming businesses around Australia as well as with cane farms. This has already been identified as an activity within this SRDC project. The results of this scorecard served to reinforce this position and also clearly bring it before the growers.

Riparian and wetland vegetation. The majority of stream banks are vegetated with some trees and shrubs extending beyond the top bank. Priority areas for revegetation have been identified through the Douglas Shire Water Quality Improvement Project and negotiations were underway with the affected landholders to address this issue.

In developing this question the project team felt that it may have given more meaningful information to ask growers to nominate percentages of stream banks within their properties that were best described by each of the four statements rather than asking them to nominate the one statement that best described the situation on the majority of their properties.

1) Headland vegetation management. Most growers were slashing their headlands regularly but leaving vegetation long enough to enable it to act as effective sediment filter strips. This result was consistent with the answers to the section on Rat management. The majority of growers who responded to this question gave a level three or four response. The remaining growers, and those who did not consider they had a rat problem, appear to have not recognised the link between slashing and rat management.

2) Cane grub management. Cane grubs are only an issue in certain areas within the district. In those areas where they are a problem, the principals of IPM as applied to grub management did not appear to be understood.

3) RSD management. This issue appeared to be well understood by the vast majority of growers.

Chemical storage and handling. Regular training to ensure the majority of growers have current accreditation was an important extension objective. The issue of those with current accreditation but who have yet to bring all storage and mixing facilities up to a prescribed standard was of some concern.

4) Farm layout for BMP harvesting. The overwhelming majority of growers indicated that the majority of their headlands were of adequate width.

2006 survey results

Another round of the self assessment survey process was undertaken at two shed meetings in April 2006. All 34 growers attending the meeting completed the forms. Each self-assessment was compiled in an anonymous manner such that individual survey forms could not be identified. However, a list was maintained of all respondents at each meeting in both years. These lists show that most of the growers responding to the second survey had also responded to the first; of the 34 respondents to the second survey, over \( \frac{2}{3} \) had also completed the first. This gives some comfort in the interpretation of change trends where conclusions have been inferred from the data. The apparent trends are not just from sampling a different population.
Changes in BMP for the individual indicators between the 2003 and the 2006 surveys are discussed in summary in the following sections. Data was not analysed for statistically valid differences and the discussion was in terms of trends that were interpreted from the data. A discussion of these changes helped the project team assess and retarget the extension program.

The results of the 2006 survey are summarised in Table 10 (below). These have been expressed in terms of percentage response rate for each indicator, practice level and total response rate. The percentage response rate allowed for easier comparison between the two sets of results with different numbers of respondents.

In some instances all growers who completed the survey did not answer for all indicators. For example only 91% responded to the indicator for urea application on ratoons.

**Table 10. Summary of BMP scorecard responses – 2006 Survey**

<table>
<thead>
<tr>
<th>BMP Indicator</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nutrient Requirements Assessment</td>
<td>9%</td>
<td>32%</td>
<td>21%</td>
<td>38%</td>
<td>100%</td>
</tr>
<tr>
<td>2. Nitrogen Rates</td>
<td>12%</td>
<td>9%</td>
<td>44%</td>
<td>35%</td>
<td>100%</td>
</tr>
<tr>
<td>3. Urea Application on ratoons</td>
<td>13%</td>
<td>3%</td>
<td>61%</td>
<td>23%</td>
<td>91%</td>
</tr>
<tr>
<td>4. Minimum Tillage Planting</td>
<td>47%</td>
<td>38%</td>
<td>15%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>5. Green Cane Trash Blanket</td>
<td>3%</td>
<td>3%</td>
<td>62%</td>
<td>32%</td>
<td>100%</td>
</tr>
<tr>
<td>6. Fallowing</td>
<td>18%</td>
<td>26%</td>
<td>41%</td>
<td>15%</td>
<td>100%</td>
</tr>
<tr>
<td>7. Fallow Practice</td>
<td>26%</td>
<td>19%</td>
<td>23%</td>
<td>32%</td>
<td>91%</td>
</tr>
<tr>
<td>8. Controlled Traffic Strategies</td>
<td>0%</td>
<td>56%</td>
<td>41%</td>
<td>3%</td>
<td>100%</td>
</tr>
<tr>
<td>9. Drain Profile and Vegetation</td>
<td>9%</td>
<td>35%</td>
<td>32%</td>
<td>24%</td>
<td>100%</td>
</tr>
<tr>
<td>10. Drain Profile and Vegetation for deep drains</td>
<td>6%</td>
<td>34%</td>
<td>16%</td>
<td>44%</td>
<td>94%</td>
</tr>
<tr>
<td>11. Block Drainage</td>
<td>6%</td>
<td>15%</td>
<td>62%</td>
<td>18%</td>
<td>100%</td>
</tr>
<tr>
<td>12. Record Keeping</td>
<td>3%</td>
<td>53%</td>
<td>32%</td>
<td>12%</td>
<td>100%</td>
</tr>
<tr>
<td>13. Business Planning</td>
<td>30%</td>
<td>9%</td>
<td>36%</td>
<td>24%</td>
<td>97%</td>
</tr>
<tr>
<td>14. Riparian and Wetland Vegetation</td>
<td>3%</td>
<td>32%</td>
<td>56%</td>
<td>9%</td>
<td>100%</td>
</tr>
<tr>
<td>15. Headland Vegetation Management</td>
<td>6%</td>
<td>15%</td>
<td>12%</td>
<td>68%</td>
<td>100%</td>
</tr>
<tr>
<td>16. Cane Grub Management</td>
<td>21%</td>
<td>36%</td>
<td>43%</td>
<td>0%</td>
<td>82%</td>
</tr>
<tr>
<td>17. Rat Management</td>
<td>9%</td>
<td>30%</td>
<td>52%</td>
<td>9%</td>
<td>97%</td>
</tr>
<tr>
<td>18. RSD Management</td>
<td>3%</td>
<td>18%</td>
<td>35%</td>
<td>44%</td>
<td>100%</td>
</tr>
<tr>
<td>19. Chemicals Storage and Handling</td>
<td>15%</td>
<td>18%</td>
<td>38%</td>
<td>29%</td>
<td>100%</td>
</tr>
<tr>
<td>20. Farm layout for BMP Harvesting</td>
<td>3%</td>
<td>21%</td>
<td>35%</td>
<td>41%</td>
<td>100%</td>
</tr>
</tbody>
</table>

1. Changes in BMP between the two surveys.

- **Nutrient requirement assessment.** The results showed a general trend towards lower level BMP except for the level one which is virtually unchanged. In other words it appeared that similar proportions of growers were using soil samples but growers were sampling fewer blocks. Overall the level of soil sampling and interpretation in 2006 was lower than in 2003.

- **Nitrogen Rates.** The proportion of growers responding to levels one and two had not changed. However there appeared to be a trend for growers to change from using blanket rates on all blocks to varying the rates to account for other nitrogen inputs.

- **Urea Application on ratoons.** Levels one, two and three all reduced and four increased. Four new split stool applicators were bought into the district since between 2003 and 2006. This trend movement towards levels three and four was seen by the project team as a positive outcome for the extension program.

- **Minimum Tillage Planting.** The trend in this data was for slight decreases in levels one and three associated with a slight increase in level two. The local industry does not believe that the technology has been proven for successful billet planting using zero tillage and this was reflected in the absence of producers at level four. Changing to wider row spacings as
evidenced from indicator eight also had an impact here. While the industry is in the transition phase of changing to wider row spacings we are unlikely to see much of a shift towards strategic or minimum tillage.

- **Green Cane Trash Blanket.** The most significant change was from three to four. This indicated that people were still retaining trash when replanting and this message has been actively promoted through the shed meetings. As we see in Fallowing (below) there has been a trend towards planting legume fallows using zero-tillage which would also account for some of the shift in this current indicator.

- **Fallowing.** There has been a big change in the reduction in levels one and two and the corresponding increase in level three. In the short term there will be significant pressure on reverting from level three back to level two until people stabilise plantings on their farms. Levels of planting in the last few years have been low in response to the downturn in the sugar industry in general and the particular circumstances at Mossman.

- **Fallow Practice.** For this indicator response rate for level one went up, level two was a long way down and level four was up as well. This was seen by the project team as primarily a response to the downturn in the sugar industry with people who have not replanted cane blocks abandoning them as weed fallow. Previously many of these areas would have been replanted. On the other side we saw a marked increase in level 4. This was considered to be from the people who had previously sprayed out their fallows and managed the weeds. In the period leading up to the 2006 survey they were planting legumes as well as managing the weeds and cane regrowth. The Mossman sugar industry had an incentive program in 2004 to plant legume fallows and 2005 saw an increase in the area planted to legume fallows without incentives.

- **Controlled Traffic Strategies.** This was viewed by the project team as an excellent result with the shift from level two to level three. The extension program and incentives in 2004 were significant contributors to this result. The Mossman industry endorsed and adopted a farming system based around single rows at 1.65m row spacing. Several growers had previously made a change to wider rows based on 1.8 cm row spacing with dual rows but most were disappointed with the productivity results. The Mossman industry recognise that the 1.65m row spacing is a compromise as the full advantage of reduced compaction and cost savings with fewer rows per hectare to manage and harvest are not achieved.

- **Drain Profile and Vegetation.** The survey results show no apparent change between 2003 and 2006. Changes in this area require major investments with only small private benefit but large public benefit to the environment. With the downturn in the sugar industry such investment was unlikely without incentive funding. Some funding was available through the Douglas Shire Council Water Quality Improvement Program (WQIP) and some drains were changed. Conversion to shallow drains that can be driven through, in some cases, also enabled more efficient harvesting through the ability to harvest blocks together. Conversion of drains where considered appropriate will be a long process and the project team did not expect to see any appreciable change between 2003 and 2006.

This indicator was also rather subjective as it depended on the grower’s assessment of the percentage of his total drain length that fitted into each of the categories. Actual measurement or validation of the level would be difficult. Given this, it was interesting to see the close match of data between the two surveys.

- **Drain Profile and Vegetation for deep drains.** The Mossman industry recognises that it is not always possible to convert deep drains to shallow drains. The best management for deep drains was considered to be an important addition to the 2006 survey. The subjective nature of the assessment discussed in the previous section also applies to this section.
○ **Block Drainage.** The responses to this question in 2006 compared with 2003 showed a trend towards lower level practices with a decrease in level four and matching increases in level three, two and one. This reverse trend was interpreted by the project team as being the result of a very wet year following a number of drier years and growers re-assessing their situations; blocks that appeared well drained in a dryer year may still have wet areas in a wetter year. Laser levelling of cane blocks in Mossman continues as blocks are fallowed or replanted.

○ **Record Keeping.** The data shows a trend from level one to levels two and three, with level four virtually unchanged. The project team believed that this trend was in part at least due to the extension program. However, we also believed that growers may be understating the extent of their record keeping and that most growers are keeping more than basic financial records. For example they will have copies of their farm maps with fertilizer rates, spraying details and other information or they will have separate records of these.

In establishing the definitions of the levels in the original survey it was recognised that there was a big jump from level two to level three. In their responses to both surveys we believe that many growers were probably somewhere in-between but still calling it a level two.

○ **Business Planning.** The responses to this indicator showed a trend decrease in level one and increase in two, and marginal increases in three and four; the most significant is the decrease in level one. The project team believed that the extension effort on business planning should be maintained with focus moving more towards recognition and use of the plan as a business management tool. In particular the program looked at establishing a benchmarking group.

○ **Riparian and Wetland Vegetation.** The data did not show any marked trend for this indicator.

○ **Headland Vegetation Management.** This data showed a trend with a marginal increase in level one but larger decreases in levels two and three associated with an increase in level four. The inference from this result was that growers were not slashing headlands as low with more than 80% nominating that they were not slashing their headlands to less than 10 cm (levels three and 4) in 2006. The trend seemed to be for more frequent slashing at a higher level.

○ **Cane Grub Management.** The data showed a trend shift from level two to levels one and three with stronger trend towards level one. On the surface this could appear as a disappointing result. However, the project team felt that two issues had an impact on this response rate.

1. In 2003 the total response rate for this indicator was 55% whereas in 2006 this rate was 82%. Growers were advised in 2003 that if they did not consider that they had an issue with any indicator or felt that they were unable to answer any indicator they should just leave it, but this same advice was not given in 2006. In this particular instance the suggestion was that only 55% of growers considered they had a cane grub problem in 2003. However, in 2006 growers may have answered the question even when they did not consider that they had a problem.

2. The project team was concerned that with this indicator best practice was poorly defined. Best practice is level four; but depending on the individual grower’s circumstances it could also be levels one, two or three.

For example:
- For a grower who does not have a cane grub problem then level one is the best management practice
- For a grower in an area where cane grubs are a problem every year in all parts of the farm then level two is the best management practice
- For a grower who has grub problems in some cane blocks or in some years then level three is the best management practice.
The indicator was intended mainly as a gauge of current management practices. This meant that the absolute responses were more important than the rankings. The absence of response to level four in either survey also indicated that growers had a poor understanding of the IPM strategies for grub control. Practices such as reduced tillage in plant blocks, green cane trash blanketing, lime and mill mud applications and fallow management all have an impact on Greyback cane beetle populations. As such, these practices are all elements in an IPM strategy for grub control. Recent changes in chemical registrations and chemical control practices for grub management would have also had an impact on the usage patterns noted in the survey data.

The data highlighted a need to target grub management in the extension program.

- **Rat Management.** The data showed a negative trend with increases in levels two and three and a decrease in level four. This suggested that fewer growers believed that they have adopted an IPM strategy for rat management and more are relying on rat baiting (either solely or partially) for control. Once again this suggests a poor level of appreciation of an IPM plan and the need to direct some extension effort in this direction.

- **RSD Management.** Overall the data shows a significant decrease in level four associated with increases in two and three. This suggests that there has been less hot water treating of cane in recent years and this conclusion was supported by anecdotal evidence. Overall there was a decrease in the proportion of growers nominating levels three or four.

- **Chemicals Storage and Handling.** Examination of the data showed very little change for this indicator although there was a slight decrease in the proportion at level one. MAS and Canegrowers Mossman continued with periodic notification to growers on availability of Chemcert courses and maintained a register of growers seeking Chemcert courses.

- **Farm layout for BMP Harvesting.** The data showed a large trend increase in level two and a corresponding decrease in level three with little change at levels one or four. This suggests that more growers considered that their headlands were wider in 2003 than in 2006. However, along with other broad subjective indicators in the survey (eg drains, drainage and vegetation management) some care was required in conclusions drawn from this result. This was a very subjective assessment and the project team felt that it was not a reflection of a real decrease in headland width.

Any significant changes in this indicator or other indicators dealing with natural resources management issues are not measurable in the short term. Trend changes would need to be assessed over a five to ten year period to measure effective change.

2. **General conclusions**

The major focus for the MAS extension program between 2003 and 2006 was in the areas of nutrient management and farming systems (the first eight indicators). The 2006 survey showed a positive trend in most of these aspects despite the generally depressed nature of the industry over most of that period. These changes were essential to improving viability and sustainability in the long term and the project team felt that the general thrust of the extension effort should continue.

Indicators involving resource management issues are difficult to measure through this broad survey approach. More detailed questioning would be required. In addition the time frame for measuring change should be in the order of five to ten years because of the slow rate of change.

Indicators for business management suggested a continuation of the extension program in that area was required.
The project team felt that the indicators for pest and disease management required a greater extension effort particularly in improving the understanding of IPM strategies and practices.

2007 survey results

A final round of the Self Assessment process was undertaken at a single shed meeting held in December of 2007. A total of 24 individual growers completed the Self Assessment worksheet. An analysis of this group is summarised in Table 11.

**Table 11. Farmers completing the 2007 Self Assessment**

<table>
<thead>
<tr>
<th>Total</th>
<th>% of Total</th>
<th>Number</th>
<th>Total</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farms</td>
<td>247</td>
<td>41%</td>
<td>177</td>
<td>8,403</td>
</tr>
<tr>
<td>Farming Entities</td>
<td>78</td>
<td>8,319</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completed Self Assessments</td>
<td>32</td>
<td>4,559</td>
<td>54%</td>
<td></td>
</tr>
</tbody>
</table>

The group of 24 growers represents 32 individual farming entities or 41% of the total farming entities who are members of MAS. The members completing the self assessment worksheets collectively farm 4,559 ha or nearly 55% of the total area farmed. The average area per farming entity in this sample is just over 143 ha. This compares with the average area per farming entity (Table 4) of 108 ha. The project team believed that the growers undertaking this self-assessment process are the larger more progressive farmers. The project team also noted that 12 of the 42 growers in the original survey group had retired or were no longer actively involved in farming.

The actual number of farmers completing the self-assessments was lower in 2007 as was the total area farmed by the respondents. However, only one shed meeting was held rather than two as in previous years. In addition the meeting was held in December after the completion of crushing and this may not have been the ideal time as some growers were away.

The original survey in 2003 was used in the development of the extension program. The survey in 2006 was conducted in April and reflected management practices in the 2005 cane seasons. The extension program was reviewed following this survey with several new initiatives including the focus on legume planting and soil sampling through the SIRP funded project. The survey in 2007 was undertaken in the December and reflected practices during that season. Hence the surveys reflect changes over the four year period from 2003 to 2007 and the project team feels that this gives a balanced view of the impact of the extension program over this time period.

The results of the 2007 self-assessment have been summarised in Table 12 with the summarised results of the 2003 survey. This table gives the percentage response rates for each of the indicators at each of the levels of performance as per the self-assessment statements. The 2003 and 2007 results include a sum of the response rates for levels three and four with the figures highlighted in yellow where the combined response to these two levels is less than 50%. The final row of figures gives total number of indicators for each of the practice levels nominated by the greatest percentage of growers.

The summarised results from 2003 compared with the results from 2007 indicate that there has been a degree of success with the program or improvement in the adoption of BMP in cane production. In 2003 the greatest percentage of growers nominated that they were at level three or four practices for 12 of the 20 indicators whereas this figure was 16 for 2007. In addition the number of indicators where more than 50% of the growers surveyed nominated a level three or four practice was 13 for 2003 and 18 for 2007.
Table 12. Summarised results of 2003, 2006 and 2007 Self-assessments (expressed as % of total responses).

<table>
<thead>
<tr>
<th>BMP Indicator</th>
<th>2003</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3 or 4</td>
</tr>
<tr>
<td>1. Nutrient Requirements Assessment</td>
<td>10%</td>
<td>21%</td>
<td>45%</td>
</tr>
<tr>
<td>2. Nitrogen Rates</td>
<td>10%</td>
<td>7%</td>
<td>55%</td>
</tr>
<tr>
<td>3. Urea Application on ratoons</td>
<td>20%</td>
<td>5%</td>
<td>71%</td>
</tr>
<tr>
<td>4. Minimum Tillage Planting</td>
<td>50%</td>
<td>31%</td>
<td>19%</td>
</tr>
<tr>
<td>5. Green Cane Trash Blanket</td>
<td>0%</td>
<td>0%</td>
<td>76%</td>
</tr>
<tr>
<td>6. Fallowing</td>
<td>21%</td>
<td>45%</td>
<td>19%</td>
</tr>
<tr>
<td>7. Fallow Practice</td>
<td>14%</td>
<td>50%</td>
<td>25%</td>
</tr>
<tr>
<td>8. Controlled Traffic Strategies</td>
<td>2%</td>
<td>90%</td>
<td>2%</td>
</tr>
<tr>
<td>9. Drain Profile and Vegetation</td>
<td>8%</td>
<td>33%</td>
<td>33%</td>
</tr>
<tr>
<td>10. Drain Profile and Veg for deep drains</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>11. Block Drainage</td>
<td>0%</td>
<td>12%</td>
<td>59%</td>
</tr>
<tr>
<td>12. Record Keeping</td>
<td>7%</td>
<td>63%</td>
<td>17%</td>
</tr>
<tr>
<td>13. Business Planning</td>
<td>41%</td>
<td>2%</td>
<td>34%</td>
</tr>
<tr>
<td>14. Riparian and wetland vegetation</td>
<td>2%</td>
<td>36%</td>
<td>57%</td>
</tr>
<tr>
<td>15. Headland Vegetation Management</td>
<td>2%</td>
<td>24%</td>
<td>17%</td>
</tr>
<tr>
<td>16. Cane Grub Management</td>
<td>9%</td>
<td>52%</td>
<td>39%</td>
</tr>
<tr>
<td>17. Rat Management</td>
<td>11%</td>
<td>24%</td>
<td>38%</td>
</tr>
<tr>
<td>18. RSD Management</td>
<td>7%</td>
<td>7%</td>
<td>31%</td>
</tr>
<tr>
<td>19. Chemicals Storage and Handling</td>
<td>19%</td>
<td>17%</td>
<td>36%</td>
</tr>
<tr>
<td>20. Farm layout for BMP Harvesting</td>
<td>5%</td>
<td>10%</td>
<td>45%</td>
</tr>
</tbody>
</table>

Number of indicators ranked by the most (greatest % of) growers at each practice level

2 6 8 13 1 3 10 6 2 2 12 7 18

Mossman growers have made significant changes to management practices in cane production over the period of this project as documented in the table above. Fallowing, fallow practice, control traffic strategies and drain management have all shown increases in responses at the higher levels. Cane grub management has also shown a shift from level two to level three as the highest response level. These have all been areas of particular focus within the extension program and the team believes the project has had a significant impact on this outcome.

Business planning results were discussed in the previous section. Record Keeping and Minimum Tillage Planting are the two areas where the responses at levels one and two are greater than the response rate for levels three and four. The Mossman sugar industry does not believe the technology has been proven for minimum tillage billet planting at a commercial level under local conditions. This situation has not changed since then and no zero-tillage planters are in use in the area and hence no responses to level four. A number of growers have adopted ‘zonal tillage’ practices where only the strip in the field where cane is to be planted is cultivated but there has been no effective shift in the responses to levels two or three between the 2003 and 2007.

The performance for the Record Keeping indicator was noted as a concern to the project team. In a previous section of this report there was some discussion on growers understating the extent of their record keeping. The project team offered growers pro-forma maps of their farms with room for keeping fertiliser and spraying records. Several have continued to use these forms but the uptake was never move than a handful of growers.

The project team felt that the indicators for drain profile and vegetation did not adequately capture changes to drain condition or management. Mossman Agricultural Services undertook a survey of cane drains in the Saltwater Creek catchment in 2006 (unpublished). This survey identified 32.5
kilometers of drains including drains along the rail and roads in an area with 554 hectare of cane. This gave an average of over 500 metres of drain per hectare of cane. Of these 63% were steep sided and 26% were classified as unstable. Stabilising 500 metres of drain would have represented a significant cost to an individual but may not result in a significant change in the indicator for that individual.

Overall the project team feels that the BMP self-assessment process leading to the extension program has been one of the most successful features of this project. The results to date, despite the continuing economic difficulties with the Mossman Sugar Industry, have justified this opinion.

Harvest Working Group and Vision 2010 Group meetings

1. Harvest and Transport 2004

A full report of the Harvest and Transport arrangements for 2004 are included as Appendix 12. This report was prepared in May 2004 and summarised the issues discussed by the Harvest Working group. The report documented the changes and considered the impact of the changes.

In summary these changes were to:

- **Toll Crushing.** A similar toll crushing system to the 2003 arrangements was negotiated between MCM and the Arriga (Tablelands) Mill with an estimated 165,000 tonnes of cane assigned to Mossman toll crushed at Arriga Mill with a further 145,000 tonnes to be transported and crushed at MCM. This would result in considerable savings to the transport costs for Mossman and a reduction in the throughput of MCM to 750,000 tonnes.

- **Hours of Work.** Shift times at the mill were changed with the first shift starting at 8:00 am on Monday morning with crushing commencing by 2:00 pm and finish crushing by 2:00 am on Saturday morning with the mill shut down by 8:00 am. This reduced the effective crushing from 120 hours per week to 108 hours per week and at an anticipated average crushing rate of 335 tonnes per hour resulted in a projected 20 week crushing season.

- **Harvest and Transport Coordination.** Until the 2004 season the transport operations had been managed by MCM staff and the harvester scheduling and movements managed by MAS. Changes were considered for the 2004 season with both transport and harvest coordination managed by MAS. These changes were intended to reduce some of the conflicts that arose from differing demands of the grower/harvesting and transport sectors.

- **Number of Harvest Units.** The number of harvest units in the Mossman Coastal area reduced from 20 to 18 with a consequent increase in daily bin quotas for most groups. The largest group in Mossman had an estimated 60,000 tonne of cane to process for the season. The intention was to operate a single shift and this equated to maintaining an average harvest rate of 50 tonnes per hour to keep to quota and not extend harvesting hours beyond safe limits. In the Mareeba cane supply area two of the five harvesters operated two shifts with 24 hour harvesting and had estimates of over 80,000 tonne.

- **Number of Harvest Rounds.** In recognition of the reduced crushing hours, reduced throughput and consequent shorter season, the industry agreed to a reduction in number of rounds from five to four.

The working group recognised that decisions on matters such as toll crushing, hours of work and harvest and transport coordination were commercial decisions made by MCM. However, the working group gave the harvesting and growing sectors of the Mossman sugar industry a forum for discussion of the issues and in particular offer opinions on how the commercial decisions made by MCM could impact on the growing and harvesting sectors. It was felt that these discussions could then be taken into consideration by MCM when making the commercial decisions.
An analysis of the age of the harvest fleet of the major operators, not including the three smallest single farm operators, was undertaken as part of the analysis of the number of harvesting units. This showed an aging fleet with the newest harvester being five years old and the oldest sixteen.

2. Harvest and Transport 2005

Project MAS002 commenced in 2005 and most of the discussions of the Harvest Working group during this period have been documented in the MAS002 Final Report. A report was prepared in May 2005 for MAS001 dealing with changes to the number of harvesting units in Mossman since 2002 and the implications of these changes. This report has been included as Appendix 13. The analyses and discussions included in this report were considered by the harvest working group during the period leading up to the 2005 harvest.

**Hours of Work.** A dramatic drop in production from 2004 to 2005 was expected as the result of the loss of all cane supply from the Tablelands with an estimate of 550,000 tonne throughput for the season. Working hours at MCM were returned to the 2003 model. This involved the first shift starting at 4:00 am Monday morning with the boilers being lit at the start of the shift and crushing to commence by 8:00 am. The last cane would be crushed by 8:00 am on Saturday with the shift finishing at 12:00. This gave a total of 120 hours crushing per week. At an average crushing rate of 330 tonnes cane per hour this resulted in an anticipated season length of 16 weeks.

**Harvesting Units.** In 2002 twenty six harvesters were cutting a crop of about 1,000,000 tonnes of cane while in 2005 fifteen harvesters were to cut an estimated 550,000 tonnes. However, with the anticipated shorter season this left nine of the 14 major harvesting groups with daily quotas of more than 500 tonne with single shift operations. This meant that although there had been a decrease in the average throughput anticipated for the 2005 season, most harvesters were expected to be operating at significantly higher daily throughputs.

This presented a major problem with local harvesters operating at daily throughput capacity for a single shift operation but relatively low seasonal throughput and limited ability to change to two shift operations. This meant that the harvest sector was achieving relatively low returns to capital on their machinery investments and severely limited the operator’s ability to finance capital upgrades. The short season also limited the ability of the local industry to attract and retain staff to operate harvest machinery. Further reductions to harvester numbers would further exacerbate this problem.

An analysis was undertaken of the relationship in the Mossman cane supply area of yield and block size on harvesting costs. A group of eight of the Mossman coastal harvest groups and one Mareeba group was undertaken on the 2005 season estimated yield. This analysis indicated a bias in the Mossman area for harvesting groups having a high proportion of small, low yielding blocks compared with the Mareeba group. The analysis also showed considerable variation both between and within harvest groups of block size and yield.

This variation was also extrapolated to show similar variation in harvesting costs between blocks within groups and also between groups. The analysis showed a difference between the highest and lowest gross return to the harvester of $117 per hectare with two of the Mossman groups having higher returns than the Mareeba group. The analysis did not attempt to quantify the break-even point or even suggest the marginal return above operating costs for the groups. From the analysis of variation in yield estimate and variation in block sizes between groups it was suggested that there would be considerable variation in the
break-even point for the different groups and that some of the groups in this analysis could be operating below costs.

Project MAS002 which commenced in 2004 would generate data to complement other work through MAS001 project in assisting individual growers and harvesters make commercial decisions about harvesting charges and other investment decisions.

Harvest and Transport Coordination. For the 2004 crush MCM hired a new transport controller and contracted the harvest management to MAS. MCM management were concerned with effective loss of control leading to disruption of the continuous supply of cane to the mill. The working group felt that this arrangement had led to closer communication and cooperation in managing harvest and transport. For 2005 MAS was contracted for both harvest and transport management bringing both functions under a single control. The contract was for three seasons.

3. Harvest and Transport 2006

The role of the Harvest Working Group was modified following the mid-project review in 2005. It was given a more strategic focus to look at an optimum model for the harvest and transport sector in 2010 and develop a timetable for achieving structural and operational changes. In recognition of this expanded role the group was expanded with the addition of a farmer without harvesting interests and representation from both MCM management as well as the MCM board. The group was also referred to as the Vision 2010 group in recognition of its expanded role. The role as a forum for discussion of cross industry issues continued.

Northern Rivers Study Tour. A discussion report prepared for the group following the study tour of the Northern Rivers region is included as Appendix 14. The group was most impressed with the optimism of the industry in the Northern Rivers and saw several opportunities for changes that had direct application for the Mossman industry. The road transport arrangements using the multi-lift bin system and the structure of the harvesting group achieving significantly lower harvesting costs were of particular interest to the group.

Vision 2010 Group Meetings. A full report prepared for the Vision 2010 group on discussions for the 2006 season is included as Appendix 15. A proposal was considered by the group of moving the road transport cane directly into the mill using the multi-lift bin system from Northern Rivers and SCT as the road contractor. This proposal was further developed through the group in subsequent meetings and presented to the mill for consideration.

SCT Logistics was awarded the contract for road transport for the 2006 season using the existing system of transferring all road transport cane to rail for receival at the mill. There was insufficient time to make any major changes for the 2006 season. The contractor agreed to provide an assessment of the feasibility of moving road transport cane directly into the mill for the 2007 season.

Harvester Working Hours. The Vision 2010 group considered the harvest transport arrangements for the 2006 season. Harvester rosters for the season were presented to the group. The main issue highlighted was the peak demand on the transport system exceeded capacity during daylight hours. To reduce this peak and smooth the demand over the whole day, the harvesters needed to have a wider spread of operating hours so that the effective harvest window was increased. The suggestion was that the harvest window be from 3:00 am to 9:00 pm. The payment of an incentive for harvesters to start
earlier or finish later to increase the harvest window was discussed and adopted with agreement from MCM.

The group recommended that as a principle, all harvesters should have two hours cutting in the dark and that a meeting be called for all harvest contractors to consider the proposed changes, incentive and to discuss rosters. A meeting of all harvest contractors was held and the concept was accepted after vigorous discussion.

All other harvest and transport arrangements were unchanged from the previous season.

**Harvest and Transport system in 2010.** The basis of the harvest and transport system for 2010 in the Mossman cane supply area was developed through three meetings held in December 2005, February 2006 and March 2006. The major parameters of the system were:

- 700,000 tonne cane from approx 8,000 ha under cane with average yields of 80 to 90 tonnes cane per hectare. The ability to achieve the target yields and district production were questioned.
- Crushing rate of at least 320 tonnes per hour giving an 18 to 20 week season
- 12 to 14 harvesters with annual throughput of 50,000 to 60,000 tonnes with single shift operations. This number may be 10 machines by 2010. The concept of one cooperative group for Mossman was discussed. The current harvesting units are primarily contractors. As such the concept was not warmly embraced and members felt that the costs and benefits of a single cooperative for the mill area would need to be quantified and would be rigorously scrutinised.
- 50% of cane moving directly to the mill by road transport by 2009. This would require significant infrastructure changes at the mill including a road weighbridge, hopper to receive road cane and modification to the mill electronic cane receival and flow management system. First step would be to move existing road cane from the Julatten, Daintree and Mowbray districts direct to the mill.
- No more than four rounds and possibly just three. Some small farms (less than 3,000 tonnes) may only cut two rounds.
- A sustainable sugar price would be in the region of $30/tonne cane or a sugar price of around $350 per tonne.

The current major impediments to progress were seen as:

- Maintenance cost for rail infrastructure
- Cost of upgrades to the bin fleet
- Limitations to achieving 24 hour harvesting
- General shortage of skilled labour for both mill and harvesting operations with the relatively short season
- Crushing rate. The growers and Harvesters preferred to see a lower crushing rate to extend the season while the mill preferred a higher crushing rate to reduce bagasse usage, produce more electricity for export and reduce labour costs.
- Confidence of growers in the long term survival of the mill.
- The ability of the harvesting sector to achieve greater efficiency was being adversely affected by the limitations of the transport system particularly bin supply with the relatively high daily bin quotas.

The first meeting of the Vision 2010 group was in December 2006. The main focus of this meeting was as a debriefing of the 2006 season and to develop recommendations from the group for issues that needed attention before the 2007 season.

A longer spread of working hours in 2006 helped but there were still major problems with bin availability:

- Night cutting was slower than cutting during daylight hours as a rule and this created problems with large daily quotas leading to excessive hours.
- Those harvesters who opted for late starts often had significant delays in the evening due to problems with bin availability.
- Some groups left bins because of excessive hours, late deliveries or poor harvesting conditions.
- Large daily bin quotas meant that extra bins made for exceptionally long days for harvest crews which became a significant WHS issues for many crews.

The compounded effect of this problem was an interruption to the cane supply with the critical shortage in the early morning. The farming and harvesting sectors saw the solution in lower daily quotas achieved through the mill operating at a lower average crushing rate or more bins. Mill management considered a slower crushing rate problematic and were not in a position to finance significant upgrades to the bin supply.

The main recommendations from this meeting were:

- A study of the feasibility of transporting road cane directly to the mill. The group felt that the Julatten district would be a logical choice.
- The issue of daily bin quotas was of urgent concern for harvest contractors. The group accepted that a definitive analysis was required to look at expenditure on infrastructure (more bins or changes to the road transport system) against the cost of slower crushing rate.
- The harvest management required some changes to improve the information flow between MAS and the harvest contractors/growers. MAS will report back with proposed changes for the 2007 season.
- The number of rounds for small growers needs to be addressed to reduce harvester movements particularly during the last week of the season. This issue will be discussed at a later meeting of this group.
- The group was concerned about the poor communication and approach to communication between the harvest sector and mill management. Group members had felt that communication had improved through the forum of the group but were disappointed with some specific instances during the season.

The proposal for the movement of cane by road from the Julatten district directly into the mill was subsequently developed to a concept proposal with a preliminary cost/benefit analysis. This was presented directly to the Mossman Central Mill Board by members of the Vision 2010 group at the MCM board meeting on 14th December 2006. Following this presentation MCM Board asked that a more detailed proposal be developed for funding and implementation consideration. The detailed proposal was largely prepared by Gerard Puglisi who is the Transport Officer employed by MAS.

The Vision 2010 group meeting in January 2007 considered the more detailed road transport proposal (included as Appendix 17) and the Manager, Alan Johnstone, took this to the next MCM Board meeting on behalf of the group.
The other major item of discussion concerned the mill crushing rate (and the effects on the daily bin quotas of the harvesters). Mill management were extremely concerned to maintain crushing rate in the 325 to 340 tonnes cane per hour range for efficiency within the milling operations and to maximise power output. Contractors were more comfortable looking at crushing rates of around 260 tonnes cane per hour using only one of the boilers with considerably less pressure on the daily bin quotas.

A tour of the mill followed for group members to get a better understanding of the issues from the mill perspective. For many of the grower members it was their first mill visit for many years.

The MCM Board agreed to a trial of the direct receival of road cane into the mill for the 2007 crush. Troncs were awarded the contract for road transport of cane to the mill for the 2007 season. The proposal was further developed and a meeting for all Julatten growers was called in March 2007. The purpose of this meeting was to directly inform the growers of the intentions for road transport of the Julatten cane for the 2007 season and to seek feedback on the proposal.

The road transport contractor advised the meeting that pads would need to be built for the trucks to load and unload bins. This was necessary as the trailers were unstable in the raised position when loading bins and needed to operate from a firm level base. MCM management advised that no funds were available to construct these and the growers would have to bear this cost. Final agreement was reached for the mill staff to negotiate with affected growers and advise on sites for the pads and provide an estimate of costing.

40 multi-lift bins were secured and used for transport of cane from the Julatten and Mowbray areas directly into the mill. A fleet of six trucks and trailers were used for the season. A road transport weighbridge was installed at the mill and the cane tip and the cane receival system modified to allow MCM to directly receive and process cane from road transport.

Three additional trucks and the existing skeleton trailers were used for the transport of road cane from the Daintree and Bamboo areas to the Missingham interchange where the cane was transferred to the rail system for final movement to the mill. Hours of work and other parameters for the harvest and transport for the 2007 season were unchanged from 2006.

Little further progress was made to the program of change towards the 2010 model. Harvest contractors involved in the Vision 2010 Group had expressed concern at early meetings that improvements in harvesting efficiency were not possible until the transport system had been improved. Once this occurred further changes to harvest arrangements could be considered.

5. Harvesting Efficiency

No specific outputs from the program to improve harvesting efficiency had been included with this report. The information has been collated and presented in the MAS002 final report.
Environmental and Social Impacts:
(Including any expected or actual adverse or beneficial environmental or social impacts of conducting the project and/or implementing its findings)

1. Environmental Impacts

The BMP process had a focus on improving water quality of runoff reaching the Great Barrier Reef lagoon. The movement of sediment, nutrients and pesticides and the effects on the reef have been documented in many reports and subject of much recent scrutiny. Sediment and nutrient movement was examined in detail in the DSC WQIP (Richard Davis, 2006) with sources identified as either point source, principally sewerage treatment plant outfalls, or diffuse sources which included losses directly from the land surface and streambank erosion processes. There had been no long-term monitoring to quantify current pollutant loads and loads were estimated with modelling undertaken by CSIRO.

This modelling predicted total loads of pollutants from diffuse sources of 130,000 tonnes total suspended solids (TSS), 2,250 tonnes total nitrogen (TN) and 179 tonnes total phosphorous (TP) per annum. This modeling also showed that: ‘…the largest fractions come from uncleared land (93%, 80%, and 86% respectively) because it is both the dominant land use in the Shire in areal terms and it occurs in the more erosion-prone, higher rainfall country.’

In addition to the modeling of current day loads, additional modeling of pre-European loads was also undertaken. These were then used in developing aspirational targets for load reduction. However, it was noted in the report that: ‘…there are very high uncertainties associated with these modelled pre-European and current day loads.’ The errors associated with these models are estimated at ±200% and that the models did not represent nitrogen transport in forested systems well. The report concluded that: ‘…In spite of the large uncertainties the CSIRO models were used to estimate the pollutant loads under present day conditions because actual monitored loads are not available at the ends of the four river catchments.’

From the cleared land diffuse sources of sediment and nutrient, sugar cane was estimated as contributing approximately 37% of the TSS, 69% of the TN and 47% of the TP. Reduction targets were set in the WQIP of 22.5% reduction in TSS, 6% of TN and 16% of total P within 25 years. The report concluded that a reduction of 12% in sediment load, 4% in TN and 14% in TP could be achieved in 7 years through a combination of:

- Application of fertiliser according to soil and plant tissue tests
- Applying fertiliser sub-surface
- Using slow release fertiliser
- Improving fallow management and planting of legume fallow crops
- Repairing two thirds of the cane drains to reduce sediment and particulate nutrient loss
- Point source upgrade, principally improvements in phosphorus removal at the Mossman sewerage treatment plant.

The BMP self-assessment process established that the Mossman sugar industry has made significant steps towards the achievement of these targets. The 2007 results indicate that:

- 26% of the Mossman growers nominated that all urea was applied split stool or underground beside the stool (up from 5% in 2003).
- Nitrogen rates have shown marginal changes with 21% indicating that they used more than 160 kg/ha N on some blocks (up from 7% in 2003) and 42% indicate that they did not use more than 160kg/ha N on any blocks (down from 55% in 2003). This figure of 160 kg/ha N was well down from the 190 kg/ha N used in the SedNet model. In addition the number of growers
indicating that they apply nitrogen in ratoons underground increased from 5% in 2003 to 26% in 2007.

- 21% nominated that all cane was planted into fallow (up from 11% in 2003), 33% nominated that the area of fallow plant was greater than the area of plough out/replant (up from 19% in 2003).
- 36% had managed legume fallows planted zero till (up from 11% in 2003) and a further 32% had managed legume fallows (up from 25% in 2003).
- 42% of growers nominated that all drains were wide, shallow and grassed (up from 62% in 2003) with 25% nominated for each of the levels ‘…at least 70% wide, shallow and grassed’ and ‘…between 30 and 70% wide, shallow and grassed’ (down from 33% at each of these levels in 2003). In addition 76% nominated that at least 70% of their deep drains were stable with sides battered, stable and vegetated.

No attempt has been made to quantify these results in terms of changes to sediment or nutrient loads as such an assessment is well beyond the scope of this project. However, the results suggest that there has been significant improvement in the uptake of farming practices that were identified as having the most impact on reducing sediment and nutrient loads.

This data was obtained on a voluntary self-assessment basis and not subject to any formal validation or audit. However, information on areas and management of fallows, number and usage of split stool fertilizer boxes and anecdotal information on fertilizer usage supports the findings in this study. In addition, work is currently in progress in conjunction with terrainNRM (the former Far North Queensland NRM Board) to validate the condition of the drainage network through the cane landscape.

2. Social Impacts

Social impacts as a result of this project are much more difficult to qualify or quantify. MAS001 was a project of change management aimed at the Mossman sugar industry rather than a project with a focus on a component of the industry or production system at a local or broader level.

A program of change management is by nature long term in many agricultural activities including sugar cane. This often means that the rate of change is slow and results from the extension program are difficult to measure over a time frame as short as four years. Assessing the impact of the program and being able to establish a direct causal link between the program and the changes observed is also difficult.

The number of growers assisted with business planning and involved in the self-assessment process has already been discussed. The KPI’s used to assess the effectiveness or success of the project in achieving its designed objectives, demonstrate the impact against these measures. However, the project team is unable to draw any conclusions on social impact posed above. We still have a sugar industry in Mossman despite the changes generally in the Australian Sugar Industry over the last 5 years. This project has in some measure contributed to this survival.

The Community Involvement activities of this project have generally resulted in positive outcomes with the Mossman sugar industry in the forefront.
Expected Outcomes:

Changes to Key Performance Indicators measured over period of this project form the basis for measuring the impact of the project. The first four objectives all relate to sustainability at the farm level and will be considered together. As previously discussed in this report the three year rolling average yield figures do not show any change over the period although there has been considerable movement in the yearly averages and changes to the underlying factors influencing productivity. The average area per farming entity has increase markedly over the period and there has been an increase in the number of growers and percentage of the area subject to higher level BMP management. Business planning was directly addressed through this project.

A summary of key indicators used to measure the improvement in sustainability of the Mossman sugar industry are produced in Table 13. Over the period of this project:

- The size of the industry has decreased from production of nearly 630,000 tonnes of cane in 2003 to just under 560,000 tonnes in 2007
- The area of production has decreased by 700 hectares
- The number of farming entities has reduced by 25
- The average size of a farming entity has increased from 90 hectares to 108 hectares.

In aggregate this gave a smaller Mossman sugar industry with fewer larger farming entities.

Average cane prices to growers for mill average ccs over this period have been in the range of $22 to $24. The total return to growers using $23/tonne of cane as an average price reduced from an estimated $14.4 m in 2003 to $12.9 in 2007. The gross return per farming entity has however increased from $123,000 to $141,000.

Table 13. Key Indicators for the Mossman sugar industry farming sector - 2003 to 2007

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2003</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Yield (Three year running average)</td>
<td>71</td>
<td>71</td>
</tr>
<tr>
<td>Average Yield (Annual)</td>
<td>77</td>
<td>76</td>
</tr>
<tr>
<td>Total Production (Tonnes)</td>
<td>627,941</td>
<td>559,554</td>
</tr>
<tr>
<td>Harvested Area (Hectares)</td>
<td>8041</td>
<td>7343</td>
</tr>
<tr>
<td>Fallow Area (Hectares)</td>
<td>927</td>
<td>1060</td>
</tr>
<tr>
<td>Plant Cane (% of total area)</td>
<td>12%</td>
<td>19%</td>
</tr>
<tr>
<td>Number of Entities</td>
<td>103</td>
<td>78</td>
</tr>
<tr>
<td>Size of Entity (Hectares)</td>
<td>90.3</td>
<td>107.7</td>
</tr>
<tr>
<td>Average Cane Price (Estimated on mill average ccs)</td>
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<td>$23</td>
</tr>
<tr>
<td>Total Return to Farming Sector</td>
<td>$14,442,643</td>
<td>$12,869,742</td>
</tr>
<tr>
<td>Average return per farming entity ($)</td>
<td>$122,332</td>
<td>$140,793</td>
</tr>
<tr>
<td>Adoption of Farming BMP</td>
<td>13</td>
<td>18</td>
</tr>
</tbody>
</table>

A decrease in the number of farming entities and a reduction in the cane supply area which led to the improvement in average return per farming entity have created an issue for MCM. Overhead costs of milling have been reduced in absolute terms by changes to staffing and operational parameters but have increased per tonne of cane processed with the decline in production. Maintaining a cane supply is a major concern to the industry.

The KPI for the adoption of farming best management practice was measured as the number of indicators for which more than 50% of growers surveyed nominated a level three or four practice. This indicator has shown an increase from 13 of the 19 indicators measured in 2003 to 18 of the 20 indicators in 2007. One of the most significant changes has been the increase in row spacings over
the period of this project to from an industry standard of 1.52 metres to a farming system based on a single row of 1.65 metres. The survey in 2006, which was reporting on practices for the 2005 season, recorded a shift in the order of 44% of growers planting at 1.65m row spacings while the 2007 survey recorded 75%. The initial 2003 survey reported 7% at the wider row spacing.

Moving to the wider row spacing gives an improvement in efficiency (less rows for planting, harvesting and management) of nearly 8%. 1350 hectares were planted in 2006 with about 900 hectares planted at the wider row spacing. The savings to the Mossman industry are detailed in Table 14. Costs for harvesting are based on average Mossman figures of $8.00 per tonne and 90 tonnes per hectare yield of plant cane giving a cost of $720 per hectare. All other costs are based on Department of Primary Industry figures for the 2006 season (Neil Sing, DPI Kiari, pers com).

Table 14. Estimate of annual cost savings of wider row spacing – Mossman 2007

<table>
<thead>
<tr>
<th>Metres of Row per Hectare</th>
<th>1.52 (5'2&quot;)</th>
<th>1.65 m (5'6&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yields (Tonnes per Hectare) - Plant Cane</td>
<td>6579</td>
<td>6061</td>
</tr>
<tr>
<td>Harvesting Costs ($/hectare)</td>
<td>$720.00</td>
<td>$663.00</td>
</tr>
<tr>
<td>Planting (Machine only)</td>
<td>$300.00</td>
<td>$276.00</td>
</tr>
<tr>
<td>Hilling Up ($/hectare)</td>
<td>$13.50</td>
<td>$12.40</td>
</tr>
<tr>
<td>Spraying ($/hectare) - Two applications</td>
<td>$9.70</td>
<td>$8.90</td>
</tr>
<tr>
<td>Fertilizing ($/hectare)</td>
<td>$13.40</td>
<td>$12.30</td>
</tr>
<tr>
<td>Total Cost (All Operations)</td>
<td>$1,056.60</td>
<td>$973.00</td>
</tr>
<tr>
<td>Area (Hectares)</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>Total Savings (All Operations)</td>
<td>$84,000</td>
<td></td>
</tr>
<tr>
<td>Total Savings (Placing Only)</td>
<td>$25,100</td>
<td></td>
</tr>
<tr>
<td>Total Savings (Harvesting Only)</td>
<td>$57,000</td>
<td></td>
</tr>
<tr>
<td>Total Savings (Fertilizing and Spraying Only)</td>
<td>$1,900</td>
<td></td>
</tr>
</tbody>
</table>

The team does not have definitive information on the total area planted at the wider row spacings. However, the project team in 2007 conservatively estimates that 2,000 hectares have now been planted at 1.65 meters or wider. This has resulted in savings to the Mossman industry in 2007 of nearly $95,000 from the move to wider row spacing alone.

The other major documented changes in management practices have been in the area of increased use of legume fallows, with a decrease in the proportion of plough/out replant, the increase in use of managed legume fallows and the zero-till planting of legume fallows. Quantifying the benefits to the Mossman industry of these changes is much more difficult. DPI figures (Neil Sing, pers com) have suggested improvements of $150 per hectare in gross margin over the life of the crop from adopting a managed legume fallow over plough/out replant. The project team estimates that over 1,000 hectares of managed legume fallows have been planted in the Mossman area over the life of this project which gives an estimated $150,000 return to the Mossman industry.

The estimates of benefit to industry outlined above are all within the life of the project. However, the major impact of the project will extend well beyond the life of the project. This is because of improvement in knowledge and practice change that has already taken place. We are confident that MAS001 has given the Mossman industry a firm foundation for change and that this change will continue. The KPI’s particularly for best management practice are supporting this view. In addition the project team has all been locally based and will continue to work with the local
industry through Mossman Agricultural Services building on the processes developed through the project.

The benefits of the business planning undertaken in Mossman are difficult to quantify but are tangible. We have documented that the industry now has fewer but larger grower entities; growers have changed management practices to improve efficiency during a period of economic difficulty and an uncertain future for the Mossman sugar industry; those who remain in the industry have analysed their options and committed to cane production. In several cases there have been generational changes in the farming entities. These are all results of growers consciously considering their options and their future in cane, using tools and knowledge gained through the business planning. Growers will continue to assess their options as circumstance change and with these tools and knowledge gained are better able to make informed decisions.

The KPI’s for management practices that have principally an environmental benefit were discussed in the previous section. Much of the work on establishing wetlands and stabilising drains has been undertaken with external funding assistance and grower contributions with support from this project. The changes to the landscape from these works have not been adequately captured in the surveys. Work initially undertaken through this project as part of the DSC WQIP on repairing drains and establishing wetlands will continue with other external funding. This project played a large part in facilitating the engagement of the cane farming community in the WQIP.

An Eco-Accreditation Program has been developed for the Mossman area, broadly based on the BMP self-assessment process. This program has been developed with financial assistance from terrainNRM and a working group of industry representatives including members of the MAS001 project team. The simple worksheet has been considerably expanded to allow for a more rigorous assessment of management practices. These claims will then need to be validated with documentation that is suitable for independent audit. Terrain NRM has a memorandum of understanding with World Wildlife Fund (WWF) for endorsement of the program. A pilot with three farmers is scheduled for completion in 2008. This program development is a direct outcome of MAS001

The activities undertaken through MAS001 on improving harvest and transport efficiency led directly to the formation of the Vision 2010 group and harvester monitoring project MAS002. The Vision 2010 group was instrumental in developing the proposal for direct road delivery of cane to MCM. It has also been an industry representative forum for harvest and transport planning and a direct formal communication link between all sectors of the industry. The group will continue to meet.

The adoption of a CQI system for cane payments raised through this group is still under active consideration with a full trial of the system planned for the 2009 season. A block level comparison of the traditional and CQI payment system will be undertaken using 2008 data after the end of the crush followed by a direct comparison on a fortnightly basis of grower payments under a CQI system compared with the traditional payment formula for the 2009 season.

Through this project the Mossman sugar industry has been actively engaged with the former DSC and now terrainNRM in the WQIP. The Douglas Shire was the first to develop a WQIP and the close involvement of the sugar industry in this process ensured that realistic and appropriate management action targets aimed at sediment and nutrient reduction were set. This was possible because of the background data generated through the BMP self-assessment process. It has also meant that the Mossman sugar industry has achieved recognition for responsible environmental management. The Sugar Awareness Days have also contributed to this recognition.
Future Research and Development Needs:

The Mossman sugar industry has undergone significant change through this project and these have been discussed in this report. However, there are still significant challenges facing the industry. Over the last five years we have seen a reduction in the size of the industry associated with the loss of cane land and continuation of relatively low levels of productivity.

MCM has developed a number of product diversification initiatives having identified the need to change from total reliance on the world raw sugar market. These initiatives have been undertaken during a period of significant financial difficulties and are now at the stage of full commercial production. However, the mill needs the full support of its suppliers to succeed with the ventures. This full support includes

**Extension Program.** The current extension program needs to be reviewed and refined to reflect current priorities. This final report will provide a background for that assessment. The BMP self-assessment process focussed on nutrient and sediment aspects of water quality with no attention to pesticide management. In addition the ability to monitor changes in environmental indicators such as cane drains and riparian vegetation has been identified as an inherent weakness in the existing BMP self-assessment process.

The federal Reef Rescue funding package offers some opportunities for incentive funds to assist growers with changing management practices. The focus is on water quality and complements work undertaken through MAS001. The Mossman Extension program needs to be evaluated in conjunction with the Reef Rescue program to ensure that growers and the Mossman industry gain maximum benefit from the programs. The Mossman industry must build on the progress made through MAS001.

i. **Record Keeping.** The apparent lack of change for the Record Keeping indicator in the self-assessment process needs to be addressed. In the first instance grower’s understanding of the different levels of record keeping should be clarified and different record keeping systems both paper based and electronic need to be developed or evaluated. The Reef Rescue package will require a high standard of record keeping for compliance and validation of practices. Many growers may need to look for different systems to meet the requirements under the Reef Rescue program.

A computer based record keeping system to integrate with the current cane planting, variety and productivity information maintained through MAS has been considered by the project team on a number of occasions. A number of the more progressive growers have expressed an interest in this type of system. Several systems have been considered although never rigorously evaluated or commitment sought from interested growers in pilot testing. The project team now considers this a priority issue.

ii. **Nitrogen Rates.** The indicators for nitrogen rates and application support other anecdotal evidence of the increase in the number of split stool fertiliser applicators. The information does not support the view that nitrogen rates have decreased although there is some evidence to suggest that more growers are adjusting their rates to account for other nitrogen inputs such as from mill mud or legume fallows.

Several local growers have been involved with research undertaken by CSIRO looking at using rates of nitrogen based on the previous year’s production (N replacement). This
predictive management tool has the potential to reduce the rate of nitrogen applied to crops without significantly affecting levels of production. However, there has not been significant uptake of this tool for determining nitrogen rates in a ratoon crop. Wider commercial field trial of this tool is seen as important as it offers growers the potential to save money as well as reduce environmental losses of nitrogen while maintaining productivity.

**Maintaining cane supply.**

The loss of cane production through the retirement from farming of growers as they look for retirement is a continuing threat to the long term future of the Mossman sugar industry. The information gathered through MAS001 has pointed to a reduction in the number of farming entities with an increase in the size of those remaining. However, the demographic information collected early in the project would also suggest that a significant proportion of growers are of retiring age and are not wishing to continue active involvement in farming operations.

The key issue is to allow this group to retire from active farming while retaining the farming assets in production. In many cases there is not another generation to continue farming and the younger generation who are interested in farming do not have the ability to finance the purchase of this farming land. On a recent visit, Ms Jenni Matilla a lawyer with extensive experience in providing corporate, commercial and financial structuring advice suggested a cooperative model of land management to address many of the issues with retaining productive farming land while achieving generational transfer in the farming operations. She outlined some of her work with a group using this model. Several Mossman growers are interested in exploring this option further and some external funding would assist the process.

Exploring these options would also be of benefit to the members of the Next Generation group who are interested in securing a future in farming in Mossman without the capital to finance the purchase or the desire and finance to assume all the risks associated with more traditional share-farming models.

**Local evaluation of cane cultivars.**

The detection of smut and its subsequent spread to most cane areas has highlighted the limited range of suitable productive smut resistant cane varieties for areas such as Mossman and for some of the important soil types in the area such as the sandy soils of the Brosnan series. The resources of the existing BSES cultivar evaluation program at Meringa are fully committed and can not be extended to these more specific local sites. A program funded by growers has commenced in Mossman to evaluate a number of cultivars at local sites. However, these local trials are limited by the availability of personnel and equipment to undertake the program. The need for additional resources to undertake this program is seen as a priority.

This local evaluation program could also include an assessment of cultivars to suit the value-added products at MCM.
Recommendations:

The focus of work undertaken through this process has been on improving the sustainability of the Mossman sugar industry. As such there is little of substance or significance in the project outputs for other mill areas beyond the processes developed and employed.

The Mossman sugar industry is the only mill area in the Australian sugar industry where management practice have been documented at an industry level and rates of adoption of defined practices over a five year period are currently available. The process of BMP self-assessment leading to industry defining an extension program focussed on improving the rate of adoption of particular practices has proven effective in this mill area and has some relevance to other mill areas. This is particularly important with the current focus of both the federal and state governments on farming practices that are impacting on water quality in the Great Barrier Reef.
References:

List of Publications:

The only external publication of this project was the poster presented at the APEN and ASSCT conferences in 2006 (Appendix 2). Other documents included as Appendices are internal discussion or information papers prepared as part of the project activities. They are included as substantive documents that generally provide detail to project activities.
Appendix 1. Discussion Paper – Evaluation of MAS001; Developing Key Performance Indicators

The MAS001 project team included a number of indicators of performance or measures to assess the effect of the project. These targets were developed for some of the key areas within the project. However with the changes to the objectives of the project and also the change of emphasis within the extension program the review panel recommended that the evaluation framework should be reviewed and:

“… the impact of the MAS001 project be more clearly demonstrated by improving the clarity of the project evaluation framework.”

The review panel recommended that a more concise set of (KPI’s) be developed for each of the project objectives. The review panel also suggested that a series of ‘mini-reviews’ should be programmed for the remaining term of the project with some external input into this review process to strategically reflect on the progress of the project.

Measuring the effectiveness of extension processes or projects has ‘…..been an on-going area of difficulty. Either it has been undertaken too simplistically (measuring the total level of adoption of specific technologies or practices – despite extension being only one of the influences operating), or it has been measured with complex formulae that provide doubtful results.” (Coutts 1997) In his paper Coutts proposed a framework of evaluation that is a ‘three ringed circus’ with three concentric rings (Figure 1).

Figure 1: The three rings of extension evaluation (Coutts 1997)

Evaluation at the internal project level mainly deals with the processes employed in the program and Coutts suggests that evaluation at this level should concentrate on evidence that appropriate adult learning principals were planned and employed since there is “…strong evidence that adult learning approaches provide positive outcomes with respect to motivation, learning and understanding (Kolb 1984).” He further suggests that an appropriate form of this evaluation may be with a workshop or facilitated reflective session with the project team. Alternatively the inputs and outputs from the extension processes and activities could be assessed.
The project team also meets routinely before and after activities in the extension program to refine processes. While this is part of the extension program development it is not a formal documented evaluation process. Principals of adult learning are employed in the planning of activities within MAS001.

For MAS001 a more formal evaluation process could be included as part of the proposed ‘mini-reviews’. We are not currently planning for this and have not made provisions within the budget for this to occur. However, the project team would be responsive to formalising processes during the ‘mini-reviews’.

The direct project impact level or the second ring increases the complexity of evaluation of the project in that the extension process and project is “…often just a pebble in a sea of competing interests, surrounded by social, economic, climatic and biological factors over which it has little control or input.” The economic climate of price fluctuations and uncertainty in the future of the Mossman Central Mill can also be included in the interests associated with this project.

Here Coutts suggests that one approach is to focus the evaluation at the level at which the extension program is having an impact through:
- Evaluation of what the program is adding to an individual participant’s knowledge or understanding process.
- Evaluate the impact at this level.

In applying this to an evaluation of Integrated Pest Management (IPM) strategies in the cotton industry Coutts suggested that evaluation indicators should be based on the “…changes in confidence and understanding about alternative IPM strategies by growers and their consultants – rather than on the level of adoption of IPM per se.” Coutts also pointed out that there are a number of different approaches to conducting this evaluation and he only canvassed a limited number of different examples in his paper.

For MAS001 the approach has been through looking to impediments with adoption of BMP and then using strategies to overcome these impediments. An evaluation of the impact of the program based on individual participants knowledge, attitudes, aspirations or skills could be developed but once again has not been planned or budgeted.

The overall industry, community or societal level is the outermost of the three levels described. This is perhaps the easiest level at which to quantify change but the difficulty is in quantifying the extent to which the program in question contributes to the change. As such the KPI’s that have been developed for MAS001 at the industry level have been chosen to reflect areas of influence from the program.

In developing the KPI’s the project team is mindful that the primary focus of the project is on assisting the growers of the MCM area. Assessing the impact of the project is important for both the project team in evaluating its development and delivery processes for extension and SRDC as the funding agency. In developing the KPI’s the project team is mindful of the need to provide meaningful evaluation while not allowing the evaluation processes to detract from the extension program through resources allocation.

The review panel recommended that Key Performance Indicators were developed for evaluating MAS001 that reflected the situation at the start of the project (July 2003), at the time of the mid-term review (July 2005) and at the end of the project (September 2007). In some cases the indicators will be direct measures of change but others will be at best indirect assessments of change.
Key Performance Indicators

The basic evaluation question we have posed is: *What can we affect within MAS001 and what can we measure that will reflect the impact of the project?*

**Objective one – Sustainable Mossman Sugar Industry**

The accepted definition of ‘sustainability’ includes social, economic and environmental factors and it is reasonable to look at developing KPI’s in each of these areas.

- **Social.** MAS001 can only have a very indirect or minor effect on social processes that may drive indicators of social sustainability. As such no KPI’s have been considered for social aspects of sustainability.

- **Economic.** The Rural Industries Research and Development Corporation have published a guide (RIRDC 1997) of ‘Sustainability Indicators for Agriculture’. The most useful measure of financial sustainability is given as ‘disposable income per household’. For the purposes of this project we are principally interested in the disposable farm income rather than the off-farm component. Disposable Farm Income is Farm Income less farm operating costs, less depreciation and finance costs. This is further broken down to:

  - Farm income which is a function of price, yield and area of cane. We currently have yield and area per farming entity data. Price is mostly determined by factors beyond the influence of this program and as such is not considered.

    Actual values for all KPI’s are summarised in Table 2.

  - The major farm operating costs are fertilizer, harvesting, chemicals and planting including land preparation. The project team currently does not have access to this data however the proposed benchmarking group would consider all of these cost elements.

Our farming systems extension program is based around improving yields and reducing costs in all areas mentioned. The KPI considered as an indicator of economic sustainability is yield. By the end of the project we hope to have additional elements of cost data that can be benchmarked over the period of the project.

- **Environmental.** The project team has developed the self assessment process for best management practice and data is available from the first round of assessments in 2004. This data was presented in full in MR3. The indicators chosen for this process were all considered to have an impact on water quality. The KPI’s for environmental sustainability area based on this process and discussed in more detail under Objective 3.

This process and data was also utilised by both Douglas Shire Council and FNQ Natural Resources Management Ltd (FNQ NRM) in developing management action targets within the ‘Water Quality Improvement Plan’ (Davis 2005). Targets within this plan are based on seven year and 25 year time-frames

**Objective two – Farm Amalgamation**

One of the major issues for the long term sustainability of the Mossman Sugar industry is the loss of productive cane land to other agricultural and non-agricultural activities. The project team also
recognises that the average size of farming entities in the Mossman area is well below the optimal size for a full time farming operation.

MAS001 project is not directly addressing this issue with a proactive extension effort. It is monitoring changes and providing indirect support through productivity and productivity efficiency initiatives, business planning advice and support as well as support for diversification options to improve farm income while supporting the Mossman cane industry.

The KPI to assess impact towards this objective is \textit{Area/farming entity}.

\textit{Objective three – Adoption of BMP}

The results of the 2003 survey of BMP is summarised in table one (below). The responses of all farmers completing the survey were collated and the total response for each practice level against each indicator is listed in the table. The general thrust of the extension program is to change management practices such that more growers are able to respond to the higher level practices (Practices three and four) against each of the indicator areas.

Using these results as a KPI over time the project team has set a target for \textit{July 2007} as being that \textbf{more that 50\% of growers will give a response to Practice three or four for all BMP indicators}. The indicator for \textit{July 2003} was \textbf{more than 50 \% of the growers nominating Practice three or four for 13 of the 19 BMP indicators}. Mossman growers will be re-surveyed in early 2006 and this will reflect the situation that was current in 2005.

In addition to the overall indicator or KPI, changes in the response to individual indicators will be useful in monitoring the extension program. Issues associated with this re-survey were discussed in the previous section.

Table 1. Summarised response from self-assessment scorecard (2004).

\begin{table}[h]
\centering
\begin{tabular}{|l|c|c|c|c|}
\hline
\textbf{BMP Indicator} & \textbf{Practice 1} & \textbf{Practice 2} & \textbf{Practice 3} & \textbf{Practice 4} \\
\hline
1. Nutrient Requirements Assessment & 10\% & 21\% & 24\% & 45\% \\
2. Nitrogen Rates & 10\% & 7\% & 55\% & 29\% \\
3. Urea Application on ratoons & 20\% & 5\% & 71\% & 5\% \\
4. Minimum Tillage Planting & 50\% & 31\% & 19\% & 0\% \\
5. Green Cane Trash Blanket & 0\% & 0\% & 76\% & 24\% \\
6. Fallowing & 21\% & 45\% & 19\% & 14\% \\
7. Fallow Practice & 14\% & 50\% & 25\% & 11\% \\
8. Controlled Traffic Strategies & 2\% & 90\% & 2\% & 5\% \\
9. Irrigation Scheduling & & & & \\
10. Irrigation Systems & & & & \\
11. Drain Profile and Vegetation & 8\% & 33\% & 33\% & 26\% \\
12. Block Drainage & 0\% & 12\% & 59\% & 29\% \\
13. Record Keeping & 7\% & 63\% & 17\% & 12\% \\
14. Business Planning & 41\% & 2\% & 34\% & 22\% \\
15. Riparian and wetland vegetation & 2\% & 36\% & 57\% & 5\% \\
\hline
\end{tabular}
\end{table}
16. Headland Vegetation Management

<table>
<thead>
<tr>
<th></th>
<th>2%</th>
<th>24%</th>
<th>17%</th>
<th>57%</th>
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17. Cane Grub Management

<table>
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<th></th>
<th>9%</th>
<th>52%</th>
<th>39%</th>
<th>0%</th>
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18. Rat Management

<table>
<thead>
<tr>
<th></th>
<th>11%</th>
<th>24%</th>
<th>38%</th>
<th>27%</th>
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19. RSD Management

<table>
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<tr>
<th></th>
<th>7%</th>
<th>7%</th>
<th>31%</th>
<th>55%</th>
</tr>
</thead>
</table>

20. Chemicals Storage and Handling

<table>
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<tr>
<th></th>
<th>19%</th>
<th>17%</th>
<th>36%</th>
<th>29%</th>
</tr>
</thead>
</table>

21. Farm layout for BMP Harvesting

<table>
<thead>
<tr>
<th></th>
<th>5%</th>
<th>10%</th>
<th>45%</th>
<th>40%</th>
</tr>
</thead>
</table>

**Objective four – Progress use of business plans**

As discussed in the review of the extension program the concern was that business plans were being used rather than just produced. As such the KPI for business planning will involve the formation of a benchmarking group during 2006.

**Objective five – Optimise Harvest and Transport**

The objective of optimising the harvest and transport system for the Mossman Sugar Industry is to achieve maximum recovery of sugar from farm to mill in the most cost efficient manner. This system is the interface between farm and mill and relies on all sectors working in concert to achieve an ‘optimum’ state. As previously discussed the review panel recommended working towards developing a model or vision for the best system for Mossman in 2010 and then look to the steps necessary over the period to make it happen.

In developing this model it is recognised that the different sectors have different individual objectives that may not necessarily be complimentary. This then means that the different sectors will have different indicators of performance against this project objective.

- The mill is aiming for a continuous supply of cane delivered at a minimal cost.

**Time lost – cane supply dry.** MCM has annually prepared figures for time lost due to cane supply outages and not including wet weather. This figure is affected by transport operations, mill infrastructure and performance and farm or harvester performance. It is a reasonable indicator of harvest and transport efficiency and as such this can be used as a KPI for Objective 5.

Changes to cane supply arrangements between 2003 and 2005 have significantly affected harvest and transport efficiencies. In 2003 approx 25% of cane supply crushed at MCM came from Mareeba where cutting occurred over the full 24 hours, cane supply was delivered continuously during the 24 hour period and the critical overnight cane supply for the mill was largely satisfied by Mareeba cane. In 2005 the cane supply was entirely from the Mossman area with restricted harvesting hours, season length was reduced as the total tonnage decreased, daily harvest quotas increased in proportion to the reduced number of harvesters and season length and the size of the bin fleet was reduced.

The factors outlined above have contributed to the significant increase in time lost because of cane supply outages recorded in table 2. The challenge remains to implement reform in harvest and transport arrangements to improve the overall efficiency of this sector.

**Transport cost/tonne cane delivered.** Between 2003 and 2005 the transport arrangements and the total tonnages of cane processed through the Mossman Central Mill varied considerably. Most of this variation was due to the toll-crushing arrangements in 2004 and
the total loss of Mareeba cane supply for 2005. These changes present some difficulties in evaluating transport costs across this period.

To use this as a KPI it will be necessary to establish a standard formula for calculating transport costs and then benchmark.

- The harvest sector for the Mossman sugar industry is based on contractors mostly with farming interests. For harvest contractors the aim is to minimise actual costs of harvesting to give the best return for their business including invested capital while satisfying the farmer clients with the harvest operation. All harvest is charged at a fixed cost/tonne although there may be differences between harvest groups and farms within a group. Harvester operating costs are mainly fuel, repairs and maintenance and labour costs effectively vary on an hourly basis.

Appropriate KPI’s for the harvest sector are:

- **Operating efficiency** which is the time that the harvester is actually operating as a proportion of the available working day. This is mainly affected by waiting for bins, migration and farm layout.

- **Field efficiency** which is the time the harvester is pouring as a proportion of the time the harvester is operating in a cane block. This is mainly affected by yield, block characteristics (row length and headland width) and harvest operator factors.

These issues are discussed in detail in MAS00 two Milestone report 3. No figures are available for 2003, but are available for 2005 and targets have been set for 2007 for all harvesters monitored.

- The farm sector is aiming for maximum recovery of sugar from the paddock at least cost. The “Harvesting Best Practice Manual” (Sandell and Agnew 2002) states that:
  ‘.....if pour rate is kept low, fan speed can be kept low; a product of similar quality is produced with minimal cane loss.’

There is considerable pressure on harvest operators to increase pour rates; payment for harvesting is currently on a fixed rate per tonne where costs are essentially tied to an hourly rate which means that price for harvesting can only be contained through increasing pour rates and many of the harvest contractors are working to high daily bin quotas because of the short season. Increased pour rate is then coupled with increased fan speed to reduce extraneous matter and shorter billet length so that bin weights can be maintained; these latter two factors also resulting in higher cane and sugar loss.

In developing a KPI for the harvest sector the indicators of field efficiency and operating efficiency need to be quantified by **pour rate** as an indicator of compliance to the principals of Harvest Best Practice (HBP). These have been calculated for 2005 and targets set for 2007.

The aims with the work program for the harvest and farm sector together are for cost reductions while adhering to harvest best practice principals.

**Objective six – tenure system to allow for homestead excisions.**

Completed. The system has now been established within the Douglas Shire Council planning scheme.
Appendix 1.  

Objective seven – Involvement with DSC Sustainable Futures and Water Quality Improvement Plan.

Cane farmers are involved with activities through these plans.

The KPI’s discussed in detail above are quantified in the summary table below. (Table 2)

Table 2: Summary of Key Performance Indicators - Mossman

<table>
<thead>
<tr>
<th>Key Performance Indicator</th>
<th>2003</th>
<th>2005</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective 1</strong>&lt;br&gt;Yield (tonnes cane per hectare)</td>
<td>71</td>
<td>71</td>
<td>80</td>
</tr>
<tr>
<td><strong>Objective 2</strong>&lt;br&gt;Size of entities (hectare)</td>
<td>78.6</td>
<td>71.4</td>
<td>77</td>
</tr>
<tr>
<td><strong>Objective 3</strong>&lt;br&gt;Adoption of Farming BMP</td>
<td>13 of 19</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td><strong>Objective 4</strong>&lt;br&gt;Benchmarking group (number)</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Objective 5</strong>&lt;br&gt;Time lost - cane supply (hours/100k tonne crushed)</td>
<td>4.5</td>
<td>14.0</td>
<td>&lt;8.0</td>
</tr>
<tr>
<td>Operating efficiency (%)</td>
<td>60 to 78</td>
<td>&gt;80</td>
<td></td>
</tr>
<tr>
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<td>Pour rates (tonnes/hr)</td>
<td>67 - 93</td>
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<td>Working with DSC Water Quality Improvement Plan</td>
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</tbody>
</table>

References:


James, M. (2003). *Lifting the viability of the Mossman sugar industry by improving the cane supply*. Final report – SRDC project MCB001. BSES, Ayr Qld.


Appendix 2. Poster presented as ASSCT and APEN conferences 2005.

Participative extension for best management practice in the Mossman cane industry.

David Parker, Alan Ruhl
Mossman Agricultural Services, PO Box 191, Mossman Qld 4873
dparker@bigpond.net.au

Best Management Practice (BMP) continuous improvement process

- Develop BMP self-assessment scorecards
- Developed in consultation with Mossman growers
- Benchmark survey in Dec 2003 with 42 growers
  - 40% of the total number of growers
  - Fertilising 60% of the total cane supply area
- Collate and discuss results with growers including validation of BMP
  - Financial
  - Knowledge, Attitudes, Skills, Aptitudes

Action Learning Cycle (after Kolb 1984 *)

Plan
Conclude
Act
Reflect

Principals of the Action Learning Cycle were employed in developing the BMP process and for planning activities under the Extension program.

- COMPASS and other extension programs with grower and external funding
- Environmental concerns — concerns with viability of the Mossman sugar industry — mill, growers and the community

Local Best Practice Groups (Clark 1997 *)

Clark and Pillet described an extension program combining participatory problem solving, working with small groups and targeted extension methods and techniques used to improve land use management in Queensland.


The Principals of Adult Learning (Fell 1997 *)

Fell defined seven principles which he saw as important in improving the way extension services were delivered. They contribute to providing a safe, supportive, comfortable, self-directed learning environment.

- Fell (1997) Adult Learning and the Principles of Adult Learning principles are important in structured training for extension, 6th. Int. Australian Pacific Extension Conf. Melbourne, Australia, 209

Mossman Agricultural Services Ltd

Is a non-profit organisation owned by Mossman cane farmers and the Mossman Central Mill providing extension and productivity services, SMS services, cane harvest and transport coordination and rural supplies to the Mossman community.

This program has been funded by the Australian Government’s National Heritage Trust.

Key Learnings

- Develop extension programs with and not for farmers
- Successful extension outcomes involve planning processes as well as activities
- Use appropriate methods and resources — you don’t always need butcher’s paper.

March 2006
For internal and external stakeholders
- BMP uptake
- Outcomes for the Mossman industry and community

Review + Surveys + Extension program
Re-survey growers using self-assessment scorecards

Evaluate extension program and processes

Re-focus extension program

Key Learnings

- Develop extension programs with and not for farmers
- Successful extension outcomes involve planning processes as well as activities
- Use appropriate methods and resources — you don’t always need butcher’s paper.

2004 and 2005 seasons

Workshops
Field days
Study tours
Shed meetings

April 2005
For internal and external stakeholders
- BMP uptake
- Outcomes for the Mossman industry and community

Review + Surveys + Extension program
Re-survey growers using self-assessment scorecards

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April 2005
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Re-focus extension program

Key Learnings

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- Successful extension outcomes involve planning processes as well as activities
- Use appropriate methods and resources — you don’t always need butcher’s paper.
Appendix 3. Discussion paper – Developing an extension program to target areas of low level adoption of best management practice in cane farming.

Background

Agricultural extension is about change and managing change. Extension programs themselves have undergone a process of change that reflects developing theories or approaches to dealing with change management at the farm level. They also reflect a developing concept of professionalism among extension officers.

Macadam (1996) described a number of phases of agricultural development following World War II. The period up until the 1980’s Macadam described as the ‘productivity era.’ Extension during this period focussed on technology to achieve maximum production. This was modified towards the end of the period with a gradual increase in emphasis on business management to temper the thrust from ‘maximum’ production to ‘optimal’ production.

Rogers (1963) developed his theory of ‘communication of innovation’ and this was the base for the ‘Transfer of Technology’ model of extension on which extension programs were based for much of this period. This model was founded on the belief that well qualified researchers were the originators of much of the scientific advances and the extension officer’s role was to transfer these innovative ideas to the farming community. This has been described as a linear model of extension (Russell et al 1989).

Figure 1. Linear Model of Extension (Russell et al. 1989)

Research → Knowledge → Adoption → Transfer → Diffusion

The 80’s and 90’s were described by Macadam as the ‘sustainability era’. This was a period of rising costs and collapse of many of the traditional export markets. It was also a period during which the push for production was balanced against an increasing concern for the sustainability of the natural resources and rural communities. Marketing was added to business management and technology in the developing extension rationale.

Figure 2. Action Learning Cycle

Plan → Generalise or Conclude → Reflect or Observe → Act
Both the theories applied to developing extension programs and the role of the extension officer changed. The linear model was replaced with more complex participative models with extension officers, farmers and researchers working together collaboratively defining problems and developing solutions. The role of the extension officer became one of facilitator of change and this was based on the premise that “……given the right conditions, information, mutual interaction and opportunity people can develop solutions to problems and take steps in directions that improve their situation” (Coutts 1994).

Extension was now seen as a process of adult learning and community capacity building. The action learning cycle or Experiential Learning (Kolb, 1984) is the basis for this process. It is generally represented as a circular process of four stages through which adults will proceed in any learning experience. Figure two is a depiction of the cycle used by Fell (1997).

In the extension context this cycle is an iterative process and can operate at a number of levels:

- **The extension plan level.** At this level the stages are:
  - **Plan.** Develop an extension plan to address an issue
  - **Act.** Commence the extension program with activities as determined in the plan
  - **Reflect/Observe.** Reflect on the activities. “What is happening? Are the activities on track? Where are participants in the process?”
  - **Generalise/Conclude.** Draw some generalisations or conclusions on the activities and process in terms of “What went right? What went wrong? What needs changing? How can these factors be included in or will affect future activities?”
  - **Plan.** Revise the plan as the starting point for the next iteration.

- **The activity level.** Each workshop, field day meeting or other activity within the extension plan is approached using the same process. Similar sorts of question can be asked at each of the stages in the process.

- **The individual participant level.** In planning at the other two levels the extension program needs to recognise that individuals are able to go through the same cycle. The extension program is predicated on participation by farmers in planned activities.
  - **Act.** To get participation there must be a purpose and relevance. “Is the activity going to address particular issues relevant to an individual farmer?”
  - **Observe/Reflect.** The activity must provide some usable information for the farmer presented in a way or variety of ways that will have some meaning for them. “What did the individual see/hear/feel/do? What stood out or had meaning for them?”
  - **Generalise/Conclude.** The activity needs to have provided something useful for the farmers. “What did the individual learn? What can they use?”
  - **Plan.** The farmer needs to put something learned from the activity into practice to get full value from attending. “How will an individual use the information learned?”

It is unlikely that individual farmers will formally consider these questions. However in planning the activity and the extension program these questions need to be considered so that individuals get the most benefit from participating in activities.

Fell (1997) saw the application of the action learning cycle and the principals of adult learning as important in improving the way in which extension services were delivered to clients. He defined a series of seven principals on which to develop extension programs and activities within the program:
- Build on local experience, use the knowledge within the group/individual
- Make the learning environment comfortable and encouraging
- Ensure the learning activity meets the needs and relates to the problems of the client
- Involve the audience in planning their own learning experience
Appendix 3.

**Partnership for Sustainable Sugar**

- Have activities that are stimulating and are participatory
- Allow time for people to reflect on what they are learning, take difficult subjects slowly and always be open to questioning
- Build group and individual confidence by letting them know that they are right, building a confidence that they are making progress towards their learning goals.

An extension program was developed to improve rangeland management in Queensland using a combination of Participatory Problem Solving, working with small groups and targeted extension methods and techniques (Clark and Filet 1997). This program also used the elements of the action learning cycle and the principals of adult learning in its design and delivery. Through this process a number of Local Best Practice (LBP) groups were established in the grazing rangelands of Queensland and the Northern Territory.

The program was designed to:
- Maximise motivation through encouraging “..’ownership’ of the process and active participation from the outset”.
- Maximise the effectiveness of the learning with suitable “.learning processes, methods and techniques to address critical components of problem solving”.
- Provide for evaluation of performance so that people can make “.informed decisions about improving processes and results”.

Clark describes in detail a Participatory Problem Solving (PPS) cycle. In summary it consists of a number of major steps in which can be seen the base of the action learning cycle:
- **Act.** Document local best management practice, problems, solutions and opportunities
- **Reflect.** Identify and prioritise opportunities for improved practice
- **Review.** Decide on what changes were needed and how these changes would be effected
- **Plan.** Implementation and evaluation of new practices.

Within each of these were a number of critical sequential steps. Clark identified the failure to address some but not all of these steps as a pitfall with the PPS cycle. It was particularly important at the third step listed above. At this stage an awareness and understanding of new opportunities are essential elements to the decision making process and dealing with constraints. However he pointed out that awareness did not necessarily mean understanding and these are very different components within the PPS. “Participants in learning exercises will not contribute their ignorance if the environment is threatening (in large groups), consequently they don’t ask questions.”

He also identified use of the producer-generated data for purposes other than those for which the participants had enthusiasm as a major weakness within this process. This could lead to loss of ownership and motivation from participants, two of the factors seen as major strengths in the LBP group process.

The Bureau of Rural Sciences (BRS) reviewed factors that influenced the adoption of improved natural resource management (NRM) practices on agricultural land by individual farmers or landholders (Barr and Cary 2000). Some of their findings that have direct relevance to this project are:
- “Adoption of new practices is a continuous rather than discrete process.”
- “The adoption of (environmentally) sustainable agricultural practices is not merely a technical process where farmers will simply adopt a more sustainable process following sufficient exposure to it.”
- “The farming community is not homogenous..” and the impact of social and economic factors on farm management need to be understood.
“Family and financial security are generally the highest priority for Australian farm families while increased (environmental) sustainability often involves increased management complexity and financial risk.”

Conversely “...environmental innovations that have been profitable or perceived to be profitable usually have been readily adopted.”

“The complexity, trialability, compatibility and the observability of outcomes..” affect the adoption of new NRM practices

Other factors affecting the adoption of new NRM practices are “...the financial cost, the landholder’s beliefs and opinions towards the new practice, the landholder’s level of motivation and perception of the relevance of the practice and the landholder’s attitude towards risk and change.”

“Landholder surveys indicate greater concern about economic rather than environmental impacts of land degradation.”

Introduction

The Extension program to target low levels of adoption of best management practices (BMP) was developed to incorporate elements from the LBP group process with recognition of the principals of adult learning and the action learning cycle. It has a continuous improvement approach for BMP and also recognises other factors highlighted in the BRS review.

It was developed to commence with the self-assessment process as outlined in the Milestone Report three (MR 3). The process followed a series of steps:

- Develop the self-assessment scoresheets.
- Have growers complete scorecards.
- Collate results.
- Discuss BMP results with growers.
- Identify impediments to the uptake of BMP’s
- Identify actions to overcome these impediments.
- Prioritse actions.
- Develop an extension program based on the priorities defined.
- Undertake the extension program.
- Review extension program.

The first three steps formed the basis for the detailed survey as reported in MR3. This paper will deal in detail with steps four to 8.

Discuss best management practices with growers. The collated results were compiled as graphs (Appendix 2, MR3) and presented to growers at the February round of shed meetings. All sections were presented and individual management practices discussed. This included validation of the ranking from one to four of BMP.

Identify impediments to the uptake of BMP’s. During the facilitated discussion growers were asked to identify the factors that were preventing them from moving from their current management practices to BMP. This discussion was recorded on butcher’s paper at the meetings and later transcribed. This is included as Appendix one for the pilot group and Appendix two for the February shed meetings.
Appendix 3.

Identify actions to overcome these impediments. During these discussions growers were also asked to identify possible actions that would help them in making a decision to change management practice. These would form the basis for defining the activities in the extension program.

Prioritise actions. A voting process was developed to allow growers to nominate their priorities for the possible activities within the extension program. This involved growers ranking each item against the compiled list of impediments. This prioritised list is included as Appendix three for the Pilot group.

Develop an extension program based on these priorities. The individual prioritised actions were combined together to develop a series of five ‘themes’ or topics that became the main thrust of the extension program. Included in this is a review of the definition of ‘Best Management Practices’ in the Mossman context. Within the program a mix of activities including workshops, field days, on-farm demonstrations and field trips to other cane areas are planned. An outline of the extension plan is included as Appendix four and details are discussed in the next major section of this report.

Undertake the extension program. The program of activities has been developed and will be ratified at the next round of shed meetings due for late May. Collection and collation of material for those meetings is currently in preparation.

Review the extension program. This review will be undertaken at two levels:

The outcomes of the program and particularly changes to management practices will be reviewed. This will take the form of asking the farmers to complete a second round of the self-assessment process during the shed meetings due after the 2004 cane season. The survey of practices at the start of the program will provide the benchmark against which changes to practices can be assessed.

The extension process will also be reviewed both at the individual activity and overall program level. This will be a more qualitative assessment of the activities and will be based around the questions: “What went right (according to plan)? What went wrong? How can we change the activity or program to make it more effective?” This will be directed at both staff involved in the delivery of the program and the farmers who are the clients involved in the program.

The Extension Program

The extension program is developed around five major themes. This reflects the various relationships or linkages between the BMP indicators in the self-assessment sheets. It also recognises that we are dealing with a farming system. Systems approach to developing an extension program to target areas of low adoption of BMP is more likely to be effective than the targeting of specific indicators or elements of BMP within the system. These themes are:

1. Nitrogen rate demonstrations (and incorporating cost-effectiveness analysis). Collectively this was voted as Highest priority area for the extension program. (see Appendix 3)

   This ties in at the local level with work currently in progress through CSIRO (Webster 2003) developing fertilizer recommendations based on yield of previous crop. The work is validating the model measuring Nitrogen (N) loss through overland flow and leaching, N export in cane harvested and N remaining in-situ in the trash and the soil.

   CSIRO (Roebeling et al 2004) have also developed an economic model examining the cost-effectiveness of various rates of N as well as different tillage levels and levels of headland cover for local (Douglas Shire) conditions. MAS have also periodically collected data of different
fertilizer practices at a block and regional level and annually maintain block yield data for the MCM area. This data can be collated to develop a picture of yield responses and fertilizer practices across the mill area over a period of time. Comparative yield and fertilizer rates are also available from other mill areas and various other research projects.

The plan is to collate relevant data including some preliminary data from the current demonstrations and present it in the local context at a Field day to be held in September of this year. The field day will include an inspection of the demonstration sites and will be before most of the fertilizing for the next season’s crop.

2. Controlled Traffic Farming System incorporating Minimum Tillage and Managed Legume Fallows. These elements as a group received the second highest priority ranking.

This is the major component of the extension program and incorporates a number of BMP indicators. It has also been the subject of much of the work undertaken by the Sugar Yield Decline Joint Venture. The work either in total or as discrete elements has previously been reported in various industry forums including industry media journals. This means that local farmers have been exposed to the results of this work in the past.

Some producers have also tried different elements of the system such as managed soybean fallows, different row and plant configurations and different (reduced) tillage land preparation for planting both fallow legumes and cane crops. However with the current state of the industry no-one in the MCM coastal area has planted legume fallows this season. From past experience various growers have appreciated the benefits of a managed legume fallow in subsequent plant and ratoon crops. However the cost of managing a soybean fallow has been reported as the main reason for not planting this season. In other words the issue is one of short-term cashflow even though the longer-term positive cash benefits from a legume fallow system are appreciated.

The survey of farming practice revealed an almost universal row spacing range of 1.5 two to 1.65 m row spacing with a 90% response rate. At all meetings there was an acceptance of compaction of the stool being an issues with the current row spacings. The problem was more pronounced in wet harvests and the last couple of years had been relatively dry at harvest. The problem of machinery modifications and possible replacement with wider row spacings was also recognised as a major constraint.

Many farmers also considered that the relative merits and problems with different row and plant configurations had not been resolved (conventional single row, wide single row or dual row at spacings from 600mm to 1. two m). There was still considerable research and commercial experimentation in defining the ‘best’ combination or the ‘best’ commercial system.

Minimum tillage planting is closely related with fallow practice and not considered in plough out/replant. The two aspects are minimum tillage to plant the fallow legume and/or minimum tillage to establish the plant cane. If row spacing are changed there will need to be a tillage involved at either end of the fallow period and probably at the time of planting the legume. However this would become part of the overall farming system. MAS has a planter that has been adapted to zero-till soybeans and is currently having a planter modified to zero-till cane. These machines will enable farmers to assess zero tillage in their own situations.

The extension program for this theme has three main steps defined (see Appendix 4).
Field trip. This is planned for June of this year. The main objective is for farmers to gather information first hand on farming systems in other areas. To discuss with other farmers and researchers issues associated with these practices.

Collate information. This will involve relevant research and grower experiences that came from the field trip as well as the collation of local information. It will also involve an economic assessment (or collation of economic modelling that has been published). The hypothesis is that over a crop cycle the net benefit of a legume fallow system is greater than the conventional system. If this can be established to the satisfaction of growers at the local level then we will see a gradual change in practices. In the short term there are production issues to be faced with changing the system at both the farm and the mill level.

Present collated information including experiences from field trip at a workshop/field day in August. This will allow for the establishment of suitable local demonstrations on particular aspects of the system to be undertaken during the fallow phase of the cane cycle.

3. **Management of deep drains.** In this case MAS would have a major role but may not have the lead role. It is generally recognised that drains are a feature of the landscape. Drainage systems usually consist of both farm drains and main drains. They may have been installed primarily to move water away from cane fields for productivity reasons but they also capture runoff from hill-slopes, roads and residential areas depending on their location. In addition many of the drains are not collecting and discharging from the one property but may pass through several properties including other private as well as public property before discharge. For these reasons it is more appropriate that Douglas Shire Council take the lead role in this part of the extension program with MAS and EPA.

Drains have been recognised as a potential source of sediment in many studies including the Douglas Shire Water Quality Improvement Program (Bartley et al 2004). It was recognised at our shed meetings that although the BMP for drains is that they should be “wide, shallow and well grassed”, it is not always possible (physically possible or financially feasible) to have all drains wide, shallow and well grassed. The main issues raised were around the question of the best management for deep drains. BMP’s for deep drains have been defined by Roth et al (2003) from their work in the Ripple Creek sub-catchment of the Herbert.

MAS will also be undertaking a mapping exercise to define drain lengths, profiles and connections in a section of the Saltwater catchment of the Douglas Shire. This will also help define the nature and extent of local drainage issues.

The thrust of this part of the extension program will be to collate local and locally relevant information to present to growers. In addition suitable demonstration sites need to be identified and funding sourced to demonstrate how best to manage deep drains and alleviate erosion problems.

4. **Record Keeping and Business Management.** This will be addressed in the next section of this report.

5. **Revise BMP’s.** As discussed in the introduction changing farm practices is a continuous process and part of that process is the revision of our definitions of BMP. The process we are developing is also a continuously evolving process. Hence the definitions we have used in the self-assessment sheets also need review.
Appendix 3.

At the shed meetings it was recognised by farmers that the definitions for drain management and riparian vegetation management needed review. In addition the responses to the record keeping and business planning sections as well as the discussion at the meetings indicate a review of these sections is also required.

The self-assessment sheets have been developed with a focus on nutrient and sediment impacts on water quality. Management practices in relation to chemicals and chemical application requires expansion and better definition. This also applies to the sections on record keeping and business planning. Discussion at the shed meetings indicated a poor understanding of the intention or meaning of the statements in these sections. Work as outlined in the following segments of this report will outline a process for improving these aspects.

As part of this extension program we intend to consider the definitions of BMP in the self-assessment sheets and discuss possible changes with growers at the shed meetings in May.

Discussion

Several issues have arisen with the implementation process:

Not all the same individuals attended both meeting. This has occurred from two aspects; some growers attended the first meeting and filled out the BMP self-assessment scorecard but not the second meeting where the results were discussed and a couple of growers attended the second meeting and participated in the discussion of results without completing the self-assessment sheets. The first group will not have had the opportunity of participating in the development of the extension plan and may not have the same level of commitment to the process. We had anticipated that there may be some farmers in the second group and invited them to fill in the sheets but no one took the opportunity.

Time constraints within the shed meetings precluded the full prioritisation process at the February shed meetings. Once again this may affect the outcome of the overall process because of low levels of ownership in the extension program developed from the prioritised list. However from the general discussion at the February round of shed meetings similar issues were raised. This gave us reasonable confidence that the program we had developed with the pilot group would also reflect the feelings of the larger farmer population. In addition most of the farmers from the pilot group also attended the shed meetings.

This BMP self-assessment process and developing the extension program from this addresses some of the concerns with the COMPASS program. COMPASS is a powerful program for raising awareness of BMP but is weak in the development of action plans and follow-up. The process of using the BMP self-assessment process to define the extension program overcomes some of these problems. However the actual adoption of higher levels of BMP within the farming community will be largely determined by the over-riding economic circumstances of the growers and confidence in viability of the local sugar industry in the intermediate to long term. These factors are the main threats to this program to date.

This process has been developed in consultation with and for the growers of the MCM. However the process is robust and is applicable to any cane growing area. It has been developed through drawing on the experiences gained in other extension program in other industries. The actual phrasing in some of the self-assessment documentation may need to be revised to suit other areas but the principals and processes employed can be directly adapted. It is a continuous improvement process that is developed with growers’ involvement and ownership.
This self-assessment process and the continuous improvement approach to adoption of BMP can be further developed to include an independent audit procedure. In this way it is a holistic approach to developing an extension program that can be used to address the three levels of sustainability. It is not based on BMP for exclusively or even primarily environmental outcomes. It also incorporates and is used to address social and economic sustainability issues at both the farm and community level.

References.


Fell R (1997). Action learning and the application of Adult Learning principals give meaning to accredited training for extensionists. 2nd Australasia Pacific Extension Conference. Albury, NSW.


Appendix 3.

Partnership for Sustainable Sugar

Extension Program Outline

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<th>Issue</th>
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<td>1. N. rate demonstrations (plus)</td>
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<td>2. Controlled Traffic Farming System.</td>
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<td>- Tony's trials - Flumes and other 2 sites – Local demo.</td>
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<td>- Tony + Peter R - Cost Effectiveness Report.</td>
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<td>- Ruddy's previous work.</td>
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<th>Outputs to/for growers</th>
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<tr>
<td>Field Day to present relevant information on N fertilizer rates in the local context. To be held Sept. '04.</td>
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Field trip - May/June '04
- Watters', Herbert, Burdekin
- Sugar Yield Decline Joint Venture, Townsville

Collate local data from Goodman's and Tibaldi's. Who is interested in the trip and when? Next shed meeting.

Minimum tillage and Fallow

| Cycle 1: Work up, Bed up, plant beans spray out, plant cane zero-till. |

Managed leucaena fallow

We need to collate:
- Garside's work
- PR/NS cashflow projections
- Local data
(Creese/Coulthard/H&K)

Cost effectiveness hypothesis
Over a crop cycle: $ > $ Follow year: $ < $ Plant and rotation crops: $ > $

Cost/benefit uncertainty

Document and present cost effectiveness.
Management at farm level and mill level

Gradual change

Local Demonstrations

August '04 Workshop

Field Day
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<th>Issue</th>
<th>What can be done?</th>
<th>How can it be done?</th>
<th>Outputs to/for growers</th>
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<tr>
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<tr>
<td>4. Record Keeping</td>
<td>Prepare farm map record keeping sheets for interested growers.</td>
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<td>Shed Meetings April/May ’04</td>
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<tr>
<td>5. Revise BMP’s</td>
<td>Split BMP for drain management. Incorporate BMP for deep drains. Revise riparian vegetation management. Validate with growers at meeting. What other changes are needed?</td>
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<td>Shed Meetings April/May ’04</td>
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Appendix 4. Steering Guidance presentation to growers – December 2005

The Basic Facts

GPS
- You all know basically how it works
- Why use GPS + Glonass, because we have researched and found this system most effective

Base Stations
- Sharing - Community
- Multibase - Network

Row/Guide Steering
- Tractors
- Harvesters
- Haulouts
- Implements

GPS Base Stations

- There are different types of GPS Base Stations
- Most common are:
  - Sharing the Base Station with a couple of neighbours
  - Community Base Stations usually include a 15 metre radio tower and a 30W Radio to transmit the signal in a (approx) 25km radius
Appendix 4.

Partnership for Sustainable Sugar

GPS Base Stations
- Multibase solutions allow 4 x GPS base stations to work together in one region, or 1 base station and 2 repeaters, as in the last slide.
- This is the setup proposed for Mossman
  They transmit on the same radio frequency
  The tractors can drive within the region receiving correction signals from any of the base stations without having to swap radio channels to pick up the new base station.

GPS Base Stations
- Network base stations are the way of the future.
  Base stations could be placed on a 100km square grid
  Connected by broadband internet
  The farmer must have broadband internet and unlimited downloads
  Pros of a Network Solution
  The 1km per kilometre error is eliminated
  eg If you are 50km from the base station - your error will be approximately 1km
  Cons of a Network Solution
  The system is expensive as it is still new technology

RowGuide Steering
RowGuide Steering for - Tractors
- Harvesters
- Haul outs
- Implements (tiller planters)
Any <s>other</s> tractor / harvester and haul out can be steered
Any <s>all</s> tractor / harvester and haul out can be steered
It is not necessary to buy a new tractor to start 'hands free' steering
There could be a problem if there were no enclosed cab.

RowGuide Steering
The tractors can have a tilt sensor installed to make sure they maintain a straight line on hillsides
Not all steering kits are the same – pricing or a steering kit does not tell you how it works.
AgGuide is an expandable system that will benefit the farmer as his requirements change or expand
The AgGuide Computer in the tractor is a Windows XP Computer similar to the one you have at home. It has a colour / touch screen.
Appendix 4.

Partnership for Sustainable Sugar

RowGuide Steering

Coverage maps and areas can be recorded

RowGuide Steering

Map Reports can be printed from our RowGuide Software showing
- Farm Name/Number
- Block number
- Date
- Vehicle & Impairment
- Total Area of the block
- Coverage area
- Variety of Cane
- Sowing/Planting Rate
- Wind speed km/h
- Wind direction
- Humidity %
- Temperature degrees C

RowGuide Steering

Unlimited farm names and fields can be permanently stored

RowGuide Steering

Select a block and RowGuide highlights the block in red and displays the area
Appendix 4.

RowGuide Steering

Levels can be recorded to create a contour map – this has always been part of our standard software – not an extra

Either Mossman Ag Services or AgGuide’s Consultants can use your block data to create the contour map and Farm Design

The block design can be loaded back into the AgGuide Tractor PC and connected to your laser bucket using our LevelGuide system

Multiple tractors and implements are stored on the removable compact flash data card

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AgGuide Prices

Base Station GPS $17,000

Tractor Kit – GPS
- Computer
  - Steering Ready Kit
  - Software
  $35,500

(Training & Installation included)

Optional

Steering Ready Kit $1,500

Glenass (per GPS) $1,250

Long Range Unit $2,000 only necessary if no outside base configuration

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RowGuide Steering

There are three major errors in line work

- Poor bed preparation:
  Ripping in line with the row does not remove the underlying furrow cross tipping in only one direction will not be good enough

- The steering system is under active or over active
  Adjust it to suit the soil requirements

- Poor implement setup (billet planter setup)

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Appendix 5. Proposed business planning workshop series for Mossman.

Introduction.

Structured business planning workshops for farmers have been developed and delivered through the FutureProfit program of Queensland Department of Primary Industries and Fisheries (DPIF). The program evolved from Property Management Planning workshops that had a primary focus on the physical resources of the property (Letts 1996). This was developed into an integrated series of six to eight workshops that cover the topics:

- Setting directions
- Natural assets
- Land use and planning
- Family and employees
- Financial position
- Enterprise analysis
- Making some decisions
- Bringing it all together

Letts in his paper described how elements of adult learning were incorporated in the development of this series and in the structure of the workshops. Three reasons for farmers participating in learning activities had been identified.

“Participants are either:
- Goal oriented, they wanted to use education to accomplish some career or life goal, realise an opportunity or to satisfy an employers or governments requirement
- Activity oriented and enjoyed the social contact; or
- Learning oriented, seeking knowledge for its own sake.”

In the current difficult situation with the sugar industry farmers are also looking for learning opportunities to help them to survive. To many farmers this means looking for ways of improving the financial outcomes for their businesses and involves reducing costs and/or increasing the income stream. Farmers are looking for production alternatives that will improve their situations in the immediate short term and are uncomfortable with the changes currently being forced on them.

For most this means looking at alternative enterprises that will complement and supplement the income from their current cane farms. Most are feeling a need to change rather than a want to change and this is then reflected in their decisions to participate in learning activities. This then suggests a fourth category of learner who feels a need to participate rather than a want to participate.

The integrated workshop series looks at setting directions as the first step in business planning. However I believe that most farmers see a business plan, at least as a starting point, as looking at their financial situation and then developing options and strategies for survival or improving their current situation as coming from this base. In this I believe there may be some difficulty in establishing the relevance of the program in satisfying the perceived needs of farmers. Farmers see a need to address their immediate financial issues and may be having some difficulty in participating in a program that begins by asking farmers to look at establishing their individual and family goals.
The paper attached outlines a business planning process for growers. This was presented to the board members from MAS who are mainly growers at a meeting held 16/9/2003. The main concern with a group business planning process was in regard to the confidentiality of financial information. Several members stated an interest in individual follow-up at that stage, but when I attempted to follow up I was unsuccessful in getting a time commitment from them that they would keep. I also spoke individually with other growers who were members of my program steering committee and again was unable to get firm commitments from them.

FutureProfit workshops (a DPI program) had been held in the Mossman area before the commencement of this program. Feedback from this process indicated a level of dissatisfaction among growers with the FutureProfit program and this may have been due to the perceived relevance issue outlined earlier. FutureProfit has now been revised and for the sugar industry is being retargeted as FutureCane. From discussions with DPI staff I understand that the emphasis has been taken away from the integrated workshop series and is more focussed on the delivery of appropriate training packages to facilitate change management based on local needs.

I have also been working with the (DPI) Farm Financial Counsellor on approaching the issue of assistance to Mossman growers with business planning advice and training. He presented at both our rounds of shed meetings in December and February. We have recently completed a survey of the current financial position of Mossman farmers. In collecting the information we had two objectives in mind:

- To collect some hard data on the current financial position of farmers in the Mossman area to be used in developing assistance measures for the current industry crisis.
- To provide a base on which to develop a business planning approach for the local growers.

The intention is to take the collated information back to the growers at our next round of shed meetings in May and from there develop a program of addressing the issue of business planning with farmers. The approach here is to develop a program of business planning from the “bottom up” rather than offering an established structured program “top down” to them. In this approach we are seeking to get commitment from growers to participate in a program that they see as having a high relevance to addressing some of their current financial concerns.

In developing the program we are not intending that we will be solely responsible for the development and delivery of the program. We have no intention to “re-develop the wheel” and will be looking to work with other programs in delivery of business planning advice and training to farmers in the MCM area. The main purpose of the program so far has been to increase the level of uptake of business planning through establishing the importance and relevance to the farmers.

**Workshop process**

The current financial position of Mossman growers has been assessed through the survey and the results and discussion of implications of this is included as Appendix 6. This will be used as the basis for developing the workshop the aim of which is to get a commitment from farmers (at least 10) to engage in a business planning process.

The introduction will look at the current industry problems in a historical context of changes to returns and sugar prices over time and changes in production trends on a global basis. These changes will then be discussed in the context of
the Spheres of Concern, Influence and Control Model (Figures 2).

A farming business is influenced by many factors over which the individual farmer has no control and it is often stated that because this is the case it is difficult to plan. If we consider the three circles in the model, the largest circle contains things about which we are concerned such as the world price for raw sugar. At the next level we have a number of factors that concern us and that we can’t directly control but that we can influence and an example may be the response at the state or federal level to the current downturn in the sugar industry. An individual farmer can lobby their local politician to influence government policy and assistance responses. Individuals working together can have more influence. At the lowest level is the control the farmer can have over the farming business. In response to the world price for raw sugar and the state and federal response to this the individual can decide on his level of production and other diversification options.

The basic steps in the workshop are:

1. Develop a profile of an “average” farmer for the Mossman coastal area based on the information collected in the survey. This profile will be personalised by giving him a name and the figures will be mean figures for each of the parameters reported from the survey.

2. Estimated income for 2004 cane season will be presented and discussed. The discussion will be directed around the question “How will Joe survive?” Discussion will include a briefing on elements within the sugar industry assistance package. Issues discussed will include increasing the income stream, reducing costs, selling assets and increasing borrowings with effects on equity.

3. Discussion will be focussed on options for survival and will be prompted by the question of “What are Joe’s options (in the longer term)?” The idea will not be to look at specific crop or enterprise options but to consider the question in more general terms and the options are expected to cover the following range:
   a) Exit industry
   b) Continue with cane
   c) Cane plus diversification (or diversification plus cane)
   d) Cane plus off-farm income
   e) Total diversification
   These will be considered in the context of family and individual farmer goals. The other question that will be posed is: “Will the mill be there in five (and 10) years time and how will this affect the options?”

4. The next question will be: “What information or assistance does Joe need to make a decision on the options?” At this point of the discussion we will be looking for maximum input from all farmers and depending on the number present will look at breaking into a number of smaller groups and report back to the main group.

5. The needs identified will have various aspects identified for follow-up and activities will be developed to address these needs. In wrapping up this session the whole process through we have gone as a group will be related to the business planning cycle and it will be emphasised that we have been through a business planning process.
Discussion

This profile is locally relevant, generated from the survey data and this allows individuals to identify with the profile. However it does not refer to anyone in particular and hence no-one need feel threatened by having the information presented. In addition the workshop format will be at the shed meetings where farmers are comfortable with the setting and others present.

The workshop will develop on information presented at previous meetings and gathered from previous meetings. It will be presented as a facilitated discussion and farmers will decide what and how there will be follow up to this workshop. In this sense they will be in control of their own learning.

The principals of adult learning and the action learning cycle (Fell 1997) have been incorporated in planning of this workshop. Much agricultural extension in the past has been premised on providing information or doing things for the farmers. This tends to build a dependency in growers of having answers or solutions to their problems presented to them. The emphasis in this program is break this dependency cycle and give the farmers more responsibility for developing their own solutions.

This process is part of the overall extension program as discussed in the first section of this report. It primarily addresses the social and economic sustainability issues at the farm and local industry level. Hence it is part of the holistic triple bottom line approach to extension for growers in the MCM area.

As discussed in relation to the extension program this approach to Business Planning is applicable to other mill areas. At this stage the question of intellectual property has not arisen but may in the future.
'JOE FARMER' PROFILE
Single family operation
Single generation operation
Partnership
Age 55
CPA 75 Ha
Estimated production 6,000 tonne
Estimated income (cane) -$30,000
Off-farm income $25,000
Debt $50,000
Equity 95%
Off-farm assets
Cash $5,000
Term Deposits $5,000
STA shares $30,000
Other shares $5,000
Other real estate $ -

'JOE FARMER' PROFILE

How will Joe survive?

Sugar Assistance Package
1. Income support
   For two years
2. Sustainability grant
   June '04 and Jan. '05
3. Restructuring grant
   + hope, wish, win casket
4. Re-establishment grant
5. Intergenerational transfer
6. Crisis counselling
7. Regional and community plans

Options
Exit industry
Continue with cane
Cane + diversification
Or
Diversification + cane

Needs
Retirement planning
(How are you going to finance your retirement?)
Succession planning
(How are you going to transfer the farm to the next generation?)
Productivity improvements
Cost reduction
What? How? Finance?
Alternative enterprises markets etc.

Price $16/tonne
Costs $20 - $24/tonne
(incl. power, phone, fuel, rates, insurance etc)

Surplus/Deficit -$5,000
Less living exp. -$25,000
Less debt servicing - $4,000
(Interest only)
-$34,000
Sustain. grant $12,000

Will the Mill be there?

Will the Mill be there?

BUSINESS PLANNING
WHERE ARE YOU NOW?

WHERE ARE YOU GOING?

HOW ARE YOU GOING TO GET THERE?

DO IT!

18% over 70 y.o.
27% over 60 y.o.
45%

@ $10,000/ha
= $75,000

Cane + off-farm income
Total diversification

Cane + off-farm income
Total diversification

What's your plan?
You + your family goals etc
5 yrs 10yrs

Mas001 - Final Report to SRDC

Why do people need a business plan?

Strategic business planning is a process of documenting for change. The process gives producers and their families a number of planning tools and business skills to make better decisions for their properties. It enables them to have greater confidence in taking control of their businesses and working their way through the significant ‘big picture’ changes that are affecting the sugar industry and most other primary industry sectors, but over which they have no control or that they feel are driving their businesses.

Decision-making or planning takes place at three different levels:

- **Operational**. The plans made everyday or the everyday practices that are followed. Things such as when to fertilize, what product to use and how much to apply.

- **Tactical**. The plans made from season to season or the medium term steps that are taken. Things such as variety to plant, what blocks to fallow and when to take out a ratoon block.

- **Strategic**. These are the plans made annually or every few years that will set the direction for the long term. This may include things like what will the farm be producing five (10) years from now, what level of re-investment there will be in the farm (or off-farm) and who will be involved in the farming business.

In general terms most planning is at an operational level, less at a tactical level and even less at a strategic level. However the strategic level is perhaps the most important level since this is what defines the direction in the longer term. It is planning at this level that will give the business the strength to survive the inevitable tough times.

**Plan to survive - survive to plan.**

The business plan is simply a document that defines the direction for the family business. It is a record of where the business is and where it is heading, the people involved and their roles in the business and how the business including the decision-making is conducted. It means that if something happens to the main person (people) involved in the business others know how to run things. It identifies strengths and weaknesses within the business as well as the opportunities that can be exploited or threats that need to be recognised and overcome.

It means that responsibilities are defined and shared for all involved and everyone is working for a common set of goals. The effort is focussed and this gives strength to the business. Planning will reduce the impact of adverse trading conditions and identify opportunities and the need for change before it’s too late.

There are many different forms of business plans and they can be prepared in a number of different ways. Some examples are available from banks and other financial institutions. Business planning courses are also run by DPI and State Development. Your accountant financial adviser or family
lawyer can help develop the business plan. They can be simple or relatively complex documents. It is up to the individuals concerned to decide depending on how the plan will be used. The information here is intended to give people a few ideas on what they might include in a business plan and how they might go about preparing such a plan.

The business plan is obviously a document that will be used by the family in operating their business. However the plan may need to be given to others outside the business as part of the business operation and then there will be certain expectations on what the plan will contain. When applying for loans the bank or financial institution will require a detailed financial assessment (profit and loss for current year plus preceding year or years, current cashflow and for the last 1 two months, budgeted cashflow for at least the next 1 two months and longer depending on the nature of the loan).

They will be assessing your ability to repay as well as their exposure to risk in loaning you the money and may also require a risk management assessment as part of a business plan. Consider this: how much risk is involved in expanding or restructuring loans for an operation based around cane production in the Mossman mill area under current circumstances? How would you define the risk and what strategies would you put in place to minimise the risk?

How is a business plan prepared?

There are various models of business planning of which this is but one example. This is based around the property management planning process that was developed in Victoria and adopted for the NT and is similar to the Future Profit program in Qld.

A Business Planning Cycle

- **Now.**

  Through the planning process the business as it is currently operating is critically examined. The various elements are looked at in detail including:

  - The **people** involved identifying who they are, what they do, what strengths they bring to the business, how they interact, where there are deficiencies in the skill base of the business etc.
  
  - The **land** and other infrastructure developments. This will include a detailed farm plan or map showing block layout, drainage plan showing drainage lines both natural and constructed features, buildings, tracks, fences, waterlines etc
  
  - **Financial or money** aspects of the business. This will include asset and liability information including debt levels, current and historical production records, current enterprise activities, current costs of production and returns, details of off-farm investments and income etc. This information can be used as a benchmark of the business as of the time of planning and can
be used to set targets (or goals) for productivity and productivity. It will also allow for performance to be measured over time against the goals set. Through this process the strengths and weaknesses of the business can be identified as well as opportunities for improvement of business performance or threats to the business.

- **Where.**
  This part of the process involves defining the direction for the business. This direction setting needs to be considered in terms of three elements:
  - The **vision** that involves the core values that drive you and your business. This sets the overall framework within which you are operating the business.
  - The **mission** statement that is about describing what the business is trying to achieve. This will define some boundaries for the business that will allow your effort to be focussed on the main activities around which your operation is based.
  - A series of **short and long term goals**. It is important in setting these goals that they are realistic and achievable as well as being specific and time based so that progress can be measured or the performance of the business can be assessed against the goals defined. These will set the specific targets for the business operation. They will cover all the key areas of the business (people, money and land)

- **How.**
  This is where the action plans and strategies are defined. They will describe how the goals are to be achieved and will be defined for each of the goals set.

- **Do it.**
  This is the farming and management or operational part of the business. Each individual involved in the business will have particular parts of the business for which they are responsible. They will be assigned different parts of the action plan or strategies for which they are responsible or in which they are involved. It may also involve other people outside the business such as agronomists or advisers who will be called upon to provide information or services for the business. Time frames will also be set.

**What are the important features in business planning?**

Some of the important features to consider in business planning for a family farming business are that it:

- **Will define the direction for the business.**
  Business planning will define and document the direction for the business in the short and long term. This will mean that the business has a greater ability to respond to adverse trading conditions.

  *Control the business - don't be controlled by the business.*

- **Recognises the personal needs of family members.**
  The personal needs of the different family members need to be recognised. Everyone involved in the family business is an individual with different needs and motivations. Involving everyone in the planning process will ensure that they are all working towards a shared vision for their future. In addition, individuals involved will bring their own strengths to the business. The business plan could also include a succession plan. Professional advice such as from an accountant or lawyer may be needed in developing succession plans in particular.

  *We're all different - recognise and reward but work together.*
o Relies on good communication between family members. All the family and other partners involved in the business need to be involved in the planning process. Good open communication is important. Everyone needs to have a fair input into the plan and this may include other family members who may not be directly involved at the time of planning. These may be affected in the future when family assets are distributed. These could include children who are still at school or who have left home and have outside work. In some cases it may be necessary for an outside facilitator to be involved in the process. This is particularly important to avoid either disputes arising between family members or to allow for effective input from all involved so that there is frank and open discussion between all family members.

Don’t assume they all know - communicate effectively.

o Needs to be periodically reviewed. The planning process is wasted if the plan results in a document that is prepared and put on the shelf never to be used again. Alternatively if after a period of time the plan is clearly not working (at a financial or inter-personal level) it needs to be reviewed rather than allowed to continue in a downward spiral.

Regular family planning meetings should ideally be arranged at convenient times for all to attend. As an important part of running the family business such meetings should be seen as a priority issue and not as a distraction from the farming. Hence a family gathering on Sunday where children are distracting some of the participants may not be the ideal time to hold a family planning meeting to review the business plan.

It’s not concrete - review regularly.

o Reflects a balanced approach to the business. A farming business is like any other system. It needs to have the different aspects in balance to operate efficiently. In a farming business the main aspects can be grouped into three key areas.

o People. These are usually family members but can also include other paid employees. Different people will have different tasks in the business and will be contributing different skills and different times.

o Money. This refers to income and expenditure and is measured in terms of productivity and profitability.

o Natural resources. The productive base of the farming business is the land resource. Maintaining or improving this natural resource will be reflected in the business. Other resources will include other capital items such as machinery.

Any farming business needs to have these three elements in balance. We often hear people lament that there is never enough time or money or the farm is too small. In setting realistic goals for the business we need to think about achieving a balance in the business. When returns are low people will often look to increase their production or cash income without considering how much more time they have or how it will affect the land base of their farms.

Work smarter not harder - keep your business in balance.
When do we do this planning?

The planning process is as important a business operation as any other farming operation. As such sufficient time should be allocated for the planning (and review) during ‘normal’ working hours at a time that is most convenient for all involved. It must also be scheduled away from other ‘busy’ times such as planting or harvest.

It’s hard to see clearly with sweat in your eyes.

How do we do this planning?

It can be undertaken as a group exercise or workshop with other growers. In this way you will be preparing your own plans but draw on the collective experiences of other farmers. Ideally the principals in the business should be involved in the workshops but others who may not be attending the workshop can still contribute in the planning process. Some farming families prefer to work as a family group and will set aside an appropriate time for all concerned to participate.

There is no right or wrong approach - just do it.
Appendix 7. Business Planning Workshops

Introduction

The workshop process was included in the program for the June 2004 round of shed meetings and was primarily an interest or awareness raising exercise. The purpose was to lead growers to seek further advice on specific issues for their own individual businesses. A follow-up workshop series was then developed to assist individual producers develop their own business plans. This part of the milestone report deals with the outcomes from the process at the shed meetings, and the development, delivery and outcomes of the larger workshop process.

Shed Meeting Process.

Two shed meetings were held in June. The focus for these meetings was on the 2004 harvest season. Discussion on business planning was one section of the meeting with other items dealing with harvest and transport arrangements for the 2004 harvest, productivity issues relating to varieties, Ratoon Stunting Disease monitoring, supply of mill mud and soil sampling and general information on extension activities for later in the year.

The session on business planning was presented as outlined in the previous milestone report. The resulting discussion focused on two main themes:

- The majority of discussion focused on how growers could survive and how they could access parts of the Sugar Industry Restructuring Package (SIRP). Specific crop options had been discussed at earlier shed meetings and discussion this time was directed towards how growers went about considering options and the principals of farm business planning. This discussion was mainly positive and growers participating were generally seeking information and wanting to move forward. The point was stressed in this discussion that growers needed to look at what changes they could make and look at a process or a number of steps that they could take to consider the options.

- Some discussion concentrated on how ‘the government’ was responsible for the majority of the current crisis in the sugar industry. Some growers considered that the problems were all outside their control and that there were no more changes that they could make to improve their situation and that the answer lay with changes to government policy. This discussion was mainly negative. It was stressed to these growers that if they considered that the problem related to government policy they should look at ways to influence government policy if they wanted to effect a change.

At the meeting there was little discussion of exiting the industry. This could be due to a number of reasons:

- Growers attending the shed meetings were the more progressive growers committed to survival of the local sugar industry

- Growers were reluctant to indicate that they wanted to exit the industry at the open forum at the shed meeting

The meetings appeared to raise the awareness of business planning as a process for considering options for change. Discussion with individual growers and also with the MAS Board members following these meetings suggested that some growers would like assistance from MAS to develop their own business plans. These plans would be used in accessing the Restructuring Grant from the SIRP as well as helping them more generally consider their farm business options. A series of
workshops was proposed to assist growers with developing individual business plans. MAS would develop a business planning template and conduct a series of grower workshops.

**Business Planning Workshops**

Mossman Canegrowers assisted MAS in developing the business planning process for local farming families. The approach was to ideally involve all family members concerned with the business rather than just the ‘farmer’ in the process and the aim will be to help them prepare their own business plans rather than prepare a business plan for them.

The overall approach is detailed in the ‘Business Planning’ document included in report four as Appendix 5. It involved working through four steps:

- **Where are you now?** This is an evaluation of the current situation for the individual business including current viability. This will include a SWOT analysis of the business and its resources (natural resources, people involved and capital including equipment and infrastructure) as well as an analysis of the current financial situation.

- **Where do you want to go?** This will involve setting vision, mission and goals for the family business including personal goals for individuals. This will set the direction for the business for the next five to 10 years.

- **How will you get there?** This will be the action plan and detail how the business and family members will achieve their goals. This will build on the opportunities identified during the SWOT analysis and include detailed cash-flow budgets for the next two years. It is expected that issues identified within this part of the business plan could be funded with the “Restructuring Grant”.

- **Do it.** This is putting the business plan into action and also involves monitoring and evaluation to measure progress and make adjustments as necessary.

The process involved a series of workshops during which the general principals involved with developing a business plan were discussed. Individual families worked separately to develop their own business plans. Individual assistance was provided as and when required within the areas of expertise of staff from MAS. It was stressed that additional assistance may be required from other financial and legal professionals on various aspects with the development or implementation of the business plan.

Workbooks were provided for individuals in preparing their own plans. These were intended as a framework and guide and not necessarily the final document in a “fill in the gaps” format.

**Workshop Series Outline.**

The following outline is a guide to the content of the individual workshops and to the stages of the business planning process.

**Workshop 1.**

- Overview of the business planning process, expectations and outcomes.
  - Understanding the difference between management and taxation accounts.
    - Cash-flow
    - Assets and liabilities
    - Profit
  - Assessing viability including key performance indicators (KPI) or benchmarks.

Workshop participants were asked to prepare the following for the next workshop:

- Calculate Equity or Net Worth based on management rather than taxation accounting.
- Performance over last three to five years based on management rather than taxation accounting.
Calculate KPI’s based on management rather than taxation accounting.

**Workshop 2.**

- Overview of an individual farm business plan.
- Description of the business:
  - Individuals involved
  - Business structure and enterprises
  - Description of the natural resources (including farm map)
  - Plant and equipment, (livestock) and infrastructure
  - Historical financial performance based on management accounts.
- Business SWOT analysis.

Workshop participants were asked to prepare the following for the next workshop:
- Individual business description
- Individual business SWOT analysis.

**Workshop 3.**

- Levels of decision making
- The Business System in balance
- Circles of concern, influence and control
- Change model
- Communication
- Developing a share vision, mission and goals

Workshop participants were asked to prepare the following for the next workshop:
- Develop a Shared Vision and Mission statement for individual farm businesses.
- Develop goals for individual farm businesses (short, medium and long term) for a range of issues including:
  - Financial
  - Productivity
  - Management
  - Marketing
  - Land/Farm Resources
  - Family
  - Estate Planning
  - Retirement
  - Personal Development
  - Lifestyle

**Workshop 4.**

- Review of workshops to date
- Turning the goals into reality
  - Developing strategies to achieve goals.
  - Developing the action plan based on the business strategies.

Workshop participants were asked to prepare the following for the next workshop:
- Strategies to address goals for individual businesses.
Workshop 5.
- Cash-flow budgeting.
- Bringing the plan together
- Monitoring progress

Workshop participants were asked to prepare the final elements of their Business Plans:
- Develop monthly cash-flow budgets for the next one to two years
- Document how and when the plan will be reviewed
- Collate final business plan document

This workshop process involved using an example farm business for workshop activities and individuals worked on their own farm business plans. The basis for this example farm business came from the information collected in the survey of current financial position of Mossman farmers completed in early 2004.

The workshops were run as evening sessions of two hours duration, once per week for five consecutive weeks. This format was intended to allow for farmers, their partners and other family members involved in the family business to participate.

Thirty nine people representing twenty eight farm businesses attended the first workshop however only sixteen people representing eleven farming businesses completed the workshop series. Most dropped out between the first and second workshops. Individual assistance will be necessary to help all those who finished the workshop series to complete their business plans.

The planning template was developed using elements from a number of different sources:
- National Bank ‘Farm Business Planning’ workbook and instruction book
- The Queensland Rural Adjustment ‘Authority Business Planning Guide’
- RIRDC ‘Sustainability Indicators for Agriculture’
- ‘BizCheck for Meat’ prepared by Rendell McGuckian for Meat and Livestock Australia
- Australian Bankers’ Association ‘Financing Your Farm’
- Strategic business planning guides from the Property Management Planning programs of the Queensland and NT governments

Discussion

The rate of drop-out between the first and second workshops is of some concern. Many of those attending the first workshop were concerned with the complexity of the planning process outlined. The main objective for many was to complete a business plan suitable for the purpose of accessing the Re-structuring Grant of the SIRP. However the planning process that MAS was undertaking was a much more comprehensive process and did more than identify areas for improvement that may be funded under the SIRP grant. The process aimed to go past the production or productivity areas of concern in the farm business. It was designed to have the farming family assess their vision and goals for the farm and consider personal issues that are also tied in with the property and business such as succession and retirement planning.

This may have contributed to the drop out rate in that many considered the process we were offering was too complicated or at least more complex than they wanted to undertake to access the restructuring grant.
Those finishing had all been to the shed meetings. This meant that they had been exposed to the concepts of business planning and the approach we were taking to business planning before the first workshop. In this way the first business planning workshop was not the first exposure to our approach to business planning. They came along with some understanding of what to expect from the planning process we were presenting through the workshops. For future workshop series we will consider an introduction workshop as separate to the start of the planning series.

Most participants have asked for additional one-on-one assistance to complete their business plans. In the planning of these workshops we underestimated this demand.

Material for the workshop series was being developed between workshops because of the relative speed with which it was developed. Because of this the material was not properly ‘tested’ on a group to find areas of deficiency within the material or presentation. During this workshop series many areas for improvement in the presentation and material used were identified and will be incorporated into later workshop series.

In late November a second series of workshops was advertised. This attracted no interest at the time. We have since been approached to organise and run some further workshops but change the format to longer daytime meetings. We will change the format to accommodate these requests and assess the response and participation.

The format of a series of regular weekly evening meetings was chosen to allow for the participation of as many family members involved in the family business as possible. It was felt that partners and other family members would be able to participate with evening meetings and most of the farming enterprises represented at the workshops had more than one person present.

General feedback from those completing the workshop series has been positive. Most felt that the planning process was worthwhile but more involved than they originally anticipated. Most will complete their business plans with some additional assistance from MAS or others such as the Farm Financial Counsellors.

Introduction
The Mossman Central Mill (MCM) has experienced difficulty in securing long-term continuing finance from its financial institution since the down turn in the sugar industry since 2001. The rural economy in the Douglas Shire is dominated by cane production that is reliant on a local mill.

The MCM has turned to growers for short-term carry on finance to overcome budgeted shortfalls in 2002 and again in 2003. In addition they have sold all non-core assets and some of the operating plant and equipment to reduce debt levels. New harvest arrangements involving operating a 5-day week rather than a continuous crushing, staggered start and finish to harvest times and grouping of harvesters around delivery points. They have also implemented changes to staff numbers and employment and out-sourced some of their transport sector to improve the efficiency of their operations to reduce their operating costs.

Returns to growers have declined from $28.69/tonne of cane in 2001 to an anticipated $16/tonne for the 2004 crushing season. This is well below the budgeted growing costs of between $18 and $24/tonne of cane without covering overhead costs including finance costs.

The general malaise in the sugar industry has been felt across all Australian growing areas. This is a result of poor returns for raw sugar on the world market as a result of global overproduction, coupled with strong Australian dollar. These conditions are not expected to significantly improve in the near future.

The ‘Hildebrand’ and other like reports have shaped government responses to the current industry crisis and recommend restructuring across all sectors of the industry to improve efficiency. In March 2004 the Queensland government released its sugar industry assistance package under “The Sugar Industry; The Way Forward.” Changes to the current Sugar Industry Act 1999 (Qld) are due to be tabled in the April sittings of the Queensland Parliament. The federal government is still to announce its package.

A proposal to collect information on the current financial situation of farmers in the Mossman area was discussed at shed meetings. All growers attending the February meetings were approached directly to fill in a survey form and those not at the meetings were included in a mail out inviting them to supply information. The information was provided on the basis that confidentiality and anonymity of the individual would be maintained.

Individuals were given two forms so that they could fill in one form to return and have a copy for their own records. Once the results were collated the original forms were destroyed. The information was given on the basis that confidentiality and anonymity of the individual would be maintained.

Individuals were given two forms so that they could fill in one form to return and have a copy for their own records. Once the results were collated the original forms were destroyed. The information was given on the basis that confidentiality and anonymity of the individual would be maintained.

In total 20 growers provided information that was collated and forms the contents of Appendix 1. This number of growers represents about 25% of the cane farmers in the Mossman coastal area.

Results
The information collated from this survey is indicating that:

- Most businesses are single family units (81%) and in the majority of cases (71%) only one generation is involved in the business and most (70%) are run as partnerships
- Only 23% of growers are less than 50 years old and 18% are over 70
- Most (74%) are farming less than 150 ha and produced less than 15,000 tonne in 2003 (90%) – 63% produced less than 10,000 tonne and 37% produced less than 5,000 tonne
Based on a cane price of $16/tonne, all growers relying on cane are looking at a farm cash
deficit this year, with 30% having a deficit of more than $40,000
Most growers (over 79%) have more that 80% equity in their businesses and the rest have
more than 60%
53% have debt levels of less than $50,000 with another 21% having debt of $100,000 to
$200,000
Most growers (63%) have less than $40,000 of off-farm income with nearly half (47%)
earning less than $20,000 off-farm. (Off-farm income includes income from contract
harvesting and other contract farming operations)
Most growers have limited cash reserves (less than $10,000) held as cash (68%) or term
deposits (58%)
All growers have Sugar Terminal Ltd shares but most (88%) have less than $10,000 invested
in other shares including Mossman Central Mill and most (63%) have no real estate
investments other than their farms.

The picture overall is of an aging farmer population, with small to medium size operations. They
have good equity levels and low levels of debt and those relying on cane for their income are facing
negative returns this year with very little reserves or off-farm income.

Discussion
The survey highlighted a number of areas of concern that need to be considered in the provision of
assistance to the Mossman cane farmers and community.

1. To survive in the short term (the next 1 two months) Mossman cane farmers will need to either
increase their levels of debt or sell assets, including some of the core farming assets. This
would then suggest that the main issues in the short term are:
   - Carry-on finance to provide for daily living expenses of the majority of cane farming families
   - Assistance to meet debt finance for at least 40% of cane farming families. This needs to be
targeted so that good equity levels are not eroded.

2. With poor returns from cane farming the pressure is on individual farmers to look to alternative
crops or farm options. Carry-on finance may cover some short-term income loss but most
farmers will be looking for alternative farm or off-farm income to meet their financial needs.
They are looking for diversification options that will either:
   - Fit in with their existing cane farming. This will be on fallow areas or marginal cane areas
that will be taken out of cane production.
   - Displace all or part of the existing cane area.
Decisions to diversify will need to be based on sound technical and financial advice. This will
mean an increase in demand for these services from existing private and government service
providers in these fields. Some additional funding will need to be made available to cover these
services.

3. In the next 15 years 75% of those completing the survey will be of retirement age or have
retired from farming. In the vast majority of cases there isn’t another generation currently
working on the farm or involved in the farming business. This then raises serious questions at a
community level about the on-going viability of the agricultural sector. In the next 15 years a
high proportion of the farming population will change.
Those retiring will need to use their core farming assets to finance their retirement. This will be
through one of two ways:
   - Sale/transfer to a younger generation of the same family. In this process the financial needs
of both generations must be satisfied; the older generation needs to retire with enough money
to satisfy their living requirements and a younger generation taking over the farming assets should not be burdened with onerous debt levels.

- **Sale of the property on the open market.** The current value of farming land is a reflection of its value as ‘real-estate’ value rather than a reflection of the current earning capacity from farming. Recent sales in the shire have seen land taken out of cane production and in some cases out of commercial farm production. This trend is likely to continue with the current downturn in the sugar industry. An increasing urbanisation of the countryside will place additional pressures on the remaining farmers about how and when they carry out farming operations. In addition the land value will be based less on productive capacity and more on location.

Many farmers will need assistance on retirement and succession planning if they are to achieve desirable outcomes for themselves and their families. Anecdotal evidence from many farming areas suggest that younger generations were and still are being discouraged (often actively discouraged) from farming. This was due to poor financial returns or perceived lifestyle issues with farming as an occupation. It is then more difficult to attract this generation back to the family farm and achieve a financially and emotional satisfactory family farm transfer. This process needs to occur with professional financial/legal advice and often assisted or facilitated by someone from outside the immediate family.

4. For a rural community the movement to a more urban population also brings changes. This is not only in the demand for services and the way in which services are delivered but also the increasing potential for conflict between alternative landuses. These will have implications for shire planning as well as delivery of health, education and other community and business services.

5. This survey has highlighted the poor financial conditions facing most cane farmers relying on income from cane production in the next year. The stress associated with declining rural incomes has, in other areas, caused an increase in health related problems: both mental and physical health problems. These problems are often difficult to detect before they become catastrophic. Additional physical and mental health support services to meet this need will need to be provided to this community.
### Statement of Financial Positions for Cane Farmers and their Families in the Mossman area March 2004

#### No. of Families relying on the Business

<table>
<thead>
<tr>
<th>No. of Families</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17</td>
<td>81</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>three or more</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

#### No. of Generations involved in the Farming Operation

<table>
<thead>
<tr>
<th>No. of Generations</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15</td>
<td>71</td>
</tr>
<tr>
<td>More than one</td>
<td>6</td>
<td>29</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

#### Age of Respondents

<table>
<thead>
<tr>
<th>Age Range</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;30</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30-39</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>40-49</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>50-59</td>
<td>7</td>
<td>32</td>
</tr>
<tr>
<td>60-69</td>
<td>6</td>
<td>27</td>
</tr>
<tr>
<td>&gt;70</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>22</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

#### Current Business Structure

<table>
<thead>
<tr>
<th>Structure</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sole trader</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Partnership</td>
<td>14</td>
<td>70</td>
</tr>
<tr>
<td>Company</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Trust</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

#### Projected Farm Cash Surplus/(Deficit) for the period of 2004

#### Surplus/Deficit Range

<table>
<thead>
<tr>
<th>Surplus/Deficit Range</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>over (60,000)</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>(40,001) - (60,000)</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>(20,001) - (40,000)</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>0-(20,000)</td>
<td>9</td>
<td>45</td>
</tr>
<tr>
<td>1 - 20,000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20,001 - 40,000</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>40,001 - 60,000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>60,001 - 80,000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>80,001 - 100,000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>&gt;100,000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

#### Debt Range

<table>
<thead>
<tr>
<th>Debt Range $</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 20,000</td>
<td>7</td>
<td>37</td>
</tr>
<tr>
<td>20,001 - 50,000</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>50,001 - 100,000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>100,001 - 200,000</td>
<td>4</td>
<td>21</td>
</tr>
<tr>
<td>200,001 - 400,000</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>400,001 - 600,000</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>600,001 - 800,000</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>800,001 - 1,000,000</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>&gt;1,000,000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

#### Area of Production

<table>
<thead>
<tr>
<th>CPA Area Range (Ha)</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-50</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>51-100</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>101-150</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>151-200</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>&gt;200</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
**Equity Range**

<table>
<thead>
<tr>
<th>Tonnes</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5,000</td>
<td>8</td>
<td>40</td>
</tr>
<tr>
<td>5,001-10,000</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>10,001-15,000</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>15,001-20,000</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>&gt;20,000</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

**Off-farm Income Earned 2003/2004**

<table>
<thead>
<tr>
<th>Income Range ($)</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
<td>21</td>
</tr>
<tr>
<td>1-10,000</td>
<td>4</td>
<td>21</td>
</tr>
<tr>
<td>10,001-20,000</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>20,001-30,000</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>30,001-40,000</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>40,001-50,000</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>50,001-100,000</td>
<td>4</td>
<td>21</td>
</tr>
<tr>
<td>&gt;100,000</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>100</td>
</tr>
</tbody>
</table>

**Off Farm Assets**

<table>
<thead>
<tr>
<th>Asset Ranges ($)</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 - 10,000</td>
<td>13</td>
<td>68</td>
</tr>
<tr>
<td>10,001 - 50,000</td>
<td>4</td>
<td>21</td>
</tr>
<tr>
<td>50,001 - 100,000</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>&gt;100,000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Term Deposits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>9</td>
<td>47</td>
</tr>
<tr>
<td>1 - 10,000</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>10,001 - 50,000</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>50,001 - 100,000</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>&gt;100,000</td>
<td>4</td>
<td>21</td>
</tr>
<tr>
<td>Sugar Terminal Shares</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 - 10,000</td>
<td>7</td>
<td>37</td>
</tr>
<tr>
<td>10,001 - 50,000</td>
<td>11</td>
<td>58</td>
</tr>
<tr>
<td>50,001 - 100,000</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Other Shares</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>9</td>
<td>53</td>
</tr>
<tr>
<td>1 - 10,000</td>
<td>6</td>
<td>35</td>
</tr>
<tr>
<td>10,001 - 50,000</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>50,001 - 100,000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>&gt;100,000</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>R/Estate</td>
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<td></td>
</tr>
<tr>
<td>0</td>
<td>12</td>
<td>63</td>
</tr>
<tr>
<td>1 - 100,000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>100,001 - 500,000</td>
<td>4</td>
<td>21</td>
</tr>
<tr>
<td>&gt;500,000</td>
<td>3</td>
<td>16</td>
</tr>
</tbody>
</table>
Appendix 9. Business Planning Workshops – Slide presentation

**Mossman Agricultural Services**

Business Planning for Cane Farming

**Business Planning**

- Family Businesses
- Business planning required for Restructuring Grant
- Farm Business surveys:
  “Findings indicate that business planning as well a background characteristics such as size of farm business, and the farm owners’ level of education and age are associated significantly with higher business performance”

**Requirements**

- Written document
- Establish viability
- Identify actions to enhance viability
- Actions aligned to Restructuring Grant application.
- Defines the direction for the business
- Prepared with all relevant people involved
- Recognises personal and family needs
- Periodically reviewed

**Developing Business Plans**

Two parts
1. Workshop process
   - Principals involved
   - Tools to use
   - Work through examples and templates
2. Individual families working together
   - Own business plans
   - Seek independent advice as required

Cost
Developing Business Plans (cont’d)

Why this approach?
➢ Confidentiality
➢ Individuals developing their own plans
   ➢ Suits individual needs and aspirations
   ➢ Avoids “Off-the-Shelf” plans
   ➢ Cost involved

Business Planning Process
➢ **Now.** Where is the business at this point in time?
➢ **Where.** Where do you want the business to be in the future?
➢ **How.** What do you need to do to get the business to where you want it?
➢ **Do It.** Putting the plan into action, monitoring progress and reviewing plan.

Parts of the Business Plan

Examples of business planning templates.
➢ QRAA - Business Planning Guide
➢ National Australia Bank – Farm Business Planning
➢ MAS Business Planning Workbook

Where to from here?

Series of 5 workshops
➢ Work through local example
➢ Work at home on individual plans

Workshop 1
➢ Overview of Business Planning
➢ Management and taxation accounts
➢ Viability assessment – Key Performance Indicators
Assessment of Viability
Key Performance Indicators
➢ Farm Business Profit
➢ Net Non-farm Income (per Household)
➢ Disposable Income (per Household)
➢ Equity %
➢ Financing costs as % of farm income

Farm Business Profit
Farm Business Profit
Equals
Farm Income – Farm Costs – Dep’n – Financing Costs – Household Allowance
➢ Non-farm income not included
➢ Does not reflect resource improvement
➢ Living expenses vary considerably

Net Non-farm Income (per Household)
➢ Can include activities such as contracting, as well as off-farm employment and investments
➢ Significant component of total income for many farm businesses
➢ Can be a useful form of diversification

Disposable Income (per Household)
Disposable Income per Household equals
Farm Income – Farm Costs – Dep’n – Financing Costs + Non-farm Income
Money left over to finance
➢ Tax
➢ Living expenses
➢ Capital improvement or principal debt reduction
➢ Asset creation and retirement funding
**Equity %**

Equity %
equals
Assets – Liabilities
divided by
Assets (expressed as a %)

- Low Equity % corresponds with difficult debt servicing
- High Equity % does not guarantee that a business is high performing

**Financing Costs as % of Farm Income**

Financing costs as % of Farm Income
equals
Financing Costs X 100
divided by
Farm Income

- Borrowings are normally one of the main costs
- Needs to be calculated over a number of years

**Individual Business Plans**

- Apply Key Performance Indicators to own businesses
- Look at performance over last 3 to 5 years
- Take figures from taxation accounts and adjust to suit management requirements
- First step in assessing current position
- Will develop business plan over workshop series

**Workshop 2**

Complete strategic audit of business
- Description of current business
  - People
  - Property and infrastructure
  - Plant and equipment
  - Business structure and historical performance
- SWOT analysis
Workshop 3
- Decision making and change
- Communication
- Setting the direction
  - Mission Statement (Why are we in the business of farming?)
  - A Shared Vision (What is it that we want to achieve?)
  - Setting Objectives – Internal and External factors

Workshop 4
- Selecting strategies to achieve the objectives
  - Offensive strategies – taking advantage of the strengths and opportunities
  - Defensive strategies – addressing the weaknesses and threats
- Assessing business resources – addressing the right number and range of strategies
- Action plan – Who will do what and when

Workshop 5
- Resource the plan
  - Cash-flow budgeting
  - Skill development
- Collation of Business Plan document
- Measuring progress – Is the plan working? When? How?
- Review the plan – Are any changes needed? When? How?

Celebrate!
- Thank you.
Appendix 9.

Partnership for Sustainable Sugar

**Workshop 2**

Complete strategic audit of business
- Description of current business
  - People
  - Property and infrastructure
  - Plant and equipment
  - Business structure and historical performance
- SWOT analysis

**Business Dollars**

Farm Income
Less
Farm Operating Costs
Equals
Farm Operating Surplus
Less
Capital Costs
Equals
Farm Profit

**Business Dollars (cont'd)**

Farm Profit
Plus
Off-farm Income
Equals
Disposable Income

**Performance Indicators**

Farm Income (Price X Production X Size)
- Farm Income/ha
- Tonnes cane/ha and Tonnes CCS/ha
- Value of effective area farmed/household

Operating Costs
- Operating costs/ha
- Operating costs/tonne CCS
- Farm operating costs as % of farm income
Performance Indicators (cont’d)

Farm Operating Surplus
  - Farm operating surplus/ha
  - Farm operating surplus/tonne CCS
  - Farm operating surplus as % of land value

Labour usage
  - Hectares/labour unit
  - Tonnes CCS/labour unit
  - Farm income/labour unit

Performance Indicators (cont’d)

Variable costs of production
  - Fuel as % of farm income
  - Repairs as % of farm income
  - Fertilizer costs/ha
  - Fertilizer costs/tonne CCS
  - Kg N/tonne CCS

Performance Indicators (cont’d)

Capital Performance
  - Return on capital
  - Farm equity
  - Farm debt to farm income ratio

Viability
  - Farm business profit
  - Net non-farm income per household
  - Net disposable income/household
  - Equity
  - Financing costs as a % of farm income

Workshop 3

- Decision making and change
- Communication
- Setting the direction
  - Mission Statement (Why are we in the business of farming?)
  - A Shared Vision (What is it that we want to achieve?)
  - Setting Objectives – internal and external factors
**Forced Change Cycle**

- Change
  - Acceptance
  - Move On
  - Memories
    - Reminisce
  - Depression
  - Anger

**Chosen Change Model**

- Discontent + Shared Vision + Plan + Capability = Change
  - Shared Vision + Plan + Capability = Happy, No Change
  - Discontent + Plan + Capability = Anxiety, Frustration
  - Discontent + Shared Vision + Capability = A Fizzer
  - Discontent + Shared Vision + Plan = Wasted Effort

**J&J Farmer SWOT Analysis**

**Strengths**
- Established property
- Competent farmers
- Some diversification (off-farm income)
- Reasonable size single family unit

**J&J Farmer SWOT Analysis (cont’d)**

**Weaknesses**
- Negative farm business profit
- ‘Small’ farm size
- High debt : farm income
- Low non-farm income
- High operating costs
- Machinery all old
- Succession plan no developed
- Low productivity
J&J Farmer SWOT Analysis (cont’d)

Opportunities
- Sell out, lease, all or some, farm or off-farm investments etc
- Actively involve next generation in the farm
- Increase off-farm income
- Reduce liabilities/improving equity

A Shared Vision

What will the farm business be like if all of the goals and objectives have been met.
- Common vision for all involved in the business
- Look to (10) years ahead
- Includes personal as well as business vision
- Covers areas such as:
  'Won’t it be great when ...............?'
  'Wouldn’t it be great if ...............?'
  'The things that are really important to me are ..........'

J&J Farmer SWOT Analysis (cont’d)

Threats
- Security of the mill
- Low world sugar prices
- Environmental issues

Mission Statement

 Defines the purpose of the business
 Provides the reason for the business
 Offers an understanding of the farm business
- Broad statement of what the business does
- Who are the customers?
- Location
- What distinguishes the farm from others?
- Is short and clear
Goals or Objectives

Defines a clear direction for the business
- SMART Goals and objectives
- Same headings as with Situation Analysis
- Short, medium and long term
- All involved

Workshop 4

Selecting strategies to achieve the objectives
- Offensive strategies – taking advantage of the strengths and opportunities
- Defensive strategies – addressing the weaknesses and threats

Assessing business resources – addressing the right number and range of strategies
Action plan – Who will do what and when

Spheres of Concern, Influence and Control

Offensive Strategies

Issue: Low farm income
Goals:
- To return to a positive cash-flow in the 2004/05 financial year.
- To increase farm income/ha by 20% in 2005.
- To improve farm equity to 80% by 2008.
Offensive strategies

Issue: Succession planning
Goals:
- To review our Wills by Dec. 2005.
- To seek financial and legal advice on succession planning by Dec. 2005.
- To transfer operational control of the farm business to Joe Jr. by 2007.
- To develop a plan whereby all farming assets will be transferred to Joe Jr. by 2014.

Defensive Strategies

Issue: Security of the mill
Goal:
- To develop one additional source of farm income by 2006.
- To support the development of one additional source of income at the mill level by 2006.

Workshop 5

Resource the plan
- Cash-flow budgeting
- Skill development
Collation of Business Plan document
Measuring progress – Is the plan working?
  When? How?
Review the plan – Are any changes needed? When? How?
Appendix 10. Business Plan for Mossman cane farmers

FARM
BUSINESS PLAN

Business Name: .................................................................

Contact: ...........................................................................

Postal Address: ..............................................................

......................................................................................

Telephone: .........................................................

Date: .................................
EXECUTIVE SUMMARY

Background
Background and description of farm business:

: .................................................................
: .................................................................
: .................................................................
: .................................................................

Current Position
Current business/economic position and outlook:

: .................................................................
: .................................................................
: .................................................................
: .................................................................

Future Direction
Outline of the longer term direction for the business:

: .................................................................
: .................................................................
: .................................................................
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Business Development
Brief description of the main strategies to maintain and develop the business:

: .................................................................
: .................................................................
: .................................................................
: .................................................................
FARM BUSINESS PROFILE

People involved in the farm

Husband: .................................................................

Background: ................................................................

: .........................................................................

: .........................................................................

: .........................................................................

Wife: .................................................................

Background: .................................................................

: .........................................................................

: .........................................................................

Child 1: .................................................................

Background: .................................................................

: .........................................................................

Child 2: .................................................................

Background: .................................................................

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Child 3: .................................................................

Background: .................................................................

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Child 4: .................................................................

Background: .................................................................

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Farm and Business Description

Property name: .................................................................

Description: ........................................................................

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Leased Land: ........................................................................

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Business Trading Name: ...........................................................

Contact name: ........................................................................

Postal Address: ........................................................................

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Telephone: ......................... Fax: ..............................................

Email: .................................................................

Legal Structure of Business (tick as applicable):

☐ Sole Trader  ☐ Partnership  ☐ Limited Liability Co

☐ Trust  ☐ Limited Liability Partnership  ☐ Other

Accountant: ........................................................................

Bank/Financial: ........................................................................

Other: ........................................................................
Property Details

Total area owned: .................................... Ha. .................................. Acres

Total area leased: ..................................... Ha. .................................. Acres

Total cropping area: ................................... Ha. .................................. Acres

Other cleared area: ..................................... Ha. .................................. Acres

Other area: .............................................. Ha. .................................. Acres

Rainfall: ................................................ mm/Year

Soil types: ..............................................

Water supply: ........................................

Irrigation Rights: ...................................... Megalitres

Cane block details: (See attached Farm Map)

Other crops grown:

Type: ................................................. Area: .................................... Ha/Acres

Type: ................................................. Area: .................................... Ha/Acres

Type: ................................................. Area: .................................... Ha/Acres

Grazing areas:

Paddock name: ....................................... Area: .................................... Ha/Acres

Paddock name: ....................................... Area: .................................... Ha/Acres

Paddock name: ....................................... Area: .................................... Ha/Acres

Paddock name: ....................................... Area: .................................... Ha/Acres

Paddock name: ....................................... Area: .................................... Ha/Acres

Paddock name: ....................................... Area: .................................... Ha/Acres
Farm Map
<table>
<thead>
<tr>
<th>Description</th>
<th>Sex</th>
<th>Year Drop</th>
<th>Number</th>
<th>Value/Head</th>
<th>Total Value</th>
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## Financial Performance

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<tbody>
<tr>
<td>A</td>
<td>Payments to owners/partners including super (From P &amp; L)</td>
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<tr>
<td>B</td>
<td>Leasing Expenses</td>
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<td>C</td>
<td>Interest and bank charges</td>
<td></td>
<td></td>
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<tr>
<td>D</td>
<td>Depreciation</td>
<td></td>
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<tr>
<td>E</td>
<td>Total expenditure</td>
<td></td>
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<tr>
<td>F</td>
<td>Operating costs = E - (A+B+C+D)</td>
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<tr>
<td>G</td>
<td>Farm income</td>
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<tr>
<td>H</td>
<td>Operating surplus = G - F</td>
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<tr>
<td>I</td>
<td>Farm assets Land</td>
<td></td>
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<tr>
<td>J</td>
<td>Plant &amp; equipment</td>
<td></td>
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<tr>
<td>K</td>
<td>Livestock</td>
<td></td>
<td></td>
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<tr>
<td>L</td>
<td>Non farm assets</td>
<td></td>
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<tr>
<td>M</td>
<td>Total assets = I+J+K+L</td>
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<tr>
<td>N</td>
<td>Liabilities Term loans</td>
<td></td>
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<tr>
<td>O</td>
<td>Overdraft/credit</td>
<td></td>
<td></td>
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<tr>
<td>P</td>
<td>Hire Purchase</td>
<td></td>
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<tr>
<td>Q</td>
<td>Total liabilities = N+O+P</td>
<td></td>
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<tr>
<td>R</td>
<td>Equity = M-Q</td>
<td></td>
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<tr>
<td>S</td>
<td>Value of leased land</td>
<td></td>
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<tr>
<td>T</td>
<td>Family living expenses (From Balance Sheet - Drawings)</td>
<td></td>
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<tr>
<td>U</td>
<td>Return on farm capital = H- (D+T)/I+J+S</td>
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<tr>
<td>V</td>
<td>Fuel costs</td>
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<tr>
<td>W</td>
<td>Fertiliser costs</td>
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<tr>
<td>X</td>
<td>Repairs and maintenance costs</td>
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## Cane Production

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<th></th>
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<tbody>
<tr>
<td>AA</td>
<td>CPA Area</td>
<td></td>
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</tr>
<tr>
<td>AB</td>
<td>Harvested Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC</td>
<td>Tonnes cane harvested</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AD</td>
<td>Relative ccs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AE</td>
<td>Tonnes ccs ACxAD</td>
<td></td>
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<tr>
<td>AF</td>
<td>Tonnes cane/ha (CPA) AC/AA</td>
<td></td>
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<tr>
<td>AG</td>
<td>Tonnes ccs/ha (CPA) AE/AA</td>
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<tr>
<td>AH</td>
<td>Total Kilogram N applied</td>
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### Key Performance Indicator

#### Production system

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<tbody>
<tr>
<td>1</td>
<td>Farm income/ha</td>
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<td>2</td>
<td>Farm operating cost as % farm income</td>
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<td>3</td>
<td>Farm operating costs/ha</td>
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<td>4</td>
<td>Farm operating costs/tonne ccs</td>
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<td>5</td>
<td>Farm operating surplus/ha</td>
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<td>6</td>
<td>Farm operating surplus/tonne ccs</td>
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<tr>
<td>7</td>
<td>Farm operating surplus/land value</td>
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<tr>
<td>8</td>
<td>Tonne ccs/labour unit</td>
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<td>9</td>
<td>Hectares/labour unit</td>
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<td>10</td>
<td>Farm income/labour unit</td>
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<td>11</td>
<td>Fuel as % farm income</td>
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<td>12</td>
<td>Repairs as % farm income</td>
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<tr>
<td>13</td>
<td>Fertiliser cost/ha</td>
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<td>14</td>
<td>Fertiliser cost/tonne ccs</td>
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<td>15</td>
<td>Kg N/tonne ccs</td>
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#### Capital Performance

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<tr>
<td>16</td>
<td>Return on capital</td>
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<tr>
<td>17</td>
<td>Farm Equity %</td>
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<td>18</td>
<td>Value of effective area farmed/household</td>
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<td>19</td>
<td>Farm debt: farm income</td>
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#### Viability

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<tr>
<td>20</td>
<td>Farm business profit</td>
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<tr>
<td>21</td>
<td>Net non-farm income/household</td>
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<td>22</td>
<td>Disposable income/household</td>
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<td>23</td>
<td>Equity%</td>
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<tr>
<td>24</td>
<td>Financing costs as % farm income</td>
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</table>
## Schedule of Machinery, Plant and Equipment

<table>
<thead>
<tr>
<th>Descriptions</th>
<th>Value</th>
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Skills, Resource Condition and Personal Development

Management

Critically review your management skills.

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Marketing

Describe your markets, your competitors and your approach to marketing.

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Land and Farm Resources

Review your resources in terms of land degradation, nutrient supply, soil structure, weeds and pests, tree population, buildings, fences, water supply etc.

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Family

How do you work together as a farming family?

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Estate Planning

Do you have wills and have they been reviewed recently (in the last two years)? Are all family members aware of the contents of your wills? Do you need to get together and discuss estate planning?

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Retirement

Are you making provision for retirement?

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Personal Development

Do you find time for educational or recreational activities which are satisfying or increase your skills?

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Lifestyle

Are you enjoying the farming lifestyle? What aspects do you most enjoy? What aspects do you least enjoy?

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**SWOT Analysis**

Please consider the farming business in terms of an individual family farming business and also a farming business in the Mossman area.

**Strengths**

What do you do best or better than others and how can you capitalise on this?

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Opportunities

What opportunities are there on your farm for change or development?


Threats

What can adversely affect your farm business and what can you do to counter them?


**Vision Statement**

How do you see the farming business if ideally all the goals and objectives have been met? This is the long term (10 years) view for the business.

**Mission Statement**

What are you producing on the farm? This is the purpose and reason for farming.

**Goals and Objectives**

Short, medium and long term

**Financial**
Productivity

Management

Marketing
Land and Farm Resources

Family

Estate Planning

Retirement
Personal Development

Lifestyle
Business Strategies

How are you going to achieve the goals or objectives of the business? These describe how you will get from where you are now to where you want to be in each of the key areas.

Farm Business Strategies (including Financial, Productivity, Management, Marketing and Land and Farm Resources)

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Personal and Family Strategies (including Family, Estate Planning, Retirement, Personal Development and Lifestyle)
## Action Plan

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Risk Management

What are the effects on cash surplus/deficit and on peak debt of changes to yields, interest rates, prices or poor seasons? How will you manage these factors? What changes do you need to make to your budgets?

Monitoring the Plan

When will the plan including the budgets be reviewed?

When will a full review of the whole plan be done? This involves getting everyone together.
## Monthly Cash Flow Budget

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Fees & permits
Insurance
Protective clothing
Rates/Leases
Repairs - Buildings
Repairs - Plant and Equipment
Repairs - Vehicles
Sundry expenses
Telephone
Vehicle registrations
Workers compensation

Total Overhead Costs
Operating Surplus/Deficit

Finance
Bank fees and charges
Hire purchase charges
Interest other loans
Overdraft interest

Capital Costs
Land and improvements
Plant and vehicles
Loan repayments
Drawings
Investments

Total Expenditure
Surplus/Deficit

Opening Balance
Closing Balance
### Yearly Financial Projection

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**Appendix 10.**  

*Partnership for Sustainable Sugar*
Projection of Assets and Liabilities

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Appendix 11. BMP Self Assessment Scorecard

Best Management Practice
Sugarcane
Self Assessment Scoresheet

Tick box (only one box in each section) that best describes your practice

1. Nutrient Requirements Assessment
   - Never use soil samples
   - Soils samples taken on less than 50% of blocks each cane cycle
   - Soils samples taken on more than 50% of blocks each cane cycle
   - Soil sample each block at least once per crop cycle

2. Nitrogen Rates
   - Always exceed 160 kg N/ha
   - Apply more than 160 kg N/ha on some blocks
   - Do not exceed 160 kg N/ha on any blocks
   - Use 160 kg N/ha or less and adjust to account for other inputs eg. legumes and/or mill mud

3. Urea Application on ratoons
   - Urea surface applied on some blocks when cane less than 500mm high
   - All urea broadcast when cane at least 500mm high
   - All urea applied close to row when cane at least 500mm high
   - All urea applied split stool or under ground beside stool

4. Minimum Tillage Planting
   - Cultivate entire block to fine tilth prior to planting
   - Cultivation prior to planting consists of less than five operations with no more than one rotary hoeing
   - Only cultivate zone where cane is to be planted
   - Plant cane directly without any cultivation

5. Green Cane Trash Blanket
   - Always burn trash
   - Burn more than once per crop cycle on some blocks
   - Only burn blocks to be fallowed or replanted
   - Never burn trash
6. Fallowing
- All plough out/replant and no fallow
- Plough out/Replant area greater than fallow plant
- Fallow plant area greater than plough out/replant
- All cane planted into fallow

7. Fallow Practice
- Weed fallow
- Managed non legume fallow
- Managed legume fallow
- Managed legume fallow planted zero till

8. Controlled Traffic Strategies (Count dual rows as one row) for plant blocks only
- Row spacing less than 5ft (1.52m)
- Row spacing from 5ft (1.52m) to less than 5ft 5in (1.65m)
- Row spacing from 5ft 5in (1.65m) to less than 5ft 9in (1.75m)
- Row spacing 5ft 9in (1.75m) or greater

9. Irrigation Scheduling
- Don’t use any scheduling tools
- Schedule irrigation based on evaporation but don’t keep any records
- Use evaporation pans to schedule irrigation and keep records
- Use soil moisture monitoring equipment to schedule all irrigation

10. Irrigation Systems
- Majority of farm flood irrigated and not all tail water recycled
- Majority of farm flood irrigated with all tail water recycled
- Majority of farm irrigated by overhead
- Majority of farm trickle irrigated

11. Drain Profile and Vegetation
- Less than 30% of drains wide, shallow and grassed
- Between 30% and 70% of drains wide, shallow and grassed
- At least 70% of drains wide, shallow and grassed
- All drains wide, shallow and grassed
11.1 Drain Profile and Vegetation for deep drains

☐ Greater than 70% of drains unstable (drains steep sided, bare of vegetation and slumping or base eroding)
☐ Between 30% and 70% of drains stable
☐ At least 70% of drains stable
☐ All drains stable (sides battered, stable and vegetated)

12. Block Drainage

☐ All blocks have wet sections
☐ More than half of the blocks have wet sections
☐ Less than half of the blocks have wet sections
☐ All blocks well drained

13. Record Keeping

☐ No records kept
☐ Some basic financial records maintained
☐ Record system suitable for BMP auditing
☐ Comprehensive record system suitable for accreditation is maintained

14. Business Planning

☐ No business plan developed
☐ Plan developed but never referred to
☐ Plan developed but needs review and amendment
☐ Plan prepared with involvement of all main participants and is reviewed and amended regularly

15. Riparian and wetland vegetation - nominate which option applies to the majority of stream banks on your property

☐ Banks with no vegetation
☐ Banks vegetated, but no trees or shrubs beyond top of bank
☐ Banks vegetated, trees, shrubs and grass extending less than 6m from top of bank
☐ Banks vegetated, trees, shrubs and grass extending at least 10m from top of bank

16. Headland Vegetation Management

☐ Vegetation sprayed out on headlands
☐ Headland vegetation maintained less than 10cm in height
☐ Headlands slashed less than five times per year no lower than 10cm
☐ Headlands slashed at least five times per year no lower than 10cm
17. Cane Grub Management (Only answer this question if cane grubs are a problem on your farm)

- Don’t use any control measures
- Chemical control used on all plant cane
- Chemical control not used on all plant cane
- Adopted an IPM plan for grub control

18. Rat Management (Only answer this question if rats are a problem on your farm)

- No management measures used
- Rely solely on rat baiting for control
- Baiting is only part of my management strategy
- Adopted an IPM plan for rodent control

19. RSD Management

- Any cane used for plants
- Less than 50% of plant material sourced from cane that has been hot water treated in the last four years
- Greater than 50% of plant material sourced from cane that has been hot water treated in the last four years
- All plants sourced from cane that has been hot water treated in the last four years

20. Chemicals Storage and Handling

- I have never obtained chemcert accreditation
- My chemcert accreditation has lapsed
- I have current chemcert but have yet to bring all my storage & mixing facilities etc up to prescribed standards
- I maintain current chemcert accreditation and adhere to prescribed principles for usage, handling, storage, and waste disposal.

21. Farm layout for BMP Harvesting

- All headlands less than 4m
- Less than 50% of headlands 4m
- Greater than 50% of headlands 4m
- All headlands wider than 4m

Introduction

Work reported to date detailed changes in harvest arrangements for the 2003 season directed primarily at cost savings to the mill. This included increasing harvest hours, staggered starting times, five day working week and some grouping of harvesters around transport delivery points. Further changes were mooted for the 2004 season including a further restriction of crushing hours. In addition the situation regarding cane from the Mareeba CPA was unclear.

At the growers level reducing the number of harvest rounds and reducing the number of harvest units were identified as efficiency measures. A proposal was also developed by MAS to effectively reduce the number of harvesters to be serviced by the transport system on a daily basis. This proposal was based on rostering harvest days for harvest units operating at less than full capacity. This was an attempt to overcome the problem of a real reduction in harvester units would only be achieved by natural attrition in the absence of a direct incentive package.

Several changes have significantly altered the arrangements for the 2004 season.

1. Number of harvest units. Two harvest groups made commercial decisions to cease harvest operations and sell equipment. This reduces the number of harvesters operating in the area from 20 (including 3 small single property units) to 18. The smaller number of units will be cutting the same area as last season with a result that most groups will have an increase in daily cut quotas.

2. Hours of work. The hours of crushing have been reduced as was indicated in the last report. The mill will start crushing at noon on Monday and will finish by midnight on Friday. This has reduced the effective crushing from 120 hrs/wk to 108 hrs/wk. This was instituted to eliminate penalty rates associated with weekend overtime.

3. Number of harvest rounds. Growers have agreed to the reduction of rounds from 5 to 4. This has meant a change to proportions cut to each round and was seen as essential given the other constraints outlined for this season.

4. Harvest and transport coordination. In previous seasons the harvest scheduling had been coordinated by MAS under contract to the mill and road and rail transport had been coordinated by staff of the mill. This season both harvest and transport scheduling will be coordinated through MAS under contract to the mill.

5. Mareeba cane will be processed under similar arrangements to last season with approximately 165,000 tonne toll crushed at Arriga mill and 145,000 tonne transported for processing at Mossman. Total estimated crush is currently 750,000 tonne to be crushed at Mossman which equates to an estimated 20 week crush given the reduced crushing hours.

Results

The impact of the changes are as follows:

1. Number of harvest units. The state of the current harvest fleet was documented in April and is summarised in Table 1. The last harvester purchased was in 2001 with the oldest machine purchased in 1988. Generally the picture is of a well maintained, reasonably modern harvest fleet although some of the haul-out equipment is old. The equipment of the three small owner/operators was not included in this survey as they are only cutting very small quantities of cane. None of the Mareeba harvest operators were surveyed.

   The estimated tonnages cut this year compared with actual tonnes from last year are in table 2. (The season estimated tonnages for each operator is also presented as a graph in Appendix 8.) Table 2 also contains estimated daily harvest tonnages for all operators given the expected 20 week crush. The two operators who finished last season had their groups split between the existing harvest groups with the majority going to 7 of the other harvest groups.

   The reduction in harvest estimate of groups is a result of declines in production within individual farms within the groups either through lower yield potential or land taken out of production. Lower yields are a reflection of the lower levels of management (particularly fertilizer and weed management) on some farms this season. This is also reflected in the lower overall estimate for the Mossman CPA.
Table 1. Mossman Harvest Fleet, April 2004.

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<td>Powerhaul (2 units)</td>
<td>1997</td>
<td>Austoft</td>
<td>Track</td>
<td>Pre 1980</td>
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<td>Ives</td>
<td>Case</td>
<td>1995</td>
<td>Cameco</td>
<td>1999</td>
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<td>Track</td>
<td>1997</td>
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<td>Fiat</td>
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None of the Mossman harvesters are operating more than one shift and under his harvest constraint 40,000 tonne is about the maximum that is possible from one set of harvest machinery in the season. In 2003 season, 8 of the 20 operators in the Mossman coastal area cut more than 40,000 tonne and had a combined harvest of 56% of the total in the area. On the current 2004 estimates, 8 of the 18 operators will cut more than 40,000 tonne and this represents 63% of the total combined estimate. This represents a significant improvement in efficiency for the local industry.
Table 2. Mossman Central Mill Harvest Operators

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Total Mossman Coastal area 649436 604612 29073.4 6460.7

Singh 94218 82947 Toll crush
Maisel 69696 70770 Toll crush
JAG Mareeba 99186 92384 4442.4 987.2
Tibaldi Mareeba 47033 50880 2446.6 543.7
Falvo (3 day week) 14425 1018 49 16.3

Mill Total 973994 902611 36011.4 8007.9

Avge crush rate 335 Tonnes/hr

2. **Hours of work.** From the perspective of the MCM, this will result in a significant reduction in the amount of overtime worked. The first shift will start at 8:00 am on Monday morning and the mill will be started so that crushing can commence by 2:00 pm. Last season the first shift started at 4:00 am Monday morning and started the mill to begin crushing at 8:00 am. Similarly on the last shift Friday will finish crushing at 2:00 am Saturday morning and have the mill shut down by 8:00 am so that there will be no shift on Saturday morning.

For the growers and harvesters the effect of this is to delay the start time on Monday morning by 6 hours and similarly the finish time on Friday will be brought forward by 6 hours meaning a loss of 12 hours to the cutting week. For all groups this then means a higher overall harvest rate per hour. When this is combined with an increase in estimates for the largest groups, the end result is a need for minimising downtime with shifting, waiting for bins and mechanical breakdowns.

The largest group will need to maintain an average harvest rate of nearly 650 tonnes per day or over 50 tonnes per hour to keep to quota and not extend harvest hours beyond safe limits for one shift. In addition to the weekly time constraints detailed above, daily time constraints are also in place. This restricts harvest hours to 4:00 am to 8:00 pm during the season to restrict noise disturbance to the Douglas Shire.
residents. This means effectively a maximum of 16 hours cutting per day and effectively precludes 24 hour harvesting. The same system of early starters and late finishers will apply as it did last year.

These time constraints then mean that for an individual operator it is uneconomic to operate more than one shift per day in the Mossman coastal area. Two shifts and 24 hour operation is economic and practiced in the Mareeba area and this is reflected in the annual cut estimates for the two areas illustrated in Table 2. The last 5 operators are Mareeba harvesters while the rest are Mossman coastal harvesters.

These economies of scale also relate back to the comments on efficiency of operators made in the section on number of harvest operators.

3. Number of harvest rounds. The second major efficiency gain will come as a result of the reduction in the number of harvest rounds from 5 to 4. Growers generally prefer the larger number of rounds because of the longer period over which they will receive progressive cane payments. Contract harvesters on the other hand prefer a smaller number of rounds which means less expense with moving and lost time.

The first round has traditionally been a small (as a percentage of total cut) round and mainly used by growers on blocks that will be ploughed out and replanted in the same season. In general terms the CCS content of cane is low at the start of the season, peaks during the season and falls again towards the end. Hence growers want the bulk of their cane cut during the middle of the season (in the second and third rounds) with small proportions during the first and last rounds.

At the end of the season the chance of interruption to harvest and loss of cane quality as assessed on CCS with wet weather is greater. Growers then want to have a small (in terms of their total production) final round. The anticipated season this year is planned to finish 4 weeks earlier than last year. This will reduce the risk of rain affecting the harvest and cane quality in the last round.

When these factors were coupled with the time constraints for the largest harvest groups, growers agreed to reduce the number of rounds from 5 to 4 for this season. The proportions of a grower’s total production cut in the all rounds were increased slightly to allow for this reduction in the total number of rounds. The largest increases were in the final three rounds.

Again on an industry basis this will improve the efficiency of the local industry overall.

4. Harvest and transport coordination. Communication between harvest operators and transport coordination was identified as an issue at the growers meetings. During the season MAS field staff personnel are constantly in the field to coordinate harvester movements. Having the transport coordination also under the contract to MAS will enable better communication between growers and the transport operations overcoming some of the communication problems in past years.

Other benefits to this arrangement will include:

- More timely changes to transport schedules to overcome some of the problems that arise as harvesters fall behind or move ahead of quota schedules.
- Less down time for harvest operators waiting for a supply of bins.
- More flexibility in the harvest and transport schedules so that there will be less forced harvester shifts to suit transport schedules.

The communication plan is based around the following elements:

- Harvest operators will get weekly printed updates of schedules that will include seasonal harvest progress of their group in relation to the mill seasonal progress. This will enable changes to ensure that groups are not falling behind or getting ahead of other groups in the district.
- Harvest operators will be responsible for directly informing growers of planned changes to movements and the growers can directly contact responsible MAS personnel if they have any issues in relation to these changes.
- MAS personnel responsible for harvest/transport coordination will have daily face to face contact with mill transport officers updating transport schedules. In addition there will be radio contact to allow for minor changes to schedules as a result of changes to field harvester conditions (breakdowns, better harvesting conditions etc)
- Harvest operators, MAS field personnel, growers and transport officers will have verbal contact by telephone or radio as required.
This will enable better management of the harvest/transport systems with more flexibility in bin deliveries to reflect local harvest conditions and better communication with growers and harvest operators. This addresses two of the major issues raised by growers about the arrangements for 2003 season.

5. **Mareeba cane.** At this stage, arrangements for toll crushing and supply of cane assigned to MCM from the Mareeba area will continue with quantities as indicated in the introduction. For the MCM the cost of road transport of cane from Mareeba is of concern for the longer term viability of this supply. Toll crushing has reduced some of these transport costs. Supplies were originally negotiated with growers in the Mareeba area to secure a larger sugar supply to improve the viability of the MCM. With the current industry downturn the economics of this supply for the MCM is in question.

The supply of cane from this area has allowed some comparisons on industry efficiency. Comparisons of block data has highlighted some major differences in the size of individual blocks and the aggregate contribution of these blocks to the mill area. Appendix 9 is a graph of the comparison of the percentages of the number of block of different size segments and their aggregate contribution to the total productive area between Mareeba CPA for the MCM (Mareeba) and Mossman coastal CPA (Mossman).

In the Mossman area 4,021 blocks total 9,104 ha to give an average block size of 2.26 ha and a median size of 1.75 ha. In the Mareeba area 464 blocks give a total area of 4,265 ha for an average block size of 9.18 ha and a median size of 6.33 ha. In addition 91.8% of the total number of blocks which accounts for 74.5% of the total area in Mossman are less than 5 ha in size. In Mareeba 57.1% of the total number of blocks accounting for 88.8% of the total area are more than 5 ha in size.

This is a very general picture from a broad look at the block structure. Block size is a function of locality (relationship to other physical aspects of the landscape such as forested areas and hill-slopes, drains, streams and watercourses and physical built environment) as well as management factors (different varieties and ratoon class). This means that although there is a relationship between the landscape and block size it is not an exclusive relationship.

The differences between Mossman and Mareeba have significant implications for the efficiency and cost of harvest operations. Larger blocks are more efficient to harvest with less non-productive time spent turning at the end of rows. The same would apply to all farming operations. Also less time is lost with movement between blocks when the blocks are larger. In Mossman 27% of the total number of blocks account for only 7.5% of the area. This suggests that a number of the small blocks that are expensive to manage could be taken out of cane production with minimal impact on total productive area.

In analysing this block information no account has been taken for fallow or non-productive CPA. However scope exists for improving efficiency in the Mossman area through rationalising small blocks.

**Discussion**

Changes in the harvest and transport arrangements this season will improve the efficiency of operations as highlighted above. The most significant changes are from a reduction in the number of harvest units and a reduction in the number of harvest rounds. The poor state of the sugar industry and low confidence levels within the Mossman growers is reflected in the non-replacement of harvesting equipment. At this point in time the age and condition of the total harvest fleet is reasonable and suitable for the current crop. However the cost of repairs and maintenance will increase and reliability will decrease as the fleet ages with no replacement.
Machinery is increasingly being utilised at or close to capacity. The reduction in the number of harvest units has improved the efficiency of use of capital invested in machinery across the Mossman CPA. Further reductions will place increasing demands on existing machinery. Based on a potential crop of 650,000 tonne to the MCM from the Mossman coastal area and current constraints on harvesting times, 50,000 tonnes per harvest unit per year is a reasonable average throughput. This suggests that the crop could be handled with 13 harvester groups working at capacity and there are currently 15 groups operating excluding the 3 small owner/operators cutting their own cane. Further reductions in numbers of harvest groups need to be considered with caution bearing in mind the current level of machinery investment and industry outlook.

Efficiencies gained with a reduction in the number of harvest rounds will be of most benefit to the harvest operators. However this will be offset by increased costs principally from rising fuel costs and an increase in the cost of repairs and maintenance with an aging harvest fleet. At this time given industry conditions an increase in harvest rates would have a significant adverse effect on returns to growers. Indeed in the last few years increasing charges for harvesting have only been in direct response to increases in fuel costs.

In the future a change to the basis for harvest payment from a system based on tonnes cut to a system based on time should be considered across industry. This may lead to a rationalisation of blocks leading to a reduction in the number of small inefficient blocks.

The other changes to harvest management will be assessed through the season and will be addressed with growers at the end of season shed meetings.
Appendix 13. Harvest fleet reduced by 15% over 2002 numbers.

Introduction

One major thrust of the project is to improve the overall efficiency of the harvest and transport arrangements for the Mossman sugar industry (Objective 6). Changes to mill operations and transport arrangements for 2004 season were documented in reports 3 and 4. An overview of these changes will be considered in this report with emphasis on the impacts on harvesters. As mentioned in the earlier reports the changes to transport and mill work operations have resulted in significant cost savings to the mill but have had most impact on the harvest sector.

Actual harvesting costs vary depending on the size and number of blocks to be harvested, the yield of the cane and the haul-out distance although the usual practice is to charge a flat rate per tonne of cane harvested. In effect this provides no incentive to improve poor harvest conditions. This has been identified as an issue in a number of recent reports to industry.

Analysis of available Mossman data was intended to demonstrate to local growers and harvesters the effective cross subsidisation that is occurring at the local level. Local ownership of the issue is important in developing local solutions to improve the efficiency of the local sugar industry.

The impact of largely external factors to the harvest sector will be looked at from the industry level and from the farm level. Firstly the changes to mill operations since 2002 and how these have impacted on the operating environment for the harvest sector is discussed. This will include a discussion of planned changes for the 2005 season. Secondly the operations of individual harvesters and the impacts that block size and crop condition in particular have on operating costs is discussed.

The milestone for assessing the improvement to the efficiency of the harvest and transport sector was defined as a reduction in the size of the harvest fleet by 15% over 2002 numbers. This has been achieved through the retirement of 3 harvest contractors from the Mossman coastal harvest fleet. This section of the report also deals with the impacts of further reductions in harvester numbers and the mechanism by which further efficiencies in the harvest and transport sector might be achieved.

Changes since 2002.

A number of changes to mill operations have directly impacted on the harvest sector as have designated working hours as defined in local government noise abatement regulations.

For the 2002 crushing season the mill was running a continuous crushing operation with an estimate at the start of the season of just over 650,000 tonne of coastal cane and just over 350,000 tonne of cane from Mareeba. In total there were 20 cane harvesters operating in the Mossman coastal district which includes Julatten and 5 in the Mareeba area. The operators in the Mossman coastal district included 3 small single farm operations. Total season length was estimated at 17 weeks.

All Mareeba harvesters and the largest 4 coastal operators were cutting 7 days/week. The rest were either 6 or 5 days/week depending on size of harvest round with two of the smallest operators only cutting 3 days/week. Cutting was programmed for 9 designated operators to start at 4:00 am and the rest were programmed to finish cutting by 6:00 pm. All Mareeba harvesters were programmed for cutting around the clock and individual start times were scheduled to suit transport movements.

For the 2003 crushing season MCM harvest and transport arrangements were based around nearly 160,000 tonne of Mareeba cane for toll crushing at the Arriga mill. The remaining estimate of 170,000 tonne was scheduled to be crushed at Mossman giving a total of approx 850,000 tonnes. The Mossman operation was changed to a 5 day week with crushing programmed for 120 hrs/week. This gave a programmed 20 week crushing.

All harvesters were programmed for cutting over the 5 days except for the smallest Mareeba group. The 9 designated Mossman harvesters were programmed to commence cutting at 4:00 am and the rest were programmed to finish cutting by 6:00 pm. All Mareeba harvest was programmed over 24 hours.
### Table 1. Harvest Group Estimates - 2002 to 2005

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For the 2004 crushing season the toll crushing arrangements continued with an estimated 150,000 tonnes. This gave an estimated 750,000 tonne crush for Mossman. 2 contractors retired from operations leaving 18 harvesters on the coast and 1 Mareeba harvester significantly reduced the scale of his operation. Mill operation cycle was changed to effectively crushing for 108 hrs per week over 5 days which worked out to a 19 week crush. Harvester working hours continued as per 2003.

For the 2005 season MCM work operations are expected to return to the 5 days/week model of 2003 giving 120 hrs/week. It is not anticipated that only in the order of 20,000 tonne cane may come from the Mareeba area with an estimate of 550,000 tonne total. This gives an estimated season length of 16 weeks. An additional harvest operator has retired this season and only 1 contractor will be operating in the Mareeba area in a dual role cutting Julatten and Mareeba.

Total throughput of MCM has declined significantly since 2002. Table 1 gives estimate figures for each harvest group for each of the years between 2002 and 2005 inclusive. The figures used in Table 1 are all estimate figures as these are the ones that are used at the start of the season for planning purposes and are the ones on which decisions for mill, harvest and transport operations are all made. The fact that estimates and final tonnages are in variance is recognised, however the variation between seasons is far more significant than the variation within the season.

The make-up of all harvester groups had not been finalised at the time of preparing this report due to the recent decision of Group 41 to retire. Growers from this (former) group had not finalised their contract arrangements with other harvesters and as such the estimates for this group had not re-allocated to other groups. This means that some of the other groups will increase their estimate for the 2005 season as the re-allocations are documented.

On these figures the total estimated crush from MCM declined from about 1,000,000 tonne in 2002 to 850,000 tonne in 2003 almost exclusively as a result of toll crushing at Mareeba. It further declined to near 750,000 tonne in 2004 and then to around 550,000 tonne in 2005. This last decline is largely as a result of the loss of Mareeba cane. The estimate for the Mossman coastal cane area has also shown a steady decline from 2003. This has been due to a combination of loss of cane area to other land uses, a decline in productivity associated with the decline in the profitability of the sugar industry and an increase in the land set aside to fallow.

In 2002 there were 26 harvesters cutting the MCM cane supply. In 2005 there will be 15 harvesters operating for almost half the cane supply. On the surface this would not seem to represent a real improvement in the efficiency of the harvest sector at Mossman.

Harvester Groups.

The columns in Table 1 show group estimate for the year, daily quotas on which bin supply was based and number of days cutting for the season broken up for each group for each of the years. In considering the ability of an individual harvester to operate efficiently it is important to consider the daily estimated tonnage as well as the total season estimate.

The average bin weights for Mossman is 9 tonne and average work rate for a group is 5 bins or 45 tonne per hour. This means that an average single shift operation could be expected to cut about 500 tonnes per day.

The daily quotas for each harvest group for each year are presented in Chart 1. In 2005 it is expected that 9 of the 14 major coastal harvest groups will be operating near or above this level. It would appear that these groups have an efficient level of labour utilisation. Changing to a 2 shift operation harvesting over a 24 hour period is often quoted as the most efficient operation from a return on invested capital perspective.

The analysis of harvest groups suggests a number of conclusions.

- On a daily harvest basis most groups are operating at reasonable levels of efficiency for single shift operations
- On a seasonal basis very few groups are achieving the anecdotal industry standard for efficiency largely because of season length
- Further reduction in the size of the harvest fleet would require changes to harvesting hours (local government regulations) to allow for economic 2 shift operations. The exception would be the 3 smallest single farm operations.
The difficulty facing many of these groups this year is how to operate and balance the following:
- Current size of the group means that one shift of harvest crew is working the limits of safety from an Occupational Health and Safety perspective.
- Current size is insufficient to justify a second shift.
- Short season length makes it difficult to attract staff in some cases even for one shift.

To justify a second shift a single harvest group would need to be around 750 to 800 tonnes per day in the Mossman area. A second shift is also difficult within the constraints of a 16 hour harvesting window imposed by local government noise pollution regulations. A second proposal was that a crew could be shared between two harvest groups but operators were reluctant to embrace this suggestion because of concerns about operation, care and maintenance of machinery.

The often quoted industry standard is for one harvest group to be cutting around 50,000 to 60,000 tonne per year as a single shift operation and double those figures for a 2 shift operation. The estimates for each harvest group for each year are presented in Chart 2.

Using the Mossman operational parameters, a single shift unit at the 500 tonnes/day average daily quota would equate to theoretical seasonal capacities of 38,000 tonne for 2005, 47,000 tonne for 2004, 50,500 tonne for 2003 or 60,500 tonne for 2002 season length.

This then highlights the issue facing the harvest sector of the Mossman industry; a short season with high daily tonnages. Low seasonal tonnages make it extremely difficult to get overall efficiency of utilization of machinery and capital invested in harvest machinery even though on a daily basis throughput is high. Fewer harvesters would only exacerbate this problem with groups finding it difficult to either find enough labour or justify the cost of running a 2 shift operation.
During the 2004 harvest season a number of individual harvest group operations were analysed. The operators were chosen to represent the range of situations within the Mossman harvest fleet. This involved looking at the harvest rounds and segmenting each harvest round on the basis of size of blocks and block estimates. The purpose of this analysis was to give individual operators a better understanding of the impact block size and yield was having on their costs and the cross subsidisation that occurs with charging a flat rate per tonne for harvest. The first part of the analysis involved the comparisons between Mossman and Mareeba in terms of block size and yield at the district level and was reported in Report 4 of this project.

In this further analysis comparisons were made between 8 coastal groups and 1 Mareeba group. See Chart 3. The yield estimates in tonnes of cane per hectare (TCPH) have been broken into 4 segments which represent the range from extremely poor to excellent commercial crops. The group that stands out in this analysis is the
Mareeba group with over 80% of their crop in the highest yield segment. This is in line with the higher yield potential from an irrigated cropping area.

The coastal groups show considerable variation in proportions of poor yield crops with group 33 having over 8% of the total number of blocks with a yield estimate of less than 37 TCPH. This compares with groups 33 and 52 having less than 0.5% in this category. At the other end of the yield range, group 41 has less than 12% of blocks with a yield estimate of more than 80 TCPH. Groups 44 and 52 have over 50% of their blocks in this yield segment.

As another broad comparison, 3 Mossman groups have more than 30% of their blocks yielding less than 60 TCPH compared with the Mareeba group that has only 1.6% in this category.

The second part of the analysis looked at number of blocks to be harvested segmented on size. The results of this analysis are presented in Chart 4. In this analysis there was no attempt to differentiate between blocks that were small because of their physical location and small blocks that resulted from a variety or class change. The same 8 Mossman harvest groups and 1 Mareeba group were used in this comparison.

The grouping of blocks is intended to give an indication of the proportion of difficult or more expensive blocks to harvest. The Mareeba group stands out with 56% of blocks greater than 10 ha compared with less than 5% for all the Mossman groups. At the other extreme less than 4% of Mareeba blocks are less than 2 ha in size while the lowest figure is 21% for all Mossman groups. Within the Mossman area, groups 8 and 55 have less than 25% of their blocks at less than 2 ha while groups 35, 41 and 62 have more than 30% of their blocks in this category.

Both of these analyses serve to illustrate that there is considerable variation between and within harvest groups on both size of block and yield estimate. From this it could be extrapolated that there is considerable variation both between groups and within groups in the cost to the harvester of harvesting.

Chart 4. HARVEST GROUP COMPARISONS

![Block Sizes Chart]

Chart 5 illustrates this point showing derived figures for gross returns to the harvester. The data used to generate this graph is based on a flat rate of harvesting of $7.00/tonne of cane. This figure was then used to calculate gross costs/ha based on tonnes of estimate for each harvest group and total area for each group. The same 8 Mossman and 1 Mareeba harvest groups were used as in the previous analysis.
In this case the Mareeba group (21j) has come in as giving the third highest return. The two outstanding Mossman groups are 52 and 55 with groups 41 and 33 at the lowest returns. The difference between the lowest and highest return group is $117 or 27%. This analysis does not attempt to quantify the break-even point or even suggest the marginal return above operating costs for groups. From the analysis of variation in yield estimate and variation in block sizes between groups it would be reasonable to suggest that there would be considerable variation in break-even point for the different groups. Indeed some of the groups in this analysis could be operating below costs.

**Discussion**

A flat rate charged per tonne of cane harvested is an effective cross-subsidisation of harvesting costs between areas of good harvesting and areas of poor harvesting. The flat rate also does not provide any incentive at the farm level to improve block layout or give any reward for better farm management practices. In addition harvest contractors have generally indicated that they as individuals are unwilling to start a differential charging system for fear of losing clients to another contractor.

The analysis of harvesting costs detailed above is an attempt to highlight at a district level the potential differences in harvesting costs that occur across the Mossman mill area. A more complete picture of the variation between groups, farms and blocks is possible with collection of data on time actually spent harvesting under different operating conditions. Most harvest operators already keep records of arrival and departures on different farms but this is generally not maintained at a block level.

A number of harvest operators were approached last year and asked to assist in keeping this additional information. However it was difficult for the harvest operators to maintain this additional detail with the required accuracy without adversely impacting on their normal work routine. The MAS002 harvest efficiency project was developed to overcome this problem. The project will involve installing remote monitoring equipment in 6 harvesters across the Mossman district to automatically collect a range of data. This data will be invaluable in enabling harvesting costs and other harvest performance parameters to be benchmarked.

The data generated through MAS002 will complement other work through this project in assisting individual growers and harvesters make commercial decisions about harvesting charges and other investment decisions. The role of this project is to support and facilitate the process of change through providing access to information and analysis and interpretation of findings. This will be complemented with appropriate extension processes.
Harvest and Transport Coordination

In Milestone Report 4 the combining of harvest and transport coordination through MAS was discussed. Changes that had occurred to the Mossman sugar industry since 2002 have already been discussed in this report. During that period the role of transport coordination had resided with MCM and the harvest coordination with MAS and the proposal for the 2004 season was to combine these two roles under a single contract to MAS.

This realignment of roles was considered when the long time transport controller ceased employment with MCM. The intention in finding a replacement was to have MCM employ the controller but for the person to work closely with MAS harvest control personnel and for the effective direction of both harvest and transport control to be with the combined group through MAS. The final decision was made by MCM management to hire a transport controller who reported directly to MCM management for the season rather than reporting through MAS. This decision was largely in response to internal concerns that effective loss of control could lead to disruption to a continuous cane supply to the mill. The net effect was closer communication and cooperation in managing harvest and transport for the season but still having effective separate control over the two functions.

For the 2005 crushing season MAS will be employing the transport controller. The interim step taken in 2004 demonstrated some of the benefits that could be achieved with a single group coordinating both functions.

A harvest working group was convened in late 2004 with representatives from MCM, CANEGROWERS Mossman, the Queensland Mechanical Cane Harvesters Association (QMCHA) and MAS. This group was to have representatives from all the relevant sectors of the Mossman industry meet to discuss issues of harvest and transport management. The group would also discuss changes to be implemented for the 2005 season.

Many of the changes to mill operations detailed earlier in this report had been defined by MCM management and resulted in real savings to mill operating costs. However there had been little consultation in the nature and effects of the changes with the other sectors of the local industry. This meant that the harvesters and growers saw the changes as being imposed on them without the opportunity of comment on how the changes would affect them or any effective input into defining the changes. The harvest working group was seen as a forum for industry to meet, discuss and define operational changes before the crushing season.

MAS also saw this as an opportunity to have the various sectors working more closely together and being more involved in pre-season planning of harvest and transport arrangements. The agenda also included consideration of wider issues such as payment systems that are important drivers of change. The group will also be used as a forum for overcoming some of the communication issues that had been identified with harvest and transport management in the past.
Appendix 14.  Northern Rivers Study Tour – November 2005

Monday 21st
With Peter Maguire
Alan and Robert Quirk and Kevin Bartlett, Central Tweed Harvesting

- Cane harvested – 70% one year old, flexible with proportion of two year old cane
- Expect to finish by Christmas
- This season good crop, was a dry year with only 70” rainfall
- Is a swampy area, harvesting contract covers 25 growers, representing 26% of total crush from mill, 150k tonnes with one harvester
- Operate 7 man crew using 1 harvester and 2 in-field units with 2 shifts
- 3 men on each shift with 1 rostered off all on a rotational basis
- Operating 7 days, starting morning shift at 3:30 am and afternoon shift at 12:00 noon crews overlap at shift change and finish at any time between 18:30 and midnight depending on daily quota; usually out by 21:00
- Cut 1,100 to 1,200 tonnes/day
- In the past the group was concerned with crews operating at too high a speed in the paddocks; to overcome this have changed from paying crews on a per tonne basis to paying a portion per hour and the remainder per tonne eg harvester driver gets $17/hr plus 8c/tonne, haul-out driver $13.50/hr and 8c/tonne
- Now one of the slowest harvesters in the Tweed
- Have a long spread of hours which gives ample time for bins to be delivered
- Season from mid-June to December
- In the whole area could leave up to 100k tonne cane this year which will amount to 150k next year giving a potential crush of 800k next year
- Currently cutting 132% of estimate
- Differential charging based on $3.50/tonne plus $2/litre fuel used by the harvester (base usage rate of 0.6 litres/tonne)
- Only charging based on fuel usage of harvester as haul distance is not a factor that the farmer has any influence over but block layout and crop presented can be influenced by the farmer
- Have installed an accurate fuel flow meter in the harvester that can be zeroed between farms and the readings taken and recorded in a fuel record book maintained by the harvester driver
- All fuel details sent to mill and paymaster processes harvest payments on behalf of the growers
- Some cane is cut green
- Operate with 6 rounds ranging from 10 - 30% with a final round of 15% but the rotation is flexible within the group
- At the end of each round a summary of year to date status is sent to all group members – transparency of operations is seen as important to good group management
- Group shares issued on a per hectare basis with one share per hectare
- Currently 8 harvest groups in the Condong mill area and it was suggested that this is still 2 too many
- Record system is based on log books for harvester and haul-outs, fuel book, and an order book
o One of the harvester drivers is the leading hand and he collects all fuel docketes while the other
driver makes sure that the wages sheets are brought in for payment
o The harvest group management is based on an elected 3 man board with one representative from
each of the 3 sub regions of the group plus a chairman
o Have separate finance, maintenance and harvest committees for daily management of group
o All purchases must have an order issued and no invoice will be paid unless there is a purchase
order, all payments to be approved by the finance committee
o Any expenditure of over $10k is presented to all growers before it can be approved
o Purchased a new harvester last year and are looking at purchasing another new machine for the
2006 season
o Record sheets for end of season 2004 summary and week 21 season 2005 summary circulated
(attached)
- Harvest rate drops at night – felt that the harvester does a better job at night
- Machine does not have (hydraulic) adjustable base cutter tilt but does have 2 speed tracks
- Average yields 95 tcph for 1 year crop, 140tcph for 2 year crop
- Generally felt that harvesting conditions for this group are better than others with more longer
rows and better blocks
- Have been operating a differential charging system for 10 years; amalgamated with another
smaller group and operated for 3 or 4 years on a flat rate system but have again been operating
with a differential charging system for 3 or 4 years again now
o Currently 25 growers in the group with 2 cut on contract
o Machine does not have a secondary extractor
o With the high throughput for the season get more of the true life out of the components rather than
changing at the regular end of season maintenance (eg tracks)
- There has been some discrepancies with fuel deliveries in the past; now get fuel deliveries every 3
days, must have one of the drivers present to verify quantities at each delivery and a docket is kept
for each delivery
- Dispute resolution with staff is difficult – have made it a policy that the group will not employ
(harvest crew) anyone directly related to a group member eg farmers sons
- Board of harvest group will put together deals eg purchase of new machinery and decisions will
be taken to all growers to ratify; voting on decisions has traditionally been on the basis of one vote
per person rather than one vote per share basis
- Group set up as a company and potential issue with people wanting to quit group when equity is
high or join group when reserves are low; overcome by limiting value of shares or price for buy in
or buy out
o Condong mill going into cogen next year; will necessitate whole cane harvesting and no burning
o Growers do not have individual contracts with the group but sign a Memorandum of
Understanding
o The group settles their own roster and equity issues and consider that effective communication
and transparent financial management is an essential part of the success of this group
- There have been substantial productivity gains in the last 10 years mainly from improvements in
land management such as laser levelling and acid sulphate management; the differential charging
system has not encouraged those at the bottom to change but has encouraged more improvements
from the better farmers – those who do not want to change have accepted that they will pay more
- Average haul distance at Condong is 500m and 800m in the other two mill areas
- Haul-outs carry 12 tonne (burnt) cane and fitted with flipper rollers
• Operate using tractors that can travel at 50 km/hr on roads that are capable of handling the speed and loads
• Have a contractor in the district who is contract marking out for planting using a Trimble GPS system charging $15/acre

Dave Bartlett and Mark North; Pacific Harvesting Cooperative

• 65k tonne group with 10 members
• Formerly a partnership but now a limited liability company with shares at formation allocated on the basis of 1 share/ha at $1/share by growers who were the existing group members
• Shares have now been allocated a buy in/buy out price equivalent to $130/acre; this was done to protect the core business and prevent opportunistic movement between groups and this was unanimously agreed to by members of the group
• In his opinion having a cooperative harvesting group is an advantage for larger groups:
  ▪ Not as affected by dominance of one individual
  ▪ Must amalgamate with like minded people
  ▪ Treat it as a business in its own right (and not as a service to the farming enterprise)
• Management of group through working committee of 3 plus chairman who manage budget with expenditure of over $10k going to all growers before ratifying
• Group captain responsible for orderly progress through rounds
• No monetary reward for management effort but mobile phone allowance
• Does not see a major issue with time/equity (some growers putting in a lot and other getting all the benefits for no effort)
• Believes that leaders will come forward who are willing to take responsibility
• Most important part is that issues are resolved quickly and are not allowed to fester and cause rifts in the group; keep everyone informed
• Cooperative has been going in some guise since the 70’s (start of mechanical harvesting in the area)
• Running 2 X 8 hr shifts per day
• Most ‘work’ is done over mobile phone or using UHF radio
• Group members have voting rights on a share basis but most votes taken on a head basis
• It is important to keep everyone involved; they are in the group to
get the job done that the individuals want
○ The group has made some costly decisions in the past and the tracked haul-outs have not been one of their better decisions; currently changing tracks to 24” wide for better floatation; expensive units to operate
○ All cane is consigned via radio link in haul-out to CHOMP system at the mill
○ Growers moving towards controlled traffic based on 1900 mm centre rows; trial within group round has shown that moving from 5’ single to 6’ dual gave an improvement of 7% in the first year and 15% in the second year
○ Has GPS auto-steer fitted to harvester and using contractor to mark out plant cane and every 3rd and 5th drill in ratoons
○ Harvesting charge based on flat rate per tonne mill average cost and then give a rebate back at the end of the season; currently $6.05/tonne and an extra $0.80 for green cane – aiming for $4.30 to $4.50/tonne cut and cart
○ Group has a range of other machinery including land plane, stool splitter, soybean planter and soybean harvester
○ Pay workers above award rates on a per tonne basis.
○ Saw new bin for whole cane harvesting and machinery in the paddock (not working)
Tuesday 22\textsuperscript{nd}  
With Rick Beattie

Trevor Wieden, Cane Supply Superintendent, Broadwater Mill

- NSW Milling Cooperative mill all road transport through SCT Logistics as the contractor
- Price is based on cost of operations plus a margin of 10% return to management
- Validation of all costs (repairs and maintenance, fuel, wages etc) by the mill is ensured through open book accounting system where the mill has complete access to all account records to verify expenditure
- All truck movements are at the direction of the mill’s cane supply superintendent and the mill’s cane delivery scheduling system
- Transport operates on a ‘just-in-time’ scheduling basis with no more than 12 minutes cane supply in the yard at any one time based on 250 tonne/hr crush rate
- Hands free consignment of cane from in-field units:
  - Units pre-programmed with farm, field and delivery point (pad)
  - After filling the bin the operator inputs bin number
  - Information sent via radio telemetry
  - Bin numbers are automatically read at the weighbridge and gross and tare weights appended to other cane consignment information in the cane receival system
  - A new travel plan is calculated for the truck unit and downloaded to the truck before it leaves the yard after the tare weighing
  - Transparency of accounting procedures and principals is an
imperative for auditing and validation

- Mill pays depreciation for the trucks and trailers
- Trucks are to be replaced after 5 years
- Trailers depreciated over 10 years and become the property of the mill at the end of this time
- Contract for cane transport is for 10 years and this is the first season of operation
- Transport fleet for all 3 mills is 33 prime movers and trailers, mill already owns cane bins but changing over to new larger capacity bins for full trash harvesting
- During crushing season operate with 3 drivers per unit; some casual drivers but most permanent
- Off season work carting grain and silage using same trailers and bins with income generated for mill from these operations.
- 15 trucks based at Broadwater mill with some cane transferred to Harwood mill
- Frost can affect some cane in the southern part of the area giving an effective growing season from early Sept to June
- Most cane cut as 2 year crop with 9 cooperative groups, 2 grower harvesters and 1 contractor
- Transport demand for season prepared based on:
  - Growers do their own estimates with provisions (penalties) in the cane harvest price for poor estimates and these are collated by early May
  - Group starting point (farm) is defined for each group
  - Transport demand model is then prepared for the season
- Cane supply contract with the mill has clause allowing for variations to specified group starting point; in effect the starting point is determined by negotiation between the groups and supply superintendent at the mill

- Mill crushing rate starts at 250tonnes/hr and this increases over the season to max of 260; during season were running at 225 when they had problems with milling train
- All road transport vehicles are fitted with GPS units and are tracked in real time; download through UHF radio link, polls units every 2 mins
- All harvesters are fitted with GPS units:
  - Data is downloaded every night by CDMA mobile phone link to mill server
  - These units will only start logging positions when all of the following are over pre-determined levels; forward speed, base cutter pressure, chopper pressure and elevator is on
- Data is downloaded to Agtrix server where harvested areas are interpreted and the status of blocks changed
- Data sent back to the mill and integrated with delivery data and reconciled with consignment data
- Data is analysed for anomalies and these are manually checked and corrected
- Data is transferred back to the main frame and assigned yield data
- Thematic (coloured) displays of mill area show status of all cane blocks (completed, taken for plants, standover etc)
- Currently reports are generated from queries in excel or access rather than with the CHOMP system; project proposal to SRDC for development of better reporting capability in CHOMP system
- Historically pre-season estimates are around 80k tonne low and there are some inequities in the system:
  - Growers estimate low (the lower the estimate the smaller is the first round harvest)
  - Nominated stand-over cane can be withdrawn at end of season (cane withdrawn for the last round reduces last round harvest)
- Considering a system of estimate based on previous 5 yr average production and proportion of stand-over
- Have tried both satellite imagery and NIR photography to generate estimates but these have severe accuracy limitations
- Mill are encouraging further group amalgamations to reduce transport issues through better utilisation of truck and bin fleet capacity
- Transport issue with overloaded trucks:
  - Chain of responsibility passed from mill to transport to harvest group to farmer
  - Have introduced a voluntary code of practice to alleviate threats of heavy handed enforcement
  - Mill will rebate to harvesting groups based on cane supplied (bin weights) within defined range and it is hoped that this will be passed onto crews as an incentive.
Andrew Tickle, Richmond River Canegrowers and representatives from Cooperative Harvesting groups

Average 100k tonne per group with 12 harvesters in 11 groups

- Richmond River Canegrowers handles financial and administration for most of the cooperative harvesting groups
- Average costs for harvesting (before fuel price rises):
  - Fuel and oil $0.70/tonne
  - Repairs and Maintenance $0.90/tonne
  - Wages $1.90/tonne
  - Finance costs $1.40/tonne
  - Admin $0.50/tonne
  - Total $5.40/tonne
- Harvesting price set $0.60 to $1.20 above these average costs and groups have capacity to rebate back to growers although this is generally not exercised
- 60 employees in harvest crews earning on average $35k for the season or $50k for the year for permanent employees
- Working an average of 10hrs/day including down time
- Last year 28week season and expect about the same this year
- Issue with mill performance this season plus flood early in season disrupting harvest
- Cogen in 2007 will mean:
  - Longer hours and this may mean extending (daily) harvest window
  - Need to modify haul-out equipment to handle trash
  - Looking at auto-steering options to find rows with full cane harvesting
  - Looking forward to changes but a bit concerned with the logistics

Historical look at development of harvesting cooperatives in NSW

- With the introduction of mechanical harvesting difficulties getting men for cutting cane but all farmers could not afford to have mechanical harvesters
- Original modified half-track machines replaced by full tracks harvesters and buggies when Toft started manufacturing
- Cooperatives were suggested by an accountant as being an appropriate structure for owning and operating harvest machinery
Started with up to 12 harvesters each cutting 20 – 25k tonnes with machines originally leased and farmer gave guarantees

Now looking at throughput of 100k to 120k tonne per harvester, machines held as security for banks; groups with approx $2m worth of assets per group consisting of 1 harvester, 2 wheeled haul-outs and 2 tracked haul-outs plus shed and mobile workshop Have a good rotation plan and then stick to it; move around between years

Aiming for 1 or 2 groups in 5 to 10 years; gives more flexibility on manning, equipment, fuel etc

Owen’s group

75k to 85k tonnes for each of two machines but still not enough

Some poor (group) management decisions in the past

Amalgamation from existing base of 12 harvesters and 24 tracked units would give huge bargaining power; also get more efficiency through getting more of the useful life out of the machinery and components

Issue of poor estimates; low estimates for first round, re-estimate in October and then withdrawing cane from last round – mill looking at using 5 year averages

Andrew Tickle

Canegrowers manage:

- Payrolls for all cooperative groups and charge 3c/tonne
- Finance and administration for all the groups and charge 4c/tonne

Powerful benchmarking facility

Formation of the cooperative is the major issue

All equipment is leased; only make 6 payments during the season on the gear

Taxation advantage with cooperative over company; low price to buy in or buy out compared with company

⅓ of area is share-farmed

Soybeans:

- $250 – 400 /tonne for grain harvested
- Freight to market $7/tonne
- Yield 1 t 1½ tonnes/acre
- Planted early December, harvest April/May

Used for oil and meal

Amalgamations project

- Aiming to have 1 or 2 groups in 5 years
- Have commissioned RCC Hassel to run workshops looking at why people are not willing to move
- Develop program to address these issues
- Focus group of 2 or 3 growers from each group

Average wages this year; $1.52/tonne or $20.13/hr (including penalties)
Appendix 14.

Partnership for Sustainable Sugar

- Average farm size 4,000 tonnes; for small farms only 2 or 3 rounds and must cut in the first round, must cut at least one paddock each round
- Russell 11,000 tonnes from 410 acres, avg ccs 11.5 and currently 0.5 to 0.6 units below mill average
- With 2 year crop usually no fertilizer or herbicide used for second year

Wednesday 23rd

With Pat Battersby, Manager Clarence Canegrowers and Vince Castle Chairman, Clarence Canegrowers, Harry Green and Peter Rose, Clarence Harvesting Cooperative plus representatives from other harvesting groups

- Harwood mill area, crush 720k tonnes cane
- 90% cut by 2 cooperative groups; one with 5 harvesters (average of 85k tonnes per machine) and the other with 2 (average 105k tonnes per machine)
- Third small cooperative group cuts 60k tonne with 1 machine
- Biggest cost to address in harvesting is from harvester to the delivery point; average haul-out distance is 700m; major emphasis in the area on reducing haul distance by increasing number and positioning of pads
- Average wages cost of 3.5c/tonne cane for every 100m of haul-out distance
- Major issue of hauling is carrying mud onto roads with either haul-out or truck
- Pour rate of 145 tonnes per elevator hour, 65% to 68% field efficiency (elevator hours/engine hours)
- Regularly operating at 90 to 100 tonnes per engine hour (4 X 27 tonne bins/hr)
- North Clarence (5 harvester group):
  - 4 round season
  - 3 cells with 2 harvesters in each of 2 cells and 1 in the last
  - Each machine in cell visits each farm twice in the season; have broken down issues of growers only wanting 1 harvester on their farm
- 9½ trucks servicing delivery points during the season (includes some cane transported from Broadwater area)
- Cells broken up to suit transport with only 1 long haul from pad to mill at any one time
- Cooperatives have been amalgamating over the last 10 years and this was seen as a natural progression
- Last merger was this year with the merger of a 70 grower cooperative that was operating 2 machines with a 100 grower cooperative with 3 machines
Most growers started with cooperatives and believe that this is the best system for harvesting.

- Changed the rules so that growers understand the need for more flexibility with rotations.
- Good communication and cooperation between growers, harvesters and the mill is essential.
- No cane inspectors; growers or harvesting cooperative have that role.
- Charge for harvesting on a flat rate per tonne with extra charge for crops of less than 20 tonnes/acre.
- Don’t believe that there is a suitable differential harvesting rate system.
- Big push from milling cooperative to cut costs by having a better integration of harvest and transport requiring fewer trucks.

The major issues to address as an industry are:
- Throughput
- Management of harvest and transport
- Communications along the value chain

Next development with electronic consignment expected to be downloading of information from paddock to mill through touch screens in harvesters.

Clarence Harvesting Cooperative have now appointed a full time manager (Peter Rose) on a trial basis for this season who is responsible for managing grower rotations; one of the harvester operators is the supervisor (leading hand or foreman) for this group and manages manning levels and starting hours.

- Aim at burning cane 2 days in advance but sometimes blows out to 4 days.
- Integrate harvester rotations with mill’s estimate to actual data.
- For good effective management of the group there needs to be:
  - Good systems
  - Good policies
  - Formalised arrangements

If a growers has an issue the agreed approach is to raise it with one of the Board of Directors to deal with.

- Cane this year is very sprawled and some of the mounds are not well formed – an issue of grower education/extension about aspects of production.
- (For group amalgamations) the executive of Clarence Canegrower decided that some leadership was essential to drive the change and they were in a position to take the lead (they represented the harvest and growing sector).
- Brought in representatives from the mill and transport.
- Managed a series of meetings where process and timetable for amalgamations were developed and then (Canegrowers) in the main lead the process of change.
- Believe that there is high degree of acceptance among growers for amalgamations (in the order of 80%).
- Process was lead and managed from the viewpoint of “……….what is in the best interest of the whole of the industry”.
- Pat Battersby is the secretary for both of the large cooperative harvesting groups.
- Aiming for harvesting rate of $5.25 (but no higher than $5.50) per tonne (plus GST).

**Clarence Harvesting Cooperative:**

- 7 directors.
- Running 2 harvesters in a ‘cell’ with 4 permanent operators; are responsible for day-to-day operations.
o Cooperative pays 7c/tonne levy to canegrowers to manage all clerical functions including payroll, employment, financial and all administration
o Have formal meetings every 3 months
o 2 to 3 months before season get rotations out, estimates in and are strict on maintaining rotations
o Generally machines walk around rotation and no need to float
o Directors go around with harvester operators to all farms for improvements to tracks, crossings etc which growers need to pay for; get around 80% compliance
o Directors get a meeting allowance but this does not fully compensate for time and effort they put in; proposal to go to the next AGM that Directors get a daily/hourly allowance for time spent on the cooperative business
o Responsibility of Directors should not be understated as they have significant legal and financial responsibilities; board is elected to make the decisions
o Produce regular circulars and reports to all members
o The harvesting cooperative is a service organisation that doesn’t really own anything; a grower can buy in or out with $100 worth of shares
o Last contractor finished in 1988; equipment was worn out and he wanted to get out as he couldn’t afford to get new equipment
o Cooperative was formed from 3 former contractors using 2 harvesters; one of these former contractors is still in the cooperative and on the board of directors
o Guarantee for finance on machinery is now with the machinery (rather than with the individual growers)

Final messages:
  o Believe that eventually there will only be 1 harvesting cooperative
  o To get ahead need to overcome past history and make a clean start
  o For any one group extra tonnage is the major asset
  o Unless you have a viable industry all other decisions are irrelevant

Looked at new Cameco harvester in operation
Looked at quick release attachment for Corradini front.
Appendix 15. 2006 plan for harvest/transport system.

The mid-term review of this project recommended an increase in focus on improving harvest and transport efficiencies in the Mossman area. The review team also recommended a study tour to the Central region and/or the Northern Rivers region to consider changes to practices and change management processes that have been made in those areas. The Vision 2010 group formed through this process has met three times before the 2006 crushing season.

Meeting of 8th February

The meeting was first of all asked to again consider what the harvest and transport system might look like in 2010. The intention was to again focus the group on the long term objective of the model to work towards. This discussion then led into a discussion of the “sustainable price for sugar” or benchmark price that the group considered would underpin the change process. Industry would support change if there was confidence in the long term; confidence that all sectors would be sustainable.

The representatives from MCM were able to give the group some general information about the marketing and sugar pricing particularly for the 2006 season. However, it was stressed that much of the marketing information was sensitive in nature and would be released as markets and sales were firmed.

MCM also raised the subject of moving some cane directly into the mill by road rather than transferring from road to rail. The intention stated was to have 50% of the cane transported by road into the mill by 2009.

The main issues that would affect the outcome of this process were confidence, communication and the ability of the industry to attract and retain workers during the crushing season. The group was seen as an important link between sectors of the industry. It was stressed that group members as representatives of the different sectors had a vital role in the information flow process. This was feeding information or concerns from their constituent members to the group and feeding information from the group discussions back to their constituents.

Meeting of 15th March

This meeting focussed on three main areas:

- Harvester work rates and realistic number of harvesters in the year 2010 leading to a discussion of the limitations that will affect harvester numbers.
- Conversion to road transport, logistics of changing to road transport and features of a road transport system such as we saw in the Northern Rivers. There was also some discussion on the relative advantages of road over rail transport. The group asked that costing and logistics of a change over should be prepared and presented to the group.
- Sequencing issues particularly for smaller growers.
The group discussed the concept of a one cooperative harvesting district for Mossman at this and previous meetings. To progress this idea the group feels that the benefits to the industry needs to be costed. In addition, the benefits to growers, harvesters and the mill from changes to the harvest and transport system, needs to be quantified. This may involve some modelling work with Andrew Higgins group.

**Meeting of 26th April**

This meeting focussed on arrangements for the 2006 crush including new road transport arrangements. SCT Logistics who have the contract to operate the transport system in the Northern Rivers region will be the road transport contractor at Mossman. The Qld state manager addressed this group and a representative will be part of this working group in the future.

SCT Logistics will undertake an assessment by September of the logistics and cost of converting to road transport directly to the mill with possibility of an introduction or initial phase in 2007. They will use their experience in the Northern Rivers region to model the Mossman area looking at the number, size and placement of bin stand and other transport infrastructure required. The future transport scenario will affect mill decisions about further investment on the currently limited bin fleet.

Transport arrangements for the 2006 season are based on 9 loco shifts over a 24hr day. However, modelling by Higgins suggested that 10 shifts were required. This led to some discussion in the group of how the transport system is restricting the bin supply to harvesters and this is affecting the ability of the harvest sector to realise efficiency gains. The group felt that until the transport issues are sorted it will be difficult to further reduce the numbers of harvesters.

Harvester rosters were presented to the group. The main issue highlighted was the peak demand on transport system exceeding capacity during daylight hours. To reduce this peak and smooth the demand over the whole day, the harvesters needed to have a wider spread of operating hours so that the effective harvest window was increased. The suggestion was that the harvest window be from 3:00 am to 10:00 pm. Some discussion followed on the payment of an incentive for harvesters to start earlier or finish later to increase the harvest window and who should pay the incentive.

It was a recommendation of the group that as a principle, all harvesters should have two hours cutting in the dark. The group recommended that a meeting be called for all harvest contractors to consider the proposed changes, incentive and to discuss rosters.

**General discussion**

The Vision 2010 group is a representative group endorsed by industry. The intention with this group is that while MAS is facilitating the discussions and assisting with the process, the plan is owned by the industry. Unless this occurs the plan will be seen as an agenda driven by one sector and without ownership the changes are being forced on the other sectors.

The group is defining the ideal model for the whole of the industry with representation from all sectors and feedback to/from all industry sectors. If the industry has commitment to the development of the model then it will have commitment to the implementation. The current situation with the
working group is that the model development includes commitment to implementation and one of the keys to this is in having good communication links between industry sectors.

Meeting 1. – 1st December 2005.

MOST SIGNIFICANT THINGS FROM NSW TRIP

- Confidence in Industry and in its Mills
- Transparency and Cooperation between all sectors
- Communication across all sectors
- Composition of Ownership
  - Cooperatives and Working together
- Harvesting price
- Differential charging (Cost + Fuel / How People are paid)
- Technology in Transport / Harvesting
  - GPS
  - Auto Steer
  - CHOMP
  - Consignment
- Coordinated harvester movements
- Throughput of machines compared with us
- Price per tonne of cane
- Expected to see Dinosaurs (equipment wise)
- Transport Contract
- Multi use of Bins and Trailers
- Group Buying
  - Ability to negotiate prices
- Extended season length
- Labour difficult with a short season
- Mill crush rate (More tonnes then us, lower crush rate?)
- Utilizing soybeans
  - How much do they lose?
  - Price per tonne
- Farm Size
  - Lot of small groups (Avg. 4000t)

MOSSMAN OUTLOOK 2010

- 1, 500 ha fallow
- 7, 700 ha under cane
- 700,000 t/cane
- Avg. 80 – 90 t/ha
- Crush rate of 320t/hr
  - 18.2 weeks
  - 12 - 14 harvesters (New or Old)
  - 60,000 - 50,000 t/each

OR

- Crush rate of 254t/hr
  - 22 weeks
  - Labour cost will increase
  - Operating cost will increase
  - Break even cost will increase


- 12 Machines (320 tonnes/hr)
  - 60,000 tonnes per season
  - 660 t/day
  - 50 t/hr
  - 13.2 cutting hours
  - With smoko, servicing, lunch and shifts = 15 hrs/day

**IMPEDEMENTS FROM 2006 – 2010**

**ROAD / RAIL**
- Infrastructure (Bridges, Locos etc)
- Mowbray cane (approx 15,000t) may all come in on road rather than rail.
- Look at tonnes per siding and what will be the likely trend in 2010
- Minimize harvester shifts

**ROAD TRANSPORT**
- Overloading
- Currently approx 200 bins a day transported
- How much longer will trailers last?
- The trailer fleet should be audited

**BIN FLEET 2005**
- 420 usable bins/flattops
- Total of 460 flattops
- Total of 544 bins (245 H/S & 299 Con)
- 30 cripples
- At 320t/hr 768 bins per day are needed
- Need to turn each bin around 1.82 times a day
- If we increase all low sides to high sides can increase daily capacity by 300 tonnes
  - How many can be converted?
  - Contractors will need to fill bins
- How much does a new bin and flattop cost?
- Don’t need all bins to slide on and off
  - Can we look at other configurations? eg. Complete bin and wheels (Mulgrave cost approx $14,000)
- Management issues regarding bins
- To maintain current bin fleet need to replace 10 bins a year

**24 HOUR HARVESTING**
- Still same machine with increased work load
- If harvester go from 40,000 – 80,000 harvester efficiency will be lost

**2 ROW FRONT**
- Larger turning circle
- Less travelling in paddock
- Increase thru put in some cases

**LABOUR**
- Short season
- People required for harvest sector - approx 40 seasonal and approx 8 part time

**CRUSH RATE**
- Reduced rate we use more bagasse and more electricity
- How do other mills operate at lower rates?
- Is a new boiler require to achieve a lower rate (New Boiler approx $25m)

**NEED MORE CANE AREA**
THERE IS A LACK OF CONFIDENCE IN THE MILL

Meeting 2. 8th February 2006


1. DEVELOP AN OPTIMUM MODEL FOR THE STRUCTURE AND OPERATION OF MOSSMAN'S CANE HARVEST AND TRANSPORT SYSTEM FOR THE 2010 SEASON.

EST. SIZE OF CROP = 700,000 tonne based
CRUSH RATE = More than 320 t/hr, target 350 – 360 t/hr
SEASON LENGTH = Approx 18 – 20 weeks (5 days a week and 10% lost time) TRANSPORT
= A 50 – 50 mix between road and rail

Road transport direct to mill
Use bigger and lighter bins (Possible same as NSW)

SUSTAINABLE SUGAR PRICE (Benchmark Price)
$30/tonne cane = 12 – 13c/lb.
($28.50) @ 74cUS = $350/tonne

2. DEVELOP A TIMELINE FOR ACHIEVING STRUCTURE AND OPERATION CHANGE.

➢ Price Benchmark

➢ 50% road transport direct to mill by 2009
  o How many bins?
  o How many trucks and trailer?

Action: AJ to develop a discussion paper on road transport options to be presented at the next meeting.

3. PROCESS

Industry Representative Group or review panel formed

Northern rivers study tour/Mackay study tour to collect information

Review panel meeting to develop industry plan

Communication with whole of industry for comments and feedback through both formal meetings (eg shed meetings) and informal discussions

The later steps are repeated a number of times during the plan development and adoption by industry.
We want this to be seen as an open process where all industry participants can have some input. The review panel reflects the views of the wider industry and is developing options and plans on behalf of that wider industry.

ISSUES
CONFIDENCE
➢ That benchmark price is achievable

COMMUNICATION
➢ Between mill and group and between group and growers; this is a two way process.
➢ Communication process is a legitimate role for this group ie forum for growers to raise issues of concern with the mill representatives and vice versa

WORKERS
➢ Specialist workers for short season
➢ 12 month employment but not for all workers required during crushing season
➢ How much is Industry prepared to (has the capacity to) pay workers?
➢ Possible seasonal labor from NZ (or southern Australia)
   o Union issues – will this be an issue?
   o Training (What training and licenses etc will these workers require under Qld or Australian regulations?)

OUTCOMES FROM MEETING

The group was told some information relating to the mills future pricing plans
➢ Comparisons between MCM and QSL Pricing – this is an issues for MCM Board in setting a price for the 2006 season
➢ Mossman and Mulgrave now operating outside QSL and other Qld mill signed 3 yr contract with QSL. What happens after that time?
➢ Sugar terminals are operated by QSL
   o Mulgrave and Mossman’s sugar can fit in one of the two sheds at the Cairns terminal.
➢ Aiming for a price Matrix better the previously available
➢ Targeting markets not previously targeted by QSL
➢ Freight less because distance is less

To go back to continues crushing need approx 1m tonne with a season length of about 19 weeks.

NEXT MEETING TO BE HELD WED 15/03/06, MAS BOARD ROOM, 2:30PM

G. Puglisi and D. Parker to work on options for the number of harvesters required to harvest the 2010 crop with 8, 10, 12 machines. (Consider 2 x 10hr shifts; No. of workers needed etc)

Also to feed back results from the harvest monitoring carried out in the 2005 season

A. Johnstone to supply a transport brief of road transport

G. Padovan to report back options for smaller farms
Eg. Farms under 3000t to be cut in 2 to 3 rounds, 1000t rounds.
Meeting 3. 15th March 2006

GENERAL DISCUSSION FROM PREVIOUS MEETING NOTES

- Reasonable harvesting rate is 5 bins/hr (including servicing and stopping)
- Transport system currently struggling to supply 5 bins/hr to harvesters
- Under existing harvester arrangements currently employing 40 workers
- Ideally should be looking at a crushing rate of 350 tonnes/hr but need to improve bin fleet depending on harvest arrangements
- Need to make improvements to boiler to achieve this average rate
- With 700,000 tonne and 350 tonne/hr closer to a 19 week season assuming 10% down time due to wet weather, mechanical breakdowns etc
- 100,000 tonne from Mareeba would increase season by 2 wks; with 800,000 tonne need to consider continuous crush
- Is 90 tonnes/hr harvester operating rate achievable in Mossman?
- Is 700,000 tonne by 2010 achievable in the Mossman area? Currently low average yields but this will improve this year and with increasing confidence in the industry

WHAT ARE THE LIMITING FACTORS IN NO. OF HARVESTERS?

- Ability to service sidings
  - How many sidings
- What is the realistic harvesting window?
  - Is 24hr harvesting possible?
- No. of workers
  - Eg. 10 harvester @ 700k tonne – still need 2 shifts.
  - More difficult to plan shifts.
- Fewer harvesters need to drop bins/hr down.
- Realistically the way machines are dropping it looks like 10 machines by 2010.

TO CONVERT TO ROAD TRANSPORT

- Large capital injection required.
- Have started discussions with SCT Logistics about transport.
  - Very productive meeting.
- JRT expect new owners by end of April.
- What is the ideal system in 4-5 years?
  - On-going rail maintenance issues.
  - Up coming legislation on light rail systems.
- Still haven’t set out full figures on converting to road system.

STEP 1.

- Road to mill – limited capacity to test out logistics – not involving too much capital cost.
- Road Hopper
- 2nd Road weighbridge.
- Just in-time system
- 20% road = 120k tones – avoiding current interface.
- Starting with existing Julatten, Daintree and Mowbray. How many bins to service this?
- Mill will have to stop to empty road bins
- If this works – move to 100% - would require large capital input.
- If you want to prove it works – don’t go hungry on bins.
Should we see this as a phase introduction rather than a “trial”?
With rail system – some ability to pull back on costs.
  o With road system – don’t have this ability.
In the last few years we have cut back on desirable maintenance BUT will have large capital cost in the future.
Need to consider costs of NOT going to road.
Rail is a big issue for insurance brokers.
Currently 39 employees directly associated with rail.

By next meeting Alan Johnson to look at cost and logistics of phase 1 by 2008, working on a 16hr harvest window.

No. OF ROUNDS

No sequence in supply award last year.
Sequence will change.
Changes because – cost and to suit transport.
Get some more flexibility in the system.
Allow the small farmer to run his farm to suit his timeline.
  ▪ Spread risk
  ▪ Maximize CCS
  ▪ Do planting
Three rounds on a 17 week season – no problem
  o Three rounds on a 20 week season – problem
3000t farm
  o Three rounds
  o 20% first round
In a wet area would prefer 4 rounds.
  o Small farms could accept 2 rounds (July and September but not in October)
Should the group make recommendations on rounds?

ISSUES

What will all the changes mean for the growers?
  ▪ With reducing number of harvesters.
  ▪ With shifting to road transport.

Need to quantify benefits to growers, harvesters and the mill from changes to the harvest and transport system to improve efficiency.

Contact Andrew Higgins to run a scenario around:
  10 harvesters
  350 tonne/hr crushing rate
  20% road transport direct to mill
  Existing bin fleet of 440 canetainters

What are the cost advantages of a one coop district?
Appendix 17. Vision 2010 Group proposal:

To conduct a trial of delivering all Julatten cane direct to the mill using 28t bins.

An estimated 80,000t of cane is to be delivered from Julatten to the mill in the 2007 season.

Under the current transport system there are certain constants for the 2007 season.

- For 75% of the season a total of 1200 tonne a day from Julatten will need to be delivered to the mill.
- That is 120 x 10t bins a day for 75% of the season.
- Cost for 2006 was $7.59 per tonne
- Approx 3450 trips a year. (B-doubles and singles)
- Using singles that equals 60 trips a day.
- The average round trip takes approx 1.5 hours.
- To complete the 60 trips in a 24 hr window it will take 3.75 trucks.
- Every day a total of 7 hours is used to deliver and pick-up bins from Cassowary ramp.
- The bins are double handled from road to rail.
- We have an ageing trailer fleet that is need of major repairs. (eg Brakes, brake drums, axles and all hyd components)
- The transferring system is very harsh on the bins, sometime causing damage.
- When bins are damaged they can be out of the system for a week till they are repaired.
- Existing bin stands are in need of repairs.
- Harvesters are limited by the capacity of bins stands.
- In 2006 the crane was needed 18 times for Julatten related incidents and that is down from 2005.
- At Cassowary ramp a water truck is used twice a day to keep the dust down.

Under the proposed system the constants would be:

- For 75% of the season a total of 1200 tonne a day from Julatten will need to be delivered to the mill.
- It would be delivered direct to the mill and dumped on a concrete pad near the sand blasting shed.
- It would then be transferred by loader to our current bins, then weighed and crushed the conventional way.
- Three high lift trailers would be used.
- 40 secondhand bins (28t capacity) would be purchased.
- For a one year trial no pads would need to be made in Julatten.
- An area where 2 bins could be placed is enough area for the system to work.
  - Fallow blocks could be used.
  - Headlands could be used.
  - Corners of blocks could be used.
Benefits of proposed system:

- Approx 2950 trips a year, 500 less than the conventional way.
- Estimated cost $5.17 per tonne.
  - (Saving approx $194 000)
- Using the secondhand bins, 44 trips a day are needed.
- Only 3 trucks would be needed to do the 44 trips per day.
- All trucks would be singles (Reducing rego, insurance and running costs)
- A total of 4 hours a day would be used to shunt bins to and from the sand blasting shed.
  - This allows locos to deliver bins to rail harvesters sooner.
  - It eliminates the need for a loco crew doing 4 hours overtime a day
    - (Saving $50 000 in wages and running costs)
- An extra 40 x 10t high sides from Julatten stands could be returned to rail to replace older low side bins. (Increasing bin weight, reducing quotas).
- The new system allows harvesters on rail to use bins when other areas are too wet.
- When mill starts after a long stop, rail harvesters could receive bins before road harvesters. (Limiting the time the factory is out of cane)
- Better utilizes current bin fleet. (Can use Cripple bins as the reload bins)
- Ability for Julatten cane to be stock piled while mill stopped.
- Less damaged bins (Money saving plus more bins going round)
- Less Maintenance to Cassowary ramp and Stands. (Saving approx $6500)
- Less usage of crane. (Saving approx $7500)
- Less down time for factory, locos or trucks while crane is on site. (Saving Approx $7500)
- Less usage of water truck. (Saving approx $7000)
- Less trailer repairs.
- Some capital would be spent to make it easier to accept Mareeba cane in the future.

APPROX SAVING = $272 500

Outlays for proposed system:

- Purchasing 40 x 28t secondhand bins. (Cost $440 000)
- Transporting bins from NSW to Julatten. (Cost $88 000)
- 1 Cat 938G loader on hire for 5 months used for 480hr/month. (Cost $127 500)
- Wages for 2 people to operate loader. (Cost $60 000)
- Float hire for loader (Cost $1500)
- Running cost of loader. Eg. fuel and oil (Cost approx $15 000)
- Construction of a 20m x 20m concrete pad. (Cost approx $45 000)

APPROX COST = $777,000

OUT OF POCKET = $504,500 INC GST