Australian National University

SUSTAINABLE FARMS

ANNUAL REPORT 2019

SUSTAINABLE FARMS

AN ANU INITIATIVE

We acknowledge the Traditional Owners and Elders past, present and emerging of all the lands on which The Australian National University operates.

SUSTAINABLE
FARMS

Sustainable Farms
The Australian National University

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Further information about *Sustainable Farms*
sustainablefarms.org.au

Annual Report available online at
anu.edu.au/about/strategic-planning/sustainable-farms

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INTRODUCTION FROM THE PROJECT DIRECTOR

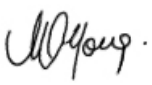
Sustainable Farms had a very big year in 2019. New funding from the Australian Government, along with co-investment from industry enabled the development of a comprehensive program of work to advance our strategic goals over the next four years. We are immensely proud of the achievements documented in this report. Our success demonstrates the commitment of The Australian National University to supporting an interdisciplinary initiative with outreach services to rural Australia.

We now deliver a transformational program driven by the ANU research that will increase conservation efforts across the South West Slopes of eastern Australia. Hosted by the Fenner School of Environment & Society, *Sustainable Farms* works across three Colleges and includes a network of field staff who monitor biodiversity on more than 160 farms each year.

Our field ecologists play an invaluable role in building understanding of biodiversity on farms. In 2019, we worked with farmers and Natural Resource Management (NRM) agencies to share knowledge with more than 750 people about managing natural assets on farms. Over the year it became increasingly evident that there is a pressing need in the community for scientific knowledge that fosters engagement and action in natural resource management. We have seen that ecological literacy supports connections between people and with place.

We would like to express thanks to our partners in NRM regional agencies. The momentum of our program is building through the collaborative projects and connections that we have with several NRM agencies and Landcare groups. The early results from these partnerships demonstrate the potential impact that we will achieve together in the coming years.

We are committed to measuring our progress and impact. Early evaluation results suggest that the deep expertise of our staff in capacity building and outreach is achieving results. We expect this to accelerate as we continue to expand our communication and engagement activities in 2020.



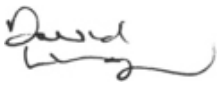
Michelle Young
Director, *Sustainable Farms*

FOREWORD FROM THE LEAD SCIENTIST

In 2019 *Sustainable Farms* produced new findings of critical importance to Australia's agricultural sector and the nation's environments. An exciting part of the project has been the opportunity to work across disciplines. A collaboration between the College of Business & Economics and the Fenner School of Environment & Society focused on potential new sustainable financial instruments that could enable restoration activities on agricultural land. This work, published in the leading international journal *Environmental Research Letters* in late 2019, showed how new forms of revenue contingent loans can provide the kinds of funding that promote management interventions such as farm dam renovation and the establishment of shelterbelts, without generating huge levels of debt for farmers or governments. This has enormous land management implications given the extent of degraded farmland in Australia. It also has significant global implications, as an area of agricultural land exceeding the size of Russia is currently degraded and new ways of financing its remediation are urgently required.

Vegetation restoration is a key part of landscape management and natural asset management on Australian farmland. In 2019, we published a major paper on the most effective ways to revegetate parts of productive farming landscapes. In particular, we sought to determine if it is best to boost the amount of native vegetation cover or physically connect areas of existing vegetation with strips and corridors. The work has shown that any increase in the amount of revegetated woodland has positive benefits for bird biodiversity. This is important for landholders because it suggests there can be many options for revegetation on a farm, each of which can have positive benefits for biodiversity.

In other work, we are well advanced in our research on the quality of water in farm dams and its implications for livestock production and biodiversity conservation. Already, there is clear empirical evidence that well managed farm dams have far superior water quality relative to poorly managed dams. Consistent with our multi-disciplinary approach to research in *Sustainable Farms*, allied work is quantifying the economic costs and benefits of renovating farm dams on agricultural land. We anticipate that in 2020 there will be many exciting outcomes from the increasing body of research on farm dams and shelterbelts in the *Sustainable Farms* project.



Professor David Lindenmayer
Research Director for Ecology and Lead Scientist, *Sustainable Farms*

2019 SNAPSHOT

751

751 people engaged with *Sustainable Farms*

- 249 at *Sustainable Farms* field days
- 502 at events led by partners

17

17 Field Days

- 9 on farm dams
- 5 on shelterbelts
- 3 on riparian restoration

20

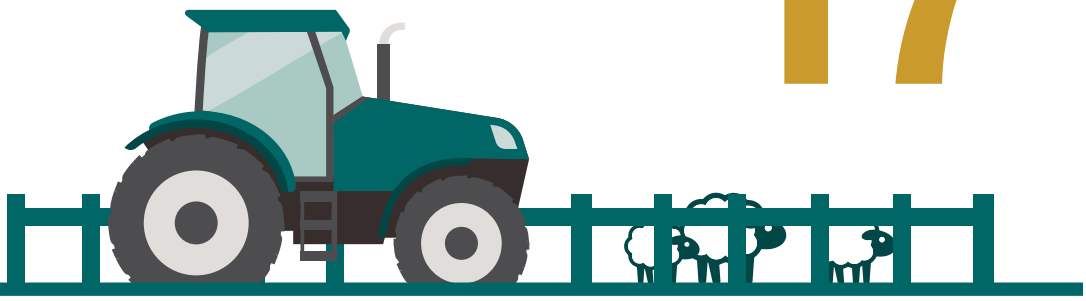
22

22 Publications

- 18 peer-reviewed Journals
- 1 book
- 3 other

17 Farmer Partners

17



1125 Social Media Followers

1125

- 579 Facebook followers
- 356 Twitter followers
- 190 Instagram followers

19

20 Partners

20

- 4 NRM agencies
- 6 Landcare groups
- 4 Industry
- 2 Universities
- 4 Government departments

SUSTAINABLE FARMS EXECUTIVE

Professor David Lindenmayer AO

Research Director for Ecology and Lead Scientist

Professor David Lindenmayer is an Australian scientist and academic. He is a world recognised expert in landscape ecology, conservation and biodiversity. His areas of expertise also include environmental management, forest management and environments, terrestrial ecology, wildlife and habitat management, environmental monitoring, forest fire management, natural resource management, zoology and forest sciences, with a particular focus on the endangered Leadbeater's possum. He currently runs six large-scale, long-term research programs in south-eastern Australia, primarily associated with developing ways to conserve biodiversity in reserves, national parks, wood production forests, plantations, and on farm land.

As Professor of Ecology and Conservation Biology at The Australian National University's Fenner School of Environment & Society, Professor Lindenmayer has published more than 1200 scientific articles, including over 760 peer-reviewed scientific papers and 45 books on a wide range of topics associated with forests, woodlands, wildlife and biodiversity conservation and ecologically sustainable natural resource management.

His work on wildlife conservation and biodiversity has, for many decades, led world research in this area. Professor Lindenmayer's conservation and biodiversity research has been recognised through numerous awards, including the Eureka Science Prize (twice), the Whitley Award (ten times), the Serventy Medal for Ornithology, the Australian Natural History Medallion and the Whittaker Medal from the Ecological Society of America. He is an Australian Research Council Laureate, a Fellow of the Australian Academy of Science and of the Ecological Society of America. Professor Lindenmayer was appointed an Officer of the Order of Australia "for distinguished service to conservation and the environment in the field of landscape ecology, to tertiary education, and to professional organisations."

Professor Philip Batterham

Research Director, Mental Health

Phil Batterham is a Professor at the Centre for Mental Health Research within the Research School of Population Health at The Australian National University. He currently holds a Career Development Fellowship from the National Health and Medical Research Council (NHMRC).

He has published more than 160 peer-reviewed articles and has received more than $25 million in research funding as an investigator. His research interests include developing and disseminating online programs to prevent mental disorders, developing tailored screening measures to identify mental health problems in the community, reducing suicide risk, and challenging the stigma of mental illness.

Professor Batterham leads the mental health theme of *Sustainable Farms*, and is keen to evaluate the effects of ecological and economic initiatives on mental health outcomes. By identifying the gaps in the quality and distribution of mental health services in rural communities, Professor Batterham hopes to identify solutions that will support farmers to remain healthy and to reduce the prevalence of suicide and mental health problems in rural Australia.

Professor Bruce Chapman AM

Research Director, Finance

Professor Bruce Chapman is an economist and has worked at The Australian National University since 1984. He has extensive experience in public policy, including: the motivation and design of the Higher Education Contribution Scheme (the first national income contingent loan scheme using the income tax system for collection) in 1989; engagement with the empirical and conceptual basis related to long-term unemployment, leading to the Working Nation program in 1994; as a senior economic advisor to Prime Minister Paul Keating, 1994-96; as a higher education financing consultant to the World Bank and the governments of Thailand, Papua New Guinea, Mexico, Canada, the UK, Ethiopia, Rwanda, Malaysia, Colombia, the US, Chile and China, 1996-2013; as a consultant to the Bradley Review of Australian Higher Education on student income support, 2008; and as a consultant to the Australian Government's Base Funding Review, 2011.

He has published over 200 papers on a range of issues, including income contingent loans, long-term unemployment, the meaning of job flows data, the economics of crime, cricket, fertility, marital separation, and government as risk manager. Over the last several years he has convened conferences, and written extensively, on the application of income contingent loans to a host of social and economic reform issues, such as for the financing of drought relief, low level criminal fines, elite athlete training, paid parental leave, white collar crime, community-based investment projects, Indigenous business investment, and for taxing the brain drain.

He was elected to the Academy of the Social Sciences of Australia in 1993, received an Order of Australia in 2003 for contributions to economic policy, and was elected President of the Australian Society of Labour Economics (2004-07) and President of the Economics Society of Australia (2007-13). He was made Distinguished Fellow of the Economics Society of Australia in 2015. He is quite friendly, excessively modest and is a tenacious, fanatical and mediocre bridge player.

Michelle Young

Director, *Sustainable Farms*

Michelle Young began managing the *Sustainable Farms* project in June 2018. She brings to the position a unique blend of experience across a range of different policy areas, including research positions in public health within NSW, assessing the effectiveness of health promotion interventions, including drug and alcohol programs and undertaking formative research for new programs in early childhood and maternity.

In 2011-2012 Ms Young was Deputy Director of the National Institute of Rural and Regional Australia at The Australian National University, where she undertook a comprehensive review of how Federal Government policy settings shaped rural economies and the quality of life for people living in rural areas.

Ms Young has also worked in the Australian Public Service as a social scientist with the Bureau of Rural Sciences, and at the Murray Darling Basin Authority as a senior member of the team leading the evaluation of the Basin Plan. She has extensive experience working with farmers on research relating to grain storage, policy reform in the sugar industry, kangaroo harvesting, water purchases, and environmental flows.

SUSTAINABLE FARMS PROJECT MAP

A simplified map of the Sustainable Farms project area

Location of Sustainable Farms team | Farmer Partners | Project Boundary | LLS and CMA Borders | State Border

Kilometres
0 25 50 100 150 200

SUSTAINABLE FARMS ORGANISATION STRUCTURE

As at January 2020
*Staff recruited in October 2019

EXECUTIVE COMMITTEE

Director
Michelle Young

Project Team
- Communications Manager 1.0 FTE*
- Project Coordinator 1.0 FTE
- Finance Officer 0.1 FTE
- Project Officer 0.2 FTE

Field Staff
- Snr Research and Extension officer Gundagai 1.0 FTE
- Research and Extension Officer Cowra 0.6 FTE
- Research and Extension Officer Wodonga 1.0 FTE*
- Biodiversity Field Officer Wagga 1.0 FTE
- Biodiversity Field Officer Gundagai 1.0 FTE*
- Biodiversity Field Officer Cowra 1.0 FTE*
- Biodiversity Field Officer Wodonga 1.0 FTE
- Engagement Officer Cowra 0.6 FTE*
- Engagement Officer Burrumbuttock 0.4 FTE*
- Engagement Officer Wodonga 0.6 FTE*

ANU College of Science
Fenner School of Environment & Society

Water and Landscape Dynamics
- Director
- Post Doc 1.0 FTE

Research Director Ecology
David Lindenmayer

Environmental Accounts
- Post Doc 1.0 FTE

Data Linking
- Fellow 0.8 FTE
- Research Assistant 1.0 FTE*

ANU College of Business & Economics
Research School of Finance, Actuarial Studies and Statistics (RSFAS)

Research Director Finance
Bruce Chapman

Economics Research Team
- Project Advisor
- Project Consultant

ANU College of Health & Medicine
Research School of Population Health

Research Director Mental Health
Phil Batterham

Mental Health Research Team
- Post Doc 0.6 FTE
- Data Cleaner 0.2 FTE

SUSTAINABLE FARMS ADVISORY COMMITTEE MEMBERSHIP 2019

Chair: Dr Douglas Robertson

Director of Research Services, The Australian National University

ANU

Professor Philip Batterham

Research Director Mental Health, *Sustainable Farms*,
The Australian National University

Professor Bruce Chapman

Research Director Finance, *Sustainable Farms*,
The Australian National University

Professor Saul Cunningham

Director, Fenner School of Environment & Society,
The Australian National University

Dr Robin Fieldhouse

Senior Research and Business Development Manager,
The Australian National University

Mr Jock Gavel

Senior Advancement Management,
The Australian National University

Professor Russell Gruen

Dean, ANU College of Health and Medicine,
The Australian National University

Professor Kiaran Kirk

Dean, ANU College of Science,
The Australian National University

Professor David Lindenmayer

Lead Scientist: Research Integration and Partnerships &
Research Director Ecology, *Sustainable Farms*,
The Australian National University

Ms Michelle Young

Director, *Sustainable Farms*,
The Australian National University

External

Mr Craig Connelly

Chief Executive Officer, The Ian Potter Foundation

Mr David Galeano

Farm Performance and Forestry Branch, Australian Bureau of Agricultural and Resource Economics, ABARES

Mr Shane Norrish

Farming and Major Projects Director, Landcare Australia

Mr Warrick Ragg

General Manager, Natural Resource Management,
National Farmers Federation

FINANCIAL REPORT 2019

Table 1: Operating Expenses by Business Area

Business area	2017 – 2018	2019	Total to end of 2019
Farmer Network	$441,647.61	$563,317.94	$1,004,965.55
Research	$165,237.30	$202,635.42	$367,872.72
Communications and Engagement	$72,598.02	$207,878.11	$280,476.13
Project Management and Evaluation	$309,018.23	$430,419.21	$739,437.44
Indirect costs	$55,371.00	$218,391.13	$273,762.13
Expense Total	**$1,043,872.16**	**$1,622,641.81**	**$2,666,513.97**

Table 2: Sources of Income 2019

Income Funds	2017 – 2018	2019	Total to end of 2019
Commonwealth Department of Agriculture and Water Resources		$1,796,969.69	$1,796,969.69
Ian Potter Foundation	$520,000.00	$500,000.00	$1,020,000.00
William Buckland Foundation		$126,840.00	$126,840.00
Vincent Fairfax Family Foundation (VFFF)	$300,000.00		$300,000.00
Meat and Livestock Australia	$102,130.04	$125,986.86	$228,116.90
Kering SA		$56,460.72	$56,460.72
Riverina Local Land Services		$55,000.00	$55,000.00
ANU Central	$100,000.00	$50,000.00	$150,000.00
ANU College of Science	$100,000.00		$100,000.00
ANU Fenner School of Environment & Society		$50,000.00	$50,000.00
Anonymous Foundation	$120,000.00		$120,000.00
Private Donors	$140,001.70	$43,857.00	$183,858.70
Murray Local Land Services		$13,500.00	$13,500.00
Wheen Bee Foundation		$12,000.00	$12,000.00
Central Tablelands Local Land Services	$27,000.00	$1,500.00	$28,500.00
Interest Earned	$3,577.81	$1,597.85	$5,175.66
Income Total	**$1,412,709.55**	**$2,833,712.12**	**$4,246,421.67**

Table 3: Operating Result

	2017 – 2018	2019	Total to end of 2019
Total Income	$1,412,709.55	$2,833,712.12	$4,246,421.67
Total Expenditure	$1,043,872.16	$1,622,641.81	$2,666,513.97
Operating Result	**$368,837.39**	**$1,211,070.31**	**$1,579,907.70**

PERFORMANCE TRACKING

SUMMARY OF KEY PERFORMANCE INDICATORS

KPI[1]		Progress
Goal 1: Farmer Network, Extension and Outreach		
1.	Brand recognition	Actively working towards
2.	Awareness of benefits of natural assets	Actively working towards
3.	Adoption of projects and practices	Actively working towards
4.	Reach of *Sustainable Farms*' extension services	Partially achieved and ongoing
5.	Quality of *Sustainable Farms*' extension services	Actively working towards
Goal 2: Establish Partnerships		
6.	Investments by Natural Resource Management partners in projects promoted by *Sustainable Farms*	Partially achieved and ongoing
7.	Partnerships with Natural Resource Management agencies and stakeholder groups	Partially achieved and ongoing
8.	Partnership outputs	Partially achieved and ongoing
9.	Capacity building	Partially achieved and ongoing
Goal 3: Multidisciplinary Research Projects		
10.	Research outputs	Partially achieved and ongoing
11.	Data collection	Partially achieved and ongoing
12.	Initiation of Sustainability Science	No progress
Goal 4: Communications, Knowledge Translation and Engagement		
13.	Media, website and social media effectiveness	Partially achieved and ongoing
14.	Level of policy engagement	Actively working towards
15.	Research translation (policy proposals)	Actively working towards
16.	Industry partnerships (joint projects)	Actively working towards
Goal 5: Program Management, Evaluation and Reporting		
17.	Work team performance	Partially achieved and ongoing
18.	Revenue growth	Actively working towards
19.	Standard of evaluation	Partially achieved and ongoing

Performance Rating

No progress: no progress has been made to meet performance requirements
Actively working towards: progress being made but currently behind performance requirements
Partially achieved and ongoing: progress is meeting or exceeding requirements with ongoing action required to maintain performance rating
Achieved: performance requirements have been achieved with no further action required to maintain performance rating

[1] Source: *Sustainable Farms* Monitoring and Evaluation Framework 2018–2023, *Sustainable Farms* Indicator Bank KPI 1, pp. 15 - 18

Stephen Wilson from Murray LLS demonstrating canid pest ejectors and other control measures at a field day in Burrumbuttock.

KPIs 1–5: FARMER NETWORK SURVEYS AND OUTREACH

GOAL 1:

Create an influential and engaging farms-based outreach and extension program to increase the engagement, awareness and adoption of enhanced natural asset management based on long-term ecological monitoring.

Progress Summary: During 2019, *Sustainable Farms* events brought 249 farmers together in the paddock to observe good examples of natural asset management. These field days were held on farms that were representative of the region in a commercial sense. Attendees heard from both the farmer and other experts about the benefits of improved natural asset management. A key feature of these field days was the opportunity to generate new ideas and perspectives between farmers, agricultural scientists, engineers, veterinarians and ecologists. In addition to our own program of events, our staff reached another 502 farmers at events hosted by other agencies and groups.

Sustainable Farms continues to develop the infrastructure to deliver high-quality field extension. This includes the production of brochures, podcasts and other resources, available at sustainablefarms.org.au.

As part of the long-term monitoring program, our field ecologists completed over 1500 surveys. The field team also collected data for new research projects. This included measuring the volume of carbon in woodland vegetation and surveying water quality and biodiversity at farm dams.

Viewing a hardened access point on a field day at Wirrianda.

PERFORMANCE CRITERION:

1. Brand recognition

Metric: Percentage of the farmers in the project area who are aware of the *Sustainable Farms* initiative.

Result: The Regional Wellbeing Survey (RWS) is managed by the University of Canberra and collects data annually in rural and regional Australia on a range of topics including wellbeing, farming and natural resource management. In 2018, the survey included a number of measures specifically designed to support the evaluation of the *Sustainable Farms* program. These results were collated into a *Sustainable Farms* Project Baseline Evaluation Report in 2019.

390 farmers in the *Sustainable Farms* project area completed the RWS in 2018. Within this group of farmers, 27% were aware of *Sustainable Farms*. Over the next three years, *Sustainable Farms* aims to increase project reach to 33%.

PERFORMANCE CRITERION:

2. Awareness of benefits of natural assets

Metric: Percentage of the farmers in the local government areas where demonstration farms are based, who score positively against an index designed to measure knowledge of the benefits of natural asset management.

Result: Results from the Regional Wellbeing Survey in 2018 showed that amongst the 390 farmers surveyed from the *Sustainable Farms* project area:

- There was a high level of awareness of the overall benefits of improving natural assets on farming land, particularly for activities that aim to increase trees and shrubs (82.3%) and improve groundcover (83.8%).
- Awareness of the benefits of restricting stock access to waterways and dams was lower, with 62.7% of those surveyed in the project area indicating their awareness of this strategy.

For further results, see the ANU *Sustainable Farms* Project Baseline Evaluation Report available at sustainablefarms.org.au/resources.

A group of young farmers listening closely to presenters at a field day in Burrumbuttock.

PERFORMANCE CRITERION:

3. Adoption of projects and practices

Metric: Percentage of farmers attending field days who indicate intention to adopt a natural asset management practice promoted by *Sustainable Farms*.

Result: *Sustainable Farms* field days were attended by 249 farmers. Post field day evaluation surveys were sent to 170 attendees and were completed by 64, which is a response rate of 37.6%. The post event evaluations survey found that 86% of farmers intended to adopt a natural asset management practice that was promoted at the field day they attended.

Metric: Percentage of farmers attending field days who subsequently invest in natural asset management.

Result: Follow up surveys will commence in 2020 to ascertain the number of field day attendees who have subsequently implemented these practices.

Sustainable Farms Engagement Officer, Kathie Le Busque and Senior Research and Extension Officer, Dr Mason Crane engaging with the public at the Henty Agricultural Field Days.

PERFORMANCE CRITERION:

4. Reach of *Sustainable Farms* extension services

Metric: Number of demonstration farms established and operating.

Result: In 2019 *Sustainable Farms* led the delivery of 17 field days. These field days were held on farms that have been part of the long-term monitoring, as well as on farms that were invited into the network because they had implemented various excellent natural asset management practices. During the year, the farmer partner network grew from 4 to 17 farmers. Growth in the network increased project reach, the diversity of concepts for demonstration and *Sustainable Farms*' overall capacity to support extension and outreach.

Metric: Number of field days and other community events (i.e. workshops, and agricultural shows).

Result: *Sustainable Farms* field days were delivered over two periods. There were eight events in the Summer Series (February and March), and nine events in the Winter Series (August and September). Each field day focused on the adoption of a specific natural asset management project. This included:

- farm dams (nine events)
- shelterbelts, tree lines and scattered paddock trees (five events)
- riparian restoration (two events)

In addition to the field days that focused on management actions, *Sustainable Farms* field ecologists also participated in events to support learning about biodiversity in the woodlands. This included a Squirrel Glider spotlighting event and three Breakfast with the Birds events.

Metric: Number of farmers in the local government areas where demonstration farms are based, participating in field days and other events.

Result: Overall *Sustainable Farms* field staff participated in 28 field days. This includes nine events led by Local Land Services, Catchment Management Authorities and Local Landcare partners. A total of 249 people attended *Sustainable Farms* field days in 2019, and 502 people attended events led by partner organisations.

In addition to field days, *Sustainable Farms*' outreach and extension to farmers contributed to eight other events:

- Presentation to a NSW Farmers' branch meeting by Senior Research and Extension Officer, Dr Mason Crane, in Tumut.
- Presentation to the Ecological Consultants Association Annual Conference by Senior Research and Extension Officer, Dr Mason Crane, in the Hunter Valley.
- Presentation to the *Resilient Farming Communities: Planning for Climate Uncertainty* forum by Mental Health Researcher, Kimberly Brown, in Boorowa.
- Exhibit at the Henty Agricultural Field Days, to introduce the *Sustainable Farms* project to the region and share information about farm dams. This included an interactive exhibit to promote enhanced management of farm dams.
- Presentation to Goulburn Broken Catchment Management Authority's *Outstanding in the Paddock: Celebrating Paddock* Trees event by Research and Extension Officer, David Smith, in Shepparton.
- *Sustainable Farms* Breakfast with the Birds community events with 48 people in attendance by Biodiversity Field Officer, Clare Crane in Wagga Wagga, and Research and Extension Officer, David Smith, in Urana.
- Presentation to *Supporting Wildlife in Dry Times* by Engagement Officer, Tamara Harris, in Orange.

Metric: Number of farmers in the project area who receive face-to-face advice.

Result: At least 32 farmers received face-to-face information from field staff in 2019. This advice included specific questions about their property and situation, particularly in relation to farm dams; where to start on NRM projects; and available sources of funding. The field team also advised more than 20 farmers over the phone on questions relating to conservation on their farms.

PERFORMANCE CRITERION:

5. Quality of *Sustainable Farms* extension services

Metric: Satisfaction of participants (%) at field days.

Result: Feedback surveys from participants were successfully implemented in 2019, and responses to the field days were very positive:

- 67% of respondents reported that they were very satisfied with the quality of the field day
- 33% of respondents reported being satisfied with field day quality
- 95% of respondents reported that they were likely to recommend the field day to a friend or colleague.

Local Land Services staff present on farm dam management at a field day in Illabo.

CASE STUDY: FENCING FARM DAMS AT LARAKOONA

Marcus Richardson runs Larakoona, a 2200-acre Angus beef property in southern NSW, nestled up against the striking Table Top Mountain near Albury. By 2018 the property's dams were showing the effects of severe drought. Crucially, Marcus had begun to think about how he might be able to protect these vital assets into the future, and his engagement with *Sustainable Farms* helped provide the evidence he needed to undertake dam enhancements including fencing.

In 2018, Marcus attended a Breakfast with the Birds event hosted by *Sustainable Farms* at Thurgoona. Over the following year, he attended two *Sustainable Farms* field days – including one at Wirrianda near Mullengandra. The Wirrianda farm dams, fenced between three and twenty years ago, demonstrate the effectiveness of the hardened access point for stock, as well as how the grassy buffer zone around the dam captured sediment and dung.

Marcus observed the improved water quality in the fenced dam, and was impressed by the aesthetic appeal of the enhanced dam with its fringing trees and active birdlife. He recalls that looking at the Wirrianda dam and hearing from the *Sustainable Farms* field ecologist "gave me the opportunity to see firsthand the improvement of the dam environment [that] fencing creates…". He recognised the multiple benefits that would come from fencing dams, including reducing the need to remove metres of silt from his dams in future.

Marcus has now fenced four dams at Larakoona with the support of funding provided by Murray Local Land Services and distributed by Holbrook Landcare. As part of this investment, Marcus also trialed different options for stock access and types of fencing. The dams at Larakoona were demonstration sites for a field day in December 2019. Even at this early point, Marcus was already able to discuss with other farmers the changes he is observing and his future plans.

As well as the many benefits the newly improved farm dams will provide for production, biodiversity, water security and aesthetics, they are now being monitored as part of the *Sustainable Farms* farm dams study. Thus, they will contribute to this unique research and extension project, enabling farmers access to ongoing evidence for how best to improve these key assets.

Marcus Richardson discussing his dam restoration project at Larakoona.

KPIs 6–9: FARMER NETWORK PARTNERSHIPS

GOAL 2:

Build the capacity of the NRM sector to support farmers to better manage their natural assets through formalised partnerships and informed by the latest research.

Progress Summary: The project has long standing partnerships with NRM agencies and in 2019 *Sustainable Farms* continued to work with the sector to improve current methods and discover new practices for improving biodiversity and other natural capital on farms. A focus in 2019 was the collaborative work on enhancing farm dams, involving Murray and Riverina Local Land Services, Holbrook Landcare and others.

Sustainable Farms Director, Michelle Young, Research and Extension Officer, Dave Smith, Biodiversity Field Officer, Angelina Siegrist and NECMA's Katie Warner meeting at a conference in Albury.

PERFORMANCE CRITERION:

6. Investments by Natural Resource Management partners in projects promoted by *Sustainable Farms*

Metric: Number of grants for on-farm works (for shelter, farm dam enhancement, and riparian restoration) awarded to farms participating in the *Sustainable Farms* network.

Result: In 2018 the *Sustainable Farms* project began discussions with Murray and Riverina Local Land Services about the poor condition of farm dams in the project region and the potential to support improvements. In response, both Murray and Riverina Local Land Services directed resources to this purpose.

In 2019, in partnerships with *Sustainable Farms*, Riverina Local Land Services completed the Farm Dams for Biodiversity Project that gave grants up to $10,000 to farmers to improve their farm dams. Application criteria for these grants included attendance at a *Sustainable Farms* field day on farm dams. After the field days, Riverina received 30 applications, and funded 24 farm dam restorations.

Sustainable Farms also supported Murray Local Land Services and Holbrook Landcare to implement a trial project to invest in farm dams, through site visits on farms and initial water testing, and there is potential to monitor for change in these measurements over time. The project funded seven farm dam restoration projects.

Finally, *Sustainable Farms* also brokered two agreements with Murray and Riverina Local Land Services on farm dams monitoring as part of the farm dams pilot study and longer-term study. See p.36 for further details.

PERFORMANCE CRITERION:

7. Partnerships with Natural Resource Management agencies and stakeholder groups

Metric: Number of agencies with whom *Sustainable Farms* has:

- Engaged in planning or review of research outputs
- A contract for delivery of services

Result: In 2019, *Sustainable Farms* maintained active contracts with:

- Murray Local Land Services
- Riverina Local Land Services
- Central Tablelands Local Land Services

Sustainable Farms partnered informally with six Local Land Services to deliver events in the project region. These relationships have helped to extend the reach of *Sustainable Farms* activities across the region.

In partnership with Murray Local Land Services, *Sustainable Farms* delivered an Outcomes Workshop which shared key ecological findings with NRM partners across the region. This workshop provided partners with the most up-to-date and localised research, which supported them to tailor government funding applications. At the same time, feedback from partners informed *Sustainable Farms* research planning to ensure research projects are responsive to needs on the ground. For more information on this event see p.27.

Sustainable Farms participated in the Slopes to Summit Group with several partners including Landcare, Murray Local Land Services, Charles Sturt University, and the Biodiversity Conservation Trust on conservation projects in the Great Eastern Ranges. As a member of this group, *Sustainable Farms* is able to benefit partners by sharing research completed by the project, to inform their activity planning.

PERFORMANCE CRITERION:

8. Partnership outputs

Metric: Number of community engagements in which *Sustainable Farms* supported partner organisations.

Result: In 2019 *Sustainable Farms* supported partners to deliver 11 field days and community events including:

- Riverina Local Land Services on a field day about Squirrel Gliders
- Two Central Tablelands Local Land Services field days on rocky outcrops
- West Hume Landcare and Corowa District Landcare on field days about Indian Mynas
- Central Tablelands Local Land Services field days on Box Gum Grassy Woodland

Sustainable Farms also supported Murray Local Land Services to develop a farm dams video featuring Senior Research and Extension Officer, Dr Mason Crane.

Metric: Number of joint funding applications submitted for farm regeneration.

Result: In collaboration with Riverina and Murray Local Land Services, *Sustainable Farms* led a NSW Environmental Trust proposal seeking $150,000 – $200,000 over three years for a conservation research project that seeks to quantify the biodiversity value of artificial wetlands and farm dams in the agricultural landscape. This proposal was not successful.

Sustainable Farms supported the Riverina Local Land Services to apply for funding under the Smart Farms grant process. This application was not successful.

PERFORMANCE CRITERION:

9. Capacity building

Metric: Number of training sessions and workshops *Sustainable Farms* has delivered to NRM agencies and staff.

Result: In 2019, *Sustainable Farms* delivered three presentations and workshops to NRM agencies and staff. In particular:

- The *Sustainable Farms* Outcomes Workshop and Field Trip, hosted by Murray Local Land Services, provided *Sustainable Farms* with an opportunity to showcase key ecological findings with NRM partners across the region. One hundred people attended this event.
- The field team worked closely with Riverina Local Land Services to build capacity on farm dam enhancements. This included a private field day with 12 Local Land Services staff to provide information prior to hosting public field days.
- The field team delivered two days of training to Riverina Local Land Services staff and contractors on squirrel glider habitat recognition and camera trapping.
- The field team worked with Riverina Local Land Services to develop a list of actions for the next 12 months.
- *Sustainable Farms* also provided advice to Landcare partners, including to:
  - Holbrook Landcare to help it determine farm dam project sites
  - Corowa, West Hume and Holbrook Landcare groups, sharing long-term monitoring information to support their honeyeater project with Birdlife Australia.

CASE STUDY: THE OUTCOMES WORKSHOP

The *Sustainable Farms* Outcomes Workshop was held in Albury on the 2nd and 3rd of April 2019, hosted by Murray Local Land Services. The workshop was an opportunity to showcase research from long-term ecological monitoring and associated PhD studies to a room of interested partners from across the NRM sector.

Topics included:

> Understanding the economics of natural asset investments

> Conservation on farms in a changing climate

> Woodland bird conservation on farms

> Project overview and evaluation framework

A key element of the Outcomes Workshop was to field questions from attendees to inform new directions for the ecology research. One issue raised by participants was the loss of paddock trees due to new clearing legislation and its potential impact on biodiversity, and the lack of research specifically examining the issue.

In response, *Sustainable Farms*' research officers are now reviewing historic bird and mammal data from the Nanangroe Natural Experiment Study, a long-term study initiated by Prof David Lindenmayer in the 1990s in an area where thousands of paddock trees were being cleared for a new softwood plantation. The review is also collecting additional data derived from historic aerial photography and new satellite imagery. This analysis may reveal some insights into the impacts of the removal of scattered paddock trees.

Attendees of the Outcomes Workshop deep in group discussion.

KPIs 10 – 12: RESEARCH

GOAL 3:

In partnership with industry and government develop a multidisciplinary research program to understand relationships within and between landscape function, mental health and wellbeing and financial success.

Progress Summary: During 2019, researchers at the ANU were engaged in delivering 12 individual projects for *Sustainable Farms*. These projects, focused at both the farm level and the landscape level, explore the relationship between the management of natural assets on agricultural land and outcomes for biodiversity, farm profit, and mental health and wellbeing. The projects have been designed so that the findings from landscape ecology will produce results that can be used by other researchers assessing the value of ecosystem services. Whilst many of these projects are still in the data collection phase, in 2019 new knowledge continued to be generated from the long-term monitoring of biodiversity on farms.

PERFORMANCE CRITERION:

10. Research outputs

Metric: Number of publications (books, working papers, journal publications).

Result: As a University led project, world leading research is a key value-add that *Sustainable Farms* can offer NRM partners in the project region. In 2019, the team was highly productive in the publication sphere, with a total of 22 publications, comprised of one book, 18 peer reviewed journal articles, and three other publications.

Book:

Sustainable Farms (2019). *Learning from Experience: Conversations with family farmers from the woodlands of southeastern Australia*. *Sustainable Farms*, The Australian National University, Canberra.

Peer-reviewed journal articles:

- Barton, P.S., Evans, M.J., Sato, C.F., O'Loughlin, L.S., Foster, C.N, Florance, D. and Lindenmayer, D.B. (2019). 'Higher-taxon and functional responses of ant and bird assemblages to livestock grazing: A test of an explicit surrogate concept'. Ecological Indicators, 96, 458-465.
- Batterham PJ, Kazan D, Banfield M, Brown K. (In press). Differences in mental health service use between urban and rural areas of Australia. Australian Psychologist. Accepted 11/12/2019.
- Beggs, R., Pierson, J., Tulloch, A.I.T., Blanchard, W., Westgate, M.J. and Lindenmayer, D.B. (2019). 'An experimental test of the compensatory nest predation model following lethal control of an overabundant native species'. Biological Conservation, 231, 122-132.
- Belder, D.J., Pierson, J.C., Ikin, K., Blanchard, W., Westgate, M.J., Crane, M. and Lindenmayer, D.B. (2019). 'Is bigger always better? Influence of patch attributes on breeding activity of birds in box-gum grassy woodland restoration plantings'. Biological Conservation, 236, 134-152.
- Chapman, B. and Lindenmayer, D.B. (2019). A novel approach to the sustainable financing of the global restoration of degraded agricultural land. Environmental Research Letters, 14, 124084.
- Crouzeilles, R., Barros, F.S.M., Molin, P.G., Ferreira, M.S., Junqueira, A.B., Chazdon, R.L., Lindenmayer, D.B., Tymus, J.R.C., Strassburg, B.N.B. and Brancalion, P.H.S. (2019). A new approach to map landscape variation in forest restoration success in tropical and temperate forest biomes. Journal of Applied Ecology, 56, 2675-2686.
- Hansen, N.A., Driscoll, D.A., Michael, D.R. and Lindenmayer, D.B. (2020). 'Movement patterns of an arboreal gecko in a fragmented agricultural landscape reveals matrix avoidance'. Animal Conservation, 23, 48-59.
- Hansen, N.A., Sato, C.F., Michael, D.R., Lindenmayer, D.B. and Driscoll, D.A. (2019). 'Predation risk for reptiles is highest at remnant edges in agricultural landscapes'. Journal of Applied Ecology, 56, 31-43.
- Hansen, N.A., Scheele, B.C., Driscoll, D.A. and Lindenmayer, D.B. (2019). 'Amphibians in agricultural landscapes: the habitat value of crop areas, linear plantings and remnant woodland patches'. Animal Conservation, 22, 72-82.
- Lindenmayer, D.B. (2019). 'Small patches make critical contributions to biodiversity conservation'. Proceedings of the National Academy of Sciences of the USA, 116, 717-719.
- Lindenmayer, D.B., Blanchard, W., Westgate, M.J., Foster, C., Banks, S.C., Barton, P.S., Crane, M., Ikin. K. and Scheele, B.C. (2019). 'Novel bird responses to successive, large-scale, landscape transformations'. Ecological Monographs, 89, e01362.

- Lindenmayer, D.B., Lane, P., Crane, M., Florance, D., Foster, C.N., Ikin, K., Michael, D., Sato, C.F., Scheele, B.C. and Westgate, M.J. (2019). 'Weather effects on birds of different size are mediated by long-term climate and vegetation type in endangered temperate woodlands'. Global Change Biology, 25, 675-685.
- Lindenmayer, D.B., Lane, P., Foster, C.N., Westgate, M.J., Sato, C., Ikin, K., Crane, M., Michael, D., Florance, D. and Scheele, B.C. (2019). 'Do migratory and resident birds differ in their responses to interacting effects of climate, weather and vegetation? Diversity and Distributions', 25, 449-461
- Okada, S., Lindenmayer, D.B., and Wood, J.T. (2019). 'Does land use change influence predation of bird nests?' Austral Ecology, 44, 768-776.
- Pulsford, S.A., Barton, P.S., Driscoll, D.A. and Lindenmayer, D.B. (2019). 'Interactive effects of land use, grazing and environment on frogs in an agricultural landscape'. Agriculture, Ecosystems & Environment, 281, 25-34.
- Sato, C.F., Strong, C.L., Holliday, P., Florance, D., Pierson, J., and Lindenmayer, D.B. (2019). 'Environmental and grazing management drivers of soil condition'. Agriculture, Ecosystems & Environment, 276, 1-7.
- Michael, D.R., Blanchard, W., Scheele, B.C. and Lindenmayer, D.B. (2019). 'Comparative use of active searches and artificial refuges to detect amphibians in terrestrial environments'. Austral Ecology, 44, 327-338.
- Van Spijker, B.A., Salinas-Perez, J.A., Mendoza, J., Bell, T., Bagheri, N., Furst, M.A., Reynolds, J., Rock, D., Harvey, A., Rosen, A., Salvador-Carulla, L. (2019). Service availability and capacity in rural mental health in Australia: Analysing gaps using an Integrated Mental Health Atlas. Australian & New Zealand Journal of Psychiatry, 53 (10), 1000-1012.

Reports:

- Lindenmayer, D.B., Crane, M., Florance, D., Smith, D., and Crane, C. (2019). *Long-term restoration in the Box-Gum Woodlands of south-eastern Australia, Ecological Management & Restoration, Project Summary*. site.emrprojectsummaries.org/2019/06/27/long-term-restoration-in-the-box-gum-woodlands-of-south-eastern-australia-update-of-emr-feature
- Lukasiewicz, A., Higgins, T., Young, M., Howden, M., Colvin, R., Chapman, B., Cruwys, T., and Lindenmayer, D.B. (2019). *Encouraging the uptake of climate smart farming practices and technologies: Final Report for the Regional Investment Corporation*.
- Morgain, R., Moggridge, B., Lindenmayer, D.B. et al. (2019). *As the dust of the election settles, Australia's wildlife still needs a pathway for recovery*. theconversation.com/as-the-dust-of-the-election-settles-australias-wildlife-still-needs-a-pathway-for-recovery-117406

Research projects active in 2019 included:

Mental Health:

- **Regional Wellbeing Survey**
  - Project summary: The Regional Wellbeing Survey is a large survey of 13,000 Australians, conducted every year since 2013. The survey, conducted by the University of Canberra, is unique in that it focuses on the experiences of Australians living in regional, rural and remote areas of Australia. Every year, many questions specifically designed for farmers are included in the survey. Farmers are recruited into the survey through flyers and surveys posted to a stratified random sample selected from the FarmBase database. Multiple farming and farmer-related organisations also encourage farmers to take part.
  - Project progress: on track, publications expected in 2020.
- **Systematic Review: mental health and wellbeing impacts of the natural environment in rural and farming communities**
  - Project summary: the aim of this project is to bring together the existing research on the relationship between the natural environment and mental health and wellbeing of people living in rural settings. This will be done through a systematic review of the literature on the relationship between mental health and wellbeing of people living or working in rural areas (including farmers and other landholders) and a range of environmental factors, including:

1) chronic natural disasters (drought); 2) natural resource management (e.g. conservation); and 3) other related factors such as land degradation, environmental/climate change, and nature connectedness.

- Project progress: data collation and coding almost complete, for reporting in 2020.

> FarmWell Survey

- Project summary: the primary aim of this study is to identify relationships between mental health and wellbeing status with farming practice and biodiversity. The secondary aim of the study is to assess relationships between financial status and mental health and wellbeing.
- Project progress: data collection complete, preliminary analyses underway, publications expected in 2020.

Ecology:

> Farm Dam Project

- Project summary: This project seeks to understand the role that fenced farm dams play in farm environmental and financial sustainability. The study will do this by investigating the effects on faunal biodiversity, water quality and vegetation structure of fencing of creeks and dams of different sizes. Specifically, the following questions will be investigated: 1) what biodiversity benefits do farm dams provide, and how are these affected by their size? And 2) what effect does fencing have on water quality, vegetation structure, and biodiversity?
- Project progress: on track, recruitment of field officers and engagement staff complete, study design and monitoring protocols in place (including selection of 63 farm dams), successful pilot study to collect preliminary data is complete. In 2020 the study will expand to approximately 120 dams across the *Sustainable Farms* project region and also start integrating knowledge between farm dams and shelterbelts. For further information see p.36.

> Linking Data Project

- Project summary: this project aims to link data from remote sensing and long-term ecological monitoring, to improve the science of predicting biodiversity change in farmland ecosystems. The project goal is to provide a set of reliable, cost-effective indicators of biodiversity and environmental change that can be used to understand sustainability trade-offs on farms.
- Project progress: on track, research assistant recruited, access to data secured, prototype developed for statistical model and data visualisation tools. In 2020, client liaison will continue and insights from modelling will be prepared for publication.

> Environmental economic accounting of box gum grassy woodlands

- Project summary: the aim of the project is to study conservation of box gum grassy woodlands. The research objective is to develop an environmental economic account including land, carbon, water, biodiversity and agriculture. These accounts are being prepared in collaboration with the National Environmental Science Program.
- Project progress: in 2019 a land account was developed for the box gum grassy woodlands region, and a field study of carbon storage in environmental plantings and box gum remnants was completed. Findings from this work will be published in two papers, one on the extent of the box gum grassy woodlands and drivers of change, and one on carbon storage in box gum woodlands. This work will also serve as a base for further environmental accounts for ecosystem services in the region.

> Kering and *Sustainable Farms* Partnership: information to support certification of sustainable land management

- Project summary: *Sustainable Farms* was engaged by The Kering Group to establish long-term biodiversity and environmental monitoring sites on fine wool producing properties in the *Sustainable Farms* project area. In partnership with Kering, the project seeks to help significantly improve land management, conservation and animal welfare practices on farms supplying to the markets where Kering suppliers are sourcing fine wool.
- Project progress: in 2019, the sampling design was established and monitoring sites were selected from farms in the project region. A preliminary analysis of these sites was successfully completed, to lay the groundwork for ongoing monitoring.

Finance:

> **ABARES data request**

- Project summary: in order to strengthen the finance team's research on revenue contingent loans and other financial options for farmers, access to a comprehensive database of farm financial records is required to enable extensive modelling of loan proposals. This project seeks to work with ABARES to gain access to areas of their database in order to achieve this.
- Project progress: access agreement currently under negotiation.

> **Cost-benefit analysis of farm dams and shelterbelts**

- Project summary: the aim of this project is to estimate the extent of any production gains, as well as the cost of investing in appropriate natural infrastructure, such as environmentally-friendly dams to replace the less palatable muddy dams found on many farms, and planting shelterbelts. The cost-benefit analysis will also include, as far as practicable, any relevant social costs and social benefits such as the promotion of biodiversity.
- Project progress: literature search on the economic effects of weight gain in livestock provided with clean water compared to those with access to turbid dams is complete, with report drafted. The collection of final data on costs and benefits will be finalised in early 2020. Literature search has also been initiated to establish the economic costs and benefits of farm shelterbelts.

Evaluation:

> **Developing a method to measure targeted practice change**

- Project summary: this project aims to develop a method to monitor and evaluate training courses, workshops and field days delivered to facilitate and support improved natural resource management. Central Tablelands Local Land Services funded this project and is the primary audience for the resulting report.
- Project progress: research report complete and delivered to Central Tablelands Local Land Services.

Sustainable Farms Research and Extension Officer, Dan Florance conducting fieldwork.

PERFORMANCE CRITERION:

11. Data collection

Metric: Collection of mental health data to inform empirical research activities (number of survey waves and response rates).

Result: Mental health data collection is scheduled for 2020, with the consolidation of data into the Baseline Report achieved in 2019.

Metric: Collection of finance data to inform empirical research activities (number and type of data collection activities).

Result: In 2019 financial data collection focused on cost-benefit analysis of natural assets on agricultural properties, specifically farm dams. A key objective of the cost-benefit analysis was to establish how much additional weight would be gained by livestock (specifically beef cattle) drinking clean water from fenced-off, ecologically-propitious dams.

There is a considerable amount of literature in Australia and overseas on the detrimental effect of cattle and sheep on the quality of water in riparian zones. However, there appear to be no published empirical Australian studies on the effect of providing livestock with clean drinking water, rather than relying on the faecally-contaminated muddy dams that dot the Australian landscape.

Apart from extensive use of internet and academic search engines, the following journals were scrutinised intensively, issue by issue: Rural Research (CSIRO), Australian Journal of Experimental Agriculture and Animal Husbandry, Australian Veterinary Journal, and the Australian Journal of Agricultural and Resource Economics. Searches were also conducted of various websites, including Google Scholar, Land and Water Australia, CSIRO, and Meat and Livestock Australia. Three major north American publications reported experiments that estimated the additional weight gain of steers and cow-calf pairs drinking clean water at between zero and 23 per cent.

A secondary objective was to identify an estimate of the willingness to pay (a measure of economic benefit to Australian society) of rural residents for more wildlife at a landscape level if most farm dams were converted to ecologically-friendly assets. Despite a search of the international Environmental Valuation Reference Inventory (EVRI) and other sources, no relevant estimates were found.

Metric: Number of biodiversity surveys completed in long-term ecological monitoring studies.

Result: In 2019 biodiversity monitoring was conducted on over 750 sites, with over 1500 biodiversity surveys completed. All scheduled field surveys on long-term ecological monitoring sites were undertaken, except where site access was an issue (change of landholder, lambing etc.). In 2019 the survey burden was significantly higher due to the need to account for the effects of imperfect detection on site occupancy as described in MacKenzie et al (2017). To make this assessment field ecologists were required to repeat bird surveys at each site five times rather than conducting only two surveys. For further information on the issues with detection see MacKenzie, D., Nichols, J., Pollock, K., Bailey, L., and Hines. J. (2017). *Occupancy Estimation and Modeling Inferring Patterns and Dynamics of Species Occurrence*, Academic Press second Ed.

The biodiversity surveys in 2019 included:

- Herpetofauna (reptile and amphibian) surveys conducted at Nanangroe Natural Experiment and Adjungbilly Creek
- Bird surveys on the South West Slopes Restoration Study, Murray Biodiversity Monitoring Program and Grazing Study
- Spotlight surveys on the Nanangroe Natural Experiment and Southwest Slopes Restoration Study

This year *Sustainable Farms* also completed:

- 100 carbon surveys across a range of sites
- A farm dam pilot study that surveyed macro-invertebrates, water quality and vegetation (98 surveys for the pilot study all together). The findings from this study will inform the cost-benefit project by the finance team.
- The ongoing cleaning and consolidation of data systems management and extraction. This included the complete migration of data onto a single database, ongoing extraction of data sets for analysis and the development and ongoing use of tablet-based electronic forms to allow onsite data entry.

Bird watching at a Breakfast with the Birds event in Urana

CASE STUDY: FARM DAMS PILOT STUDY

Farm dams are critical infrastructure in production landscapes, and also serve as refuges for biodiversity. The benefits of well-managed farm dams are recognised, but there has been little research into the specific trade-offs, costs and benefits of dam restoration for farmers. *Sustainable Farms* researchers are now working to address this gap and have completed a successful pilot study that marks the beginning of a significant body of research.

In 2018 *Sustainable Farms* began discussions with Murray and Riverina Local Land Services about the poor condition of farm dams in the project region and opportunities to support improvements in on-farm infrastructure. Subsequently the Australian Government Department of Agriculture and Water Resources committed funds to research and monitoring of the environmental benefits of managing farms dams and shelterbelts.

On-farm research into water quality management – and the resulting benefits for stock health and wetland-dependent species such as waterbugs, frogs and birds – is vital to help to identify win-win situations for both producers and the environment. For example, it has to date been unclear what improvement in water quality can be achieved by fencing a farm dam, nor how this is affected by management of the surrounding landscape such as reduced grazing or establishment of shelterbelts.

In addition to providing water for stock and irrigation, farm dams often serve a secondary purpose as refuges for biodiversity. Indeed, many rare plants, birds, and frogs might not persist in farming landscapes were it not for the valuable water, shelter and food resources available from farm dams.

The farm dam project is now in a roll-out phase after a successful pilot study in 2019. Initial research shows that the drought has had a profound influence on water quality, with many dams showing high levels of salinity and acidity (though not at levels that appear toxic to livestock). More concerning are observations of faecal coliforms at up to 100 times the recommended levels for livestock drinking water, and comparably high levels of E. coli – though these values appear restricted to dams that have almost completely dried up, and are substantially lower in dams that have been fenced to exclude stock. Work is continuing to summarise the initial findings for publication in 2020.

The next phase is to expand the farm dam studies to 120 dams in 2020, with associated monitoring of key fauna such as waterbugs, birds and frogs. The project also aims to add a series of finer-scale studies on the conservation of threatened species (such as Sloane's froglet, *Crinia sloanei*) and on additional management options to improve water quality still further (such as the addition of aquatic or riparian vegetation to farm dams). These studies will greatly expand the evidence base on how farm management can be optimised for both production and environmental benefits.

Sustainable Farms Research and Extension Officer, Dave Smith, collecting water samples from a farm dam.

KPIs 13 – 16: STRATEGIC ENGAGEMENT AND COMMUNICATIONS

GOAL 4:

Lead a program of research translation and communication to influence programs and policies of key government institutions, industry groups and philanthropic foundations to support sustainable farming.

Progress Summary: One of the key focus areas for *Sustainable Farms* in 2019 was the conceptualising and development of a revenue contingent loan model for climate smart farming and natural asset management. This included the production of a report commissioned by the Regional Investment Corporation (see case study below) and the publication of a multidisciplinary research paper, authored by Research Directors, Professor David Lindenmayer and Professor Bruce Chapman, which will form the basis of further policy engagement in 2020.

Sustainable Farms Research Directors took part in several meetings and briefings with Members of Parliament and departmental staff, and established a new partnership with the Clean Energy Regulator to encourage farmer engagement in the Emissions Reduction Fund. The project had three industry partnerships underway during the year, with Meat and Livestock Australia and the Kering Group (both three-year partnerships) and the Wheen Bee Foundation.

The project continued to develop and improve key communications platforms, including the website and social media channels. These platforms will be increasingly important in a number of ways, including: research translation as the project outputs grow; influencing the programs and policies of government, industry and philanthropy; and growing the farmer network.

Farmers inspecting an established shelterbelt at a field day in Holbrook.

PERFORMANCE CRITERION:

13. Media, website and social media effectiveness

Metric: Numbers of website users (new users, repeat users and number of page views).

Result: The reach of the *Sustainable Farms* website grew significantly during 2019, attracting 5782 users. This is a marked increase from the 465 visitors to the site in the first four months of the site's existence (September-December 2018), reflecting the growing reach of the project. The bounce rate of 59.31% and the lower number of page views per session (average 2.39) compared to 2018 is to be expected as the website's reach grows but in doing so becomes broader and less targeted when compared to the initial launch period. It is positive to see a significant number of returning visitors (14.6%) to the website.

Communications products developed in 2019 and published on the website include four new episodes of the *Sustainable Farms* podcast series. The Resources page, which hosts the information brochures on key natural assets, attracted 1152 views throughout the year, suggesting solid numbers of resource downloads, although precise download figures were not trackable. Two newsletters were distributed in electronic form via MailChimp.

Metric: Engagement with social media (Facebook); number of social media mentions on social media channels.

Result: The *Sustainable Farms* Facebook page has a small but engaged audience, with 564 page followers as at the end of 2019. This is supported by audiences on second-priority platforms Twitter (356 followers) and Instagram (190 followers).

On Facebook, daily page engagement on reach represents the number of people who have engaged with the page as a proportion of how many people saw content from that page in their feed. *Sustainable Farms*' average daily page engagement on reach is 10%, which is very high.

Many of our partner organisations in the project area engage with and mention *Sustainable Farms* on social media channels on a regular basis. Over the course of 2019, 2032 pages or individuals mentioned *Sustainable Farms* on Facebook, and there were 191 mentions on Twitter.

Metric: Number and type of engagement with Press, Radio and TV.

Result:

> Press
  - Five articles in The Border Mail involving coverage of *Sustainable Farms* field days (3) and funding from the Department of Agriculture and Water Resources Grant awarded to the project (2).

> Radio
  - Four segments with ABC Local Radio in Riverina covering *Sustainable Farms* field days and conservation on farms with Senior Field Extension Officer, Dr Mason Crane.
  - Research Director Ecology, Professor David Lindenmayer, appeared on ABC radio on two occasions to discuss conservation on farmland in the woodlands.
  - Research Director Finance, Professor Bruce Chapman, had segments on commercial television (2) and radio (2) discussing the benefit of revenue contingent loans for supporting agriculture.

PERFORMANCE CRITERION:

14. Level of policy engagement

Metric: Number and type of presentations and meetings with relevant actors in the government, industry and finance sector.

Result: Meetings and presentations:

- Research Director Ecology, Professor David Lindenmayer, presented at the Rabobank Farm2Fork Summit on 'Achieving sustainable farms: new insights, new opportunities'.
- Professor Lindenmayer also held several meetings to provide policy advice on farming and biodiversity to Members of the Australian Parliament. He also met with both the Victorian Minister for the Environment and the Threatened Species Commissioner.
- Research Director Mental Health, Professor Phillip Batterham, led a briefing session for federal politicians and staffers at Parliament House on suicide prevention, particularly in rural areas.

Partnerships:

- *Sustainable Farms* commenced a farmer listening groups project with the Clean Energy Regulator to encourage farmer engagement in the Australian Government's carbon farming scheme.
- *Sustainable Farms* partnered with the Climate Change Institute to design a climate smart loan for the Regional Investment Corporation (RIC).

Sustainable Farms Research Director Ecology, Prof David Lindenmayer presents to Rabobank's Farm2Fork Summit.

PERFORMANCE CRITERION:

15. Research translation (policy proposals)

Metric: Number of tools, resources and guidelines generated from the research findings with policy relevance.

Result: A key element of informing policy is the translation of research into meaningful and relevant proposals. In 2019 *Sustainable Farms* worked towards this objective by:

> Laying the foundation for translation around the research on revenue contingent loans to support remediation of degraded agricultural land. For further information refer to Chapman, B. and Lindenmayer, D.B. (2019). 'A novel approach to the sustainable financing of the global restoration of degraded agricultural land'. Environmental Research Letters, 14, 124084.

> Preparing environmental accounts of the Box Gum grassy woodlands in collaboration with the National Environmental Science Program which will be used as an information system for research on conservation. In 2019 a workshop was held to discuss the land accounts with representatives from state and federal governments.

PERFORMANCE CRITERION:

16. Industry Partnerships (joint projects)

Metric: Dollar value of funding received through industry partnerships.

Result: *Sustainable Farms* received $324,000 in 2019 through industry partnerships. While this is below target, there was no further scope for additional activities during the year. This is an area *Sustainable Farms* intends to pursue further in 2021.

Metric: Number of projects currently being undertaken jointly by *Sustainable Farms* and industry.

Result: *Sustainable Farms* had three active partnerships with industry, meeting our target for partnership quantity. These include:

> A three-year, $256,000 partnership with Meat and Livestock Australia (MLA) to work on developing environmental indicators to strengthen on-farm reporting. The project is led by Dr Martin Westgate.

> A partnership with the Kering Group, worth $56,000 per annum for three years. In 2019, despite some delays, a number of monitoring sites were established.

> *Sustainable Farms* commenced a $12,000 partnership with Wheen Bee Foundation, producing several podcasts and resources to describe how to support pollinators in agricultural landscapes.

CASE STUDY: ENCOURAGING THE UPTAKE OF CLIMATE SMART FARMING

While farmers in Australia are accustomed to both good and bad years, these fluctuations are intensifying as climate impacts increase. As land can both absorb and release greenhouse gases, farming is in a unique situation: agriculture is part of the problem, and potentially a significant part of the solution, to climate change. However, access to revenue may be a limiting factor that prevents many farmers from adopting climate smart farming practices and technologies.

Sustainable Farms partnered with the ANU Climate Change Institute to provide options and recommendations around how the Rural Investment Corporation (RIC) can design and deliver an effective loan program to encourage farmers to take up climate smart farming practices and technologies. The project identified program settings which would most effectively encourage farmers to take up climate smart farming (CSF) practices in terms of: 1) practices and technologies; 2) loan eligibility; 3) loan settings; 4) adoption barriers; 5) perverse outcomes; and 6) any other issue raised by the RIC.

The concept of climate smart agriculture has been promoted all over the world, but it varies widely depending on the context. The ANU team's first task was to define what climate smart farming involved. Australian farmers are known for being incredibly innovative and the challenges they face are context specific. Rather than including a list of practices that might limit farmers' innovation, the team identified CSF as 'a set of practices which taken together represent a strategically planned, transformative change at the farm level by providing a net reduction of emissions along with adaptation to climate change while increasing productivity'. There are three 'Climate Smart Pillars' to CSF: (Productivity, Adaptation, Mitigation) + Transformative Change (changes at the farm level) + Strategic Goal (explained in a strategic plan).

This study also provides a comparison between time-based repayment loans such as those currently available through RIC, and revenue-contingent loans, in terms of their settings, repayment schedules, serviceability, and eligibility criteria. Different combinations were modelled with base amounts varied to explore the effect of changes in interest rates, the amount and term of the loan and different loan/grant arrangements.

For an industry where revenue can often fluctuate considerably, revenue-contingent loans present several clear advantages over time-based repayment loans for borrowers, especially in times of financial hardship, although the specific settings chosen will affect the desirability or otherwise of the loan for both RIC and the target market.

Attendees of a *Sustainable Farms* Field Day viewing a restored dam from its hardened access point.

KPIs 17 – 19: PROGRAM MANAGEMENT AND EVALUATION

GOAL 5:

Make informed management decisions by monitoring and evaluating the project and adjusting resource allocation to progress and evolve the project.

Progress Summary: In 2019, *Sustainable Farms* received several new income streams that enabled the full roll-out of activities to meet objectives of the project's Strategic Plan 2018-2022. This funding included a large funding grant (*Commonwealth Grant Agreement for Tree Planting and Farm Dam Enhancements*, to the value of $5,930,000) from the Department of Agriculture and Water Resources, and a three-year grant from the William Buckland Foundation (*Sustainable Farms*, to the value of $389,126). This expansion involved recruitment and orientation of nine additional staff. Work planning and training for the new staff was completed in the second half of 2019. The result is that at the beginning of 2020 *Sustainable Farms* now has the capacity to deliver new research on farm dams and shelterbelts. In addition, the project has extended into Victoria and is also delivering a more extensive program of outreach and capacity building activities across the whole project area.

Sustainable Farms Biodiversity Field Officer, Clare Crane collecting samples from a farm dam.

PERFORMANCE CRITERION:

17. Work team performance

Metric: Percentage of staff achieving objectives in line with accountability frameworks.

Result: Performance development processes have continued for existing staff and been established for new staff, with the team achieving above the target of 85% stated objectives in their Performance Development Reviews in 2019. Other activities undertaken to improve performance across the project in 2019 include:

- Development of the *Sustainable Farms* Business Plan 2019 finalised in April.
- Planning workshops were held with the *Sustainable Farms* team over 2-3 days in April and October to ensure continuous improvement of the project and ongoing skills development.
- Governance structures were well-managed in 2019, with all Executive and Advisory Committees meeting as per the terms of reference, and with reports provided on request.
- Oversight of the contractual relationships between partners continued in 2019, with reporting obligations met.

In 2019, *Sustainable Farms* established project registers, business records and protocol documentation to continue the consolidation of the project. This work, along with the establishment of stakeholder mapping, is ongoing.

Sustainable Farms staff, Research and Extension Officer, Dave Smith, Senior Research and Extension Officer, Dr Mason Crane, Engagement Officer, Amber Croft and Biodiversity Field Officer, Angelina Siegrist at the Henty Agricultural Field Days.

PERFORMANCE CRITERION:

18. Revenue growth

Metric: Increase in revenue.

Result: New revenue was committed to the project in 2019 by the following organisations:

- Commonwealth Department of Agriculture and Water Resources $5.93m over five years
- Private Donors $43,857
- Meat and Livestock Australia $256,000 over three years
- Murray Local Land Services $13,500
- Riverina Local Land Services $55,000
- Wheen Bee Foundation $12,000
- William Buckland Foundation $389,126 over three years

There were 33 meetings, including introductions and presentation opportunities, with new potential funders and ongoing discussions with existing funders. These interactions are cause for optimism in relation to fundraising in 2020.

PERFORMANCE CRITERION:

19. Standard of evaluation

Metric: Percentage of evaluation standards met by *Sustainable Farms*.

Result: The *Sustainable Farms* Monitoring and Evaluation Framework (MEF) was developed in 2018. The reference document for the standard of evaluation conducted by *Sustainable Farms*, identified by the MEF is the Evaluation standards for Aotearoa New Zealand available at anzea.org.nz/evaluation-standards

During 2019 both the MEF and the evaluation standards were used to guide the:

- Review and selection of a digital survey tool
- Development of field day questionnaires and collection processes.

CASE STUDY: DEVELOPING A METHOD TO MEASURE TARGETED PRACTICE CHANGE

The Central Tablelands Local Land Services (CTLLS) delivers workshops and capacity building events to landholders across a wide range of topics, including natural resource management (NRM). However, like many other NRM bodies, CTLLS would like to implement a long-term, program-wide methodology to assess whether their learning programs have led to NRM improvements. In 2019 *Sustainable Farms* worked with CTLLS to develop a method for monitoring targeted practice change.

For CTLLS, reporting obligations are met and progress towards delivering core services are monitored through the MERIT platform. However, this does not provide clarity as to whether the practices of participants change after attending a learning event. To assist CTLLS to monitor practice change following its outreach activities, *Sustainable Farms* provided advice for developing a method to monitor and evaluate training courses, workshops and field days delivered to facilitate and support improved natural resource management.

A key finding in the report provided to CTLLS, and the basis for *Sustainable Farms*' own field day program logic, was the importance of understanding the adult learning cycle and developing a field day program that supports this cycle. Most notably, repeat attendance at NRM events assists farmers to develop confidence in an NRM concept, and networking with other farmers who share their own experiences are central to successful adoption of natural asset management. This is illustrated in the Field Day Success Loop.

The report also included: an indicator bank, with supporting metrics, to create a tool to support the measurement of the intermediate outcomes; a review of digital survey tools for collecting structured data against the proposed metrics, advice on sampling considerations; the collection of narratives to capture additional evidence about the relationships between attendance at field days/workshops and subsequent changes in the practices and experiences of participants. The report is available at sustainablefarms.org.au/resources.

The Field Day Success Loop of Farmer Learning.

Farmers sharing ideas and experiences at a *Sustainable Farms* field day.

CONTACT US

Further information about ANU *Sustainable Farms*
sustainablefarms.org.au

Annual Report available online at
anu.edu.au/about/strategic-planning/sustainable-farms

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