QUEENSLAND FARMERS' FEDERATION

Inquiry into the impact of **Climate Change on Queensland Agricultural Production**

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State Development and Regional Industries Committee

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The united voice of Queensland agriculture

Contents page

This submission is provided to:

Committee Secretary
State Development and Regional Industries Committee
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Our members

- Canegrowers
- Cotton Australia
- Queensland Fruit & Vegetable Growers
- Nursery & Garden Industry Queensland
- eastAUSmilk
- Australian Cane Farmers Association
- Queensland United Egg Producers
- Turf Queensland
- Queensland Chicken Meat Council
- Pork Queensland
- Bundaberg Regional Irrigators Group
- Burdekin River Irrigation Area
- Central Downs Irrigators Ltd
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- Mallawa Irrigation
- Pioneer Valley Water Co-operative Ltd
- Theodore Water Pty Ltd
- Eton Irrigation
- Queensland Oyster Growers Association
- Lockyer Water Users Forum

About the Queensland Farmers' Federation

The Queensland Farmers' Federation (QFF) is the united voice of agriculture in Queensland.

We are a member-based organisation representing the interests of peak agriculture industry organisations (both state and national). Through our members, QFF represents more than 13,000 primary producers across the cotton, cane, horticulture, dairy, nursery and garden, poultry, pork, and intensive animal industries.

We unite the sector to engage in a broad range of economic, social, environmental, and regional issues through advocacy, policy development, and project activity. We work with the government of the day on behalf of industry, farmers, and the community to provide powerful representation and contribution to the policy direction, sustainability, and future growth of Queensland's agriculture sector.

Our Council of member representatives and policy committees set the strategic priorities for policy development and advocacy, while our Executive Board ensures our corporate governance.

QFF draws on the expertise and industry knowledge of our members and through our commitment to collaboration and considered policy development, we lead Queensland's agriculture sector towards a strong future, ensuring our members are ahead of the game and have a voice at the table on the issues that matter to their members.

Submission

QFF welcomes the opportunity to provide comment on the **Inquiry into the impact of climate change on Queensland Agricultural Production (July 2023).** We provide this submission without prejudice to any additional submission from our members or individual farmers.

The aim of this inquiry is to identify the impacts of climate change on Queensland's agricultural production, to the State Development and Regional Industries Committee and report to the Legislative Assembly on:

(a) the impacts of climate change and climate variability on Queensland agricultural production and the existing and potential future risks of climate change on the sector.
(b) opportunities for the Queensland Government to create and support resilience, adaptation and mitigation measures in preparing the agricultural sector for future climate change.

Key priorities to be considered during this inquiry include:

- **Future sustainability of farm inputs**
- **Biosecurity**
- **Energy and Water**
- **Adaptive Capacity**
- **Supply chain**
- **Opportunities and challenges**
- **Recommendations**

Overview

In the absence of mitigation and adaptation measures, climate change could potentially have a significant impact on agricultural production and trade competitiveness in Australia through changes in domestic and international agricultural productivity and through changes in the demand for different products. Given the potential impacts, both mitigation and adaptation measures must be undertaken, as Australia is more likely to experience greater impacts from climate change than its competitors which will ultimately impact our GDP.[1]

We are aware of climate change and the impacts we are seeing globally. The effects of climate change on agriculture can and are in some regions already resulting in lower crop yields and reduction in nutritional quality due to long periods of drought, increasing heat waves and more frequent flooding as well as increases in pests and plant diseases. We are also seeing the exact opposite with higher crop yields (due to CO_2 fertilization which increases the rate of photosynthesis) in some regions because of increased atmospheric CO_2. These effects are unevenly distributed across the world and are caused by changes in temperature, precipitation and atmospheric carbon dioxide levels due to global climate change. One thing we are not prioritising sufficiently is the impact to our water and land resources and ultimately our food security.

It is predicted that Australia's population is expected to reach 35 million by 2050,[2] which will exacerbate the rate of change and demand in our food production system, which now, is a series of factors and events, that will increase the threats to Australia's position as a food secure nation. Land use, social and environmental challenges, available arable land and water, coupled with increased drought and flood events from climate change are likely to threaten Australia's position as a food secure nation.[3]

Immediate provisions for the protection of agricultural land, with increased controls and regulation over urban land planning and development; adequate legislation safeguarding productive land from mining and other developments; addressing and implementing a realistic strategy for skilled labour; and increasing agricultural research and development are paramount in ensuring Australia remains both a domestic and export supplier of world class food.

The increased global demand for food is becoming a challenge for agriculture, with land required for expansion limited, and in competition with other land uses impacting existing land resources available for agriculture. There are numerous challenges that are threatening agricultural productivity, including climate change, and natural resource degradation.[4] This may heavily impact on productivity rates, GHG abatement policy, and ultimately global demand.[5] Future based scenarios have been identified through various research organisations including CSIRO, that are integrating a systems modelling approach to help identify impacts of climate change on agricultural production and land use in Australia from 2013 to 2050.[6]

[1] Gunasekera, D., Tulloh, C., Ford, M., & Heyhoe, E. (2008). Climate change: Opportunities and challenges in Australian agriculture. *Canberra, Australian Bureau of Agricultural and Resource Economics*.
[2] Australia to 2050: Future Challenges (treasury.gov.au)
[3] Changes in Australian agriculture and land use: implications for future food security; Millar, J. Roots J. International Journal of Agricultural Sustainability, 10:1, 25-39. 2012.
[4] Grundy, M. J., Bryan, B. A., Nolan, M., Battaglia, M., Hatfield-Dodds, S., Connor, J. D., & Keating, B. A. (2016). Scenarios for Australian agricultural production and land use to 2050. *Agricultural systems*, *142*, 70-83.
[5] Grundy, M. J., Bryan, B. A., Nolan, M., Battaglia, M., Hatfield-Dodds, S., Connor, J. D., & Keating, B. A. (2016). Scenarios for Australian agricultural production and land use to 2050. *Agricultural systems*, *142*, 70-83.
[6] Grundy, M. J., Bryan, B. A., Nolan, M., Battaglia, M., Hatfield-Dodds, S., Connor, J. D., & Keating, B. A. (2016). Scenarios for Australian agricultural production and land use to 2050. *Agricultural systems*, *142*, 70-83.

Through this scenario-based research, new land uses such as carbon plantings, biofuels and bioenergy, and environmental preservation areas, compete with food and fibre production, which contributes to a reduction in the area available for agriculture. These new land uses are already becoming a priority as Queensland transitions to renewables and to meet state and national commitments. It is attainable for all these land uses to co-exist, especially when carbon plantings are less desirable because of market responses in the constrained high abatement scenarios, which reduces the impacts to land use change as a result.

However, capacity constraints and instrumental policy settings, can help reduce the change in land use and allow for greater strategies enhancing adoption of R & D in agriculture technology and productivity. Adapting to the impacts of climate change, including improved farming technologies, and practices can help reduce losses in productivity through crop diversity, yield stability, and water efficiency. Ultimately, these changes must be addressed now, due to the time required to implement changes in land use and land management practices. The timely effort to meet net zero targets and reduce emissions must not be a cost to agriculture in Queensland.

Future sustainability of farm inputs

The sustainability of the agriculture sector is driven by many factors, with input costs such as fuel continuing to rise, putting increasing pressure on farm input costs and creating a cost-price squeeze.[7] Diesel prices over the past few years have hit record prices, in some cases the combined input costs of fuel, fertiliser and chemicals has increased to 150%, representing an average compounding inflation rate of 4.7% p.a. with a 28% increase since 2019.[8] Many of these inputs are sourced from overseas. Most consumers have not yet seen the impact of this as farmers have absorbed many of these price increases, however this is not sustainable.

Having a domestic supply of farm inputs required to drive production, which allow primary producers to plan ahead for the future, will be a necessary mitigation strategy, not only to continue the economic viability of farm businesses, but also help underpin the support required to retain food security into the future.

QFF supports a renewal of domestic production capacity of farm inputs such as fertiliser, which under the transition to renewables could provide cost effective incentives for fertiliser production if a more stable and affordable energy supply network is achieved. This would also require a public ownership stake to reduce the potential of parity pricing to imported products.

Unfortunately, what we will continue to see through a rapidly changing climate is the increase in other farm inputs such as the use of pesticides and fertilisers due to the change in climate and highly variable weather conditions. This will provide a greater opportunity for pests to invade areas that they had previously not inhabited, but also enable changes to diverse latitudinal and longitudinal dispersion and increase in populations of introduced pests. The increase in pest and diseases, will continue to intensify as the climate warms and we see an increase in rainfall providing optimum conditions for various pests and diseases to threaten biosecurity in Australia.

Biosecurity

With the change in climate, the biosecurity threat to Queensland agriculture will also change, as bacteria, viruses, fungi and animals and plants that carry disease, causing potential destruction of some agricultural production, find a new ecosystem to establish themselves in. Some diseases will

[7] (Millar & Roots) *in* Beyond 'get big or get out': Female farmers' responses to the cost-price squeeze of Australian agriculture; Newsome, L; Journal of Rural Studies, 79:57-64, 2020.
[8] https://mecardo.com.au/cost-of-farming-up-28-in-3-years/

become less prevalent, but others will increase. Diseases seen in more tropical areas will more likely be found further south. These diseases can have catastrophic impacts on animals, individual businesses, farmers, the economy, the environment and human health. To prepare for these adverse incomes, there is a need for future thinking and an increased emphasis on finding it early. Both aspects are currently under emphasized and under resourced in government biosecurity strategies.

There is a lack of focus on forecasting and analysing trends and threats, particularly the impact of climate change. In 2006 there was an outbreak of sugarcane smut. Sugarcane smut is caused by the fungus *Ustiilago scitaminea* and in Queensland during 2006, large margins were wiped out in the Queensland sugar industry.[9] It was found in multiple areas and tracing evidence suggested that the disease had been present for two years, which was linked to a change in climate and series of weather events, that increased the latitudinal and longitudinal spread of the fungus across the ocean from Indonesia.

Early detection is critical to minimise the impact of new diseases. Policy decisions contributing to Queensland's agriculture has seen:

- The Cape York Biosecurity Centre closed, which was an educational and inspection centre that a significant proportion of vehicles per year, that have passed through, stop and educated and checked for disease carrying produce.
- Qld closed its regional labs in 2011 and has but one lab in Brisbane for animal diagnostics. NSW has increased its diagnostic capacity with multiple specialist pathologists.
- Field animal health officers have also declined in numbers.

In the plant industries, there are equally as many pathogens as animals but less dedicated laboratories to receive samples for general surveillance. There is usually a longer time for the disease to be diagnosed and then it is difficult to eradicate.

The impact of climate change is such that defences will need to be flexible, alert, timely and agile to respond quickly to changing climates that foster new pathogens to enter and establish. Forward thinking now and re-establishment of resources, particularly regional testing labs and the encouragement of submissions of suspect samples will mean the difference between a small, contained outbreak to one that affects the whole of Queensland.

Energy and Water

The impact of climate change on agricultural production is significant. Energy and water are the two major cost inputs that impact all commodity groups within the agricultural sector. Agriculture, however, has always adapted to change, and adapting to climate change is no different, however it's unlikely that adaptation responses will successfully shield all farms from adverse consequences of climate change.[10]

As per one of the aims of this inquiry is to seek opportunities for the Queensland Government to create and support resilience, adaptation and mitigation measures in preparing the agricultural sector for future climate change, QFF seeks that the Queensland Government undertake a significant

[9] Croft, B.J., Magarey, R.C., Allsopp, P.G. *et al.* Sugarcane smut in Queensland: arrival and emergency response. *Australasian Plant Pathology* **37**, 26–34 (2008). https://doi.org/10.1071/AP07083

[10] Kingwell, R. S. (2006). Climate change in Australia: agricultural impacts and adaptation. *Australasian Agribusiness Review*, *14*(1673-2016-136785).

role now in looking at the future use of water resources required for the future of agriculture production.

QFF strongly suggests that the Government invests in a revised water captured and storage policy, that genuinely seeks to capture increased water during extreme wet events and release it (for both environmental and production purposes) during extreme dry events. Traditional water policy has relied heavily on averages, and while that has served Qld relatively well, a shift needs to take place to manage a more extreme climate.

QFF has conducted on-farm extension and policy work which is helping to inform policies and actions that are changing the way that agriculture uses water and energy. This has also contributed to different land use management practices so that we can ensure reliability in sourcing energy, decarbonise our sector to meet targets, access more export opportunities and manage our input and operating costs.

Operating costs on farm are currently at risk of high energy costs (network expansion, accelerated renewable energy projects, etc) which will have a direct impact on irrigated food production. Currently many agricultural businesses are heavily reliant on diesel as an energy source, due to the continuing increase of energy prices. Energy is a major input cost on farm, due to a variety of factors, whether it is for cooling of chicken production facilities, refrigeration for horticultural produce, cotton ginning or irrigation, energy forms a major cost component of the agricultural sector.

Producers are constantly seeking and implementing new strategies and technologies to help reduce cost, increase efficiency, and ultimately keep their businesses viable through the changes in climate and the highly variable weather conditions. The rate and extent of warming and rainfall, and the distribution of the increase or decrease of rainfall, will impact the food, fibre, and foliage sectors in different ways and at different times. The consequences of not adapting to climate change for the agricultural sector, will prove more disastrous than not adapting to a change in weather.

Both unsustainable water and electricity costs are eroding the viability and productivity of many agriculture businesses and eroding Australia's international competitiveness. An international comparison of Australia's key agricultural trading partners conducted in 2012 showed that Australia's average electricity prices had grown by 40 per cent since 2007. Cost increases for irrigated agriculture have been more than 100 % for most and as high as 300 % for others over the same period. Affordable tariffs are a main driver of sustainable business.[11] Unfortunately these figures have continued to rise, whilst farmers have continued to change farming practices to not only reduce costs of water and electricity, but also help them mitigate and adapt to the changing climate.

QFF advocates for a more sustainable system to remove the burden of high electricity costs on Queensland's food, fibre and foliage producers. This includes supporting sound policy and proven technologies that advance farm-scale renewable energy as part of integrated regional energy supply and demand management solutions, thereby leveraging existing distribution assets; and addressing issues arising from the lack of retail competition.

Lowering costs will enable our primary producers to increase production, which results in higher returns to the economy, ensuring long-term stability in regional areas through continuous production and contributing to maintaining food security. Our farming community contribute

[11] Electricity Prices in Australia: An International Comparison': A report to the Energy Users Association of Australia by Carbon + Energy Markets, 2012.

significantly to rural development projects and jobs in regional areas, and thus are dependent on long term sustainable energy pricing to maintain economic viability. Adjusting regulation to enable sustainable pricing, will contribute to a stronger economy and see farmers and irrigators continue in business as opposed to reducing farming practices to save costs or seek alternative electricity supply options.

Queensland's agricultural sector requires a joined-up and coherent policy approach to address the issues and impacts of climate change on energy and water infrastructure, otherwise Queensland will continue to experience a fast decline across both its electrical and water infrastructure, risking the future viability of the intensive and irrigated agricultural sector in the state.

Adaptive capacity

Adaptive capacity in Queensland is affected by the continual change of government and policies, with little priorities applied in the way of resources, or social and financial capital. [12] A flexible framework is required in Queensland that allows for the assessment of factors that contribute to adaptive capacity, which enables a whole of agriculture approach that includes infrastructure, farm machinery, environmental assets, producer goods accessible by community and improved genetic resources such as crops and livestock.[13]

Adaptation needs to be a shared responsibility, with governance required to play a key role in taking action on key risks, with some strategies already outlined by the Department of Agriculture Fisheries and Forestry, which include the Future Drought Fund, the National Soil Strategy, Research and Development a Commonwealth Biosecurity Roadmap for 2030.[14] However, over the past 30 years, regional communities have seen little emphasis placed on drought and flood preparedness in a proactive based role, and more in a reactive capacity. It is acknowledged that policies and decision making is complex, and dynamic, as it involves a myriad of responses from social, economic to political determinants that enable the development of adaptive capacity improvement strategies.[15]

The adaptive capacity of governance is weakened by incorrect policies or a direct lack of them to ensure the agricultural sector remains viable, not just for the export sector, but also for domestic trade and ensuring rural and regional communities remain viable. For different adaptation options to be effective, is ultimately dependent on the capacity to plan, design and implement them, and therefore recognising the contributing factors of adaptive capacity is crucial for effective responses to climate change.[16]

The lack of adequate drought and flood planning in Queensland can cause insufficiencies in water supply, however it is instrumental that climate change adaptation and mitigation strategies are incorporated into all aspects of the water planning process and future water policy framework. In the independent review of Commonwealth Disaster Funding, there has been a movement to identify constraints and support in disaster funding, which was included in the independent review.[17] Identifying regions more susceptible to increased drought and floods, will help funding for infrastructure to be focused by a more evidence-based approach that will help mitigate climate

[12] Keys, N., Bussey, M., Thomsen, D.C. *et al.* Building adaptive capacity in South East Queensland, Australia. *Reg Environ Change* **14**, 501–512 (2014). https://doi.org/10.1007/s10113-012-0394-2
[13] Jacobs, B., Nelson, R., Kuruppu, N., and Leith, P. (2015). An adaptive capacity guide book: Assessing, building and evaluating the capacity of communities to adapt in a changing climate. Southern Slopes Climate Change Adaptation Research Partnership (SCARP), University of Technology Sydney and University of Tasmania. Hobart, Tasmania.
[14] Adaptation and the agricultural sector - DAFF (agriculture.gov.au)
[15] Keys, N., Bussey, M., Thomsen, D.C. *et al.* Building adaptive capacity in South East Queensland, Australia. *Reg Environ Change* **14**, 501–512 (2014). https://doi.org/10.1007/s10113-012-0394-2
[16] Keys, N., Bussey, M., Thomsen, D.C. *et al.* Building adaptive capacity in South East Queensland, Australia. *Reg Environ Change* **14**, 501–512 (2014). https://doi.org/10.1007/s10113-012-0394-2
[17] 20230714-QFF-Submission-to-NEMA-Independent-Review-of-Commonwealth-Disaster-Funding-WEB.pdf

change impacts and help manage the future challenges of water security in the agricultural sector. It is important to note that as part of QFF policy, QFF has supported the move away from 'transactional' assistance during drought seasons and changing the attitude of government assistance from seasonal support to long-term disaster preparedness and resilience.

A study conducted in SEQ suggested that drought, flood, and catchment ecology issues were not easily merged in strategic policy frameworks and that the expert policy communities for these issues remain separated. There is a significant difference in opinion from those that operate in water infrastructure to those who dealt with riverine ecosystems or with emergency management. Recent policy debates about the policy implications of climate change and variability, have reinforced the need to take knowledge-sharing approaches more seriously in natural resource management, which is backed by evidence-based science.[18]

The water policy framework needs to incorporate climate change challenges and, as such, also acknowledges that policies do not cause adverse impacts for the food, fibre, and foliage sector. Greater alignment between both state and federal governments is needed to allow for not only greater transparency in future funding, but a smoother transition for the delivery of new water infrastructure projects to help support future water security, and maintain agricultural production, which underpins food security.

Water governance in Queensland, needs to prioritise the protection of agricultural land, which is now being progressively zoned for urban and commercial development, and putting further constraints on natural resources. The increasing demand on land use, and water supply has increased the constraints on irrigated agriculture, inciting the real costs of water supply, through the additional costs of water resources planning, and water licensing.

Supply chain

The increase in extreme weather events, cause disruptions to the supply chain that have a direct impact on when produce is delivered to its end point, and its final cost. Harvested crops dependent on time sensitive supply chain deliveries can go unsold, which has devastating effects in all areas of the food supply chain. The increased costs for fuel, energy, water, labour can be crippling to small farmers supplying the domestic market. The increased prices in fuel for truck dependent farming operations, has become a large proponent of the input costs on farm that delivers increased prices of food to the end of the supply chain, with in most cases, primary producers not receiving the increased food prices to recover their initial supply chain costs.

The same can also occur in extreme weather events where flooding can decimate a year's supply of produce, therefore putting a strain on the domestic market, whilst also trying to supply limited stock to the overseas market, which will see the economic value of produce increase rapidly due to limited availability. Logistics and freight are therefore not the sole disruptors to the supply chain distribution but do compound the impacts on cost and availability in times of natural disasters, including biosecurity threats and high input costs. Regional workforce shortages also contribute directly to transport and logistics capability which can be indirectly linked to the change in climate from the relocation of regional workers to city regions, to the impacts from natural disasters. Currently, there is a severe shortage of truck drivers. This is having a direct impact on the ability for truck transport to operate at efficient levels and is seeing delays in moving produce and stock on and

[18] Head, B. W. (2014). Managing urban water crises: adaptive policy responses to drought and flood in Southeast Queensland, Australia. *Ecology and Society*, *19*(2). http://www.jstor.org/stable/26269544

off farm. A sustainable pipeline of appropriate workers is important in ensuring a strong transport and logistics sector into the future.

Opportunities and challenges

There are various threats, opportunities and challenges of climate change on agriculture production in Australia. Changes in crop type grown due to change in climate, decreased yield due to land resource capability, seasonal produce changes due to early/ late flowering (this impacts all aspects of the food supply chain including both the domestic and export market), water availability, floods, drought, and cyclones all contribute to production outcomes. Crop productivity, soil water balance, increased climate variability are some of the most significant factors influencing crop production.[19] QFF suggests the utilisation of climate change modelling through a comparative analysis of climate change impacts on crop productivity using climate, water and crop yield models. This needs to flow onto direct policy that protects both the landholders' interests, but also the future agricultural production in Queensland.

It is predicted that water availability will increase in some parts of the world, which will have its own effect on water use efficiency and water allocation.[20] Crop production could increase if irrigated areas are expanded, or irrigation is intensified, however could also increase the rate of environmental degradation. Climate change will also influence the soil water balance, through soil evaporation and plant transpiration, which may shorten the crop growth period in the future, but impact water productivity. Crop yields affected by climate change are projected to increase or decrease, dependent on location. These challenges need to be incorporated when assessing mitigation and adaptation measures.

If water availability is reduced in the future, soils of high-water holding capacity will be better to reduce the impact of drought while maintaining crop yield. With the temperature increasing and precipitation fluctuations, water availability and crop production are likely to decrease in the future. Water availability, reliability and affordability, will be the limiting constraints for crop production. Climate variability is one of the most significant factors influencing year to year crop production, even in high yield and high-technology agricultural areas.

Ultimately climate variability will see both opportunities and threats, however more funding is required in agricultural research and development to not only ensure Australia's food sector is protected, but also the nutrients required in our soils to help maintain food security. Policy needs to be driven from the grassroots, by utlising climate models, not only for the expected prolonged periods of intense weather events, such as drought, floods and cyclones but how do we maintain the nutrients in our soils throughout these events that underpin the health of all living ecosystems. Climate variability, impact on key cropping activities (e.g., planting, harvesting) during unseasonal climatic events, and impact of increased frequency of natural hazards (cyclones, floods, droughts) are critically impacting on production, supply chains, infrastructure, profitability and sustainability.

As primary producers strive to increase their capacity to prepare for extreme weather events and manage as much of their own risk as they can, gaps in the insurance market in relation to flooding and other natural disasters is limiting. Insurance is often cost prohibitive or in some instances not available. This can impact a farmer's ability to manage their own risk and affect bankability of individual enterprises. A new, innovative approach to insurance options is required to assist growers

[19] Climate change impacts on crop yield, crop water productivity and food security – A review. Yinhong Kang, Shahbaz Khan, Xiaoyi Ma. Progress in Natural Science 19 (2009) 1665–1674.
[20] Climate change impacts on crop yield, crop water productivity and food security – A review. Yinhong Kang, Shahbaz Khan, Xiaoyi Ma. Progress in Natural Science 19 (2009) 1665–1674.

more successfully manage their risk and ability to increase their preparedness for extreme weather events and natural disasters.

The agricultural sector has been attending to both mitigation and adaptation strategies for many years, as a means of survival without subsidies, or reduction in taxes. It is essential that all farmers have a transparent and equitable environment when it comes to retailers and wholesalers. Transparency, fair trading and contract terms for growers, flexibility in contracts to support growers when they are impacted by extreme weather events or changed production seasons due to weather and other unforeseen circumstances. Contract specifications which reduce food waste and allow customers to access all types of food, not just that which meets strict specifications, which will not only acknowledge the climate change opportunities and threats that are currently being addressed, but also contribute to the longevity of agriculture production in Queensland.

Agricultural exports compete with the domestic produce of other climate ambitious nations, who are implementing emission-intensity legislation and carbon border adjustment mechanisms to ensure a level playing field for imported goods, so their sectors are not unfairly disadvantaged, or their bold carbon reduction targets undermined. It is imperative that the Queensland government provide a firm commitment and clarity on emissions reduction targets and commit support to achieve them, or farmers and agribusinesses will be left to do the difficult work, and critically, certify that our products meet the emission intensity criteria of the import country. Efforts in this regard must be meaningful and support a more sustainable, productive and profitable overall supply chain. The agriculture sector has been contributing to a reduction in emissions via on farm renewable energy sources, reduced soil tillage, changes in farming practices, and changes to animal feed. It is critical that environmental outcomes are linked to productivity increases.

Biosecurity also plays a major role in food, fibre and foliage production. Biosecurity will play an even more important role in the protection Australia's domestic and export market. With the global temperature continuing to rise, the incidence of biosecurity threats increases, as pests and disease increase their range of latitude and longitude distribution. The increase range of pests and diseases are due to the attractive climatic conditions, enabling a greater range in distribution. More funding needs to be prioritised for the impacts of climate change on agriculture and the impacts to biosecurity, from the inevitable increase of pests and diseases as the climate continues to warm.

Recommendations

QFF does not support a return to policies that would allow the fragmentation of rural land by the excision of individual small lots in agricultural production areas.

QFF supports a more streamlined approach to trade through export legislation, which provides more options for exports and reduces risk associated with exports concentrated in smaller markets.[21]

QFF supports a renewal of domestic production capacity of farm inputs such as fertiliser, which under the transition to renewables could provide cost effective incentives for fertiliser production if a more stable and affordable energy supply network is achieved.

QFF suggests the utilisation of climate change modelling through a comparative analysis of climate change impacts on crop productivity using climate, water and crop yield models. This needs to flow onto direct policy that protects both the landholders' interests, but also the future of food security in Australia.

[21] Improved agricultural export legislation - DAFF (agriculture.gov.au)

QFF recommends that more funding needs to be prioritised for impacts of climate change on agriculture and the impacts to biosecurity from the inevitable increase of pests and diseases as the climate continues to warm.
Utilise a whole of government approach for the development and implementation of policy on the reuse of water from sewage treatment plants as a sustainable option for agricultural water.

Develop a water drought policy that facilitates a long-term strategy incorporating climate change and climate adaptation incentives to continue productivity when drought conditions are enacted by the state while reducing the economic impact on the agricultural sector.

Implement policy that integrates the complex groundwater and soil relationship on farmland and the associated infrastructure required to maintain a healthy water and soil environment.

Implement a revised water captured and storage policy, that genuinely seeks to capture increased water during extreme wet events and release it (for both environmental and production purposes) during extreme dry events.

Identifying regions more susceptible to increased drought and floods, will help funding for infrastructure to be focused by a more evidence-based approach that will help mitigate climate change impacts and help manage the future challenges of water security in the agricultural sector. QFF supports the move away from 'transactional' assistance during drought seasons and supports the government to move away from seasonal support to long-term disaster preparedness and resilience.

Summary

While there is consensus that some degree of climate change is inevitable, there remains significant uncertainties surrounding the likely effects of climate change on the agriculture sector, especially at the regional level. Some models suggest an increase in agricultural productivity, while other models suggest a substantial decrease in productivity in many regions. Some regions that are highly dependent on agriculture could experience considerable economic losses as a result of climate change. However, adaptation to the impacts of climate change, including improved farming technologies and practices, can help reduce the size of these losses.[22]

Parity pricing, fertiliser costs and supply, domestic food prices, fuel, affordable energy, soil health, water availability and reliability, biosecurity, unseasonal climatic events and increase frequency of natural disasters, change in crops, workforce shortages and global supply shortages on the supply chain, are all going to impact agricultural production.

QFF suggests that a broader view of climate change, beyond disasters and food production, has yet to be fully integrated into climate change policy, and supply chain governance and practice in Queensland. As such, it is paramount that QFF and other agricultural organisations contribute in a consultative capacity to the compilation of a comprehensive policy framework that helps reduce the impacts of climate change on agricultural production in Queensland.

[22] Heyhoe, E., Kim, Y., Kokic, P., Levantis, C., Ahammad, H., Schneider, K., ... & Carter, J. (2007). Adapting to climate change-issues and challenges in the agriculture sector. *Australian Commodities: Forecasts and Issues*, *14*(1), 167-178.

If you have any queries about this submission, please do not hesitate to contact Ms Sharon McIntosh at sharon@qff.org.au.

Yours sincerely

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