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CSIRO comments on the Interim report of the Review of Part 3 of the Future Drought Fund Act

Productivity Commission Submission

Original CSIRO Submission 23/808

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Introduction

CSIRO welcomes the opportunity to provide further information and feedback to the Productivity Commission Inquiry into Review of Part 3 of the Future Drought Fund Act. These comments are provided in response to the Productivity Commission's request for comment on its Interim report, released on 13 June 2023, as additional input for the final report.

CSIRO had previously provided a submission to the Inquiry into the Australian Government's Future Drought Fund (submission Number 8. CSIRO Ref 23/808).

CSIRO is involved in the delivery of several of the programs of the Future Drought Fund and is responding on the basis of this participation and relevant background experience.

CSIRO will address the findings and information requests relevant to its involvement in the Fund's activities where it has expertise and experience.

CSIRO feedback on the interim report of 13 June 2023

Information request 1

Explicitly recognising climate change resilience as a priority for the Future Drought Fund (FDF) could increase the types of activities eligible for funding. The Commission is seeking views on this proposed change, including:

- *given the limited resources available to the Fund, what climate change resilience activities should and should not be funded?*
- *whether changes are needed to the governance arrangements of the Fund.*

There is emerging evidence that climate change is exacerbating the frequency, duration and intensity of drought and its impacts[1]. Therefore, it is important for drought resilience programs to consider climate change and associated extreme events. However, broadening programs to support resilience to climate change should not compromise the focus on addressing drought. A potential solution could be to design programs that explicitly develop a specified resilience to drought and a general resilience to climate change and other related shocks and stresses.

With regards to governance arrangements, close coordination with other national and state/territory programs, climate change adaptation initiatives and disaster risk reduction schemes operating in rural and regional areas, will be important to increase systemic outcomes and to reduce the burden on local organisations and communities.

1 CSIRO and Bureau of Meteorology (2022) State of the Climate 2022.

Information request 3

The Commission is seeking views on how the Future Drought Fund can best support social resilience, considering the roles that state, territory and local governments play. The Commission is also seeking views on:

• whether existing programs (outside the Better Prepared Communities theme) could be adjusted to better achieve flow on benefits for social resilience, and if so how

• how social resilience outcomes can be best measured

From a resilience thinking and practice perspective[1], the FDF's primary focus areas of agriculture, rural and regional communities and environments are considered as coupled human-environment or social-ecological systems.

- The social in social-ecological systems, encompasses the economic subsystem.

- The resilience literature[1,2] emphasises an integrated approach to building resilience. Attempts to develop economic, environmental, or social resilience separately, or focussing only on some subsystems, can lead to missing significant vulnerabilities and resilience conferred from relationships among these subsystems.

From this perspective, drought resilience programs and long-term investment could be guided by an integrated assessment of the current state and trajectory of resilience to drought of agriculture, rural communities and landscapes as social-ecological systems. Such resilience assessment conducted at an appropriate level, for example, on distinct agricultural, rural/regional communities and landscapes as social-ecological systems, can guide what aspects and properties of the system to *maintain*, *modify* and *transform* to build and sustain resilience[3]. This is consistent with the FDF funding plan's recognition that building drought resilience may require farmers and communities to make incremental, transitional and transformational changes. Such an integrated approach could help to avoid unhelpful distinctions between environmental, economic, and social resilience. Instead, it offers an opportunity to tackle drought vulnerabilities and explore resilience options that emerge from the socio-cultural, economic, and environmental dimensions and their interactions.

Given the Productivity Commission is considering *whether the FDF, in the next Funding Plan, is best placed to contribute to the resilience of the agriculture sector and communities through prioritising funding towards economic and environmental resilience and less on its suite of social resilience activities*, it is important to highlight what may be lost from not having an integrated approach and if attention on the social dimension is substantially reduced:

- *Potential and connectedness* are core drivers of the resilience of a social-ecological system[2] with significant social components that could be lost with a focus on environment and economic resilience. *Potential* refers to accumulated capital and capacities and *connectedness* to interactions that control the cohesion of a system. Human and social capital and several social attributes that contribute to social resilience are central to absorptive, adaptive and transformative capacities of a social-ecological system. The *connectedness* of social to the ecological system is mediated by networks and institutions that govern human and human-environmental interactions)[4].
- Collective action and coordination of efforts among landholders and across different rural sectors, community segments, and supply chain actors are required to build drought resilience. Building resilience requires diverse capacity at individual, local community, and other scales and across the social, economic and environmental dimensions[5]. It may be diminished if the focus on the social dimension is reduced.
- Drought has substantial direct and indirect impacts beyond the farming sector and landholders[6]. Primarily focusing on land managers, the environment and economics could exclude non-farming rural communities vulnerable to drought impacts, while removing non-farming livelihood options. Sustainable drought resilience is not only built through efforts directed at the land and environment, but also by efforts focussing on social aspects, that take pressure off the environment and can provide less drought-prone livelihood options. Maintaining vibrant rural communities with strong social resilience is essential in providing labour and various services to farmers and other landholders, keeping and expanding diversified livelihood options, and enabling innovation for transformation for farm and non-farm community members.

- Severe and consecutive droughts often result in significant losses of income, job losses, business closures, increased debt, and financial stress. This can lead to mental and physical health and well-being issues among farm and non-farm members of rural communities[7]. Community health and well-being is a crucial priority theme identified in all of the regional drought resilience plans that the CSIRO research team reviewed. Various initiatives and actions were proposed in these plans—more than a third of them were aimed at social resilience. Most of these social resilience-related actions were aimed at community mental and physical health. The plans also emphasise increasing community access to psychosocial and other health services, financial counselling and maintaining green community spaces. In building social resilience, having a nuanced understanding of differential causes of vulnerabilities can assist in tailoring health and other professional support before, during, and after droughts and better meet the specific needs of different community groups.

How social resilience outcomes can be best measured – An integrated resilience impact assessment method could be used[8]. It is possible to develop a tailored social resilience impact assessment tool from the several social resilience assessment frameworks in the literature.

Recent resilience assessment studies have found it helpful to have subjective resilience assessment. This is because individual or community perception and self-evaluation of their resilience has a material impact on their resilience[9]. Subjective resilience assessment can also provide access to community members' knowledge and experience, which are often missed in objective approaches[10]. Models for integrated subjective and objective resilience assessment are being developed[11].

[1] Walker, B. & Salt, D. 2012. Resilience thinking: sustaining ecosystems and people in a changing world, Island press.

[2] Holling, C.S. and Gunderson, L.H., 2002. Resilience and adaptive cycles. In: Panarchy: Understanding Transformations in Human and Natural Systems, 25-62.

[3]Maru, Y., O'Connell, D., Grigg, N., Abel, N., Cowie, A., Stone-Jovicich, S., Butler, J., Wise, R., Walker, B. & Million, A. 2017. Making 'resilience', 'adaptation' and 'transformation' real for the design of sustainable development projects: piloting the Resilience, Adaptation Pathways and Transformation Assessment (RAPTA) framework in Ethiopia. May 2017. CSIRO, Australia.

[4]Abel, N., Cumming, D.H. and Anderies, J.M., 2006. Collapse and reorganization in social-ecological systems: questions, some ideas, and policy implications. Ecology and society, 11(1).

[5]Walker, B., Crépin, A.S., Nyström, M., Anderies, J.M., Andersson, E., Elmqvist, T., Queiroz, C., Barrett, S., Bennett, E., Cardenas, J.C. and Carpenter, S.R., 2023. Response diversity as a sustainability strategy. *Nature Sustainability*, pp.1-9.

[6] Kelly, D., and Phelps, D. G. (2019). Looking beyond the D.U.S.T. - building resilient rangeland communities. The Rangeland Journal 41, 233–250.

[7] Luong, T.T., Handley, T., Austin, E.K., Kiem, A.S., Rich, J.L. and Kelly, B., 2021. New insights into the relationship between drought and mental health emerging from the Australian rural mental health study. Frontiers in psychiatry, 12, p.719786.

[8] Maru, Y. T., Sparrow, A., Butler, J. R., Banerjee, O., Ison, R., Hall, A. & Carberry, P. 2018. Towards appropriate mainstreaming of "Theory of Change" approaches into agricultural research for development: Challenges and opportunities. Agricultural systems, 165, 344-353

[9] Béné, C., Frankenberger, T., Griffin, T., Langworthy, M., Mueller, M. and Martin, S., 2019. 'Perception matters': New insights into the subjective dimension of resilience in the context of humanitarian and food security crises. *Progress in Development Studies*, *19*(3), pp.186-210.

[10] Jones, L. and d'Errico, M., 2019. Whose resilience matters? Like-for-like comparison of objective and subjective evaluations of resilience. *World Development*, *124*, p.104632.

[11]Yong, S., Maru, Y.T., Herr, A., Measham, T.G. and Loechel, B., 2022. A method for benchmarking two different resilience assessment methods. *Ecology and Society*, *27*(4).

Interim Finding 6

Investing in climate information services is appropriate, but funding two overlapping tools may be unnecessary

Provide information about climate risks is important to inform decision making. However:

- *the uptake of the climate information tools has, so far, been modest*
- *there is an overlap between the target audience and information provided by Climate Services for Agriculture and Drought Resilience Self-Assessment Tool*
- *the effectiveness of the tools could be enhanced with improved user engagement*
- *the uptake of the tools could be increased through better co-ordination with the Drought Resilience Adoption and Innovation Hubs, Farm Business Resilience and Regional Drought Resilience Planning programs.*

The Climate Services for Agriculture (CSA) program (undertaken by the CSIRO and Bureau of Meteorology) supports the need to reach more farming enterprises, so that the information and benefits derived from it can be more widely accrued. The Climate Services for Agriculture tool has now had over 9,500 visitors to the site. One of the CSA program priorities through to June 2024, is the roll out of a 'train the trainer' program. The training program will provide Australian agribusiness advisors with the knowledge and skills needed to comfortably explain the climate risk information that is now available on *My Climate View*. To be launched in July 2023, *My Climate View* is the new branding for the farmer facing website previously accessed as Climate Services for Agriculture. This allows other service/tools under development to be hosted under the CSA program banner. The CSA program's plan going forward is to have clearly branded products with a specific purpose for each product under the CSA program banner. For example, *My Climate View* will be a product specifically developed for farmers and farm advisors for their medium to long term (strategic) planning needs. *My Climate View* has recently been updated to present the information in a simpler way based on user feedback and the integrity of that needs to be maintained.

In relation to multiple products under the CSA banner, the product branding would need to convey the linkage between each product, so users know which product to use for what purpose.

Other adoption activities planned for the coming year are stronger integration with other FDF Programs, including the Farm Business Resilience Program. Continued collaboration with the Drought Resilience Hubs and social science research to better understand what is required to shift thinking from seasonal decision making to strategic decision making based on climate projections information provided via *My Climate View*. To boost awareness, the CSA team has developed a strong social media communication strategy.

CSA has engaged with around 1500 end users of the tool. The engagement initially focussed on involvement of farmers and advisors, in co-design, to help understand user needs and how the tool could meet them. The co-design engagements have included:

- in-depth interviews
- one-on-one demonstrations and discussions
- focus groups

- demonstrations at field days

Although all new concepts and designs are still undertaken with users, more recently, the engagement has focused on awareness and adoption. The train the trainer program is a way of scaling the adoption effort. Awareness is also being raised through presentations and demonstrations at industry conferences and forums.

The CSA program will continue to build its relationships with other FDF programs. To date CSA has been engaging with the Drought Resilience Hubs and has developed its train the trainer courses with them (Southern Queensland, Northern NSW Hub and North Queensland Hub). The program is establishing relationships with other programs and is discussing with the Queensland Farm Business Resilience Program how CSA training can be integrated into their program.

The CSA program are also collaborating with the Western Australian Department of Primary Industries and Regional Development to explore their use of the CSA application programming interface service which allows users to deploy CSA data and insights in their own apps or products. This collaboration allows the CSA team to evaluate how the application programming interfaces need to be deployed, so that others in the ecosystem can build their own products which require better climate information for specific uses.

Information request 9

The commission is seeking views on the future of both Better Climate information programs.

- *Should the Future Drought Fund continue funding both Climate Services for Agriculture (CSA) and the Drought Resilience Self-Assessment Tool (DR. SAT)? If so, what information should they provide to whom?*
- *Should DR.SAT be integrated with CSA? If so, what elements of DR.SAT should be incorporated into the consolidated tool.*

The potential for CSA (post *My Climate View*) to have multiple tools increases the range of integration possibilities that could be explored based on user need, user experience and existing technology and Intellectual property considerations. CSA via *My Climate View* provides information to farmers and advisors to allow them to adapt to the impacts of climate variability and climate change. DR.SAT is a self-assessment tool for farmers which incorporates climate information provided by CSA as one of the facets of this self-assessment. However, climate is only one aspect of resilience covered by DR.SAT which also takes user input to help users understand their drought resilience. Whilst there is an overlap in target users of CSA and DR.SAT, they have a different purpose and lead to different user experiences. CSA does not require farmers to “login” to view information, whereas DR.SAT does require users to “login”, potentially leading to a barrier to entry. Whilst exploring the integration of elements of CSA and DR.SAT, careful consideration of how this is carried out is required and should be based on end user engagement.

The responses to the Productivity Commission’s request for more information on the question of what information the two tools need to provide to whom and what elements of DR.SAT need to be retained is a good starting point from which to validate with potential users.

Information request 11

The Commission is seeking views on how the Regional Drought Resilience Planning program can be improved, including through better integration with other Future Drought Fund (FDF) programs, stronger governance and public reporting. The Commission is also seeking views on whether the Australian Government should reassess the value of the program and consider options for reallocating funds to other FDF activities.

Based on CSIRO's independent review of the first 15 foundational regional drought resilience (RDR) plans and a synthesis of the learning from these reviews, the CSIRO supports the continuation of the RDR Planning Program.

The RDRP Program provides an opportunity for regions to plan for integrated social, economic and environmental resilience. The process of developing plans through partnerships and multistakeholder engagement is important for social learning and developing community capacities. The plan as a product built on drought impact, vulnerability or resilience assessment guides investment and actions informed by evidence, needs and priorities relevant to regional stakeholders. We arrive at this suggestion because of the role of

A summary of CSIRO's observations of the importance the RDR plans and therefore the RDRP Program is provided below:

1. **Diverse cultural, social, and economic dimensions.** The RDR plans allowed regions to consider drought resilience from a holistic systems view. Planning included:
    - describing key elements of the system
    - assessing past and likely future impacts on social/cultural, economic and ecological dimensions of the region as a system
    - proposing several actions for building resilience across those dimensions.

    This comprehensive systems view is critical for building specified resilience to drought and general resilience to climate change and other unspecified significant stressors and shocks. It is important to note that the RDR plans proposed a substantial number of actions and initiatives to bolster the resilience of the social/cultural dimensions of the region.
2. **Diverse perspectives.** The RDR plans demonstrated an understanding that droughts affect not only farmers and landholders, but also other rural sectors and community segments. Most of the plans have engaged non-farm groups to some degree. The plans also reflect some recognition of differential vulnerabilities to drought in how they have engaged particular stakeholder groups (e.g., Traditional Owners).
3. **Capacity limits and needs revealed**. While most plans demonstrated a moderately developed capacity for drought planning, CSIRO's review also identified emerging needs that will likely need to be addressed. The planning process provided insights into the state of drought resilience planning across the country, and in doing so, revealed some common challenges or capacity needs that could inform national and state drought policy development.
4. **Links to existing work.** RDR plans have done a valuable stocktake of past and existing related work, linking to and building upon other initiatives and plans. For example,

developing some plans involved close work with state-wide disaster risk reduction strategies and associated state-level coordination.

5. **Capacity building for collective action**. There are local and regional capacities that likely need to be developed at different levels, which cannot be realised if planning is limited to individuals or sectors. Building resilience requires collective action and building capabilities at and across local, community and regional levels.
6. **Adaptive governance**. A key consideration for building regional resilience to drought and other stressors and shocks is establishing adaptive governance arrangements that can effectively anticipate and respond to uncertainties and disruptions. This will be important to support the overall policy shift indicated for the FDF program from drought relief to resilience. However, the plans have demonstrated gaps in this capacity across levels. Therefore, the program could provide support for capacity building in establishing appropriate governance arrangements.
7. **Baseline information and state of resilience in the region**. All plans included at least a preliminary assessment of the impacts of past droughts and likely future impacts. Some plans also developed drought vulnerability assessments. Those assessments could be upgraded to include a regional resilience assessment that would be useful as a baseline for tracking the progress of activities identified in RDR plans, other FDF initiatives, and overall regional drought resilience outcomes and goals.

Given the holistic view that the RDR plans could provide, it is important to consider integrating other programs to support the effective development and implementation of regional drought resilience plans.

There has been some level of integration between the programs within the Better Prepared Communities theme, which could improve the effectiveness of drought resilience plans. These plans provide a good focus to bring people together to address issues. The diverse programs that existing within the FDF could help to understand the plans' assessment of what is needed in the regions, providing resources and capacity to implement context-relevant projects and actions identified in the plans. For example, regions have identified mental health and social well-being as essential contributors to building resilience, which could be fostered in the Helping Regional Communities Prepare for Drought initiative, as well as networking efforts resulting from the Networks to Build Drought Resilience initiative.

Additional comment on the report:

As the work referred to on page 36 of the report by Hochman et al., (2017)[1] comes from CSIRO research, we would like to point out the interpretation of this work as currently presented is in error.

The report states "…for example Hochman et al., (2017) estimated climate change has reduced wheat yields in Australia by 27% from 1990 to 2015…"

The research showed "…that water-limited yield potential declined by 27% over a 26 year period from 1990 to 2015…" but that actual yields "…have stalled since 1990 (see Fig 1. Based on ABARES, 2015)". That is actual yields have been steady over the period. The paper describes that although

the water-limited yield potential (the maximum yield predicted by a model with water as the only limiting factor) has decreased, between 1990 to 2015 the actual yields in farmers' fields have been maintained by application of technology to counter the effects of the less favourable growing environment (reduced water availability and increased temperatures).

[1] Hochman Z, Gobbett DL, Horan H (2017). Climate trends account for stalled wheat yields in Australia since 1990. Glob Chang Biol 23:2071–2081.

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