

Project Catalyst: An innovation project for cane growers in the Great Barrier Reef catchment

Andrew Rouse¹ & Craig Davenport²

¹ WWF – Australia Suite 3.04, Level 3, 60 Leicester Street, Carlton VIC 3053

² Catchment Solutions 85 Gordon Street Mackay QLD 4740

Email: arouse@wwf.org.au

Abstract. Project Catalyst is a sugar cane innovation project established to trial and validate farm management practice change to improve water quality for the Great Barrier Reef (GBR). Funding from the public and private sectors has enabled Project Catalyst to build a strong network of innovators committed to sustainable cane farming. With a focus on changes that have environmental as well as economic benefits, Project Catalyst highlights that farmers can drive significant improvements for the environment without jeopardising their business viability. Growers are supported throughout the trialling of new concepts by an experienced team including farm extension and agronomic service providers, economists, suppliers, environmental consultants and communications specialists. The project has been structured to provide growers with a positive environment for the exchange of ideas and information that has fostered innovation. In this paper, we explore how Project Catalyst came about, some of the early challenges, and some key learnings from this approach to innovation.

Keywords: innovation, runoff, surplus nitrogen, pesticides, herbicides.

Introduction

Project Catalyst commenced in 2009 as a pioneering partnership between WWF, the Coca-Cola Foundation, Reef Catchments and a dedicated group of cane farmers in the Mackay Whitsunday region of Queensland. In 2011 the project expanded into the Burdekin and Wet Tropics and now has 78 participating sugarcane growers, from Sarina in the South to Mossman in the North, that farm about 20,000 ha of cane land. North Queensland Dry Tropics (NQDT) and Terrain Natural Resource Management groups (NRMs) joined as project partners at the time of this expansion. A group of supporting agribusiness suppliers invest on an annual basis (cash and in-kind resources) to help deliver the annual Project Catalyst Forum where the growers and supporting groups convene to discuss the year's trial results, opportunities for future trials, and issues that are affecting their farming businesses. In 2016, the project secured Australian Government funding (Department of Environment and Energy's Reef Trust 3) for three years to drive broader adoption of the trialled and validated grower innovations that result in water quality improvements for the GBR.

The purpose of Project Catalyst is to reduce the environmental footprint, enhance crop production and increase farm viability within sugarcane production systems in the GBR catchment by accelerating the identification, validation and adoption of innovative farming practices.

Project Catalyst is a partnership of growers, agribusiness, sugar supply chain groups, an environmental organisation, NRM regional bodies, the Australian Government and research scientists. The project is structured so that the participating growers have input into the list of practices evaluated, helping to create a culture of innovation and collaboration amongst the participating growers. This has created a more positive approach to the pressures facing the industry. Project Catalyst is seen as an enabling project, which supports the GBR Long Term Sustainability Plan targets, and goals pertinent to rural systems in the GBR.

Project Catalyst combines the key outcomes of improved water quality, soil health, farm production efficiency and precision planning. The program's focus on innovation augments and complements efforts of industry extension bodies, respective State and Federal programs that aim to increase adoption of improved farm management practices, which in turn enhance water quality, soil health and other natural resource conditions.

Transfer of information and adoption by the wider sugarcane community

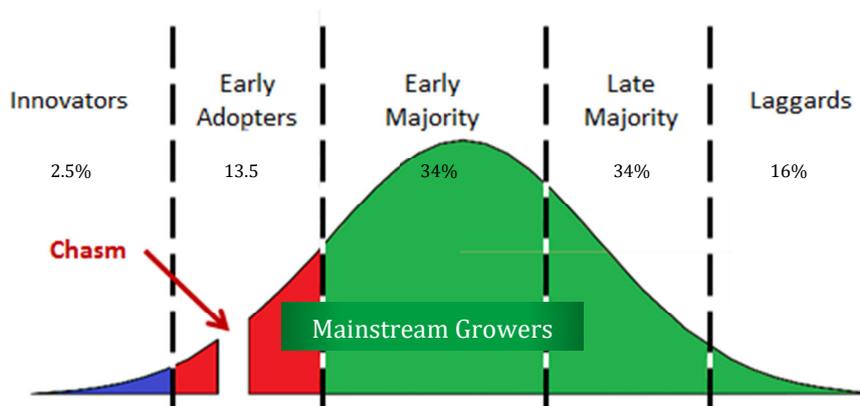
A key component of Project Catalyst is the dissemination of validated practices to other sugarcane producers, research groups, policy advisors and sugarcane productivity services. The focus is on inspiring and supporting a wider group of growers to implement practices validated by the project across their farms.

The project seeks to bridge the gap between Innovators and Early Adopters, described by Geoffrey Moore as 'Crossing the Chasm' (Moore 2014). The adoption of proven technology and know-how is a predictable process that needs a number of methods to communicate the message before it is adopted on mass by the targeted group. To bridge the 'Chasm' between

the Innovators and the rest of the industry requires targeted investment in securing the support of Early Adopters (see Figure 1).

The Innovators are the individuals within a sector with the ideas who are willing to take a financial risk, to test an idea, technology or process. They are important in driving change as it is typically the Innovators who are prepared to experiment and take a punt on a new approach to business. They are sometimes perceived as unnecessary risk takers given the time and effort that can be invested into new approaches that may not deliver a satisfactory return on investment.

Figure 3: The technology adoption lifecycle or "crossing the chasm"



Source: Moore 2014

There are approximately 3,700 sugarcane growers in Australia managing over 400,000 ha of land. About 80% - or 3,000 growers - are within the GBR catchment and therefore farm run-off has the potential to impact on the water quality of the GBR. Using Figure 1 as a guide, about 15% - or 450 growers - in the GBR catchment will be Innovators or Early Adopters. Currently, Project Catalyst has 78 Innovators or Early Adopter growers and has plans to increase this to over 300 growers over the next three years.

The Early Adopters include the industry leaders, the ones other growers respect. They are quick but cautious to use and copy an innovator's technology and process. Early Adopters are known to pick and choose what to adopt and make it pay. If they are seen to be using new practices then the mainstream growers in the Early Majority group, and later on the Late Majority group, will adopt them in the expectation that the Early Adopters have the ability, resources and intellect to choose the best options and refine them.

Peer to peer learning is central to the project. Project Catalyst's strategy is to direct resources to assisting Innovators to flourish by providing them with technical support to conduct trials on their properties and to report on trial results to other growers participating in the project. The project also holds farm-based events such as shed meetings where other growers - the likely Early Adopters - are invited to hear directly from the project's growers on the practices being trialed and the findings to date. The project seeks to convey findings in an open and transparent manner, where growers learn from other growers without any concerns that the information or recommendations made is coming from vested interests.

The extension activities funded by the project aims to bridge the gap between Innovators and Early Adopters by supporting the business case for Early Adopters to adopt one or more practice changes. Our experience is that Early Adopters are most receptive to change where they are exposed directly to Innovators who can provide their perspective on why they have adopted a particular practice or technology - a business case presented from one grower to other growers.

Typically, Early Adopters require repeated exposure to new approaches before taking steps to change their practices. To help with this, Project Catalyst holds a series of regional events such as field days and shed meetings where trial results are presented. Agronomists funded by the project are available for farm visits for interested Early Adopters to assist them with identifying steps they can take. The Annual Forum brings together all the growers and other parties participating in the project to present the year's trial results and provide an opportunity for growers from different regions to share ideas and experiences. In a sector facing considerable challenges, Project Catalyst is helping the participating growers to be more receptive to change and the opportunities that can arise when exposed to an environment that fosters innovation.

Methods

Why does Project Catalyst work?

Since 2009, Project Catalyst has evaluated a range of innovative farming practices, some of which are being more widely adopted by the industry, including: banded mill mud application, soil mapping, GPS technology, and variable rate fertiliser application. Only those practices that deliver an environmental and economic benefit are promoted more widely to the industry. The project is making a valuable contribution to identifying and validating the innovative practices that will assist the Queensland cane industry to adopt practices consistent with the goals and targets of the GBR Long Term Sustainability Plan including the 2025 water quality targets.

There is nothing new about growers coming up with better ways to manage their farms. The real difference is that Project Catalyst brings together like-minded growers to share their ideas with others supported by additional data on economic, environmental and other benefits that growers can achieve through adoption of these practices. Growers are sharing their innovations and results with each other without any reservations about who owns the intellectual property.

How does Project Catalyst run trials?

Trials are operated through a network of extension providers who are experienced in the design, implementation, monitoring and assessment of trials applicable to the type of practice change under evaluation. The trials collect data on economic, water quality, farm management and productivity variables compared to standard practices using control and test sites across different soil types. Where possible, trials are undertaken on different farms to compare climatic variations (i.e. rainfall). Typically a trial will be run over multiple seasons as well as plant cane and older ratoons.

The trials have been designed to evaluate a practice or technology, some of which have been proposed by the participating growers with the remainder by the project's extension providers. Some of the trials put forward by the growers may build on work they've already done and help to provide a more structured approach to evaluating the economic and environmental benefits of the practice or technology.

Summary of Trial Program

Matching fertiliser and chemical application to crop requirements:

- reduced nutrients on old ratoons and late cut ratoons
- reduced nutrients on soils with production constraints
- targeted variable rate applications of fertiliser and pesticides
- strategic use of residual chemicals
- using GPS to improve farm management.

Specific practices or technologies for particular site conditions or grower preferences:

- skip row planting
- sub-surface amelioration of soils
- improved irrigation strategies.

Application of bio-fertilisers:

- mill mud applications
- banded application
- sub-surface application.

Results and discussion

Project Catalyst successes

Project Catalyst growers have been successful in trialling and validating practice changes that have benefits to water quality, farm productivity and soil health. Many of these trials relate to better matching fertiliser and chemical application to crop needs, and are relevant to a wide range of site conditions. Other trials are targeting site specific conditions that are constraints on productivity, or are evaluating practices/technologies put forward by growers (e.g. skip row, bio-fertiliser).

Factors contributing to the project's success

A trial program targeting environmental and economic benefits of new practices and technologies

The project will only promote for wider adoption those practices that deliver economic and environmental benefit. The trial program has largely focussed on finding more precise ways to

apply inputs such as fertiliser and chemicals that enable the grower to improve productivity or efficiency whilst delivering an environmental benefit. Important factors include:

- *Understanding site conditions and constraints on yield potential.* Project Catalyst growers are encouraged to improve their farm management plans for the application of nutrient and chemicals using GPS, farm soil mapping and other strategic application techniques to reduce surpluses that are at risk of run-off from the farm. These practices, once implemented across the farm, can have economic and productivity benefits. Controlled traffic using GPS reduces soil damage while rotational crops grown on the fallow, strategic ripping and site-specific application of ameliorants to improve the soil, are all practice changes that can shift growers from practice Class C to B.
- *Tailoring fertiliser and pesticide application to match crop demand at the Block or Zone level.* Targeting fertiliser application to the crop yield potential at block or soil type, using green crops such as soybean to accumulate nitrogen, reducing nitrogen inputs for older ratoons and late harvested cane, and reducing nitrogen after mill mud applications, are all practices that can reduce nitrogen surpluses. The extension service providers assist growers with selection of practices suited to their conditions. Project Catalyst to date has provided growers with practice change options that have delivered an estimated reduction of more than 20kg/ha of N fertiliser.
- *Supporting adoption of validated practices across farms.* Project Catalyst provides participating growers with access to extension service providers who can advise each grower on the appropriate practices to adopt for their farm conditions. The extension service providers are also assisting the Project Catalyst growers to provide peer-to-peer learning to encourage Early Adopters to also adopt new practices.

Project longevity Innovation projects need to run for many years to deliver meaningful results. Project Catalyst is fortunate that it has been funded since 2009 which has enabled a range of practices and technologies to be evaluated, strong relationships to develop between growers and service providers, and for growers to gain confidence in new approaches and to undertake the role of peer-to-peer presentation of results. This is challenging to achieve in the typical three year project funding cycle.

Grower input and peer-to-peer learning The project partners have strived to put the growers at the centre of the project. By providing opportunity for them to put forward practices and technologies for evaluation, and supporting them to present results to their peers and other growers, the project has helped to foster an environment where growers are more accepting of change and the opportunities it can present.

Trust-based relationship between growers and service providers The importance of a long-term, trust-based relationship between the growers and service provider cannot be over-stated. Feedback from many of the growers is that this is a critical component in helping them to have sufficient confidence to take the initial steps to change practices, knowing that they will be supported along the way. Essential with this is that the service providers are not selling a product – their role is to support the grower to have a more efficient and productive business.

Culture (a positive, safe environment to innovate) The project has strived to provide a positive environment for the growers. Innovation will have as many failures as successes, and this is accepted by all participating in the project. Feedback from many of the growers is that the project provides a safe place to experiment and share ideas and results where they are supported by other growers, project partners and service providers. In an industry facing many challenges, feedback from many of the growers is that the project provides them with a more positive outlook for their business and the industry.

Diversity of project partners The project is an unlikely alliance of government, the private sector, an NGO, NRM bodies and growers. Each partner may have a different motivation for participating in the project; however, each brings to the project its perspective on issues which helps foster a better appreciation of motivations and drivers for change across the industry and its stakeholders.

What are the limitations of an innovation program?

Factors influencing the rate at which new practices are adopted or additional growers sign up to the project include:

- Uncertainty around return on investment. It can take years to fully quantify the financial benefits of making a practice change. Some growers are understandably reluctant to change until they are confident of the return on investment.

- Insufficient extension services. Trust-based relations with an extension service provider is critical in supporting growers through the steps to adopt new practices.
- Proportion of industry receptive to change. The bulk of the industry growers are not Innovators or Early Adopters, and for a myriad of reasons, some are reluctant or unable to change. Other drivers may need to come in to play to encourage or compel these growers to change.
- A perception that all initiatives should be part of the formal industry R & D program.
- Competition for R & D funding (public and private).

Many of the trials have costs associated with the deployment of new equipment or modifications that have to be borne by the growers, as well as operating and maintenance costs, chemicals and labour which are not able to be compensated through these funding sources. Whilst economic benefits can be modelled, these costs limit the size of the trials and number of broader adoptions that growers can undertake until such time as productivity gains are realised.

Where to for Project Catalyst?

Project Catalyst will continue to support the Innovators and Early Adopters to improve the environmental outcomes and productivity of their farms through changes in farm management practices, especially in the areas of chemical and nutrient management. The project has potential to:

- increase the number of participating growers and geographic locations
- strengthen linkages with R & D institutions and other agricultural sectors
- link into practice levels prescribed in the SmartCane BMP.

Going beyond the farm gate, that is, the development of collaborative approaches to water quality improvement through waterway rehabilitation, water quality treatment systems and water recycling opportunities will further increase the downstream benefits for the GBR.

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All the Project Catalyst growers deserve thanks for their efforts to drive the innovative ideas and refine them so they can be trialled and validated for broader adoption.

References

Moore, GA 2014, *Crossing the Chasm, Marketing and Selling Disruptive Products to Mainstream Customers*, 3rd edn, Harper Business, New York, N.Y.