DCAP3

CREATING ALTERNATE INCOME STREAMS TO INCREASE FARM PROFITABILITY AND BENEFIT THE ENVIRONMENT (UNISQ)

Go/No-Go Case

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We would like to express our special gratitude to the number of farmers and land managers who have dedicated their valuable time to participate in various interviews and surveys. Their insights and experiences have been invaluable to our research.

Additionally, we would like to express our heartfelt appreciation to the project steering committee for their invaluable guidance and support. Their expertise and insights play a vital role in shaping the direction of the project, helping us achieve meaningful outputs and outcomes.

Funding

This project is funded by the Queensland Government's Drought and Climate Adaption Program (DCAP) that aims to improve drought preparedness and resilience for Queensland producers.

Summary

Practical and affordable adaptation solutions are urgently needed to help farmers address increasing climate variability. Governments are incentivising adaptation in the agricultural/land management sector by providing market-based instruments (e.g., carbon and biodiversity credit programs; also known as natural capital schemes) that also offer opportunities to diversify income streams by rewarding the adoption of ecosystem-based measures to protect agricultural systems from climate extremes. These measures include practices that mitigate climate change risks and protect biodiversity and ecological function (i.e., the provision of ecosystem services), thereby building more resilient agricultural landscapes and production systems This industry-led project collaborates with producers to assess the benefits and risks of these new opportunities and their potential to create a more diversified, sustainable and resilient agricultural sector.

The project has progressed significantly according to the established timeline. So far, we have successfully achieved seven key milestones, which demonstrates our commitment to efficiently meeting the project's goals. Additionally, the team has developed four comprehensive case studies that offer valuable insights and practical applications related to the project's objectives.

Project key achievement include:

- A comprehensive review report on 'Options and cautions: Environmental credits, practice, and payments for QLD land managers' has been completed
- Natural capital landholder survey to evaluate the drivers, motivations, barriers, and willingness of producers and land managers to participate in carbon income diversification schemes
- Identifying and mapping climatically marginal cropland for potential environmental plantation as income diversification opportunities
- Determining the thresholds for when it is worthwhile to switch between environmental schemes
- Assessing the long-term viability of the environmental credit schemes
- Evaluating the impacts of potential ecosystem services on the sustainability of natural capital schemes
- Evaluating the economic benefits of allocating a portion of income to reinvest in risk management and adaptation strategies that enhance farmers' capacity for drought risk mitigation and adaptation
- Preliminary development of a targeted decision-support tool for investments in, environmental credit (i.e., natural capital) schemes.

A core aim of the project is to ensure that agricultural producers are supported in making well-informed decisions regarding practice change that will likely impact (either positively or negatively) their triple bottom line. While it is still early to draw definitive conclusions about the potential impacts of the project, nevertheless we can outline the anticipated benefits associated with well-informed cost-effective climate risk decision-making, such as the implementation of natural capital schemes. These include early preparedness and response to future droughts and other climate challenges; improved productivity especially due to the positive benefits associated with enhanced environmental services; increased profitability due to enhanced productivity, alternate income streams and potential benefits arising from improved environmental services; and improved business flexibility. Businesses that embrace these strategies will have the ability to adapt to both favourable and challenging seasons through improved knowledge sharing and capacity building. Risks are likely to involve challenges associated with practice change and uncertainties associated with increased climate variability, market volatility, policy uncertainty and changing consumer expectations.

The project has established strong collaborations and partnerships with various organisations dedicated to enhancing farm resilience, promoting sustainability, and achieving better environmental outcomes. A key element of this initiative is the formation of a project-level Steering Committee (SC), which plays a crucial

role in fostering effective governance and ensuring clear communication among academic institutions, industry representatives, farmers, and Natural Resource Management (NRM) groups. Furthermore, the project is actively engaging with the Natural Capital Markets Community of Practice and several key initiatives, including the Northern Australia Climate Program (NACP) and the Northern NSW and Southern Queensland Drought Resilience Adoption and Innovation Hub.

A key focus of the project is enhancing capacity building and knowledge dissemination. To accomplish this, the project has established a dedicated website that serves as a comprehensive resource hub, providing valuable information and updates about the project's objectives and outcomes. The project has also actively participated in relevant workshops and conferences where team members have presented their research and findings, fostering dialogue and collaboration within the industry. Another vital component of the project is the development of detailed case studies that illustrate practical applications of its objectives and provide stakeholders with relatable examples. Furthermore, the project has played a significant role in stakeholder forums and industry briefings, facilitating discussions that connect research, practice, and policy. To keep the public informed and engaged, the team has also produced case study videos, newsletter articles and media releases. Collectively, these efforts have greatly contributed to improving capacity building and expanding knowledge within the community and beyond.

In conclusion, the project is successfully achieving its intended objectives of providing informed decision-support around the value of market-based tools and associated adaptation solutions for farmers facing climate-related risk. Ultimately, the project will better equip farmers to make well-informed decisions that build their resilience to future climate challenges.

Project short description

Practical and affordable adaptation solutions are urgently needed to help farmers cope with the impacts of increasing climate variability by adopting management practices that reduce climate-related physical and financial risk. These include both diversification of income streams to help smooth income variability and ecosystem-based adaptation measures that buffer agricultural systems from the impacts of climate extremes.

This project, led by industry, works closely with producers to evaluate the benefits, risks and trade-offs of new opportunities to create a more sustainable and resilient agricultural sector. These opportunities are expected to help farmers diversify their income and mitigate the risks associated with climate change by building climate resilience and accessing markets that reward them for increasing carbon sequestration through vegetation and soil, as well as other environmental credit options.

Essentially, the project:

- Assesses the potential costs, benefits and trade-offs for farmers looking to engage in these financial mechanisms, particularly in areas where climate variability and climate change may pose a risk to the delivery of planned/contracted outcomes; and
- Create resources for farmers (e.g. case studies, risk analysis and other decision support) that will allow them to make informed decisions.

Key deliverables

- QFF-led documentation of land managers'/farmers' drivers, motivations, barriers, perceptions and enabling conditions to participate in biodiversity and carbon credit schemes
- Regional maps of Queensland showing the potential benefits and risks for farmers looking to participate in carbon/environmental credit generating schemes
- Farm-level case studies (12) evaluating and communicating the feasibility, benefits and risks for farmers looking to participate in carbon/environmental credit generating schemes
- Leveraging of UniSQ's skills to develop user-informed Decision Support Tools (DSTs) to assist land manager/industry decisions to participate in biodiversity/carbon credit schemes
- Project milestone reports, factsheets, and scientific publications.

Outcomes

- Enhanced support for decision makers regarding the potential benefits and trade-offs associated with engagement in biodiversity/carbon credit schemes
- Reduced demand for disaster relief (hence, costs) for the Queensland Government
- Greater understanding of key issues and collaboration between the agricultural sector and relevant government institutions to collectively develop adaptation and mitigation strategies that generate 'win-win' outcomes for farmers and the environment.

Project milestones

The project has made significant progress in alignment with the established timeline. To date, we have successfully reached six key milestones, demonstrating our commitment to meeting project goals efficiently. In addition, the team has developed four comprehensive case studies that provide valuable insights and practical applications related to the project's objectives. Notably, these case studies are ahead of the anticipated schedule, indicating our proactive approach and the effectiveness of our strategies.

01

A Set-up a project advisory committee to facilitate and guide project advancement, robust consultation, monitoring and evaluation and adoption of the outputs.

B Develop models for identifying climatically marginal land (using regional/farm level data on financial farm performance measures, such as revenue, profit, cost of production etc.).

02

A Engage farmers (through semi-structured questionnaires and targeted workshops) to identify drivers, motivations, barriers, perceptions, enabling conditions and willingness to participate in the scheme

B For climatically marginal land, identify the income generating potential of conversion to drought resilient options/diverse income streams by conducting a thorough review of literature

03

A Report on drivers, motivations, barriers, perceptions, enabling conditions and acceptance to participate in the program

B Map climatically-marginal land based on Milestone 1b

C Quantify income-generation potential from environmental credits resulting from land use change (e.g., revegetation) and changed practices on marginal land

04

A Quantify the benefits of revegetation, soil carbon and biodiversity for remaining productive land (e.g., in terms of competition for water/nutrients from revegetation versus improvements in ecosystems services, such as shading, shelter belts etc. that may mitigate drought impacts).

05

A Identify actions that could use a portion of generated income to re-invest in risk management/ adaptation options that increase farmer drought risk mitigation and adaptation capacity

06

A Preliminary cost/benefit analysis mapping of the different options identified above and how they relate to climate risk

07

A Assess how targeted decision support could be used to 'de-risk' farmers' concerns about changing management practices to reduce climate risk/generate alternative income streams

Project key achievements

A comprehensive review report on 'Options and cautions: Environmental credits, practice, and payments for QLD land managers'

This review highlighted the emergence of new markets for ecosystem services and income diversification opportunities among the credit generating frameworks. However, it also notes that the usual markets for agricultural products have changed their expectations about sustainable practices. As such, industry and land managers need to navigate the paradox of disclosing poor climate or environmental past performance, which may attract credits issued for changed practices, while also running the risk of having their products rejected by major buyers for the same disclosure.

The review also pointed out that the frameworks are changing rapidly. Some methods are being removed due to concerns about their validity, such as the ERF Human Induced Regeneration (HIR) method, despite their popularity. Others are being removed due to lack of uptake, like the ERF Dairy method. The review also recognises that the details of the Australian government's Nature Repair Market are yet to be defined but noted that Queensland's Land Restoration Fund and Reef Credits programs may provide useful guidance in the interim.

Finally, the review advises that Queensland's producers should be prepared for continued change as the 2030 international target deadlines for emissions reduction and nature protection approach. This will only add increasing pressure on producers to participate in new ecosystem services markets and respond to shifts in the expectations of buyers of agricultural products.

Given the fast pace of change in this regard, we are currently undertaking an update of our earlier report.

Natural capital landholder survey to evaluate the drivers, motivations, barriers, and willingness of producers and land managers to participate in carbon/biodiversity income diversification schemes

Survey results indicated that:

- Very few of the 56 survey respondents are currently participating in either the carbon or biodiversity markets.
- While respondents expressed considerable interest in engaging in carbon farming projects – and potentially also biodiversity benefit schemes – there was also a level of concern about possible risks.
- Reported awareness and understanding of carbon farming schemes were higher than that of biodiversity benefit programs.
- Many of those who have sought information about carbon farming schemes were satisfied with the information they received; this was less evident for biodiversity benefit programs.

- Lack of information was cited as a particular barrier to participants' interest in engaging in biodiversity benefit schemes.
- Perceptions of potential benefits, risks, and sources of information were similar in both carbon and biodiversity markets.
- Climate was considered by only a few respondents as a potential risk when engaging in carbon or biodiversity market.

Again, given the fast pace of change in this space, we are currently developing a revised set of survey questions in order to re-run the survey, as suggested by the project steering committee.

Identifying and mapping climatically marginal cropland for potential environmental plantation as income diversification opportunities

We have identified and mapped potential marginal agricultural lands—areas of cropped (including opportunistically cultivated) land with low or declining economic value. Our aim was to identify the value of transforming these lands into more drought-resilient uses, such as perennial grazing and shelter belts, which could generate environmental credits as an additional/alternative income stream for farmers. Focusing on climatically marginal farming regions in Queensland, Australia, we found these areas could greatly benefit from environmental crediting schemes due to current or anticipated declines in productivity. By analysing total factor productivity, climate data, and satellite indicators of cropland attrition, we assessed land marginality and identified where targeted support could enhance agricultural resilience. Notably, total factor productivity growth was identified as sensitive to moisture levels in central and southwestern Queensland–providing motivation for farmers in these regions to explore alternative opportunities such as engaging in environmental crediting initiatives. Our finding suggests that climatic information, especially on high mean minimum temperatures and increasing vapour pressure deficits, will be useful in identifying and mapping potentially marginal cropping areas, assisting producers' in understanding the financial benefits of environmental credit schemes and supporting climate-risk decision-making.

Determining the thresholds for when it is worth switching from cropping to environmental credit schemes

Our research indicates that environmental credit schemes could be a viable option for farmers under certain circumstances. However, their feasibility depends on several factors, including crop type, region, and average gross margins. We found that the success of these schemes is largely influenced by the scenario values used in analyses, and both payment and cost considerations play a critical role in determining their effectiveness. Our detailed analysis indicates that farmers should actively consider participating in environmental credit schemes, especially when their average gross margin for cropping operations drops below the mean opportunity cost of production. In our modelling, we calculated an indicative average gross margin value of 57 AUD per hectare per year. It is crucial to note that this average gross margin value is derived from various inputs and assumptions, including a set price of AUD 38 for each Australian Carbon Credit Unit (ACCU), as well as considerations for establishment costs and the potential for carbon sequestration on the land. Furthermore, it is important to recognise that this figure does not take into account the additional value of ecosystem

services that can arise from adopting improved environmentally beneficial production practices. These services may include enhanced biodiversity, improved soil health, and increased soil moisture and water quality, all of which can contribute to reduced costs of production and increased productivity, long-term sustainability and resilience in agricultural systems.

Long term viability of the environmental credit schemes

We examined the feasibility of long-term implementation of these initiatives through a hypothetical 25-year contract period. Our findings suggest that these schemes become more beneficial as the number of unfavourable years increases. However, the success of these projects also varies depending on the crop type and region. For instance, in the Balonne and Maranoa regions, transitioning from cotton to environmental credit schemes becomes advantageous if 30-50% or more of the years have low gross margins.

Evaluating the additional impacts of potential ecosystem services on the sustainability of natural capital schemes

The externalities associated with natural capital schemes—whether positive, neutral, or negative—complicate our assessment, particularly regarding potential adverse impacts on farm productivity. Positive externalities, known as ecosystem service benefits, include advantages like windbreaks, soil moisture conservation, and natural pest control, all of which can enhance agricultural productivity and increase farmer income. In contrast, negative impacts on productivity may result from competition for nutrients, water, and light.

We conducted scenario analyses to estimate the potential net value of environmental credit schemes, considering factors such as carbon sequestration potential, carbon prices, biodiversity credit values, and establishment costs. More than one million scenarios were analysed, revealing varying outcomes based on crop type, region, and fluctuations in gross margins. Despite uncertainties, environmental credit schemes demonstrated potential value under certain conditions, particularly in years with low gross margins. The scenarios indicated that farmers might only consider switching to these schemes if production values decline significantly—specifically, to below, on average, AUD 13 per hectare per year. Conversely, in scenarios featuring strong positive externalities, the transition points for considering natural capital schemes were higher (above AUD 101 per hectare per year).

In conclusion, while uncertainties exist, environmental credit schemes offer promise for enhancing agricultural sustainability and increasing farmer income. However, careful consideration of externalities and thorough scenario analysis is essential for making informed decisions regarding the adoption of such schemes.

Evaluated the economic benefits of allocating a portion of generated income to reinvest in risk management and adaptation strategies that enhance farmers' capacity for drought risk mitigation and adaptation

We first conducted a thorough review to (i) evaluate the advantages of diversified farming systems compared to traditional, simple farming systems and (ii) identify various investment options available, particularly in broadacre crop production. This included exploring income diversification projects and future reinvestment opportunities. After establishing this foundational understanding, we proceeded to conduct a preliminary cost-benefit assessment of several key adaptation options. These options included both incremental change, which can improve existing practices, and transformative change that could fundamentally alter farming operations.

Our review shows that diversified farming systems tend to yield positive financial outcomes compared to simpler farming methods. On average, diversified systems are at least as profitable as simplified cropping systems, with similar profits, gross incomes, and costs in developed countries. In developing countries, they demonstrate significantly higher gross and net financial returns. Moreover, the economic feasibility of diversified farming systems is closely linked to their ability to manage risks associated with market fluctuations, input costs, and adverse weather conditions. This is particularly true when the operational management decisions, climatic risks, and market dynamics related to different aspects of the diversified farming systems are uncorrelated.

We analysed cotton relocation options, including expanding part of current operations to a new more climatically suitable location, which could be a key strategy when planning comprehensive climate risk management strategies. Our findings suggest that relocation would be more effective if the risks associated with the new and existing locations are uncorrelated. For instance, during drought years, strong returns from cotton grown in the Burdekin—where part of the crop could be relocated—could offset lower returns from the Balonne, Central Highlands, and Maranoa regions. This approach would support the sustainability of such diversified farming systems. Additionally, the relocation strategy would be more advantageous if suitable plant varieties are available that are well-suited to the climate of the different regions. Improved varieties could lead to higher yields and enhanced income opportunities. Furthermore, investment in supporting infrastructure would facilitate a much larger and quicker expansion of relocation possibilities.

Investing in modern irrigation systems, like sprinkler and drip irrigation, is a widely recommended adaptation option that can significantly improve water use efficiency and reduce agricultural water consumption, helping to mitigate the impact of drought. We investigated the feasibility of investing in highly efficient irrigation systems, especially in the context of surplus income generated by cotton producers through environmental plantations. Our findings suggest that adopting these technologies is an economically viable option with strong economic returns, especially in the face of more frequent drought conditions.

Biochar addition to cropping soils has been praised for its potential to enhance drought tolerance and soil fertility and reduce land degradation, ultimately leading to increased agricultural productivity. Our study evaluated the economic implications of integrating biochar into dryland wheat farming in the Maranoa region. Our economic evaluation shows that a modest increase in yield alone does not make using biochar economically viable. However, considering both the increase in yield and the cost savings on fertilisers, we find that using biochar is marginally feasible. Our sensitivity analysis shows that yield and biochar costs are important factors in determining economic feasibility. We did not

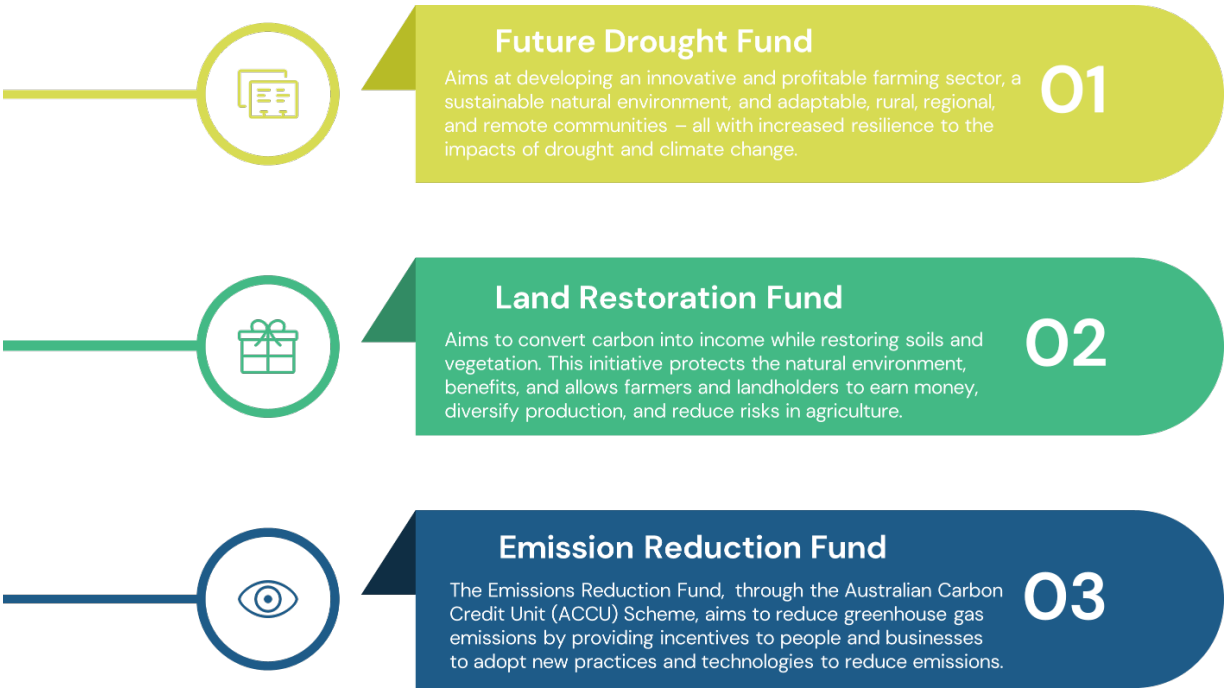
consider the environmental benefits, but accounting for them may also improve the economic feasibility of biochar application.

Development of a targeted decision-support tool for investments in Natural Capital Schemes

This report produced a spatially-explicit regional-scale decision support system for evaluating the financial benefits and costs of natural capital income streams, such as carbon and biodiversity credit schemes. It aims to inform both farmers and government agencies about investment needs and potential outcomes of natural capital projects. The analysis, based on ABARES profit data, is broad-scale and not specific to individual paddocks. Future work will focus on finer-scale decision-making tools for farmers. Key elements and findings of this milestone report were: (1) Cost-Benefit Analysis: this was conducted on 752 cropping areas in Queensland, aligned with Queensland's Land Restoration Fund (LRF) schemes, (2) Income Potential: various scenarios were analysed to determine the potential value of environmental credits, (3) Profitability: Most basins are profitable for agriculture, even in low-profit years, with few areas showing high environmental benefits and low agricultural profitability, (4) Geographical Insights: Southern and northern Queensland show potential for environmental credits, especially in basins like Balonne and Condamine, and mixed cropping and barley systems show more potential benefit; and (5) Challenges: Central Queensland shows negative value for environmental credits, and there is a significant gap between current environmental credit values and what is needed to benefit farmers. Overall, the report highlights the complex trade-offs between agriculture and environmental credit schemes and the need for further refinement and downscaling of the analysis.

Alignment with government programs

Our project closely aligns with several critical adaptation and mitigation initiatives, including Future Drought Fund (FDF), Land Restoration Fund (LRF), and Emission Reduction Fund (ERF) at both the state and federal levels. Specifically, our project supports government efforts that aim to enhance resilience against drought and climate change impacts, improve environmental sustainability, and increase resilience in the farming sector and vulnerable regional communities.



Our assessment methods and outputs, including maps, frameworks, and algorithms, are highly relevant to the Department of Environment, Tourism, Science and Innovation (DETSI) and, specifically, the Land Restoration Fund (LRF). Discussions with DETSI and LRF staff, as part of the project Steering Committee, have indicated a strong interest in the project's outcomes. Their engagement underscores the importance and relevance of our work, as it supports their strategic goals in land restoration and sustainable management practices. We are committed to ensuring that our findings and methodologies not only meet these interests but also provide actionable insights that can be applied in practical contexts.

In a similar vein, this project involves an in-depth investigation into the economic advantages provided by diversified production systems. A key focus is on how these systems enhance the ability to effectively manage climate-related risks while simultaneously minimizing environmental impacts. This research plays a vital role in complementing the existing Emission Reduction Fund (ERF), which aims to meet our national commitments to reduce GHG emissions, as well as the Natural Capital program under development to address biodiversity loss. We have undertaken a comprehensive analysis of the various motivations that drive producers and rural land managers to engage in carbon and biodiversity income diversification schemes. This includes identifying both the barriers they face in adopting such practices and their overall willingness to participate in these initiatives. By understanding these factors, we aim to provide insights that can facilitate greater involvement and ultimately lead to more resilient production systems.

Similarly, our project complements the Future Drought Program (FDF) by helping farmers and land managers develop drought risk management strategies proactively. We focus on helping farmers identify and evaluate the financial implications of various adaptation options that can mitigate the impacts of drought and other climate risks. Through our integrated approach, we empower farmers to not only generate additional income through improved environmental management but also to reinvest that income into both incremental improvements and transformative practices that can significantly enhance their resilience against climate-related risks. Moreover, our project prioritises enhancing planning and management capabilities for farmers and land managers. We are providing them with the tools and resources necessary to implement effective strategies that improve their farming practices, ensuring they are better equipped to navigate the challenges posed by drought, climate variability and climate change. By fostering a culture of proactive planning and adaptation, we aim to create sustainable agricultural practices that will increase the resilience of agricultural production systems.

Project interim impact

It is still too early to draw definitive conclusions about the potential impacts of the project, as it is currently only halfway through its planned delivery. Nevertheless, we can outline the anticipated benefits associated with enhanced decision-making around engagement with natural capital schemes.

Expected benefits of natural capital schemes

The well-planned integration of natural capital schemes across different industries is expected to provide a multitude of benefits. These include improved resource management, heightened preparedness for drought, and increased biodiversity, with associated benefits to crop productivity. The overarching objective of these natural capital schemes is to enhance the delivery of environmental outcomes while building the resilience and sustainability of businesses, enabling them to more effectively navigate the uncertainties of variable climatic conditions.

A summary of the benefits is provided below:

- Proactive Preparedness (MS 5): By implementing natural capital schemes, agricultural businesses will be better equipped to anticipate and respond to future droughts and other climate challenges. Additional income earned through natural capital schemes will assist producers to proactively develop both incremental and transformative risk management investment strategies to ensure that farm operations can continue smoothly even during adverse conditions.
- Improved Productivity (MS4): Natural capital schemes, especially the positive benefits associated with environmental services, are expected to enhance productivity levels through improved soil health, moisture retention and pest control. Through natural capital schemes, businesses can optimise their operations, resulting in healthier ecosystems that support overall agricultural productivity by increasing crop yield, and improve the gross margins of cropping.
- Increased Profitability (MS3): Businesses that adopt natural capital schemes may, under certain circumstances, achieve increased profitability/greater income stability through (i) potential benefits arising from improved environmental services leading to enhanced productivity, and (ii) access to additional income.
- Business Flexibility (MS2): One of the key advantages of the natural capital approach is its capacity to enhance business flexibility. Businesses that embrace these strategies will have the ability to adapt to both favourable and challenging seasons. This adaptability is crucial in a climate where changes in drought and other climate events can greatly impact farm income.
- Improved regional benefits and community engagement: The implementation of natural capital schemes may foster community resilience and engagement by facilitating discussions and collaborations among industry peers. By sharing experiences and best practices, businesses can strengthen their networks, gain insights, and work together towards common sustainability goals, thereby creating a supportive community dedicated to environmental sustainability. However, unintended impacts on the broader socio-economic system in rural communities may occur and still need to be better understood.
- Enhanced knowledge sharing and the development of capabilities among growers, land managers, industry stakeholders, policy makers and the broader community focussed on improving environmental sustainability. Members of the Natural Capital Markets Community of Practice have shown significant interest in the project's interim outputs, acknowledging that the project outcomes will be important for their organisations as well. Similarly, the Southern Queensland Landscape area illustrates how local farmers and land managers are now better equipped with the necessary information and tools to evaluate emerging opportunities, particularly in environmental markets.

These resources enable them to make informed strategic and operational decisions, enhancing the management of their land and resources.

Project collaborations and partnerships

Robust collaboration and partnerships have been forged with various organisations committed to enhancing farm resilience, promoting sustainability, and achieving improved environmental outcomes. A critical aspect of this is the establishment of a project-level Steering Committee (SC), which plays a pivotal role in fostering effective governance and facilitating clear communication among academic institutions, industry representatives, farmers, and Natural Resource Management (NRM) groups. The members of this Steering Committee comprise key stakeholders, including AgForce, Southern Queensland Landscapes (SQLandscapes), the Queensland Farmers Federation (QFF), the Department of the Environment, Tourism, Science and Innovation (DESTI), the Land Restoration Fund (LRF), and the Queensland Department of Primary Industry (QDPI).

This industry-led project, spearheaded primarily by the QFF, has successfully cultivated strong collaborative relationships with a diverse range of stakeholders, including various agricultural industries, farmer groups, and related programs and projects. For example, QFF has been collaborating with QFF members, including CANEGROWERS, Cotton Australia and Queensland Fruit and Vegetable Growers, on the project.

Additionally, QFF plays a pivotal role as the Chair of the Natural Capital Markets Community of Practice, a group dedicated to discussing and advancing natural capital management. This group includes members from natural resource management (NRM) organizations, industry representatives, and the Department of Primary Industries (DPI). The UniSQ has actively engaged with this community by presenting updates on project progress during two separate sessions. The participants of this group have expressed significant interest in the project’s developments and are keenly anticipating its outcomes.

In the early stages of our collaborative efforts, we also held productive meetings with representatives from the Commonwealth Bank and the Australian Bankers' Association (ABA).

Additionally, the project has aligned itself with several key initiatives, including the Northern Australia Climate Program (NACP) and the Northern NSW/Southern Queensland Drought Resilience Adoption and Innovation Hub, which focus on enhancing drought resilience and adaptation strategies. Collaborations have also extended to governmental agencies such as the DESTI, especially through the LRF, and have involved research institutions such as the Australian Bureau of Agricultural and Resource Economics (ABARES), tasked with ensuring resilience and environmentally smart production systems.

Project capacity building and awareness

Conference/workshop presentations

- Jayne Thorpe, Kate Reardon-Smith, Shahbaz Mushtaq, Jarrod Kath (2024). Options and Cautions: Environmental Credits, Practice, and Payments for QLD Land Managers. Environment Institute of Australia and New Zealand National (EINNZ) Biodiversity Offsets Conference 3.0. From offsetting to carbon positive: 23-25 July, Canberra.
- Jarrod Kath, Kate Reardon-Smith, Jayne Thorpe, Shahbaz Mushtaq (2024) Assessing the Environmental Credit Landscape in Queensland's Cropping Zones: Marginal Land Mapping and Income Generation Potential. Environment Institute of Australia and New Zealand National (EINNZ) Biodiversity Offsets Conference 3.0. From offsetting to carbon positive: 23-25 July, Canberra.
- Jarrod Kath presented results on climate marginality and the potential value of environmental credits from the project at an UniSQ-DAF collaboration meeting hosted by DAF at the Ecoscience Precinct, Brisbane, on 5th July 2024.
- Jarrod Kath presented results from the project on mapping and quantifying natural capital opportunities across Queensland's agricultural landscapes to the Forest Research Institute, University of Sunshine Coast on 8th July 2024.
- Jarrod Kath and Kate Reardon-Smith met with Liz Gould - Principle of Connect4Conservation and current Director, Great Eastland Ranges (GER) – on 11 July to discuss the project and potential value of environmental credits. Liz currently works with landholders engaged in biodiversity projects on production landscapes across the south-east Qld region.
- Presentation to to the Natural Capital team of the Department of Environmental Science and Innovation (DESI). The project team believes that there are significant opportunities for collaboration with the DESI Natural Capital team, particularly regarding data sharing and modelling.
- Several presentations of the project's interim outputs have been made to the Carbon Community of Practice (Carbon CoP). These presentations have not only facilitated the validation of the project outputs but have also contributed to sharing knowledge and building capacity within the broader community focused on improving environmental footprints.

Case studies

Four farm-level case study videos have been produced by the project team at QFF. These will be made available on the DCAP 3 natural capital website: https://cacs.usqresearch.edu.au/dcap3. Summaries of the videos are provided:

> Video 1: Aaron Kiely is an Emerald based cotton farmer. Aaron's family farm is on around 600 hectares of irrigation land which utilises flood and pivot irrigation. The farm is currently undertaking a five-year trial carbon sequestration project that is offering Aaron the opportunity to step into the space and monitor its potential. Aaron raised concerns around the legislative environment, citing a lack of clarity as a barrier to wider adoption of carbon projects across the agriculture sector. Aaron also discusses the adversities facing farmers and the opportunities for adaptation through cotton research RDCs, new seed varieties and changes to family farming systems.

- Video 2: Renee Anderson is a farmer in the Central Highlands. Renee farms cotton and winter crops across two family farms spanning around 450 hectares under irrigation, with an additional 60 hectares set aside for biodiversity and water infrastructure. Renee believes carbon sequestration will be important for the agriculture sector moving forward, however cites a lack of authoritative, reliable, and trustworthy information as a barrier to project adoption. Renee also believes that the benefits of participating in a carbon project are largely transitional, noting that once locked-up land has reached maturity it is no longer sequestering carbon.
- Video 3: Philip Reid trades under Paringa Gold which owns eight properties in Central Queensland based out of the Paringa Feedlot. The Paringa Feedlot was originally established in the 1980s to take the variability of drought out of the farming system. The business has investigated the carbon issue and has had several discussions with professionals but has not had the confidence to proceed, largely due to the impact that tying up country for carbon sequestration would have on the productivity of its core operations. Philip notes that the agriculture sector has a strong role to play in carbon sequestration but requires financial support from government and greater recognition from the community.
- Video 4: Kristy's mixed farming operation in Central Queensland has around 5000 acres under cultivation and also runs cattle. The farm has made several investments to protect against flood and drought, including contour management, soil conservation and scheduled crop rotations. Due to time constraints the farm isn't currently investigating a soil carbon project. While open to the prospect of participating in a project in the future Kristy notes that she needs to know more about what is involved.

Project website

To create wider awareness the DCAP 3 natural capital website has been developed. Available at: https://cacs.usqresearch.edu.au/dcap3. The website is expected to host project reports, case studies, and publications as they become available.

News and Media

- 'Drought, death and taxes: Preparing for the inevitable big dry' (UniSQ news, 8 Nov 2022) (https://www.unisq.edu.au/news/2022/11/dcap-third-phase#:~:text=This%20project%20will%20fill%20fundamental,manage%20areas%20with%20woody%20vegetation
- Project short communication through the DCAP e-newsletter: 'Project helps producers create alternative income streams' [Jan, 2024 DCAP e-newsletter: https://app.vision6.com.au/em/message/email/view.php?id=1495907&a=119950&k=5t6qaSYCRB7P5BvdrSFEWvhao1O2XefcSdJGkUjFBdE]

Steering Committee Meeting

The project team has established a schedule of regular meetings with the project Steering Committee (SC). These meetings serve as a platform for ongoing dialogue and collaboration and ensure the project remains on track to achieve its objectives. The SC members have expressed strong enthusiasm for the project and actively support its objectives and outcomes. The SC members

provide invaluable insight and guidance crucial for aligning the project's goals with the needs of farmers and land managers. Additionally, the SC members ensure that the project is adaptable to the evolving policy landscape, helping to maintain its relevance and effectiveness in addressing current agricultural and environmental challenges.

Future Milestones and Activities

Planned Milestones and activities include:

Milestone	Activity	Due date
MS 8	Based on mapping and results from initial cost/benefit analysis, identify 12 case study areas with QFF.	31 March 2025
MS 9a	Develop 12 farm-level case studies to demonstrate the feasibility of alternative income stream options such as carbon/biodiversity credits.	31 March 2025
MS 9b	Working with QFF and using farmer feedback, develop downscaling approaches to provide farmer level decision making tools that assist them in assessing whether income diversification options are feasible and profitable on their land.	30 June 2025
MS 10a	Assess how climate risk (e.g., ENSO and climate change) affect the financial viability of converting marginal land to generate alternative income streams. Provide advice on the most beneficial/less risky time to adopt new practices (e.g., ecological restoration) from the farmers' perspective.	30 September 2025
MS 10b	Go/No Go Option: A short report will be provided summarising project outputs and outcomes and industry engagement conducted to date.	31 December 2025
MS 11	Investigate how integrated re-investment generated from carbon/biodiversity credits into climate risk management/adaption options (e.g., Practices to improve soil condition, pasture improvement) can be optimised to maximise farm profitability while minimising risk (e.g., due to climate variability, carbon market volatility) to further increase farmer drought adaptation capacity, thereby generating a positive feedback loop that continually increases farmers' climate resilience over time.	31 December 2025
MS 12	Implement a QFF-led extension program to raise awareness about options that will assist producers to incorporate climate risk mitigation/income diversification measures into their farm management systems.	31 March 2026
MS 13	Produce final and updated cost/benefit analysis maps of the different options identified and how they relate to climate risk.	30 June 2026
MS 14	Develop a prototype DSS property management information system that allows farmers to visualise and assess the economic benefits (or otherwise) of converting marginal land to more drought resilient uses.	30 September 2026
MS 15	Develop an operational DSS property management information system, updated to incorporate industry feedback, that allows farmers to visualise and assess the economic benefits (or otherwise) of converting marginal land to more drought resilient uses.	30 September 2026
MS 16	Produce a synthesis report on assessment/M&E of farmers perceptions of the viability of options with policy recommendations.	30 September 2026