

Boosting production and profitability on-farm whilst cutting Reef pollution

This section details an investment package to improve the productivity and profitability of existing sugar and beef properties by using land, water and farm inputs more efficiently, while achieving Reef Plan's target of Reef-safe water quality by 2020. The investment has five key components:

- Major extension program to fast-track industry-wide uptake of profitable pollution cutting practices.
- Financing transition to profitable pollution cutting practices.
- Payments for pollution outcomes.
- Research, development & innovation.
- Monitoring, auditing and reporting.

Indicative figures for budget are provided. The total investment of \$950 million over five years can be scaled with consequent changes to the program. For a number of key programs the initial investment is recycled and becomes an ongoing fund.

When budget and program elements are firmed up a full cost-benefit study can be undertaken. These results could then be compared to the cost and benefit arising from a similar investment in large water storage infrastructure. For instance it could be compared to the Nathan Dam, which is the most 'investment ready' of the proposed Queensland dams, and has a cost of \$1.4 billion dollars based on the latest SunWater Annual Report.

Comparing the cost-benefit analysis of Nathan Dam provided in this report to Scenario 2 shows the investment is lower yet the benefits are greater to Queensland farmers, agricultural productivity, market access, overall economic benefit, as well as improved Reef health.

1. Major extension program to fast-track industry-wide uptake of proven profitable pollution cutting practices

In an economically rational world, businesses adopt practices which are more profitable. However, many farm enterprises do not implement current industry best practice, including profitable practices which cut pollution. The current low level of uptake of BMPs for cane and beef producers are evidence of this.

There are a range of barriers to adoption. It may be through farmers simply being unaware of certain practices, not trusting recommended practices as suitable to them, or not having the skills to implement new methods. A significant boost in on-farm extension would overcome many of these barriers to adoption.

A well-established extension program would be able to assist with other aspects of the investment package including: applying for practice adoption loans, accessing pollution reduction payments, adopting the latest R&D, as well as marketing.

Extension of best practice to boost profits and cut pollution

- Cane farmers annually apply 54,000t of nitrogen (N) fertiliser worth \$54 million.
- The surplus N available for loss off-farm of up to 40,000t is the key determinant of Reef pollution—up to 10% reaches the Reef as dissolved inorganic nitrogen (DIN).
- This lost fertiliser costs about \$40M annually and cutting this by 70% would save \$28M.
- Land condition is the key determinant of sediment pollution from beef properties.
- Cattle graziers can more than double their profit by improving land condition (Table 2 MLA)

Table 2: Financial analysis of 5,000ha beef property in A versus mainly C condition

	'A' condition	'C' condition
Carrying capacity (head)	1,244	546
Weight gain steers (kg/head/year)	130	130
Breeders wean rate (%)	80	80
Profit before tax (\$/year)	154,240	67,660

Assumptions:

- Breeding and fattening enterprise
- Stocked at safe carrying capacity (on average, cattle consume 30% of annual pasture growth)
- 'C' condition grows only 45% of 'A' condition pasture

Analysis:

Agricultural practice improvement requires farm-specific solutions and close extension support

- Best management practices for agriculture, unlike most other industrial operations, are site-specific, requiring customised solutions such as remediation of sodic soils, yield and soil mapping, aerial and satellite imaging and interpretation.
- While the mapping is relatively affordable the interpretation requires close extension support.
- Engagement of 300 extension staff is proposed, a portion to service the 1500 cane farms with the highest risk of losing inputs due to location or other issues, in roles including agronomic analysis of economic optimum fertiliser rates, and the optimal timing, placement and form, on-site trials, yield insurance, technology, management tools and financial advice.
- For cattle graziers extension staff would service the 500 beef properties with highest risk of losing soil and other inputs, in roles equivalent to those suggested above for cane farmers.

\$200 million (\$40 million/year)

2. Financing the transition to profitable pollution cutting practices

One of the major impediments to increased productivity and profitability and reducing loads to the Reef is often access to capital to restructure enterprises. (Starr et al 2013) (Van Grieken et al, 2010). Whilst new practices may be profitable, in many cases they may require an upfront investment as well as a lag period before the new practices return a profit. A portion of agricultural business may not have the ability to finance works, or even to seek finance on commercial terms.

Previous Reef grants programs required a 50% farmer contribution which excluded farmers for whom cost is a major barrier to improvement, instead subsidising those who may have been able to afford the investment without subsidy.

Government low interest loans would provide the upfront capital to undertake works. This mechanism also allows for a return of investment to government and a recycling of funds rather than one-off grant payments.

Proposed works would need to link to actions which reduce pollution and be assessed as credible. The extension program would assist the farmer: identify the practice and infrastructure improvements relevant to their farm, develop their application, and implement practices.

However, the loan would be simply repaid without onerous compliance checks. The next section sets out payment for pollution reduction. Landholders who successfully reduce pollution would receive payment and this could be used to pay off the loan.

Ideally, a suite of on-farm improvements which cut pollution and which also bring a commercial rate of return would be identified. In these instances finance could be sourced from mainstream lenders. The ANZ Bank's recent publication *Molehill to Mountain* found that the best prospect for a return on investment in agriculture over the next five years was in the beef industry – with returns on investment between 7-13%.

Data on economic and environmental benefit arising from the initial loans provided by government could be used to prove up the business case to commercial loan providers. Ethical investment funds could be a potential source of funds, as they may invest even with a below commercial rate of return. Ethical investment in Australia is estimated to be \$180 billion. One of the key constraints is finding sufficient projects to invest in which have proven environmental (and economic) outcomes.

\$300 million (available over the five year period)

3. Payments for pollution outcomes

Ultimately it is results that are needed – on-farm practice changes which achieve pollution reductions. Payment for outcomes rather than equipment or training provides incentives to implement improved practices and achieve reductions. It provides certainty that outcomes are being achieved for any given investment.

There are a range of options to provide payment to farmers (or other businesses) to achieve reduced pollution. The two key mechanisms proposed are payments through sugar mills and payments from a Water Quality Bank (which would lead to a full water quality trading market).

Mill payment system

- The current cane payment system does not incentivise efficient fertiliser application (i.e. the amount of fertiliser applied for tonnes of cane produced) largely paying for tonnes of cane.
- If mills' cane payment to cane growers had a bonus for improved fertiliser efficiency (lower kgN per tonne of cane), there would be a strong driver for uptake by the entire industry.
- A simple approach would be to base the bonus on benchmarks in fertiliser efficiency with an initial target set of 1.4 kgN/tonne of cane.
- Improved N efficiency cuts the N surplus (excess fertiliser not used by the crop) and is the best proxy for reduction in fertiliser polluted run-off to the Reef.
- Start-up funds would be provided to mills for a 5 year period for progressively improved fertiliser efficiency.
- Payments for achieving the initial 1.4kgN/tonne would be decreased over the period encouraging cane farmers to act quickly to maximise payments, with the full bonus being paid for higher levels of efficiency.
- Extension, R&D and transitional support funds would ensure that reduced rates of fertiliser application did not impact farm profit and mill viability.
- Funding to mills would be contingent on Cane Supply Agreements locking in the requirement for fertiliser efficiency outcomes at the end of the funding period.

- Farm data would be provided to the mills with the assistance of extension staff, and would be independently audited.
- Mills would be able to use the funding to facilitate certification to international standards such as Bonsucro which would assist with market access and social licence.
- Water quality improvements could be kept with the Water Quality Bank to be sold to re-invest in further pollution cutting actions (see below).

\$50 million

Reef Water Quality Bank

- A Water Quality Bank should be established to buy proven water quality improvements from landholders and other entities.
- These water quality credits could then be sold - the purchasers would be those entities which need to meet water quality requirements such as wastewater treatment plants, urban subdivisions, or other new development.
- Purchasing water quality abatement from catchment actions would be cheaper for urban utilities and developments than onsite treatment in most instances (even with a requirement to achieve an actual pollution improvement not just equivalent reduction).
- Placing a cap on pollution from all development would increase the demand for buying of water quality improvements and greatly assist a strong trading market.
- The government's seeding funds would finance the initial water quality improvement projects – with the most cost-effective pollution reductions identified through mechanisms such as 'reverse auctions' where funds are provided to those who propose to achieve pollution reductions at the lowest price, as well as Water Quality Improvement Plans.
- Actions which could gain water quality credits would include management practice changes (above a certain minimum standard), long term crop changes which bring pollution reductions, as well as land restoration.
- It would allow a farmer to make a choice whether or not to participate and what actions they wish to take.
- The Water Quality Bank would then sell the pollution reduction credits from the initial verified water quality improvement actions and the investment funds would be recouped to be continually re-invested.
- Actions could be taken on-farm which achieve multiple outcomes (water quality, carbon storage and biodiversity) and therefore potentially provide multiple income streams to a landholder.
- These actions could occur on low production land and therefore offer a greater overall farm income.
- The R,D&I program would assist identify the key actions which reduce pollution, as well as boost farm income and Reef health.

A mature water quality trading market

- A cap on pollution and seed funding for the Reef Water Quality Bank would facilitate a market in water quality trading.
- This market could be further enhanced by providing pollution 'property rights' to businesses which could be bought and sold, with increasing value driven by continual reduction in the overall pollution cap, similar to what occurs for water allocation trading.

\$200 million (total outcome package \$250 million)

4. Research, development & innovation fund

If all cane farmers adopted current best practice it may reduce DIN up to 30%. This will not meet the Reef Plan 50% reduction target and certainly not the likely 70% reductions needed to arrest Crown of Thorns Starfish outbreaks.

We need to invest in research to find the next generation of profitable pollution cutting practices. We also need to research how best proven profitable practice can be best communicated to improve its adoption in the grazing and cane industries.

R&D is necessary for agriculture to remain competitive as well as to achieve Reef pollution targets. It also provides a good return on investment. The ANZ paper Molehill to Mountain states "Returns on agricultural Research and Development (R&D) in Australia have historically yielded returns of 15-40%. The Australian taxpayer and agricultural industry may be better off spending on R&D than on new large scale irrigation schemes".

International experience shows that location of agriculture is more important to environmental impacts than management practices. Up to 50% of impacts can be reduced by changing land use on less than 5% of land (Clay J., 2012). Investment in improving productivity on better land yields a far higher return than trying to make unsuitable land more productive (Clay J. 2012). Research is needed to apply these findings to agriculture in Reef catchments.

There are many fundamental questions that need to be addressed that could bring significant economic and environmental returns on investment including:

- On which areas of existing agricultural land can we gain the best productivity improvement with the right practices?
- Which alternative crops suited to local conditions will reduce pollution and offer better market returns?
- Which land would provide better economic and water quality returns by being converted to native vegetation?
- What are the high value markets are the future that Queensland can supply?
- What is the economic optimum rate, timing, placement and form for sugar cane and banana fertiliser application?
- If a multi-billion investment stream from ethical investment was available what are the action which would deliver both return on investment and environmental outcomes and can be implemented at a sufficient scale?

The Reef agricultural program has already invested in RD&I and this could bring much greater returns with further investment:

- Research in the Mackay district under Project Catalyst, funded by Coca Cola Ltd and the Australian Government has demonstrated profitable use of precision agriculture for cane at the intra-block level, which reduces fertiliser use and pollution (Webster et al., 2012).
- Research has shown emerging evidence of practice changes that reduce Reef pollution risk and are commercially viable e.g. analysis of a 120ha cane farm in the Burdekin Delta indicated capital investments to move from C to B class practices were in the order of \$69,000 (Van Grieken et al, 2010) while efficiency gains show a present value over 10 years of ~\$300,000.
- Early evidence from controlled release fertiliser research is also promising (Di Bella et al, 2014)
- Research trials in the Burdekin showed for the plant crop, significant reduction in fertiliser use had negligible effect on either cane or sugar yield and the trials are continuing with wide support

from farmers (Tables 3 and 4) (DEHP, 2013 (June 2013) presentation of trials undertaken collaboratively by SRA, Queensland Government and cane farmers).

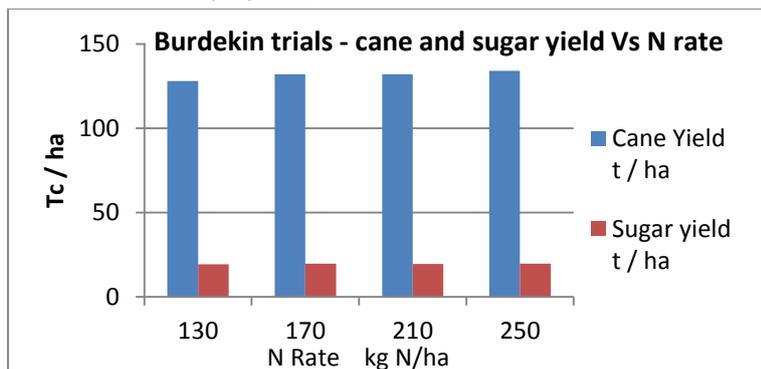


Table 3: Burdekin trials, N rates range from a low 130 kg N/ha to a high 250 kg N/ha without cane or sugar yield penalty. The industry BMP (6ES) rate is 170 kg N/ha and the grower preferred rate is 210 kg N/ha (Note: 2012 plant crop only, trials on 15 sites continuing).

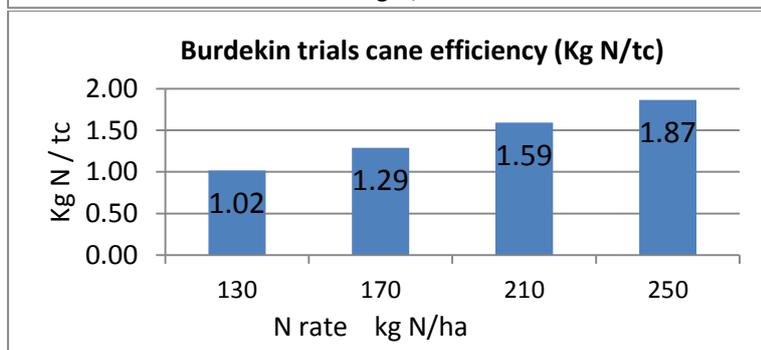


Table 4: Burdekin trials, Neff ranges from a low 1.02 to 1.87 kg N/tc without cane or sugar yield penalty. The industry BMP (6ES) rate is 170 kg N/ha and the grower preferred rate is 210 kg N/ha (Note: 2012 plant crop only, trials on 15 sites continuing).

- Grazing trials in Queensland's dry tropics showed that, regardless of grazing system, beef production by stocking at rates which keep land condition close to A condition produced double the weight of beef compared to land allowed to decline to C condition.

\$100 million

5. Monitoring, Auditing and Reporting

To provide surety that the investment is achieving its aims of improved productivity and decreased pollution there will need to be an investment in improved monitoring, auditing and reporting. The paucity and lack of public availability of both data on practices and water quality means that it is highly problematic to demonstrate the effectiveness of investments to date – which exceeds \$450 million.

A network of sub-catchment water quality monitoring sites which can provide near real time data on pollution loads would allow a better targeting of action and investment to those areas providing the highest pollution loads. It would also allow monitoring of the effectiveness of programs providing clear feedback to farmers in a sub-catchment, and allowing for refinement in management. Just this measure alone could provide significant water quality benefits through highlighting areas of high pollution as well as program success.

Data collection and analysis of farm practices is also critical. Information on farm practices is needed to target interventions where practices have the greatest room for improvement for pollution, accurately assess the uptake of improved practices, and to verify the relationship between practices and water quality improvements. Good data will provide the basis for farm planning and productivity maximisation.

Extension officers will be able to collect much of the on-farm data. When verification of practices is needed for payment or certification there will need to be third party audit. Farmer agreement for data collection and use (including privacy requirements) would need to be addressed and linked to provision of funding or services.

Data on water quality and management practice will be needed to verify pollution reductions and consequent payments from sugar mills and the Reef Water Quality Bank. It will also allow identification of the minority of businesses that continue with high polluting practices.

Improved management practice and water quality data will provide surety to the government and the community that public funds are being properly invested. Future Reef Report Cards will be able to much more accurately report on pollution reductions.

\$100M total

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