CANEGROWERS Mackay

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12 April 2019

Queensland Competition Authority
145 Ann Street
BRISBANE CITY QLD 4000

Submission to the QCA on its' Draft Determination for Electricity Prices for 2019-20

Summary

Canegrowers Mackay is a non-for-profit organisation serving the interests of sugarcane growers in the Central Region with a membership of 82%.

As with our submission on water pricing for the next price path from 2020-24 we are distressed at the myopic approach by successive Queensland Governments to gouge consumers, by taking exorbitant economic profits from the electricity Network at a huge cost to the economic, social and environmental well-being of not only this region but the whole of Queensland. The high price of electricity has placed an enormous strain on not only the farming community but businesses' alike. This situation is untenable and unsustainable. The NEM is in disarray. Policy and regulatory frameworks have hamstrung the AER and the QCA by its own admission has been sidelined as an auditor as opposed to providing Government with the real intent of it's work which is to advise Government on the competitiveness of electricity prices and the ability of the consumer to pay. QCA can only make recommendations on the retail (R) component. Under the Queensland Government's delegation, the QCA must consider setting notified prices using an N+R approach, where N (network) costs are a pass through. The point is that the NEM, AER and QCA appear to operate in isolation none of which actually considers Australia's international competitiveness. It is assumed that this would be COAG's main priority but it appears that "powerplay" and political expediency over rides our ability to focus on economic strategy for the good of the whole country.

The question has to be asked. How did Australia's electricity prices become one of the highest in the world from one of the cheapest in such a short space of time? In brief the problem has been caused by:

- The NEM has received mixed messages from successive governments, happy to expound their own philosophies with no clear direction and strategic planning.

- Strict regulatory frameworks were either watered down or not adhered to. International benchmarking to maintain adherence to efficiencies were not used or disregarded. The result is that regulators were not able to contain excess spending by network owners.
- As a consequence, the RAB of Ergon and Energex were/are inflated providing inflated profits and economic returns at a direct cost to the consumer and businesses' ability to remain competitive on the world market.
- FiT's were not priced on market value and were in fact exorbitantly overpriced for which consumers ended up paying.
- A closure of coal fired generators with not enough lead time for a switch to affordable LNG as a replacement. LNG exports and a reigning in of exploration meant that expensive LNG had to replace coal.
- Generous RET subsidies and a disregard for balanced generation created a mis-match of supply and demand.

Consumers are now reaping the benefit of this dire mismanagement. Understanding that the issues highlighted above are not within the scope or TOR of the QCA. They need to be said however as an iniquitous situation has been realised where the cost to consumers, business and the economy is unsustainable.

There have been countless briefs' and submissions made to regulators and governments since 2008, but the status quo has prevailed.

There are immediate steps that can be taken to reduce the cost of electricity while broader regulatory frameworks and policies are hopefully implemented. These are:

- Reduce the cost of the environmental footprint on electricity prices by reducing subsidies of the LRET, SRES and employ a market price for FiT's. Ensuring that a balance is achieved.
- Write down the RAB of state-owned networks.
- Increase wholesale competition.
- Retail pricing and especially Tariff structures are confusing and have by default rorted millions of dollars from unsuspecting customers.
- An over-estimation of network congestion (spare capacity has been created by the flourishing renewables market) means that tariff structures and the pricing of tariffs should be reviewed.

Agriculture is in a unique situation. A business can increase the price of its product with an increase in input costs to a certain extent unless that business competes on the international stage. Sugarcane producers are price takers and the long-term price of sugar has not increased from 14.5 USc/lb in decades. The net effect of increasing electricity prices and as a consequence water prices have had a devastating affect on the viability and productivity in those regions where producers are reliant on supplementary irrigation systems and where water prices are high. This will be discussed in more detail, suffice to say here that all of the submissions and pleas made to date to both government and regulators, to curtail electricity prices and or for either a food and fibre tariff or to retain existing TOU tariffs has fallen on deaf ears. Since 2008 electricity tariffs have increased by more than 130% whereas residential tariffs have increased by 56%.

QCA is flawed in its assumption as promulgated by Ergon that "Data from Ergon Retail 129 shows that a significant number of customers currently on transitional and obsolete tariffs would be better off on standard business tariffs". This may be the case in some regions where low-pressure systems are in use, peak and off-peak times are used to irrigate, and water costs are much lower. 60% of irrigators in the central region use high pressure systems irrigating during the off-peak window and are now using only water to keep cane alive as the cost to irrigate is below the margin. Surely

QCA can determine to maintain transitional tariffs if the consumer does not have the capacity to pay the new small business tariffs.

There are other transitional tariffs that will be maintained to 2022, why not irrigation tariffs?

QCA can determine on factors in the "Electricity Act" as quoted "we may have regard to any other matter we consider relevant". Vis a vis objects in the Electricity Act:

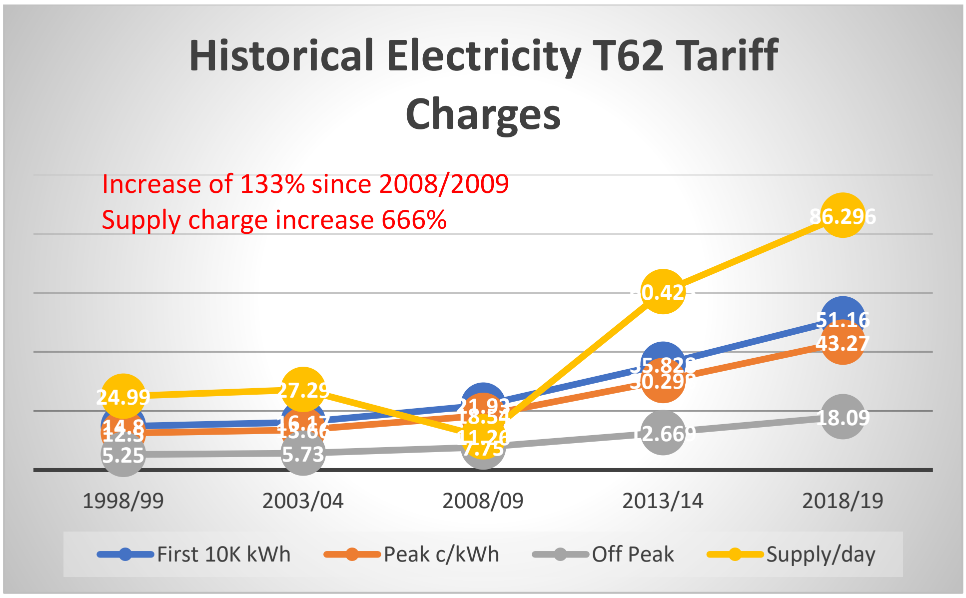
(d)ensure that the interests of customers are protected

(e)take into account national competition policy requirements.

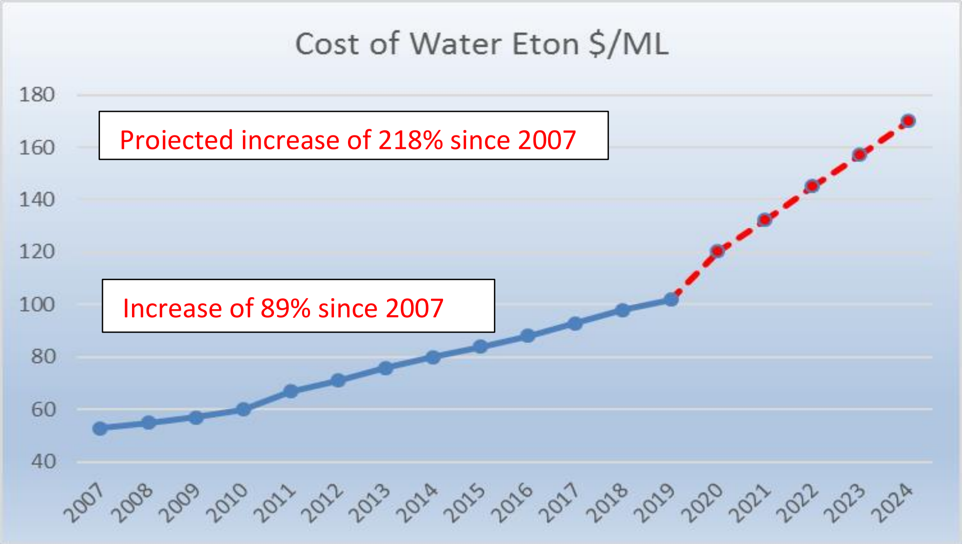
There is no "fit for purpose" tariff for irrigators as well as distribution schemes. Until such time as Ergon and/or the AER can determine on a "fit for purpose" tariff for irrigation it surely makes sense to maintain these transitional tariffs until a decision is made on an irrigation tariff or the price of existing business tariffs make it economically viable to transition.

Some irrigation distribution schemes in the central region are at the point of collapse. Forcing these schemes on to a large business demand tariff will definitely see their demise.

<u>The issues faced by sugarcane producers as a direct consequence of increasing electricity and water prices in the central region</u>



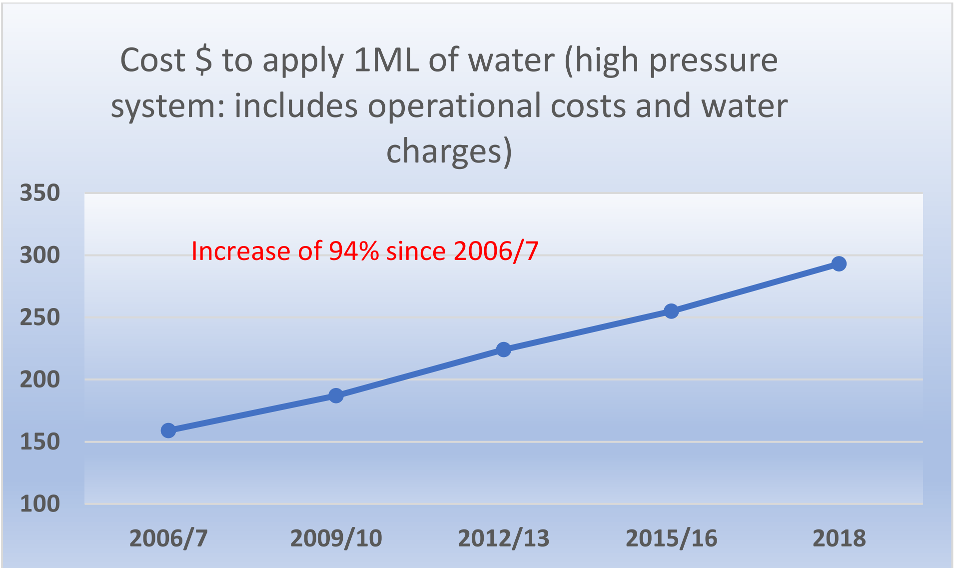
Majority of growers in the central region are on the TOU Ergon tariff 62



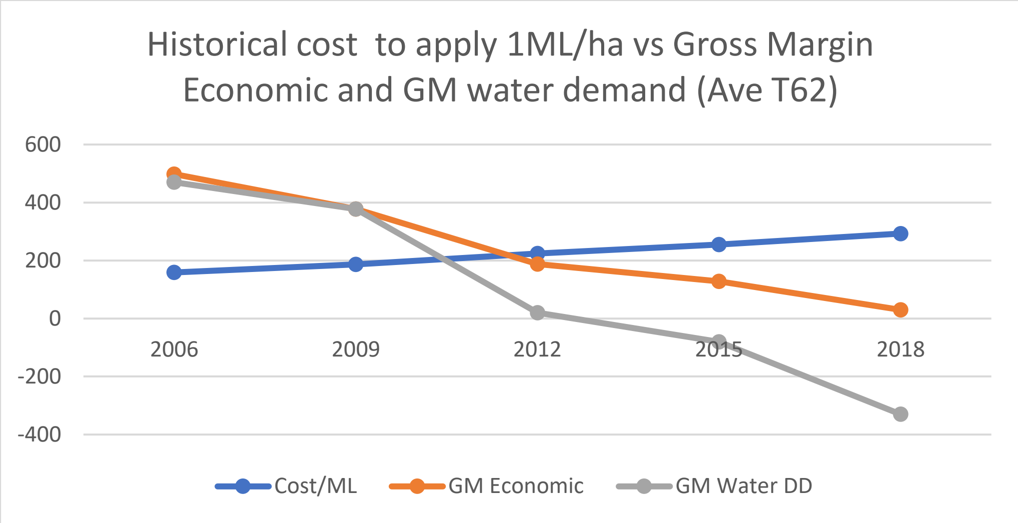
A major component of supplying water to agriculture are pumping costs of water. Electricity charges are therefore the major contributor to increasing water prices, but there are a host of other issues which have contributed to rising costs of scheme water, many of which are not fair and or could have been averted.

Graph below is the increase in operational costs in $/hectare of applying 1 megalitre of water per hectare and includes electricity charges, water costs, labour and R&M. The major contributor to these increased costs is the increase in electricity prices hence pumping costs and water charges.

Graph 1



The majority of systems are either high pressure (gun)70% of irrigable area or flood (furrow) 20% in the Mackay region due to initial water allocations and design of systems for supplementary irrigation. Investment in more efficient systems require much greater capital investment in excess of an extra $1000/ha. This type of investment is not economically viable when the individual grower cannot meet crop demand at an average of 5ML/ha above effective rainfall.

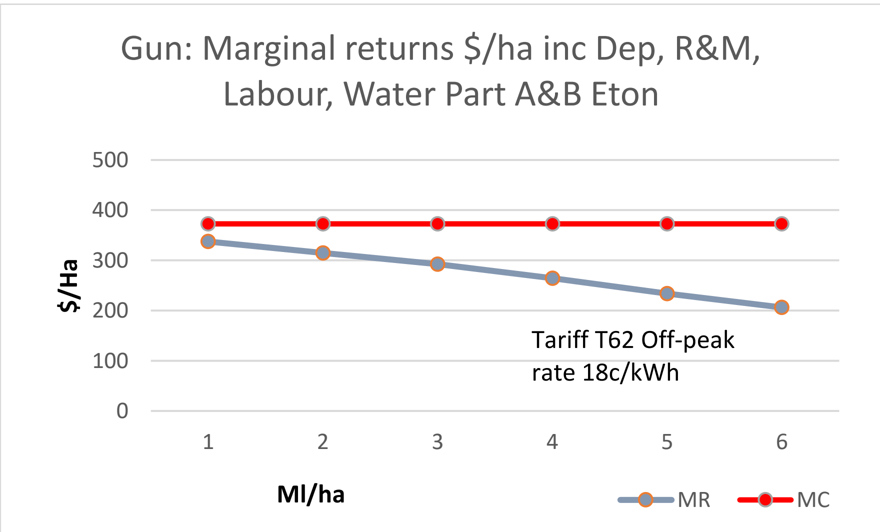


When the schemes were built economic studies indicated that the intersection of marginal returns and marginal cost curves were $ 180/ML (break-even). This figure remains relevant today, as the cost to apply a ML/ha of water vs the gross margin returns indicate. However, for high pressure systems the cost as defined in Graph 1 and above is now approaching $300/ML (operational costs + Part A + Part B). For this exercise Part A cost of water is included as a cost to obtain the gross margins. Part A can no longer be apportioned to fixed costs as that cost has too big an impact on margins. The economic margin above depicts the maximum amount of water that can be applied economically and cuts off in 2011 where crop demand can no longer be met economically. When crop water demand is met gross margins turn negative in 2010. Constant sugar price of $30/tc after harvesting costs applied and an average of T62 high and low prices.

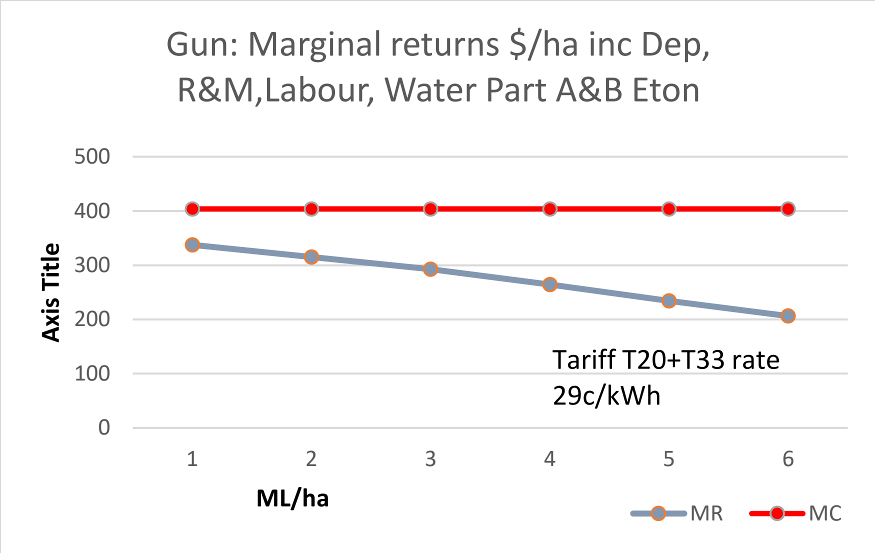
At that time the cost to apply 1ML/ha was approximately $140

The long-term sugar price was and still is US 14.5c/lb

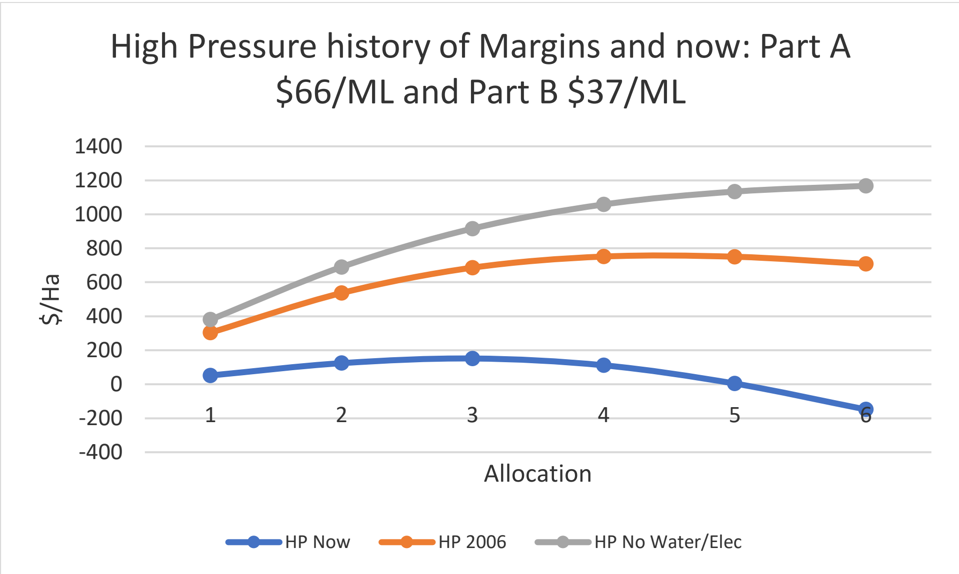
Graph below show negative returns even when using existing T62 tariff at off-peak rate of 18c/kWh.



Any increase in rates or changing to small business tariffs widens the gap on negative returns.

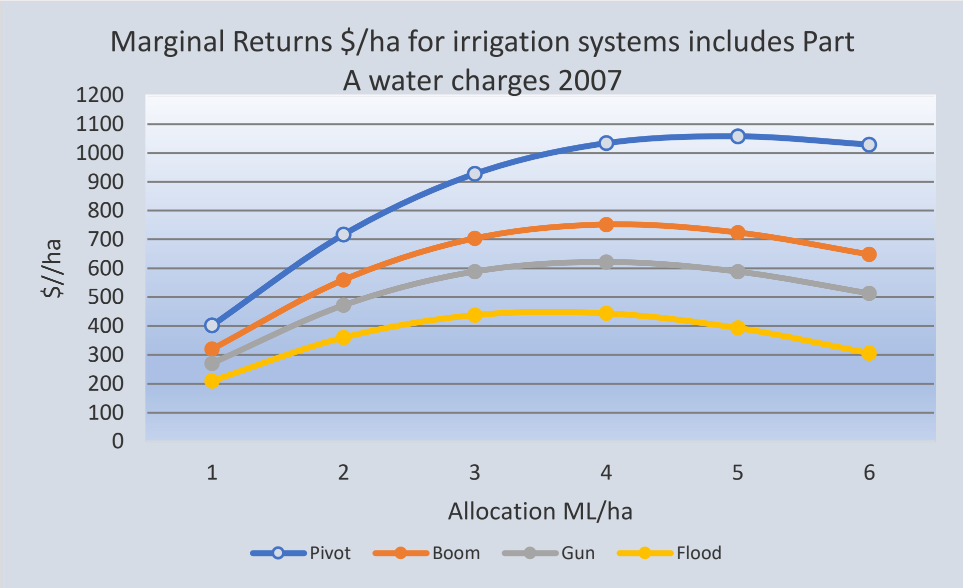


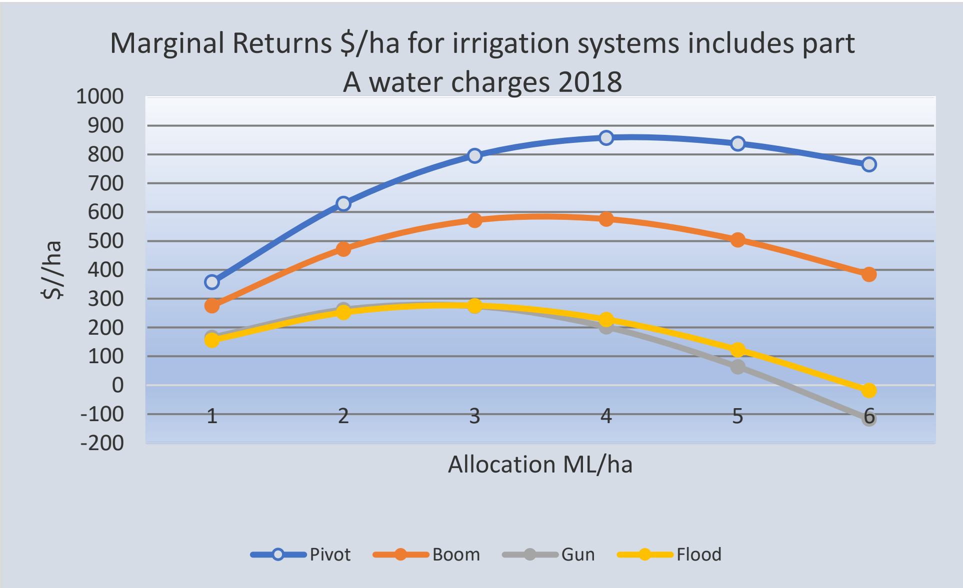
Cost of electricity and water at 2018/19 prices is unsustainable: does not meet crop water demand and no re-investment.
But can still convince growers to undertake efficiency measures such as installing VSD's, installing solar etc.
When growers on higher water prices heard that the price of water could go up further they stopped installing solar.
There is no room to move as graphs above are using 100% off-peak tariff of 18c/kW



Graph above is indicative of the declining returns in $/ha to growers. The most perverse outcome is that in any given year the average amount of irrigation water that needs to be applied to maximise crop production is 5ML/ha. The marginal returns for high pressure systems at the present cost of water and electricity charges turns negative at 3ML/ha of applied irrigation. Therefore irrigators cannot meet crop water demand economically and hence a decline in productivity as we have already witnessed. These returns are based on a sugar cane price of $40/tonne and does not include the cost of harvesting, nor part A water charges, nor capital costs. Expected price of cane this year is well below that figure.

Recent years indicate a decline in water use from storages. From the 3 schemes in the central region water use has declined from 48% to 20% in 2017 and yet crop water requirement for that year was 6ML/ha -way more than the total storage availability. (see Table 2 page 15)





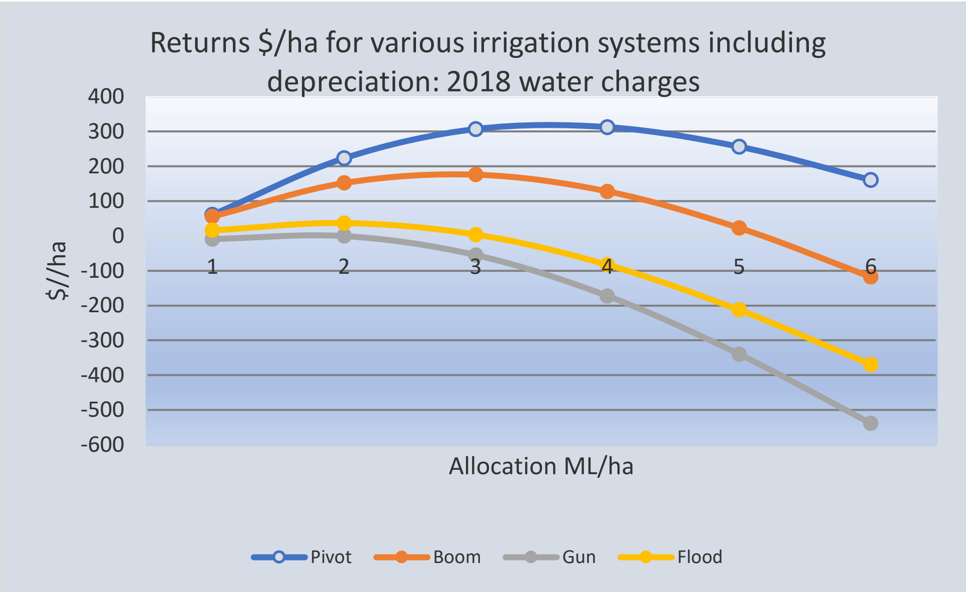
<u>**Graph below – assumptions current situation**</u>

Cane price -$40/t
Water price includes part A & B-(**Fixed $65.79 & variable $36.76/ML (Eton)**
Depreciate equipment over 15 years

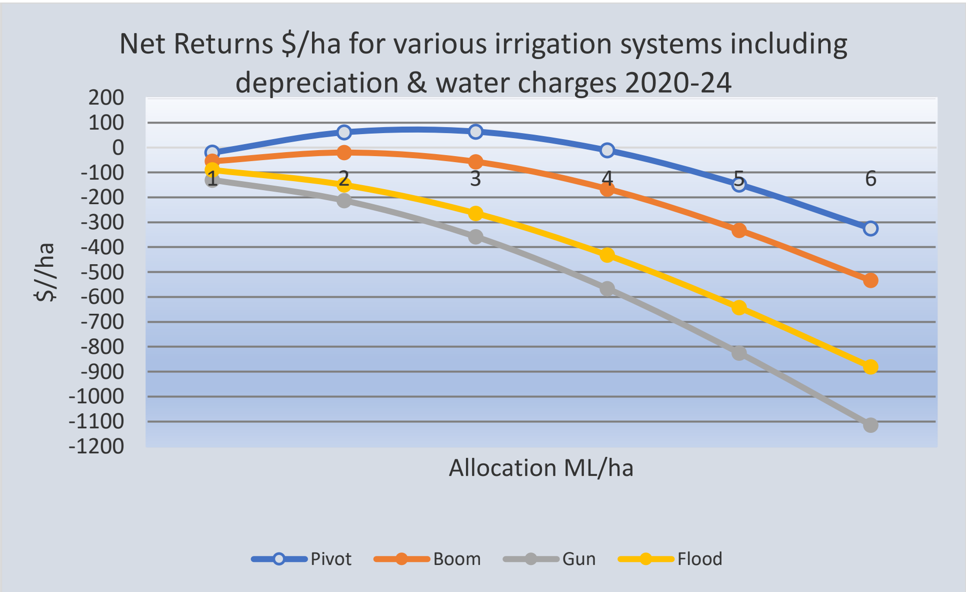
Harvesting cost of - $10/t

Generic costs of labour, pumping costs and R&M for each system

Graphed below is revenue less costs indicating that on some irrigation systems when water costs are at the upper bound (Eton) it is un economical to irrigate. This would also indicate that to put in new infrastructure for irrigation would also be un economical. This scenario even makes the most efficient systems a risky investment.



Graph below is net returns on irrigation systems for Eton scheme with a predicted cost reflective water charge of $172/ML (A&B supposedly the cost reflective price for 2020 to 2024) Maintaining T62



Marginal returns have been in decline due directly to increasing electricity/water prices. Water use has declined as a direct consequence of this (other factors considered later) and therefore a decline in productivity, putting enormous pressure on farm and mill viability. I have focused on the Eton scheme due to that scheme having only one distribution cost whereas Pioneer Valley (PVWB) has differing prices on all outlets. Some of the outlets on the PVWB distribution system has both higher and lower costs than the Eton scheme.

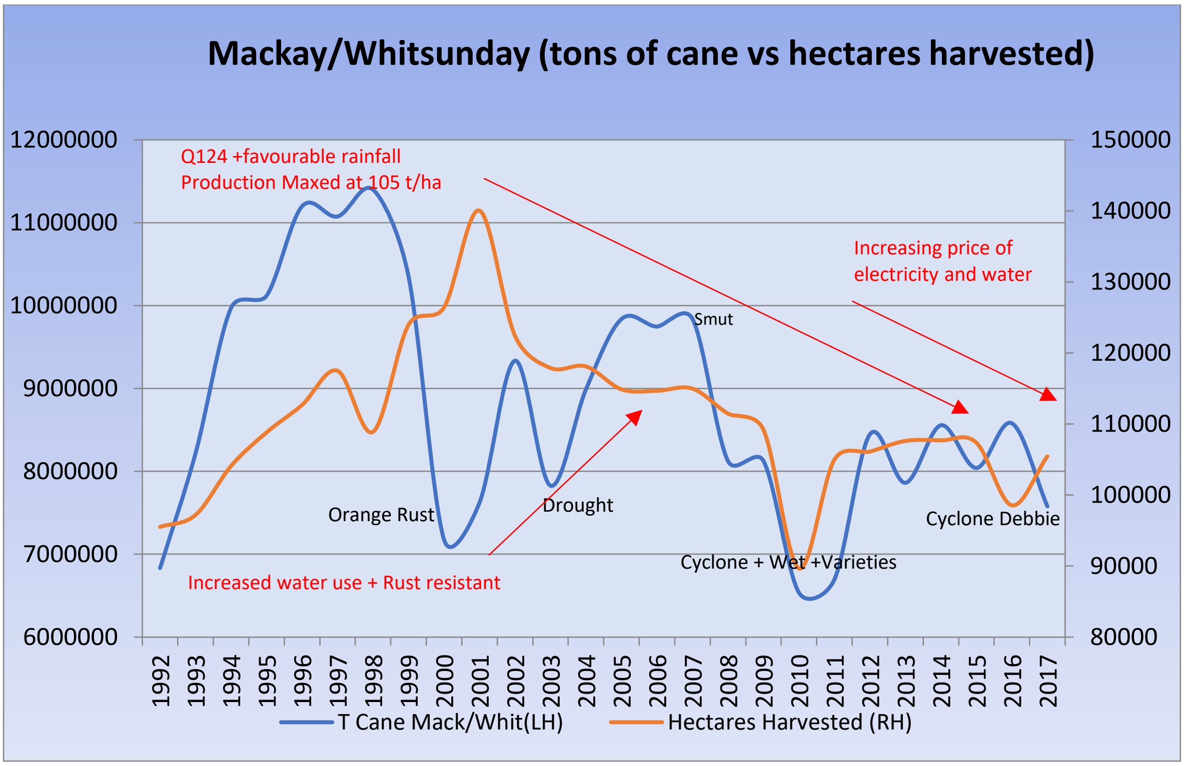
An important aspect of the graphs above is that with the ever-increasing price of electricity and water the marginal returns gap between high pressure systems and flood or furrow systems creates an adverse situation on three fronts.

It is forcing growers to use less efficient systems ie furrow irrigation which results in reduced productivity. The power bill for high pressure is approximately 2x higher than for furrow irrigators. The productivity graphs above are based on maintaining crop demand for water. As most systems are designed for supplementary irrigation and hence erratic supply of water to the crop the indicative returns above are not met and hence growers are forced to look directly at the expenditure item on electricity.

Secondly furrow systems are renowned for not only inefficiency but contribute to environmental problems. It is difficult to control the exact amount of water required to meet PAWC (plant available water content) and more importantly RAW (readily available water). Over application is an inherent problem with furrow irrigation which results in deep drainage or excessive run-off. Other detrimental issues include silting, ponding and waterlogging. Some of these issues can be mitigated but is also expensive. It is also very difficult to control or increase the efficacy of nutrients and chemicals with this type of system.

Thirdly even at existing prices growers are unable to renew or invest in irrigation. Any increase in charges will see dis-investment, productivity decline (already witnessed), and exacerbate farm and mill viability, as well as a possible closure of distribution systems.

Sugarcane Production and Economics



The graph depicts weather and disease issues faced within the industry since the crash from orange rust in 1999/2000. Q124 was an extremely successful commercial variety which could handle most situations and was a top yielder. During that time weather conditions were extremely favourable and although there were dry and wet years extremes were not as distinct as they have been over the last 18 years (Graphs 4&5&6). More importantly rainfall distribution was much better with enough rainfall to maintain good growth in the early and late parts of the season. *Since orange rust, smut, droughts, waterlogging, and rainfall distribution patterns coupled with declining water use as a result of increasing electricity and water charges have all played a role in yield decline*. The fact that the industry had to come up with new varieties to replace orange rust susceptible varieties and again in 2008 to replace smut susceptible varieties have left an indelible mark on industry productivity. The newer varieties are not as robust and require more attention with regards to management, especially water management. This also reduced the range of varieties that could be planted to negate pachymetra and other sugarcane diseases. Recent advent of the disease YCS has been found to proliferate when the crop is under water stress. A perfect storm.

Because of the issues faced above and the fact that world sugar prices were depressed for most of the 2000's, created financial stress on farming businesses and these businesses found themselves in a margin squeeze situation. Many businesses' during this period had to take out higher levels of debt and reduce inputs which put greater pressure on yield decline.

Climate change/variability is increasing the need for water:

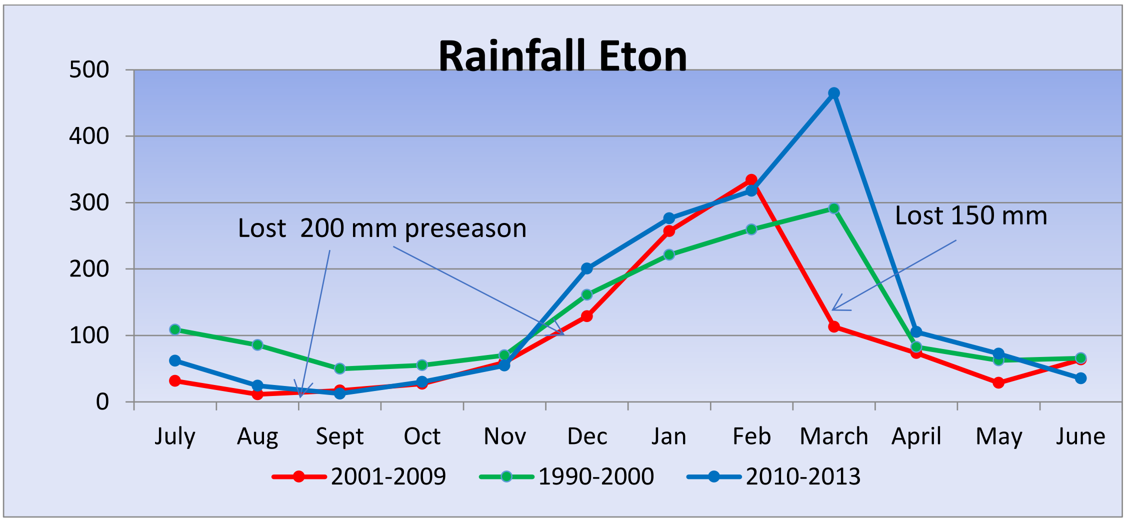
- Rainfall distribution patterns are changing
- Temperatures are increasing which increases crop water demand.
- The cost of electricity and water is putting huge pressure on farmer and miller viability
- We are becoming uncompetitive on the world market
- Market share is in decline
- Water quality issues will be exacerbated- Declining crop yields will reduce NUE (nitrogen use efficiency). Reduced irrigation will result in reduced efficacy of nutrients and chemicals, and the use of more chemicals as a result of reduced crop biomass and hence trash retention. Resulting in increased run-off to the reef.
- As a consequence of declining farm productivity, mill viability in Mackay has resulted in the shutdown of a mill with an extended harvesting season. This has resulted in the harvesting season ending in December or the beginning of January. Nutrients and chemicals applied at this late stage in the growing season means greater losses to the environment as the crop has not had the opportunity to utilise the nutrients applied (obviously dependant on rainfall intensity).
- Viability of water storage and distribution schemes are in jeopardy with declining usage making at least $100,000,000 worth of infrastructure "white elephants". 60% of the irrigable area in Mackay is supplied by the Eton and Pioneer schemes, their imminent collapse and reduced on farm productivity will put greater strain on the central region sugar industry which is already teetering. Production (2018) is down to 4.6 MT of cane and mill viability requires 5.8 MT.

Drastic action is required.

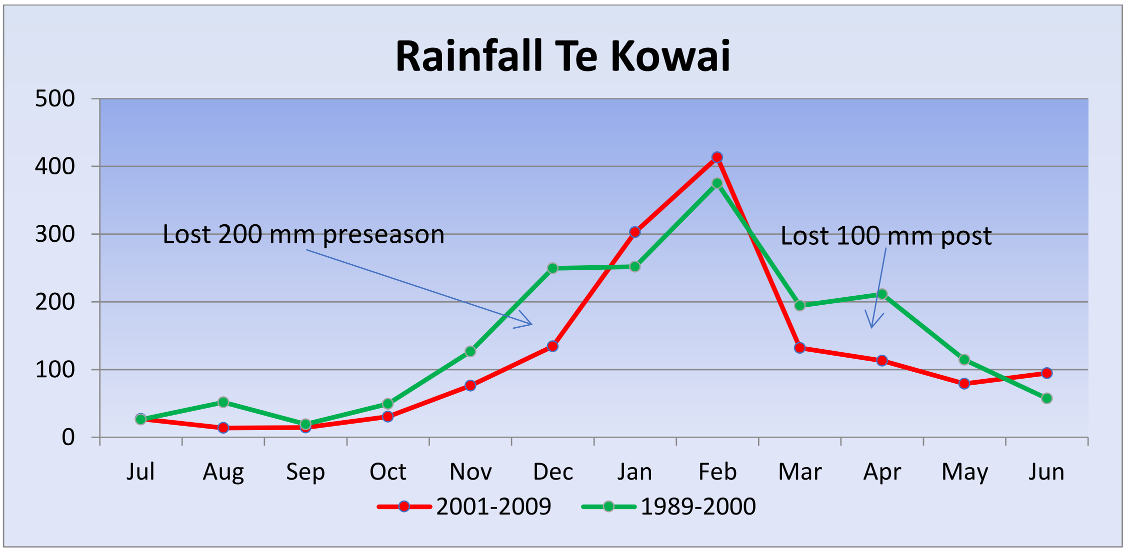
Rainfall distribution

The greatest impact on productivity has been rainfall distribution even though total rainfall has not decreased.

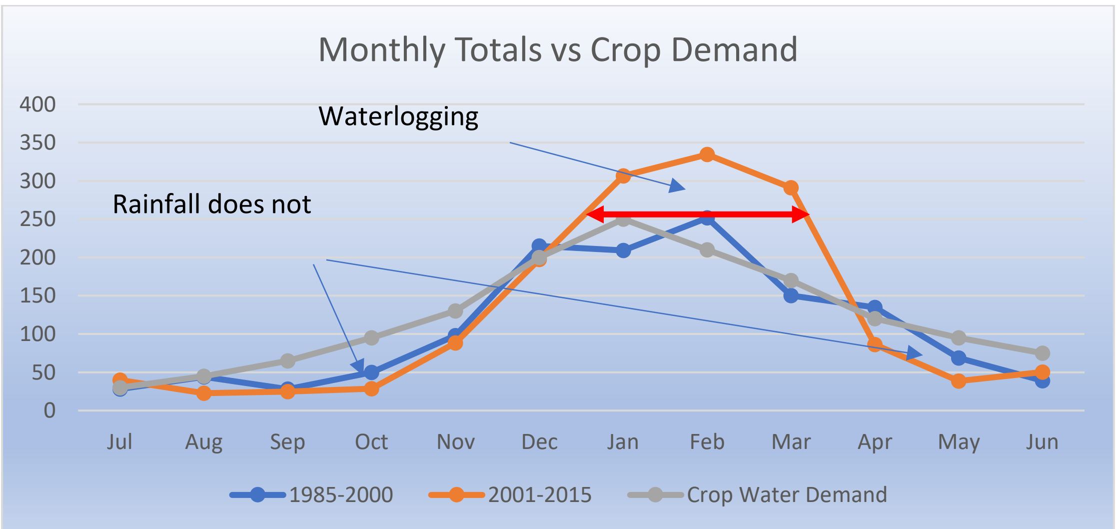
Graph 4



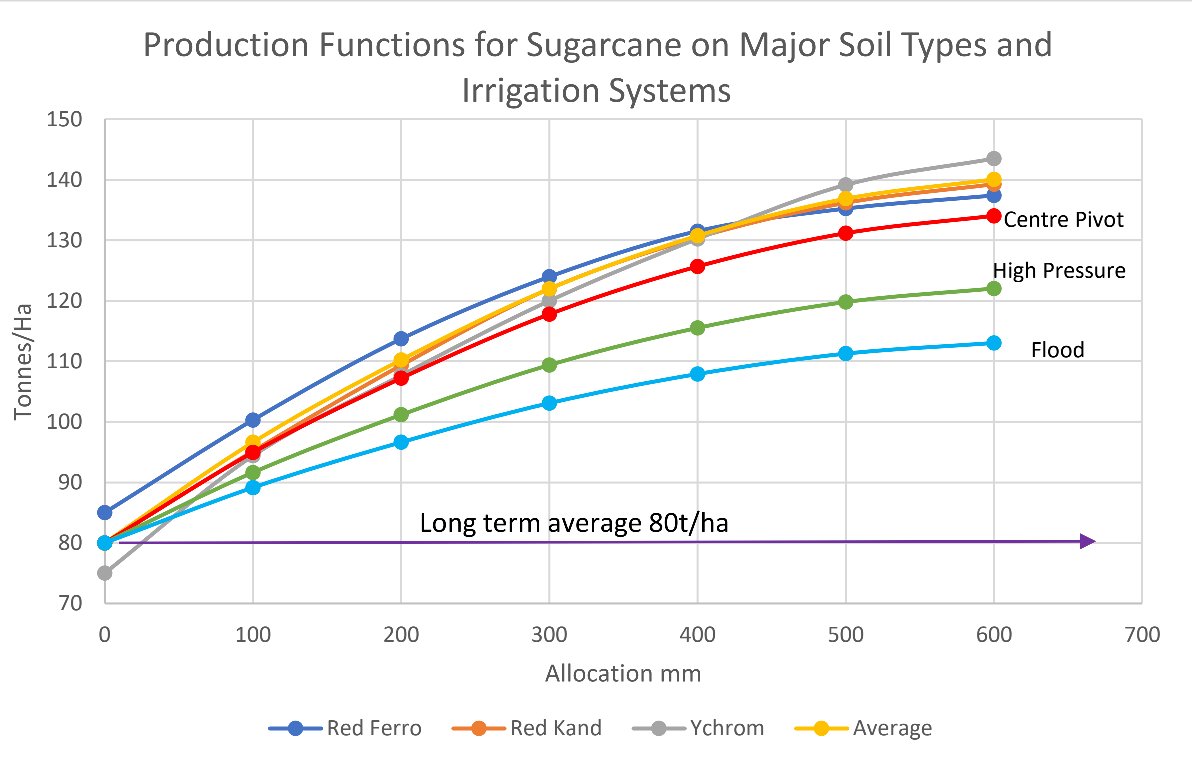
Graph 5



Graph 6



The graphs illustrate one of the major problems faced today and is probably the greatest contributor to reduced yields in the past 2 decades. Whether it is cyclical or whether it is due to climate change is debatable. The fact remains that rainfall events are spiking mid-season and early growing and late maturing phases in the crop cycle are experiencing reduced rainfall. This makes the argument for water storage, increased water use and irrigation efficiencies crucial. In the last decade we have lost 3 ML of water/ha during the early and late growing season, but more rain mid-season which exacerbates the situation because the stunted crop is not able to handle waterlogging conditions. It must be understood that this is a trend and cannot be applied to all seasons. If you consider that on average from historical figures we require 5ML/ha of irrigation per season to maximise production, the situation has been exacerbated. Total crop demand is 12ML/ha. Average effective rainfall is 7ML/ha. Shortfall on average is 5ML/ha. (See Table 1 page 14)



- The graph above shows average sugarcane production functions for 3 major soil types in the Mackay region with no limitations to inputs or water. (Source APSIM model)
- Included are production functions for low and high pressure systems and flood
- The long-term yield average is 80t/ha
- 60% of growers have some form of supplementary irrigation between 2-5ML/ha
- Available usable storage including bores is in the region of 170,000ML. Only 43% of allocations are used on average annually and declining
- Average allocation required to maximise production is 5ML/ha
- Hypothetically a foregone productivity loss of 100,000 ML/5ML/Ha =20,000Ha *(min 35t increase/ha) =700,000t
- Upgrading of systems to low pressure and if allocations are used will increase productivity by a further (30,000ha*19t/ha) = 570,000t.
- Total Gains 1,270,000 tonnes of cane equates to $50,000,000 (growers) $75,000,000(Industry) X multiplier effect? (regional)

If there are major gains in productivity as above why are water allocations not used?

- The cost of power and water (as explained previously)-see **Table 2** for declining water usage, and the section on water and electricity prices.
- Design of supplementary ad hoc systems with obvious inefficiencies (cannot apply enough water at the right time.)
- Majority of systems are high pressure with high pumping costs (60% of systems)
- Lack of applied knowledge to water use efficiencies and economic interpretation. Due to declining production and increased input costs creating a margin squeeze, growers are fixated on the expenditure items electricity and water.
- Limited water supply inhibits capital expenditure on more efficient but more expensive systems. The conundrum here is that most growers are on allocations of 2-3 ML/ha. This is not enough water to maximise production. The requirement to meet crop water demand is in the region of 5ML/ha (**Table 1**) above effective rainfall and this can vary between 1-9 ML dependent on total rainfall figures and intensity. To payback an efficient system (such as a centre pivot or lateral move) requires huge capital outlays in the region of $3-5000/ha. This cannot be achieved at present water and electricity prices especially when water is limiting. Viability issues negate any thought of increased capital expenditure on irrigation development. There are other factors that can be considered and implemented to alleviate the situation: But only when we can reduce either power or water costs or both for those users paying the most.
- Use allocations to meet crop demand on the most productive blocks only.
- Introduce renewables and efficiencies to reduce costs.

To be assessed on an individual basis only and will depend on the trade-off costs between water and electricity. Becomes complicated.

Table 1

Annual Summary of Rainfall Deficit for 2000 to 2018

Year	1st Quarter (mm)	2nd Quarter (mm)	3rd Quarter (mm)	4th Quarter (mm)	Annual (mm)	Equivalent ML/ha
2000/01	164.4	68.5	0.4	81.8	315.1	3.2
2001/02	179.4	250.1	97.7	175.8	703.0	7.0
2002/03	169.7	393.1	194.9	161.3	919.1	9.2
2003/04	135.6	200.6	73.7	229.3	639.2	6.4
2004/05	217.5	65.4	162.0	6.4	451.3	4.5
2005/06	106.6	307.0	68.3	0.0	481.9	4.8
2006/07	85.0	216.5	23.0	26.1	350.5	3.5
2007/08	128.6	195.5	4.9	235.9	564.9	5.6
2009/10	139.5	222.0	27.0	150.0	538.5	5.4
2010/11	0.0	0.0	0.0	140.0	140.0	1.4
2011/12	138.0	137.0	55.0	93.0	423.0	4.2
2012/13	84.0	230.0	192.0	40.0	546.0	5.5
2013/14	133.0	287.0	16.0	57.0	493.0	4.9
2014/15	51.0	338.0	164.0	98.0	651.0	6.5
2015/16	115.0	210.0	58.0	9.0	392.0	3.4
2016/17	99.0	183.0	0.0	100.4	382.4	3.8
2017/18	205.0	200.0	112.0	140.0	657.0	6.6
Average =	126.6	206.1	73.5	102.6	508.7	5.1

Table 2

	Actual Use 2000 to 2018							Available ML 164571
	Proserpine		Eton		Pioneer			
Year	Total ML	ML/ha based on 9518 ha (ie 38,075 ML @ 4 ML/ha)	Total ML	ML/ha based on 15,960 ha (ie 52,670 ML @ 3.3 ML/ha)	Total ML	ML/ha based on 15,508 ha (ie 46,526 ML @ 3 ML/ha)	All Schemes Total ML Used	Available Entitlement Used
2000/01	11636	1.22	18700	1.17	8900	0.57	39236	29%
2001/02	32363	3.40	49305	3.09	32422	2.09	114090	83%
2002/03	44991	4.73	45350	2.84	43270	2.79	133611	97%
2003/04	28539	3.00	24451	1.53	18210	1.17	71200	52%
2004/05	30443	3.20	19885	1.25	11055	0.71	61383	45%
2005/06	23653	2.49	27945	1.75	13469	0.87	65067	47%
2006/07	14251	1.50	18653	1.17	8641	0.56	41545	30%
2007/08	17665	1.86	16095	1.01	7631	0.49	41391	30%
2008/09	16800	1.77	10500	0.66	9121	0.59	36421	27%
2009/10	18000	1.89	21473	1.35	32000	2.06	71473	52%
2010/11	5200	0.55	5000	0.31	12000	0.77	22200	16%
2011/12	14400	1.51	15500	0.97	5200	0.34	35100	26%
2012/13	17400	1.83	15347	0.96	18000	1.16	50747	37%
2013/14	16800	1.77	20600	1.29	13500	0.87	50900	37%
2014/15	29700	3.12	20500	1.28	15800	1.02	66000	48%
2015/16	24275	2.55	25263	1.58	14366	0.93	63904	47%
2016/17	10000	1.05	13020	0.82	5000	0.32	28020	20%
2017/18	11840	1.24	19033	1.19	12036	0.78	42909	26%
Average =	20442	2.15	21479	1.35	15590	1.01	57511	43%

The economic impact on declining productivity has been immense as quantified in previous sections to this submission. Of note is the fact that where water prices on schemes throughout Queensland are approaching $100/ML water usage is drastically reduced. That figure is not to be used as an indicator of a break- even scenario. It is not it is way less than that, but also hinges on the cost of electricity.

Variability in production has an added debilitating effect on grower performance as well as the wider community. As an example where water resources are cheaper and meets demand eg the Burdekin the variability in production is 50% of the variability in the Mackay Whitsunday region where water prices are high and growers are dependent on supplementary irrigation.

The impact on water quality would also be immense with a decrease in NUE, but in all likelihood even more profound when you consider the fact that crops do not achieve maximum biomass potential early in the season due to stunted growth and then this is followed by waterlogged conditions mid-season increasing run-off and reducing the efficacy of both nutrients and chemicals applied to the crop.

Environmental Considerations

Mackay–Whitsunday report card

The Mackay–Whitsunday Healthy Rivers to Reef Partnership report card helps identify the regional pressures affecting waterway health in freshwater, estuarine and marine environments. Pressures in the Mackay-Whitsunday region range from those occurring on an international level such as climate change to reef-wide and localised regional pressures, among them coastal, port and agricultural development, tourism and litter.

Activities in the catchment strongly influence waterway health scores. Mackay–Whitsunday region is a major agricultural area with a significant area of the catchment under cane production, with catchment runoff of pollutants, particularly nutrients and pesticides, presenting a major pressure, notably in the Pioneer and Plane river basins. Rainfall is a key driver of water quality. Loss of wetlands and riparian vegetation is also a key pressure on the region's basins and estuaries.

The region was heavily impacted by Severe Tropical Cyclone Debbie in 2017.

Key messages of the 2016 report card:

- *Rainfall is a key driver of water quality and two years of below average rainfall means scores for water quality in freshwater and estuaries are similar to the previous year, with pesticides remaining a key issue in the Pioneer and Plane basins.*
- In the Whitsunday inshore marine zone, water quality scores from sampling at long-term monitoring sites decreased from moderate to poor. Research is currently underway to help us understand this situation.
- For the Whitsunday inshore marine zone the improvement from a D to a C score reflects only a marginal overall increase. This is because two out of three indicators improved, however the third has declined.
- Urban stewardship scores have improved from the last report card due to improvements in implementing the planning and management guidelines for urban development.

Key messages of the 2017 report card

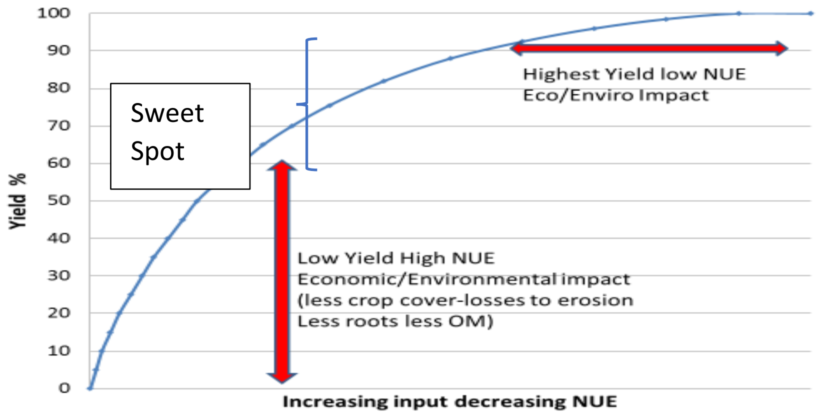
- The Mackay-Whitsunday region was brutally impacted by Severe Tropical Cyclone Debbie when the Category 4 storm crossed the coast on 28 March 2017. The 2017 reporting period (July 2016 to June 2017) captures only three months of post-cyclone water quality condition. The 2018 report card will further reflect any impacts from TC Debbie.

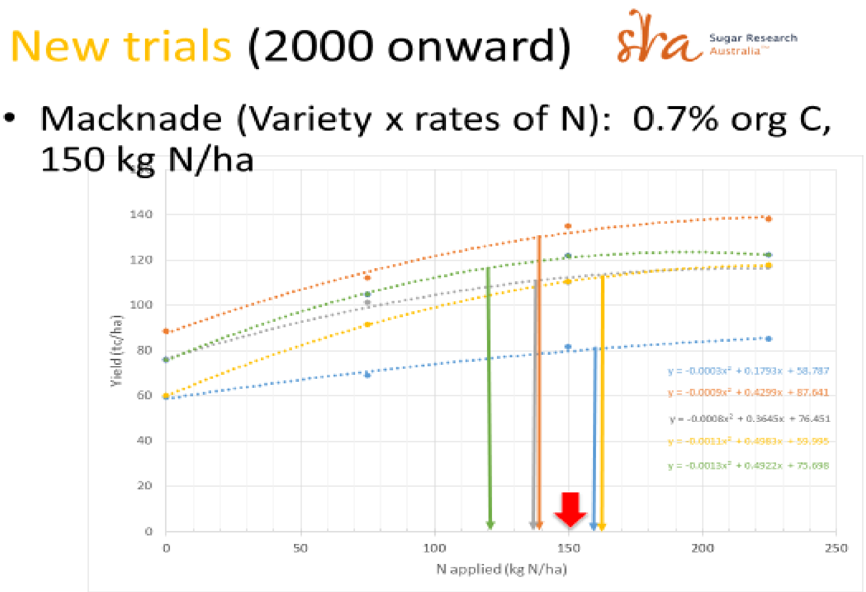
- Water quality in most estuaries, except for Sandy and Carmilla Creek estuaries, were in good condition, despite including the period when TC Debbie crossed the coast.
- Good water quality scores in the estuary systems suggest that water quality returned to pre-cyclone conditions soon after the event. The Region's estuaries are short systems that experience large tidal ranges, so that following large rainfall events pollutants are normally flushed out of the estuaries rapidly.
- Four out of the five reported basins were in moderate condition, similar to the 2017 report card.
- The Don basin scored very good for pesticides.
- Offshore marine water quality was very good for the fourth report card in a row.

Environmental Benefits of irrigation

The Mackay Whitsunday Region delivers high DIN and Pesticide loads to the GBR. The small incremental improvements being achieved at present in water quality are admirable but the improvements are small as seen in data provided by P2R modelling. We need a gamechanger wholistic look at what can achieve faster and greater benefits. *Business as usual will not cut it*. Projects carried out in isolation do provide information for change but are too slow in uptake and done in isolation do not create meaningful step-change. The use of irrigation strategies will improve water quality dramatically. Seems strange that Governments are obsessed with regulation and enforcing compliancy in a scatter gun approach as opposed to looking at the farming system holistically and strategically to maximise productivity profitability and at the same time meet environmental outcomes.

Nitrogen Use Efficiency





- Optimisation of all inputs not just N will maximise crop growth and vigour
- This in turn will lead to increasing OM the building block for soil health
- Increased crop cover and a healthy root system protects the soil from erosion or sediment loss and utilises nutrients so that losses are minimised.
- Given the fact that to the best of our knowledge 6es has determined our range of N rates within the “sweet spot” in most circumstances, our focus should look at what other tools are available to reduce N losses.
- Management strategies. Right product, right time, right placement, right rate.
- More critical than the above is having an incorporation strategy such as the correct application and timing of irrigation so that products are activated and used by the plants before losses can occur.

Consider the trials done by Ken Rhode

Although these trials were not replicated, they were large scale and provided some practical farming advice. It is obvious from the trial that the rate of N is not as critical as retaining what is applied. The 10/11 rainfall season was almost 90 % above long-term average. Despite receiving a favourable rain forecast, runoff occurred 3 days after fertilising and 10% of N fertiliser was lost. This was very much a worst-case scenario. In the 11/12 season more favourable conditions (longer period of time between application and first runoff event allowing smaller falls of rain to incorporate nutrients) occurred resulting in the high rate losing only about 0.6 kg N/ha more than the low rate. Each rate (200kg/Ha and 139kg/Ha) lost only 1% of applied N. I understand there are other pathways for losses but to some extent they would be proportional losses. Therefore, if the difference in losses are negligible then we can assume that most of the N was retained on farm at both rates!! The call for reducing rates is an oversimplification of a complex issue which can better be solved by holistic farm management. Farm retention of nutrients is more critical than rate! We can vastly improve water quality by more effectively using the N available. We can consistently reduce N losses by improved management practices like using the correct amount of overhead irrigation to incorporate fertiliser and activate crop uptake.

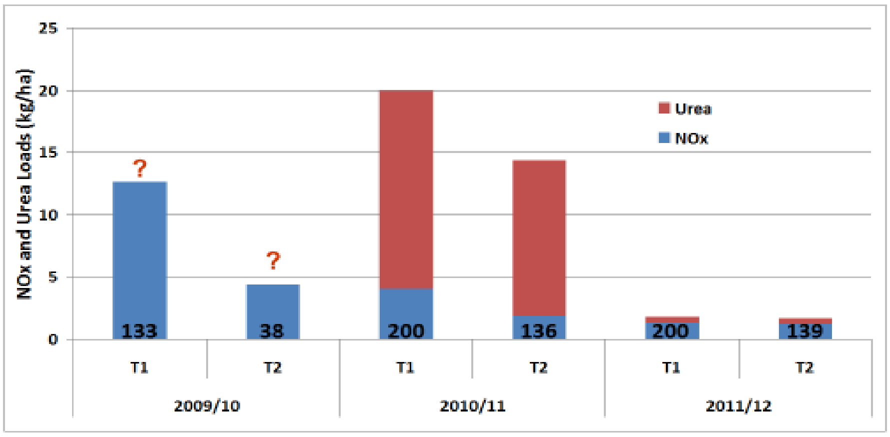
Important to note here that even though losses of N were reduced to 1% of applied N the crop that was harvested was only 85t/ha adding weight to the fact that timeliness and incorporation strategies are paramount to reducing losses and can be achieved without big increases in yield. The loss pathways other than run-off in this case were not quantified so more research is needed in this space.

Effective control of nutrients and chemicals via irrigation strategies

- Efficient irrigation maintains crop vigour which maximises productivity and maximises biomass as soil protection pre and post-harvest. High trash retention suppresses weed germination.
- Nutrient and chemical uptake is maximised by a healthy crop. This reduces the amount of run-off hyperbolically the longer the gap is between application and the first run-off events.

Annual nitrogen loads – Victoria Plains

- Losses in runoff of NO_x+Urea were ~10% of applied N in 2009/10 (urea not analysed) and 2010/11, but only ~1% in 2011/12
- Urea dominated N loss in 2010/11 due to runoff 3 days after application
- Timing of N application more important than rate applied?

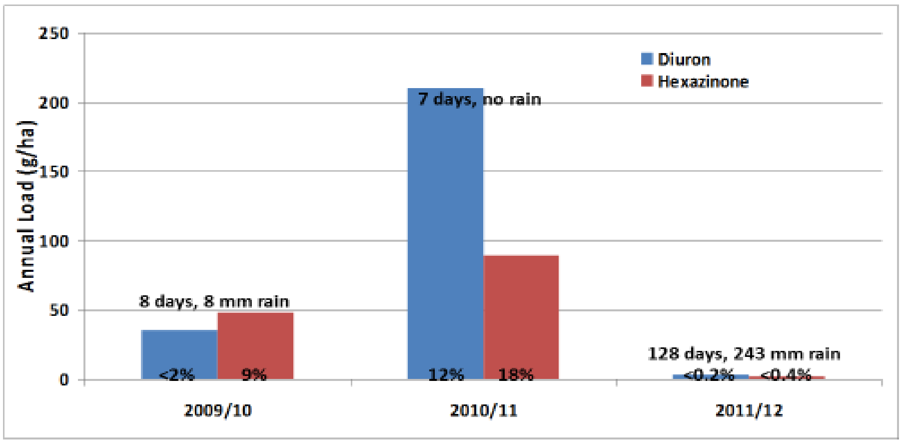


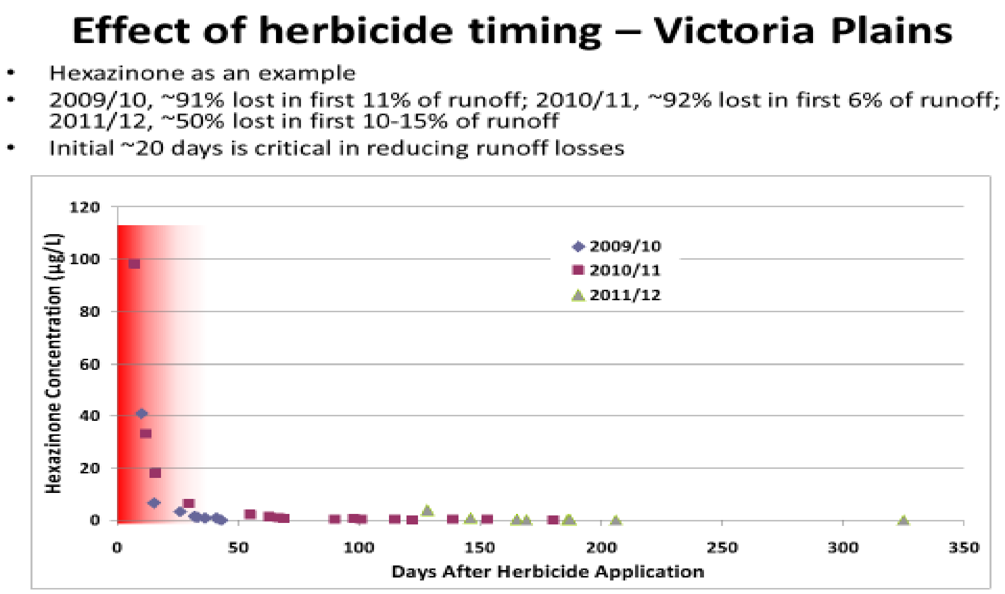
The same situation occurred with herbicide losses as per the graph below.

With regards herbicide losses it is even easier to control than nutrients because their shelf life is much shorter especially if they have been activated.

Annual herbicide loads – Victoria Plains

- Velpar/Bobcat applied each year at similar rates
- Losses mainly driven by period of time between application and first runoff
- Majority of losses occur in first few runoff events





These trials indicate that if we use irrigation management strategies correctly there will be a huge benefit to water quality.

MCL is at present working with growers to enhance irrigation efficiencies and to meet water crop demand via telemetrised data from probes to apply the right amount of water at the right time. We do not have the money to quantify loss reduction of DIN, but are able to use broader indicators like NUE.

In some instances we have had growers reduce their NUE from 2 kgN/Tc to 1.15 kgN/Tc, purely from increased production from an efficiently irrigated crop. We cannot assume a 75% saving on N as this is a complex issue and must be quantified, but the savings would be way more than what is being achieved at present. More importantly it achieves the desired TBL effect.

<u>Socio Economic Considerations</u>

The GRP of the Mackay Whitsunday Isaac region is approximately $6.92B and fluctuates dramatically dependant on the amount of coal exports and the price of coal. In 2017 this value increased by nearly 75% on the back of increased coal prices even though there was a decline in the quantum of coal exported. As such agriculture is a minnow when it comes to the overall contribution to the regional GRP figure.

Agricultural output is in the region of $1B with fluctuations around that figure largely dependent on weather conditions. Sugars contribution is in the region of $350-550M

However it is important to highlight the fact that Sugar punches above it’s weight when it comes to providing stability and is the socio-economic backbone of the region. Of the registered 10,000 businesses in the region the largest proportion (1850) of these are registered Agriculture related businesses, representing 18.5%. As a net exporter agriculture quickly climbs the ladder and of the total net export value from Mackay, agriculture contributes $261M, which equates to 29.5% of the total net export value.

Local Mackay Whitsunday Production figures

- 5 mills (3 Mackay Sugar, 1 Proserpine, 1 Plane Creek)
- 1147 business units
- 130,000 hectares under sugar cane
- 110,000 ha harvested annually
- Employs approx. 3000 locals includes farming harvesting and milling enterprises
- Value of crop in the last 5 years ranged between $350 million to $500 million.
- Raw Sugar production in the last 5 years has ranged between 825,000 and 1,350,000 tonnes
- Dunder is produced at Plane Creek. Approximately 60,000 ha fertilised annually.
- Bio refinery producing ethanol.
- Co-generation plant producing 30% of Mackay's usage.
- 84% land in the region zoned as rural
- <5% of region's population inhabits rural areas
- 7% employed in agriculture (direct employment)

The resilience of grower and milling businesses have been sorely tested over the last two decades, with the milling sector at the point of bankruptcy due in the main to reduced crops and some bad financial and strategic decisions. The milling sector namely Mackay Sugar is in the process of seeking outside investors, however they will not recover at present production levels and nor would a restructured business survive at present levels. The present crop size is hovering around the 4.6MT mark and viability requires a crop of at least 5.8MT. The Mackay region has produced crops in excess of 100tc/ha in the past and there is no reason why this cannot be achieved again. 20% of caneland has gone out of production due to the feeling of insecurity and lack of confidence in the crushing capacity of mills, margin squeeze and regulatory pressures. The other Wilmar mills in the region do not face the same level of angst even though there have been other issues to resolve like the marketing and grower economic interest issues. Mackay Sugar is by far the biggest player in the region with >80,000 ha of sugarcane land contracted to the mill. Wilmar Sugar has approximately 48000 ha contracted to it. They also face viability issues if the crop size is not increased from present levels.

The region cannot afford anymore contraction of the supply of cane and is at a critical juncture. The reasons for contraction is twofold and involves socio-economic issues and productivity issues. The socio-economic issues can be overcome by improving productivity and improving viability.

Effective water resource management has the ability to make growers more profitable but also provides the opportunity to make their businesses more resilient to short term downturns whether that is due to a downturn in world sugar prices or the vagaries of weather which so often affects the central region. The effects of climate change has already had a phenomenal impact on the sugar industry especially in the central region due to high climate variability and the only way to negate this is ensuring that we increase water supplies in the long term and make the most efficient and effective use of available supplies in the short term.

As growers become more productive, mill viability becomes assured. This in itself will instil confidence in the industry and instil confidence in the younger generation that have moved off-farm to look for jobs in other industries. Agri-business and agriculture related businesses will benefit from increased on farm disposable income. A strong agricultural industry provides a fall back for those who have had to look for jobs in the resources sector either because of farm viability or because the younger generation saw no future in it.

Efficient irrigation provides a risk mitigation strategy for the farm business. It will also provide income in the event that the sugar industry contracts by providing the means to produce alternative crops.

Effective Resource Management.

The cost of water is inextricably linked to the cost of electricity.

We cannot continue to look at these resources in isolation. A point in case is the effect that electricity prices have had on the price of water and how the combination of these price increases have had an effect on the viability of all businesses. At no point has the QG, Sunwater or QCA determined at what price water and electricity would undermine the capacity of the user to pay or the point where it undermines development or the socio-economic and environmental impacts. Should we be looking at Sunwater as an effective resource manager? Should we be considering equity in the supply/cost of water so that all regions are competing on a level playing field? At what point do customers cease to use the water and what is the opportunity cost when that resource is no longer used or usage is reduced. What would be the returns to the Eton and Pioneer Valley schemes if the cost of water is reduced and usage is increased?

What has SunWater done to reduce the cost of water? Have they installed renewable energy sources (solar) to augment the cost of pumping?

Climate change has already had an impact on productivity in the Central Region. We have argued the impact of available water and the cost of water on the TBL. We have not got to the worst point in this end game and yet we already have the problem of a substantial decline in productivity.

I have focused on the issues faced in the central region. Electricity markets are much more complex and it is not the intent of this paper to focus on those issues. The intent of this paper is to highlight specific issues faced in the central region with regards to the impact that the cost of power and water have had. We only ask that the QCA are cognisant of these issues and provide support where possible eg. maintaining TOU tariffs for irrigators and for distribution schemes, as well as alerting Government as to the plight of irrigators and the consequence to viability, the TBL and the affect on the region.

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