# Science to Practice Forum

**Day 1 Part 3 Program Transcript**

**7 June 2022**

**Introduction**

The Forum brought together farmers, their communities, the eight Drought Resilience Adoption and Innovation Hubs, Future Drought Fund program leaders, researchers, agribusinesses, and all levels of government to share knowledge about building drought resilience.

**Transcript**

[Event begins]

Andrew Bell:

And we're back for the third and final session of the first day of the Future Drought Fund Science To Practice Forum. Welcome back. The session, by the way, about WA and that pilot project, is going off, I can say. It's very gratifying not only for us to see that, but also all the questions coming in. There's nothing worse than Q&A sessions with no questions. And you have not let us down today, the questions keep rolling in. Thank you so much for your engagement.

Andrew Bell:

We've visited three of the eight hubs so far, we're now off to another one. And every hub has its own particularities. And the next one is Northern WA and the Northern Territory. That is a big slice of this big country, spanning a state and territory border and many different challenges in agricultural practice. The phrase big country never rang as true as it does with this hub. So let's take a look at what's going on in the top end.

Jed Matz:

Drought takes many different forms in our region. We cover desert, we cover subtropical and tropical environments. So what drought means to our producers and communities is different in every sort of region that we have. We talk about the business resilience and it's about people planning for risk.

Patrick Underwood:

We need to deliver cattle 365 days of the year. And it's a really seasonal side of things. It's really seasonal, as far as a lot of people like to sell their cattle after the wet season. So any innovation that we can use or drought proofing of country, whether that's supplementary feeding or whether it's moving cattle around the turgid places where there are grass, such as the floodplain. It's all really helpful to get an annual supply of cattle, which is important for our customers.

Patrick Underwood:

I've basically spent my whole life in the industry. I was born and raised on cattle stations 900 kilometres south of Darwin, on the edge of the Tanami Desert. So grew up there as a third generation pastoralist. Most of the territory has a very long dry season. So there was an average rainfall, down there, of about 20 inches. It tended to rain most years that we were there. My grandfather bought it in 1957. We sold it in 2013. We averaged that sort of rainfall.

Patrick Underwood:

But it's interesting in the last four or five years quite a lot of the territories missed out on a good wet season. And the wet season that just finished saw probably 80% of the territory get an under average wet season. Which is disappointing for them, because if you don't get rain by April in the territory, you're not going to get your next lot of rain until October, November. Winter rain is rare and useless.

Jed Matz:

Collaboration is a massive part of the Hub's role. There are already great organisations within the territory, in Northern Western Australia, working with producers. So our role is not to come in and duplicate that work, ours is to coordinate and share information across those groups, get them working more closely together.

Will Evans:

This year's the 150th anniversary of the pastoral industry in the Northern Territory. And I think what we're really doing this year is talking about well, what do the next 150 years look like? I think what the Hub's provide, is this is the first time this group of people has sat around a table together and said, "Look, let's dedicate our resources, let's dedicate our time, our expertise, our knowledge and our networks to really trying to build what is a unique opportunity for everybody in the area."

Tom Dawkins:

In anything we do, the more that we share ideas, it's a fast track to success when you're collaborating and you're sharing knowledge. So in Australia, we've got these funny state borders that get in our way sometimes and create some unnecessary tunnel vision. At a commercial level, our industry is a great example of where those state borders really don't exist. We look across into Western Australia where some of the cropping is more well-established and other opportunities to value add, to grow our market options. I think that the Hub's a really good place to house a lot of that conversation. And it brings together stakeholders that are pretty diverse, but that all share a very common objective.

Simon Smith:

We'll have to clean it out, this one. Don't we? I guess one of the frustrating things, particularly being in the north, often you feel very isolated, not just for inputs for farming and so forth, but also on knowledge. It's difficult to get to some of the bigger conferences. So having a hub that brings together that knowledge, that looks at innovation, looks at drought resilience, is super important because there's a lot of knowledge out there. And our role as, I guess, a farming advocacy group and member base group will be to filter that down to the farmers. To give them the best opportunity to be drought resilient, going forward.

Jed Matz:

Hopefully, over the next five years, we've established ourselves as a integral part of the ecosystem of extension and adoption in this region. We've built capacity within our member organisations and created more extension and adoption capacity within those groups. That the producers in our regions are starting to implement new technology and becoming more resilient businesses and are more prepared for changes that are predicted to come our way.

Andrew Bell:

Another one of our videos giving you a glimpse and a taste of what's going on in the Hubs. Now we're going to go live up to the top end and Jed Matz who's the Hub Director up there, Jed delightful to see you. I bet you it's warmer up there than it is down here in Canberra.

Jed Matz:

Yeah, a little warmer and I was running a bit late, so I had to run to the camera. So I probably got to sweat up now.

Andrew Bell:

Lovely to see you. Take it away with the showcase.

Jed Matz:

Okay. Well, welcome from Larrakia country. I'm Jed Matz, I'm the CEO of the Northern Territory, Northern Western Australian Drought and Innovation Hub. So really what we're trying to show you today is the way that our hubs are trying to work. Our hub, we think is about building on the existing skills and capacity that's within our membership and trying to enhance that and wherever possible, build further on the existing capacity. So what we're going to show you today is some of the great work that some of our members, in this case the Northern Territory Department of Industry Tourism Trade, the Department of Ag here is doing in indigenous pastoral companies. So we're not trying to reinvent the wheel, we're trying to stand on the shoulders of our members and extend that work a little bit further.

Jed Matz:

So what you're going to see is a prerecorded message. Some of the audio is a little rough, but I think that just reflects the fact that this was done during COVID times. So it needed to be done on handheld devices remotely without necessarily great audio recording equipment. But also that's done during working cattle station times so there's a little bit of background noise as well, which is just part of the course.

Jed Matz:

So you're going to hear from Steve Robinson and Chaz de la Core, who are Industry Pastoral Program Officers and Managers within the department here in the Northern Territory. And you are also going to hear from a number of indigenous pastoralists about some of the work that they've done to make their businesses more resilient from drought. So I guess that's all for me. Been really enjoying this symposium and hearing about the other hubs. And I hope you like what you hear from us.

Steve Robinson:

It's Steve Robinson and I'm a Development Officer with the Northern Territory Government Indigenous Pastoral Program. I'll hand you over to my colleague, Chaz de la Core. His office found in Catherine at the moment and he can explain to you a bit more about the work that we do.

Chaz de la Core:

And my name is Chaz de la Core and together we deliver the Northern Territory Government and Indigenous Pastoral Program. Promoting Aboriginal participation in the NT pastoral industry. Our primary role is to provide extension service mentoring to Aboriginal parcels, to assist, improve enterprise productivity for the focus upon improved land management outcomes, livestock management, best practice, infrastructure development, general business management. In particular, there is a strong focus upon improved grades in lab management practises. Including managing for drought events with the emphasis upon long term, sustainable production outcomes. Pastoral infrastructure investment has supported development of 30,000 square kilometres of NT Aboriginal lands for pastoral purposes. Since 2010 cattle numbers on NT Aboriginal land has increased from 40,000 head to over 200,000 head with significant flow of economic and social benefits. First practice grazing land in management, including for drought event is now of increasing significance.

Steve Robinson:

Reduction from Aboriginal pastoral properties has been from a combination of improved productivity from existing pastoral properties serviced by our extension services or from the opening up and development of new grazing lands. IPP combines traditional knowledge with modern science. Our research scientists bring the science component to the table emphasising, matching partial productivity to resource potential.

Steve Robinson:

For example, our research staff conduct pasture growth modelling, where we look at forage demand and the nutritional requirements of cattle, combined with pasture utilisation rates of different land types, combined with historic rainfall. And at the end of the day, we have an estimated carrying capacity at different percentiles being for good seasons or below average season.

Steve Robinson:

Bring the Aboriginal traditional knowledge to the table. And this is based on tens of thousands of years of observation of the fauna and flora and how this interacts with the landscape. Sometimes we need to take into account cultural, significant areas, or just maybe even hunting grounds which Aboriginal people just they want to keep it natural and they don't want it subject to livestock grazing. The day we basically have a melting pot of modern science mixed with traditional knowledge. Which paves a pathway forward for us to develop land for grazing purposes in a culturally appropriate manner and as per the aspirations of the Aboriginal owners of the land.

Chaz de la Core:

Frank Shadforth is the owner of Seven Emu Station, a passionate cattleman, a traditional owner. Frank shares his view of managing his land and some of the changes he has seen.

Frank Shadforth:

Hello, I'm Frank Shadforth, owner of Seven Emu Station, more or less a traditional owner. I was born and raised here and I've seen this country change a hell of a lot since I grew up here. One of the worst thing I see is too much burning and it's the wrong time people are burning. And yeah, they're killing a lot of spiders and not only spiders, a lot of birds nests and all that sort of stuff. A lot of things changing and one of the problem I talk about is native bee. And the reason why I do talk about it is because I grew up hunting for food and in this river system, you don't see the flying fox come up to the river no more because of the male bees gone out and the trees don't flower and pollinate properly. That's why you see a lot of flying fox in town. I don't like clearing trees and pulling trees is not good for the country. I'd rather leave the country natural as it is in.

Steve Robinson:

Bluegloss is 100% owned and managed Aboriginal cattle company. They run approximately 30,000 head on properties in the Northwest of the territory and also in the central region. And this gives them the capacity to move stock from between properties in accordance with seasonal conditions and reduce the risk of exposure to drought conditions. They've also recently embarked on a water development program to also reduce their exposure to drought conditions. This is their story.

Steve Craig:

Right. My name is Steve Craig, General Manager of Bluegloss Propriety Limited, 100% aboriginally owned and operated pastoral company in the Northern Territory. We run approximately 30,000 head of cattle consisting of three past releases for State Creek and Bronby Plains in the North, Northwest and Ooratippra Station out on the Sander.

Steve Craig:

Well, we feel that having this, the property in the south sort of helped us drought proof our enterprise and vice versa. We could either go back south or go back north and or come south and target the markets in the east and the south. Yeah, well we've had a major development program with water infrastructure and we're trying to shorten all our waters down to four kilometres. And we've fenced all our river systems off so there's no degradation in the water courses and stuff like that. We don't rely on the river systems and surface water at all now. All our infrastructure improvements and development, it is authorised through the Bluegloss board, traditional owners board. And it's all culturally appropriate work that's done with their approval

Chaz de la Core:

Clarry Shadforth is another Aboriginal pastoralist in the Gulf Region. That he has implemented the strategy to reduce the potential impact of dry seasonal condition on his cattle enterprise. Terry explained some of his management plans thus follows.

Clarry Shadforth:

I'm Clarry Shadforth from Seven Emu Station in the Northern Territory. And we've run cattle here on Seven Emu's and we also got a contract [Department to confirm] that we sort of get out and go and do stuff away from Seven Emus. Contract mustering and removing feral animals. We've also got a solar board down on the coast, along the on the Robinson River here at Seven Emus. Where we don't have to rely on any surface water or water rivers and that which helped us a lot.

Clarry Shadforth:

Yeah, we just subdivided another three paddocks up for rotational grazing and that sort of thing. So late in the year, we've got a couple of spare paddocks there if needed, if we run out of grass in one paddock. So we've got that option to rotate, which is a big benefit for the Station. Also later this year, we've also got a solar board getting put in up at the homestead here to pump our water into the Station. Yeah, because at the moment we're sort of pumping out of the river. So this solar pump's going to benefit the homestead.

Steve Robinson:

External investors have invested approximately 18 million dollars in recent times into pastoral infrastructure on Aboriginal lands. This could be adjoining landholders, people looking to get into the pastoral industry, or existing enterprises looking to expand. One of these is DK Grazing, Don White, who operates free pastoral properties in the top end, as well as the state of the art export depot. Don took on a large area of Aboriginal flood plain land in the Daily River area as an extra feed resource to help him through the dry periods. This is Don explaining his enterprise.

Jermaine Davis sr:

So yeah, Don White from DK Grazing. We own and operate three cattle stations in the Northern Territory, also our live export depot. We've just taken on a 15 year term lease on some undeveloped country out on the [Department to confirm] River region. Started putting a bit of money infrastructure and with the development program then get up to running a stand alone operation. Initially we're fencing in onto waters and accommodation and yard facilities so that'll a fully operational area. In addition to that, there's a weed control and feral animal management and stuff to do out there to get it operating. We'll use it in conjunction with our existing operations to feed cattle over the dry season. The quality of our other stations is that good, it good enough to do weight gains.

Steve Robinson:

Extensive areas are underdeveloped parcel lands exist in some parts of the Northern Territory. For example, there's approximately 10,000 square kilometres in the Northeast of the Territory, which is in close proximity to regular droughted areas of the Downs Country in Barclay and Western Queensland. There's good opportunity for investors to work closely with and in conjunction with Aboriginal people to develop these lands and to also provide career pathways for Aboriginal people within industry where very other little opportunity exists.

Chaz de la Core:

We hope that you enjoyed this presentation. Please do not hesitate to contact us with any questions that you may have. Thank you.

Andrew Bell:

And thank you, Chaz and Steve and before that, the Director of the Northern WA, Northern Territory Hub, Jed Matz. We've got certainly got a taste of the Territory there and amazing footage and information to ponder. Well, we're going to stay sort of up in that part of the world. Now we're going to go over the border fully now to Western Australia and a story about healing and saving. It's about the Noongar Boodja Rangers. They're a team of around 20 wheatbelt based Ballardong Aboriginal people who are delivering natural resource management activities through that region. And we're going to have a Q&A in a moment. So we're going to have a video first, but any questions about what they're getting up to please go to the Q&A feature. But what we're going to see first is to get a real taste of what's happening on the ground as the Rangers save seed to heal the land and a lot more besides.

Jermaine Davis sr:

Our rangers are out planting on country and playing a wider role to revamp around the wheat belt region.

Judd Davis:

My name's Judd Davis, I'm a Project Delivery Officer at Wheatbelt NRM and I've been bought into coordinate the seed collecting project.

Dr Karl O'Callaghan:

Wheatbelt NRM is an independent community based organisation, which provides leadership across the wheatbelt, in the management of our natural resources. We work alongside wheatbelt communities to take positive action to strengthen the natural, social, cultural and agricultural resources of the wheatbelt.

Jermaine Davis jr:

My name's Jermaine Davis and I wanted to become a Noongar Boodja Rangers because at the start it was more getting the work experience to be working with family and everything like that, with dad being my boss. And then from then on, it went on to more seeing the positive outcome it could have on the younger generation, doing a lot of work with the school kids and then, yeah, it's just grown on me over the years.

Jermaine Davis sr:

Hi, I'm Jermaine Davis. To see the progression of where it was when I first started to probably three days a week work, if that. To having a lot of contract work and the program progressing as quick and as fast as it can. Within that five years of me being there has progressed immensely. It's young men working on country and delivering the message back to the communities from their elders.

Cale Moody:

My name is Cale Moody and I wanted to become a Noongar ranger to help look after the country, try rebuild what was lost. There's a lot of clearing going on in drought. I think it'll be good just for make sure the country just rebuilds ourself up.

Jermaine Davis sr:

You look around the riverways for our people. That's where we lived and breathed off. Summertime our elders would hold swimming events in the river cause they weren't allowed out the pools. So a lot of their food [Department to confirm], fish, turtles were all in that river ways. So long ago when our elders lived off the land and you slowly see how drought has affected that. With yabbies and turtles and other stuff and the dryness of the river that you can't go down there and recreationally enjoy what was there when they were kids.

Jermaine Davis jr:

Working with the boys they make work enjoyable. So you're going out not only just to collect seed, you are also having a bit of fun while doing it. And you are working on land, which is what I like doing the most. And also to see what comes out of it in the future. Like when the re veg sites get planted and everything like that. And you see what comes out of what you collected. Makes me pretty proud.

Jermaine Davis sr:

Seed Collecting Enterprise came as a conversation with myself and my manager back at the time. We wanted to progress the ranger program and see where it was heading. We thought about Bush Tucker stuff, but we thought it was too hard to do. Came up with the concept of a seed collecting idea and progressed that into a seed collecting business. Because of thought at the time, that was where everything was heading to that space with clearing of land and mining sites and stuff like that. So seed collecting was really important and we didn't think at the time that would progress as quick as we have and as well as we have in that short time.

Judd Davis:

First off with the environmental positives, just to see plants growing in the ground is inspiring to see plants coming back on country. Part of growing up, I used to go out the Bush with my grandfather, Kevin Davis, who was an elder for the wheatbelt region. So he taught me a lot about the Bush and traditional ecological knowledge. And I remember back then doing things like fire restoration and seeing plants come up just from creativeness with fire, the fire ephemeral plants. So that just brings me back to memories with pop and him telling me why it was so vital that we teach the younger generation to bring back plants and to restore our country.

Cale Moody:

It's really interesting to learn about new things, especially plants learning the names and stuff and also getting some knowledge to pass down. Also.

Judd Davis:

It's just good to see local Noongar people getting back on country, earning a day's wage, but also learning about their country. Not just through the Western science, but also through traditional, ecological knowledge and having that connection to culture.

Jermaine Davis jr:

My journey started off knowing nothing about seeds. And with the help of Judd now you've learned the skills to how to collect certain seeds because everything's different. And also just telling trees and picking what they are knowing their name.

Judd Davis:

Part of collecting seed for our native vegetation throughout the wheatbelt. We select species that are endemic to the region. That just means that's where they only grow. They only grow on the wheatbelt. Part of building resilience through native vegetation is restoring the natural ecosystem, which obviously impacts more moisture retention. And just bringing things back into a natural balance. Well, the seed collecting project, we have three major clients at the moment. One is Main Roads. So as a part of their offset planting, when they clear, they're tasked to buy farmland from private land owners and we're basically just collecting seed for them to revegetate that old agricultural land. The other is Ramelius Resources who are collecting seed for some of their mine sites. So as a part of their mine site closure, they have to revegetate. And then for Outback Carbon, we're also collecting a lot of seed up near quarter, helping them meet their key performance indicators with collecting a lot of like mallee's and eucalyps.

Kent Broad:

These seeds and the seedlings will be used on well, we've got a particular 1500 hectare project spread across about 15,000 hectares. And with that, we want to try and link up the remaining remnant vegetation that's there. And to create wildlife corridors through the landscape and also to help with the drought mitigations. And we've been really proud to be, I guess the inaugural client, if you like of the Wheatbelt Ranger Program and to have Judd and his crew out there collecting for us has been a really great opportunity for us.

Judd Davis:

This work is really vital now, not just the work itself, but education. Just to educate people who come out with me regularly so they can understand why it's so vital that we're putting trees back in the ground.

Jermaine Davis jr:

Obviously the re-veg that will come out of it in the future with all the companies that we're doing work for and also gaining more skills. And then when we get new Rangers come on or new people that come to help us out, you can teach them what you learned over your years of doing what you're doing.

Judd Davis:

Especially in the wheatbelt, which is my locality, you just see the trees less and less. Which is going to affect us pretty badly in the long run if we just keep letting the trees get cleared and not put anything back.

Cale Moody:

It really does mean a lot to me, especially because I have a lot of family that live out in the wheatbelt and we all like to go out to the bush to get a feed, a kangaroo and stuff. So, but it's really good to know all these things.

Jermaine Davis jr:

There's a few jobs that we've done already, that you go out and see like the trees are slowly coming up and it's like, "Man, we've done this work and it's good to see it all come up." And then obviously for my kids, it could be somewhere you take out and be like, "I put in the hard work to do all of this and then it's all showing out."

Jermaine Davis sr:

And then obviously you build a rapport amongst your peers and they see how important a role seed collection is. And with Aboriginal people and if you deliver the right message and deliver the quality products that you can do that then progresses to other organisations and companies and mining sites that support this program because they do really great things. In that short amount of time, we've gone from one contractor to a number of contractors in a short period. Which sells a message that we're doing something pretty good. You've heard a number of stories today about drought and how it's impact on the community. And, and I guess on a emotional sense for Aboriginal people. It's around our waterways and stuff like that usually a meeting ground for our people. So I know myself as

Jermaine Davis sr:

As a young kid growing up, swimming around water holes and main rivers. And today you can't do that. And a lot's changed in that time but we want to make it a sustainable industry where we have Aboriginal people working full time, collecting seed.

Judd Davis:

I guess the ideal future for me in terms of people interacting with the bush would be give and take. So realising that yes, we do have natural resources and they have a lot to give but also we have to be actively managing and maintaining and sustainably using the resources so that we don't deplete them and then have nothing left for future generations. And those who come fifty to a hundred years later.

Jermaine Davis sr:

I think our ranges along with our elders are playing a really strong part in rebuilding drought. We're not going to say that we know it's going to change everything but I think if we can all work together as a collective, we can try and mend our country as quick as we can.

Andrew Bell:

And we can now go live to the Wheatbelt Natural Resource Management, Dr Karl O'Callaghan is the CEO and is a familiar face there of Jermaine 'Bomber' Davis. Hello gentleman, good afternoon. That was a great video. So where does and by the way, ask questions away, those watching on the Q&A box. Where do you see this going? How far can the seed collection and starting from a small thing it seems to be, it means much more than just collecting seeds.

Dr Karl O'Callaghan:

Yeah. I think what you heard there was that the Wheatbelt rangers, the Aboriginal rangers started some time ago with small work. Just helping around town and doing small jobs. And I think hitting on the seed collection as an enterprise has given the Noongar Boodjar rangers and Aboriginal people a real sense of involvement in the natural resource management and restoration of the Wheatbelt and it means something to them. And as you can see from the video, the rangers want to be involved in this. And there is a big demand for seed collection around the Wheatbelt.

Dr Karl O'Callaghan:

Most of that for restoration work. So you've heard some comments there about some of the mining companies that want restoration work done, the main roads department, of course they do a lot of clearing in the building of roads. And so there's offsets to be done and also carbon planting. So I guess that from my perspective there will be a lot more demand for seed and the seed enterprise as we move forward in the future and as carbon planting expands and as people get used to the fact that carbon offsets and offset planting re-vegetation is so important to rebuilding the natural resources of our Wheatbelt here in Western Australia.

Andrew Bell:

Bomber, are you, I think you used the word pride. It shone through the video. I mean, could you have imagined where you are now when the whole notion started?

Jermaine Davis sr:

No. I think it's a really exciting space that we've managed to deliver pretty quickly that I guess for our guys it's playing their vital part in healing the country, whether that's through collecting seed and reveg. I think these young guys take a real good responsibility on that and really led by their elders at the same time when they've seen I guess country growing up and seeing it how quickly it can change. And I guess if we all work together in that space it can be really exciting. I think one thing that I hear from my guys at the moment is that they're really enjoying that space of playing a model part in rebuilding of the country and healing of the country, whether it's through seed collection and they're able to play a wide role with that. And I guess it gives a bit of ownership that the Noongar and their elders can eventually trust them to hand over that and go, you guys are doing a great job.

Andrew Bell:

One thing that shone through was that the eyes are on a prize beyond our lifetimes and their lifetimes. A phrase used was give and take is sort of give and take with the natural environment but also at a human level building relationships. I wonder Karl and Bomber if you can talk to how the relationships have grown over the course of this project.

Dr Karl O'Callaghan:

Well look, I think you have to understand that it is predominantly an agricultural area. And so over time a lot of the wheatbelt has been cleared, about 90% has been cleared since the 1930s. But part of the rebuilding of the natural environment has been establishing good relationships with landholders who are really enthusiastic about being part of this. So getting landholders involved, getting communities involved, getting the traditional owners involved has been really, really important to the success of this project. And we also have mentioned private enterprise as well. People like mining companies. So building relationships is absolutely essential. And also understanding the different tensions that occur in a place like the Wheatbelt where there are a lot of different activities going on and how those activities mesh with rebuilding the natural environment.

Andrew Bell:

We got a question here coming in from Ben Hogan. I don't know which of you can speak to this. Ben's asking, "Does germination happen in the ground in situ or elsewhere and then transplanted. And do you know," this is the second part of the question, "a rough percentage of seeds that mature?" I don't know Karl or Bomber which of you can speak to that?

Dr Karl O'Callaghan:

Well either of us. Species have to be germinated sometimes in the ground and sometimes they're germinated in nurseries. It depends on the type of planting that's being done. One of the challenges the seed collection not just here in Western Australia but everywhere is establishing things like purity and viability. And the viability is about how many of those seeds germinate. It also of course if your direct seeding depends a lot on what the seasons are like, whether you're getting rain or what type of season you are getting. So germination can be low.

Dr Karl O'Callaghan:

Some years it can be as low as 30% or less and some years it can be higher. But you heard in that video a conversation about Wheatbelt endemic seeds. So when these seeds are collected, it's not just endemic to the Wheatbelt, they're actually endemic to a specific location in the Wheatbelt. And the reason that is done is to make sure that the right plants are growing in the right areas but also you have the best chance of germination and viability. But viability and purity remains a challenge for us to work towards to establishing. So we understand that a little bit better.

Andrew Bell:

The right plants in the right areas. Bomber we've got a question here from Nancy Gateway who's asking are the rangers getting qualifications as they develop their skills doing this work?

Jermaine Davis sr:

Yes, we're looking at about our guys on the search to conservation management training. So there is ongoing training and qualifications for our guys if obviously they want to better their skills and learn more at the same time. So we're really strong on that. The organisation with our ranger program is further qualifications that can make them better people and make them better rangers moving forward. So any qualifications that do pop up that we find is relevant for us and our guys and moving forward that one they're keen on doing, which is the important thing. We're all excited and happy to merge on that road.

Andrew Bell:

And just before we wrap it up, how about the next generation coming behind the young people? Are the kids aware of what's going on as well?

Jermaine Davis sr:

Yeah, we work closely with the high school in town with some of their contact Aboriginal kids. So we get about probably once a year or so ongoing work on country. And I think they play a really important role moving forward in this drought space that there's a generational gap with Aboriginal people, including myself and my traditional owners. And I guess my parents that there's that generational gap that were they weren't able to pass down that knowledge through loss of connection through our waterways and through our rivers and through the bush tucka and stuff like that. So having I guess myself and Judd on board that is able to one, work around our ranger group and then obviously our ranger group works within those primary school, high school kids. I think it just lays the foundation that in 10 years time, 20 years time, we've got a generation of excited people that want to continue to work together.

Andrew Bell:

Well Davis, Dr Karl O'Callaghan thank you so much for sharing this story which is specific to just one area of WA but informed so much more around the country. Thanks so much and stick around with us in this forum. We're now going to Queensland to join Glenn Landsberg. We're going to hear about reading the landscape to identify disturbances, what's going on, and therefore to fortify farming systems. Glenn is a project officer at Southern Queensland Landscapes and he's joining us now. Hello Glenn.

Glenn Landsberg:

Yes, g'day thanks for the invite. Yeah, days like today's actually a wonderful opportunities to pick up ideas and often just cement in our minds the importance of what we are already doing, often already are doing. Working with landholders trying to work out where they are and how to give them that drought resilience. And in these range land areas, the rain seems to be our most limiting factor. However, the work we've been involved with is so much more than just restoring water's function in the landscape. Rather, it's been a holistic program of sharing general knowledge and ideas and the ability to really read our landscape and restore its resilience. Being aware of what's needed to restore the balance and using that ever increasing range of tools in the toolbox. Droughts and the shortage of water are optional and we certainly see that in the landscape.

Glenn Landsberg:

Two of the biggest issues when I talk to most people on the land is drought and erosion. And drought's an apparent lack of water and erosion's too much water. But somewhere in the middle, there's a big opportunity. And these couple of photos here just highlight that so well. These photos were taken on the same day during the 2019 drought. And there's only a fence that separates the two and simply taking the water that was causing that erosion and with using different ideas and technology, we've diverted that water into spreader channels and suddenly that water's doing good work again, growing pasture and not doing damage.

Glenn Landsberg:

Sometimes we have to take water off country for it to recover but it's trying to get that water back into the soil, getting it so that it's all functioning again. These water infiltration tests saw so much three inches of water infiltrated in one and a half minutes in a functioning soil in the top left hand photo. And yet in a nonfunctioning soil that was still bare, three inches was still there in 10 hours. So reading our landscape is once again really important to identify its function so we have an idea of what we're trying to achieve. Deep rooted systems. We often don't get to see what's happening underground and where we have a cutting like this we can see the sponge that's created by that perennial pasture and how important it is to keep that pasture there and get it established again.

Glenn Landsberg:

When it's working, this is our drought mitigation. It's also our flood mitigation. That's where we store that water in those high flow, high runoff events. And we can see there too that when we only have annuals with very small roots, we don't have anywhere near the sponge to store that water. Drought resilience, reimagine, recreate and restore. Looking at country with landholders, looking at where it has lost its function, how it may have functioned previously and what's necessary to restore it economically. A lot of countries are past being under recover on its own without some sort of intervention. This property here it was destocked for nine years and still wasn't recovering. It wasn't until we started doing work in March last year and top left hand photo is where we're doing some laser work. We've modified how we're using lasers so that we're a lot more mobile and we can cover a lot of country. In this situation we did 30 kilometres of spreader banks in two days as well as other works.

Glenn Landsberg:

And yeah, you can see the first falls of rain starting to happen on that there and the transformation. And then the bottom left hand photo that's March this year. That's how quickly we can turn that country around and on a large scale. Yeah, it's quite extraordinary what that country can do once you get that water back in the soil and take water that's running and get it walking again. Wherever it is running, just slow it down, take the velocity out of it and next thing you know, good pastures are starting to grow again. This is just another type of country that we deal with. A lot of floodplain and wetland restoration. And we see a lot of damage from band bore drains, fence lines, roads, all sorts of things like that. And it's identifying those issues that are draining our country. And in this case here on this, there was two properties here on a flood plain system 40 kilometres long and it's not a ban and bore drain running down it. And on the top property, that's the size that a ban and bore drain.

Glenn Landsberg:

By the time we get to the second property you can see the landholder is standing in it. And then halfway down his property it's so big that old bore drain that you can park a vehicle in, you'd actually park a truck in it. And that actually put a stone causeway across it for access. And the landholder remembers when that was the same size as the bore drain in the top photo. And we can see then that satellite image, if that's coming through clear enough, that was March last year. So after eight years of drought, finally had three inch storm last year. In the top property we'd done a fair bit of work, spreading the water back out of that bore drain. And with that water of image or that water layer I put on, you can see how the water's spread in that blue and purple up the top on the flood plain.

Glenn Landsberg:

But then when you get to the bottom part of the flood plain, the last 20 kilometres, it just drops into that erosion feature and does nothing for him. So poor bloke, he's waited eight years for a flood and it didn't do anything. It all just went down that erosion feature. And that's where we're trying to help landholders see just how big an impact that's happening. He's waited so long for a flood. What it would've meant to him financially to have had that flood plain working, which in place is about two kilometres wide. And yet after finally it's a big fall of rain and it did nothing. So a huge cost to him economically. Environmentally it's a massive cost. We did find down the bottom of that second property where we could spread the water back out. And that's that fourth photo that you can see someone standing in that node of pasture that came up where we did spread that water back out again. And that's the sort of difference that we can make.

Glenn Landsberg:

Regeneration means we can make rain, we can cool down the planet, rehydrate the land and turn deserts green, it starts with imagination. And we're using a lot of modern technology to make that come true to we're using we've got an army of landholders now using satellite images on their phone. Just walking around with their phone, finding out where country's not functioning. We're using a lot of layers of work, all sorts of systems. Anything that we can, we're modifying to get that landscape working again. But yeah, that's very short version of what we're trying to do out here anyway.

Andrew Bell:

Thank you, Glenn. If people have got questions, ask away please. Re-imagining jumped out at me, is re-imagining what you do with land one of the hardest things to talk about because it's not concrete, whereas restoration is going back to where you were?

Glenn Landsberg:

The re-imagination, that's often looking at the landscape and trying to identify what its function was previously. We can see that in the vegetation there's lots of signs in the landscape that tell us, it gives us an indication of how it might have functioned beforehand. So that's sort of where the re-imagination is coming from. But then also imagining how can we bring that functionality back again, what can we do to restore that functionality?

Andrew Bell:

We've got a question that's coming from anonymous who says, do you see, I quote, "Bang for buck first step any grower can take?" Or is that perhaps trying to get a quick fix, I don't know?

Glenn Landsberg:

No, look I use that terminology a lot. And often the problem, particularly in these really big places, it's so big, where do you start? So yes, bang for the buck is a little crude, but it's certainly a big point that what is the lowest hanging fruit? What can we tackle that's going to make the biggest difference? And certainly an easy one is just looking where the country is draining. We've got wetlands that are over 3000 hectares or one that I've got to work on the moment. And it's just got a tiny little drainage feature at the base of it that's stopping it from functioning. So it's identifying where those issues are in the landscape. And sometimes it's just looking at if you've got fairly flat country, are all of your fence lines and roads, are they just draining water out of your paddocks? How can we turn that water back into the paddocks again and get it to start soaking in?

Andrew Bell:

Joe Hall is asking, "Are the spreader channels banks you refer to similar to swales and are there any topographical limits on how successfully this approach can be used?" And Joe also asking, "How about ongoing maintenance?" Obviously that's an issue. You can't just do something and leave it.

Glenn Landsberg:

Certainly some of the ones we design we do leave. And it depends, we have to design them with what is in the capability of the landholder to maintain them or whether they're going to leave stock in there. The earth banks if we're doing little square banks and channels often try to get the stock off it for a little while, particularly cattle, they love fresh earth and they're going to play in it and try to knock it around. Where people have a lot of old or dead timber. Timber windrows are a fantastic way to slow and spread water, the leaky weirs. Yes, there is maintenance and certainly we do tend to do swale work in more slopped country. And depends on the scale. You can as to how well they're going to hold up without maintenance.

Andrew Bell:

Question here from Anne Coote. He says, "Hi Glen. The industry uses various terminology to describe earthworks, to slow the flow of water, spreader banks, spreader channels, level contours and the like. What's the difference between them and how do you analyse the property and the steps to take to determine what needs to be done and how you prioritise the works?"

Glenn Landsberg:

Oh, we're getting some complex questions here. They're good ones but it's certainly looking... I find that hard to explain. It's a matter of looking at how can you slow the water. Usually at the top of the system to try and get a bit of control, take the speed out of it. Sometimes you can do it from the bottom of the system. If you've got a big flood area that you can spread water out, that's safe. You look for those safety zones. It's really a matter of, for me it's a matter of eyeballing a place and working out where those points of interaction are. It'd be very hard to describe that without seeing that.

Andrew Bell:

Segueing into your final question then. We've got an anonymous question saying, "Are you and your team taking further steps to share and communicate the benefits further or are you mostly relying on preexisting networks in Southern Queensland?"

Glenn Landsberg:

We're doing a bit of video work, doing more and more video work these days. So that's a good way. Yes, trying to get the word out however we can because there's so much that people can do that it does tend to need, it certainly helps to have people on ground who can help with the planning side of it. That's probably the biggest issue I see in it.

Andrew Bell:

Glenn, thank you so much for your time and telling us about how to read the landscape. It's a sort of fairly fundamental thing and it's been really interesting to hear from you. Thank you all for your questions and thank you Glen for your time this afternoon.

Glenn Landsberg:

Thank you.

Andrew Bell:

So we are on a better land management session, session three of the FDF Science to Practice Forum. How do you build drought resilience in organic production systems? That's our next topic. We have a panel discussion for you chaired by Niki Ford of Australia Organic Limited. Organic is of course a growing part, pun intended of the agricultural landscape with its own set of challenges and opportunities as we all think about drought resilience and better land management. Let's join the discussion.

Niki Ford:

Good afternoon everyone. My name's Niki Ford. I'm the CEO of Australian Organic Limited, the peak body for organics in Australia. And today we have a fantastic panel here to discuss, how do you build drought resilience in organic production systems? Unfortunately, due to some timing issues, this session has been recorded. However, the panellists will be present online to answer any questions you have after this recording. So I would like to introduce today's panellists, Melanie Leather. Melanie is a beef producer from central Queensland who is passionate about sustainable grass fed beef production and the future of farming families in Australia. Along with her husband, Robert, son and daughter-in-law their family owned three properties covering an area of 17 and a half thousand hectares where they breed and finish cattle for organic EU and grasslands markets, Melanie aims for a productive, sustainable and profitable business with best science available to secure a long term future for her family and clean and safe food for the world.

Niki Ford:

We also have Nathan Moore. Nathan is the sustainability manager for Hewitt Cattle. Hewitt Cattle manage over 2 million hectares of certified organic land spread over 17 properties in the Northern Territory, New South Wales and Queensland. With the remainder for the Arcadian supply chain from third party farmers. Nathan's remit is to develop pathways and platforms to recognise good stewardship, positive land use practices and achievement of environmental and sustainability outcomes for the organic supply chain. Nathan has spent the past six years working in Australia's carbon industry, managing large scale projects in the rangelands under climate solutions fund. And we also have David Keens. David is a second generation biodynamic farmer, is the owner and manager of Manna Farms producing organic almonds over 210 hectares of organic and conventional citrus. As an almond grower addressing the sometimes negative water efficiency and land use reputation almonds have within the Ag sector has been key to his successful business. So welcome the three of you. And thank you for joining us today. So we'll start off with David. How do you approach drought resilience?

David Keens:

Well we're having obviously permanent planted tree crops don't necessarily measure drought resilience from I suppose a figure point of view but our approach being biodynamic is all about looking after the soil. So our plan and we've been biodynamic farming now for 33 years as a second generation farmer. We're there to look after the soil and do our best to have that soil in I suppose as nature intended. So it's all about increasing soil carbon, increasing organic matter into the soil. That increasing in organic carbon and organic matter into the soil in our region, which traditionally has a rate of somewhere between 0.3 and 0.5% to try and get that up to sort of the 2, 2.5% which is what we're aiming to do has some significant I suppose increases in soil moisture holding capacity.

David Keens:

I think for every 1% of increase in organic matter in the soil we're looking at somewhere between 100 and 200,000 litres extra the soil can hold per hectare. And that leads to a number of different benefits. Obviously there's increase in rainfall capture. We're minimising runoff, we're reducing soil erosion and we're able to irrigate for I suppose deeper waterings and have more space between the waterings which is increasing the I suppose root mass and root depth of the trees which is resulting in obviously a more resilient and robust tree.

Niki Ford:

So David, we've got two pictures up on the screen, one of your orchard and one of a regular orchard that isn't biodynamic or organic. Can you tell us a little bit more about those stark differences?

David Keens:

Yes. As you could probably see by the pictures, people would probably wonder how we would ever be able to farm organic almonds in this way. I mean, obviously almonds traditionally are, it's a monoculture of just dirt and trees. And normally ground cover is I suppose, the enemy in an almond orchard. You've got nuts falling on the ground. The harvester has shaken the nuts on the ground and obviously swept and picked up off the orchard floor. So generally we would like to see no weeds to make that harvest process easy, but we've got a lot of inter row cover cropping in there. We irrigate 100% of the floor to bring our manures and get our nutrients into the soil and increase our organic matter in the soil. Do a lot of mowing as well, which is obviously returning organic matter back into the soil to increase that carbon content into the soil and hopefully make everything more resilient.

David Keens:

But yeah, the harvest process is still the same for us. There's a little bit more labour involved in cleaning that up, with mowing we do some flame weeding of our tree lines rather than using herbicide. But the process, the whole, exactly the same, a little bit slower maybe than the conventional guys. In saying that, we also have minimal wear and tear on our machinery with not a lot of dirt and dust going through the machines and creating wear and tear on parts and bearings and chains and things like that. So, yeah, it's chalk and cheese, but we make it work and we've been doing it for a long time now. So yeah, it's a bit different to the others, but I wouldn't want people being scared off by what they see on the photos because it's an achievable system and something that can be done quite easily.

Niki Ford:

Again, you can certainly see where you'd want to be getting your almonds from.

David Keens:

Well, we do get comments that we do have very, very good tasting almonds and very great flavour content in the almonds, I suppose. So we've got extremely good demand for them and we've been doing that for a long time and we've got a really good customer base that's loyal, so it's great.

Niki Ford:

Excellent. Thanks. Thanks, David. And Nathan, how does your approach to drought resilience differ for a larger business?

Nathan Moore:

Yeah, so with our supply chain, there's advantages and disadvantages to having large scale properties spread across the country. Obviously with the recent drought periods, it means that a significant area of our portfolio was impacted with low rainfall, high temperatures and suffering from some of those extreme drought periods. But it also provides us with flexibility having that supply chain with managers and production systems in areas that may not be as heavily affected, allowing us to manage grazing pressure and transferring stock or adjusting the timing of stock transfers to work out where they're best suited at that time and where they have the least impact on grazing systems as well within our production. So it's definitely a challenge, but it's something that we're building our capacity and working on those outcomes as a company and working with our land managers to try and generate best strategies for those outcomes on ground as well.

Niki Ford:

And Melanie, how do you manage this aspect of your business?

Melinee Leather:

Yeah, well, it's interesting because I guess we're a mix of what David's spoken about and what Nathan has spoken about. And I'd completely agree with David with soil health being really critical for a resilient business. So for us, probably a number one focus during those times of drought is making sure we can conserve our ground cover to protect our soils and retain as much moisture as possible. And that entails making some pretty tough decisions around reducing numbers when you have to. So sometimes as producers, we can get very attached to our animals and our genetics and those tough decisions have to be made. If the numbers have to be reduced to conserve your ground cover, then that's what's going to have to happen. We also look at things like strategic weaning of calfs. So maybe some early weaning, if things are getting really tough and dry for us. And absolute attention to our water supply.

Melinee Leather:

So clean quality water is critical at any time, but particularly important during times of drought. You've got boggy dams and waterholes, things like that that would need fencing off to ensure cattle aren't bogging or getting access to poor quality water. And of course your bores supplies can reduce during these times as well. So checking them for quality, making sure there's no salinity coming in. But I think for the long term sustainability of any business, particularly during droughts, I think it's about making those hard decisions early and thinking, number one is the welfare of your animals and looking after the care of your environment. So it's about making tough decisions early, I think.

Niki Ford:

Absolutely. And Melinee, do you want to tell us a little bit more about your exploratory process within this area?

Melinee Leather:

Yeah, so we're really passionate about sustainability in the beef industry. And I think the beef industry's very lucky in that we've got the Australian Beef Sustainability framework in place, which really helps the beef industry tell its story along the entire supply chain. So that's really important to us. But also just being involved in a number of projects, looking at tree planting on the property, we do method to market project, which looks at carbon markets that might be suitable for the beef industry. We're involved with the Enhancing Remnant Vegetation pilot, Steak and Wood project. So a number of projects that help us to transform our business in ways that we will be more resilient and sustainable in the future. And that collaboration with all of those different industries and organisations is really important to us as well. There's a lot of tools and technology out there available to us. I think for us, it's about aligning ourselves with the right people and getting the right information to assist us on the way.

Niki Ford:

This is an extensive list of projects you're part of Melinee. What other aspects of your business have you had to adapt?

Melinee Leather:

Yeah, look, we definitely know that it's getting hotter and dryer, so we've got to make management decisions around how we are going to adapt to that. And things like planting the trees. So having corridors that we can have shade for our cattle. So reducing the temperatures. And certainly nutrient cycling back into the soil and retaining more water in those soils as well. When we're looking at our herd inventory, we've got to make sure that we've got young cattle that we can turn off at a better weight for age. Utilisation of feed is really important. So legumes help to reduce emissions in the cattle as well, as well as the woody legumes, sequester carbon, as well as reduce emissions from the cattle. So a number of things, yeah, renewable energy is really important to us. So converting fossil fuel pumps to solar powered pumps. Water pumps is really important to us. I think there's numerous things that we can do, but it's a very varied and broad approach that we need to take.

Niki Ford:

Thanks Melinee. And look, just sticking with livestock production for a moment. Nathan, what's preventing your business from increasing its drought resilience?

Nathan Moore:

Yeah. So I think there's a few factors that we have to overcome and that's providing our land managers with the right support and knowledge base to build these practices themselves and give them the confidence to look at all of those sorts of activities that Melinee was listing as well. So there's quite a few options that our land managers have maybe enacted on their own on the properties that they manage. We also have at sometimes transition of managers in and out of different properties across our portfolio. So there can be a challenge with consistency of maintaining programs and those sort of outcomes long term as well, which is something we are working on building. Having those long term management plans for achieving those outcomes on grounds and providing them with the tools and resources to expand those programs in terms of programs that may have been enacted at some point in the past, but maybe they weren't picked up on or expanded at the time. That could reasonably be adapted to other properties in the same region in our portfolio as well, and provide broader outcomes from the same project types.

Niki Ford:

Okay. And just a one last question on livestock for the moment. What do you think would make it easier and this is a question back to you Nathan and then I'll ask Melinee as well.

Nathan Moore:

I think easier is an interesting question. There's a lot of processes that you can look at and engage with different service providers in these areas. Finding that consistency of management and those processes to achieve the right outcomes to your business and that production system as well. So we're in the process of engaging with a number of different service providers and engaging with consultants on achieving the best outcomes through our systems.

Niki Ford:

Melinee.

Melinee Leather:

Yeah, look, I think like Nathan said, there's a lot of great service providers out there, tools and technology available to us. For me, it is sometimes difficult to find these resources in a one spot, easy to find place. So I think as an industry, we probably need to be able to get this information together where it's easily accessible to everyone. So I think things like that are really important. What is ahead of us as an industry is quite complex and confusing for most of us as well. So we need to make sure that government has extension people on the ground that can help us navigate some of these challenges that are ahead as well.

Niki Ford:

It certainly is complex. And knowing where to start is really that vital step to making change, isn't it?

Melinee Leather:

Yeah. Absolutely.

Niki Ford:

So David you've recently joined the family business from another profession and operating organic and conventional businesses. What's been your experience here?

David Keens:

Well, I suppose drought resilience for us, coming from a different area and coming home sort of 12 years ago to take over the family business and help increase that. And our goal was always to show people that organics isn't just a sort of fly by night or a small scale sort of system, it can be done on a large commercial scale. And that's one of our philosophies is that we want to be able to show people we can grow large amounts of clean and green produce and do it on a scale that's on par with the big conventional guys.

David Keens:

So probably the difference between our conventional and our organic approach is the conventional approach has pretty much always been sort of NPK farming. For us, it's with trees, it's all about what nutrients you are removing from the soil, or the trees are removing from the soil and what you're putting back into grow the yields that you want to grow and grow the size of the crop and the fruit that you want to grow. And that's all well and good, but I think it's a very single minded approach and that industry is starting to catch up and starting to change. And they're learning a lot. And we've learned a lot from the organic side of things where it's a bit more of a holistic approach. We have inter-row cover crops. And as Melinee was talking about, I think they're critical in our area with hot, we're in Mildura, we have mid 40 degree temperatures. Without those cover crops, high soil temperatures, more evaporation loss, more runoff.

David Keens:

Climate's changing. We don't get long, slow rains anymore, or very rarely. We get thunderstorms and large downpours in a short amount of time. And to make sure that soil is healthy and porous and have the ability to soak up what rain is available in our region, which is generally only about 250 millimetres a year, is critical. So, the organic approach, I think being that sort of overarching looking at soil health in general, it's about trapping the water, maximising the amount of water that we're using and giving that availability to the trees. It's microbial health and maximising the efficiencies in the soil for the inputs that we are putting in. Resilience isn't just about saving water or getting through times of drought on what you do with the water that you're putting on the trees.

David Keens:

It's minimising the inputs that you're putting in. It's making your business as a whole resilient to be able to cater for the tough times. And for us, coming out of the Murray River, we're obviously irrigating. So to some extent, we've always got water, it's just a matter of how much we want to pay for it. So we're a little bit different to the other guys. And things will change over the coming five or 10 years, I'd imagine with that system. But the business as a whole needs to be completely resilient. And so we're looking at things with our conventional citrus on how we can build microbial health in the soil, organic matter in the soil, reduce the chemicals that we're putting on. So we're maximising our cost efficiencies and expenses, which is making us more resilient.

David Keens:

And I think the almond industry and the citrus industry and horticulture in general, I think is really starting to understand that soil health is key. And it's not just about chemicals putting on, it's about microbial health, organic carbon, organic matter in the soil, water holding capacities. And it's great that that shift is starting to happen. As Melinee said, there's some really good technology out there now. And so we've got the ability to not just go out with a chop as people might perceive us to do and weed our trees and tender our little organic fields. We've got large ground state of the art technology, treat andromeda soil, moisture probes, infiltration maps being generated. Piles of data that is trying to make us more efficient and obviously more resilient as a business as a whole.

Niki Ford:

Yeah. It's certainly come a long way from the image of small cottage industry. Thank you, David. How do you know if you're successful from an environmental perspective?

David Keens:

Well, it's a difficult one to gauge. And I suppose I'd be interested to talk to Nathan after the seminar about the carbon side of things, because we would like to think that our gauge as a whole now is how we're increasing the organic matter in the soil. And if we are growing that, and we can only probably get that to a certain extent, we know that we're maximising the efficiencies of the soil. And so that's done through soil tests and watching that year on year to see how that's going with the health of the trees, obviously.

David Keens:

But from us getting off the track, probably a little bit of the carbon side of things and environmental re-gen and all that sort of stuff, the baselines that are sort of been gauged and set at the moment, it's a bit difficult for us because our baseline's so high, we've been doing this for 33 years now. And so we don't have a whole lot of increase to actually do, but we're not being rewarded for that. And what we've done over the past 33 years in looking after the soil and making sure that we're the best stewards of the land possible.

Niki Ford:

Oh, I think that's a perfect segue actually. So Nathan you've come from the carbons sector to the agricultural side. What have you observed since you've arrived here?

Nathan Moore:

Yeah, so the carbon industry has advanced quite a bit over the past 10 years and there's still some significant challenges for, I guess, getting access for landholders and farmers to get into carbon markets and develop projects. I think there's probably still more need to pivot towards having a more transparent carbon industry and providing more feedback and communication platforms to understand the best ways to participate and where the industry is heading and how to stay ahead of those changes. I think there's a lot of work going into more flexible participation options for farmers and landholders, but there's still a lot of work to be done in that area. And looking at the sort of outcomes and how that affects on ground production because in most senses, farmers will be managing carbon in their systems and looking for the best ways to be recognised for that.

Nathan Moore:

And as David mentioned, some of those initiatives and products just cannot be used retrospectively, which is a bit of a, maybe a surer kind of aspect of some of those methods and processes. But there's still some positive work that can be done in those areas and more methods that can be developed to account for that as well. And I think for anyone looking to get involved in that space, there's a lot of, as we mentioned before, service providers out there and different types of projects you can engage in. So it's just about trying to arm yourselves with the right information and engage with service providers. Maybe shop around for the best fit for your system and the service provider that deploys the most suitable model for engagement and sharing of costs and credit generation and those sorts of things that you'll need to consider for the future as well.

Niki Ford:

So Hewitt Cattle has engaged with the neutrality program for carbon with your production systems. Can you tell me a bit more about that, Nathan?

Nathan Moore:

Yeah, so a little while ago, Hewitt and the associated producers through the Arcadian supply chain participated in a low CO2 certification process where we secured offsets credits from an international market and used that to attach a label to products on shelf and looking at access to markets for low CO2 products. Our aim for the future will be transitioning to hopefully generating our own offsets in Australia rather than relying on international credits and having to either surrender or relinquish those credits to the federal government to become a carbon neutral organisation instead of relying on international credits through different systems. And there's a bit of understanding for us to learn there as well about trying to find the best gains, where we can reduce our overall footprint, which will reduce the volume of credits that we may need to achieve that outcome. And if you can reduce your overall footprint at every aspect of your business, right through the supply chain, it just reduces that need to secure more offsets for the future as well.

Niki Ford:

Yeah, that's fantastic. And obviously and somewhere that most producers, regardless of sector, would want to aspire to be long term. So it's fantastic that work has begun.

Nathan Moore:

That's right. It's still a long way to go, but we're heading in that direction.

Niki Ford:

Yes. Wise information there, Nathan. And while I'm with you, it'll be the last question I'll throw to each of you. What would you like those who are listening to this to take away from this discussion today?

Nathan Moore:

I think that there's still a lot of positives that can be found right across all of these systems. And if we refer to sort of the carbon industry as a particular area of focus, there is some positive traction there moving towards broader outcomes in biodiversity, soil health, regen ag and accounting for those on farm systems as well. So that the industry's heading in the right direction. Again, it's just about keeping up to date with where these processes are heading.

Niki Ford:

And David.

David Keens:

I suppose, coming from both sides of the systems I suppose, one thing I think we all need to be doing and I think everyone's getting on the same page now, is we need to look after the land. And we need to do our little bit to make sure that it's there for generations to come. And the organic industry's a great industry to do that. I think it's an industry that is always about the soil and looking after what we have. And I'd question anyone, if they could find someone who's been looking after the land and doing a great job of looking after the soil and the health of the land that they're doing that's not making a great business out of that.

David Keens:

The soil and soil health I think is key to any great farming system. And I think that everyone as a whole needs to sort of get on that page and do their bit to try and look after what they've got, because if we keep trending down the way that we're going at the moment across the world, the generations to come are really going to be in a real battle. Farming land is going to decrease and we're going to be in some serious strife. So we all need to do our bit now and whatever system you choose, I think everyone can do their part in increasing the soil health and life of the soil. And that makes everyone more resilient and should be better for generations to come.

Niki Ford:

David. And finally, Melinee, your thoughts.

Melinee Leather:

Yeah. Look, I would say we just cannot afford not to make improvements around sustainability and drought resilience of our systems. It's going to be critical for our long term sustainability. I also think that I agree with David around the organic system's fantastic because there is a real focus on land management. I mean, not only do we talk about it, but we get audited on it. We've got verifiable evidence and data to back up what we're doing around these things with land management and environmental services. So that's a great thing because consumers and customers want to know that. They want to know that you are transparent and you've got something to back up the claims that you're making. So that's pretty exciting.

Melinee Leather:

I also think that we're fortunate in that we can lead the solution to climate change. And agriculture is really key component to that solution. The red meat industry for instance has had the greatest reduction by any sector in the Australian economy with reduced emissions, 57% since 2005. So, I mean, that's outstanding. We are leading the way. We just have to probably spread that message a little bit better than what we do. But yeah, exciting times. We've got a responsibility to feed the world with clean green and safe food. And so we've got to do everything we can to ensure that we can continue that for the long term.

Niki Ford:

Fantastic. Look, I think some really great messages and thank you for the discussion today, Melinee, Nathan and David, despite the different sectors, each of you presented the common theme that there is no one solution and a hands on approach to the specific issues by sector is the answer to building resilience across the emerging and dynamic industry that is organics in Australia. I believe those who are listening, would've found the examples of how you and your business have built drought resilience in organic production systems, extremely beneficial and will now open to questions for those listening online.

Andrew Bell:

And thank you to Niki Ford for chairing that discussion. Melinee, Nathan and David are joining us live now for your questions, some of which have already arrived. But can I just posit this, how much can the organic sector inform the nonorganic sector. As you were just saying Melinee, you've already got, part of your MO part of your standard business operation is this transparency of what you do. Do you think there's a way of informing the rest of the sector? Anyone got any thoughts on that?

Melinee Leather:

Yeah, I think that's really important what I was saying about the auditing of our systems. And that's really gives customers and consumers a lot of confidence in what we're doing. So as I said, we're not just talking about it, we've got verifiable data and systems in place that actually can verify what we're saying. So yeah, I think, it's successful in organics. It makes people confident in the product that they're buying. So I think the more conventional industries could look at that and maybe take something away from that.

Andrew Bell:

I've got this specific question for you David here from Ann Coote, who asks, do you measure soil microbes? If so, how? And what is the basis for amendments or change to support them?

David Keens:

We haven't done a whole lot of soil microbe testing in the past. We have just started doing that and micro testing of the soil's a little bit tricky and we use a third party testing facility to conduct that. I believe that the microbial testing that they do test the, I suppose, dead microbes in the soil to get a baseline... live ones maybe there. So we've sort of, with our mowing and composting and our organic system over the years, obviously looked to try and build organic carbon. Only in the last couple of years have we decided to really look into the microbial health of the soil as well and believe that there's a big benefit in making sure that there is a good population of microbes and official bacteria and fungi.

David Keens:

So we've actually started a bit of a program on that in the last couple of years of putting out soil applied probes and sources for those microbes to survive through winter and through summer and things like that. So it's a little bit of a tricky one to get an exact measurement on, but I suppose, with any measurements, if you're doing them on a regular basis and you can see that there is a non drop off or an increase in those figures, then obviously you're on the right track.

Andrew Bell:

Thanks there David. I've got one here, which I'll direct in the first instance to you, Nathan. It's a pithy one from another anonymous contributor. What is your definition of soil health?

Nathan Moore:

Well, it's a very broad question. I think it's difficult to answer in a uniform way for everybody. But soil health, I suppose in this instance is looking to improve...overall condition and looking at, I guess, the production systems that we work with as well and the results that we're achieving through, I guess, regular seasons and the types of environmental outcomes we're achieving on ground and the way we've managed those systems. Especially with grazing interactions and overall biodiversity and getting consistent health out of those systems and assessing past your health, as well as the mixture of, I guess, biodiversity that we interact with on our properties. And that includes sort of the dry farming operations as well. So yeah, soil health can be, I guess, looked at in many different ways, but essentially it's measured very differently across different production systems. And for us, a lot of the time in broad acre grazing operations, it's the ground.

Nathan Moore:

Monitoring things like ground cover and response to rain, seeding and responses at different times during the season to rain events as well. And just assessing without necessarily putting technical measurements in place to monitor soil health, where it's not feasible to do that.

Andrew Bell:

That was a bit of a macro question. As we move towards the end of our session, I've got a bit of a micro question here from Felicity Gilbert and Nancy Ganaway. They're both asking, are the inter-row pastures grazed at all, or are you sowing grain seed into pasture? Now, that's one of those questions where I, as a lay person, just read the words out and don't necessarily understand the question. I don't know who can help illuminate me and Nancy and Felicity. David?

David Keens:

I'm feeling, I have a feeling that one's directed at myself, being that the inter-row of our almond trees, we have a full orchard of inter-row of a number of different species. Look, we don't do any grazing of the inter-row. We had tried grazing of the inter-rows to minimise weeds and keep that ground cover shortened without mowing it many, many years ago with sheep, cattle, goats. And while we did have a limited success on that, unfortunately, all of those different animals eventually took the almond trees and started eating the leaves and the nuts off the trees. So, it was a non-viable system for us, unfortunately. And so, we don't do any grazing on that front.

David Keens:

In terms of being able to plant, I suppose, grain or some form of harvestable seeds through the inter-rows, the almond trees, when they're planted, they're not planted very wide. 7.3 metres is our row spacing. And especially until they get to probably 15 years old, you can only really fit a 2-metre wide by two and a bit metre high tractor down the middle of the row. So, getting a big harvest machinery in to strip the grain off the inter-row, if that was what we were doing, it's not possible.

David Keens:

So, we have a special mix of cover crop made up of clovers and brassicas and legumes and things that are going to give us hopefully as deep-rooted system as possible to aerate the soil and loosen the soil for compaction, but also that we can mow that and keep that relatively low in times of almond harvest. So, it's a specific type of cover crop that is grown for almonds, I suppose. Different than a citrus, but it's definitely something that's got to be selected very carefully.

Andrew Bell:

Thanks, David. One last question and I'll just lob this in. It comes from Hannah Griffith who asks, some have criticised organic farming for being focused on the label rather than deeper change or regeneration of agroecosystem health. How much of that do you, Hannah asks, see within the industry? Who'd like to have a go at that. Any takers?

Melinee Leather:

Yeah. I'll have a go.

Andrew Bell:

Okay. Melinee.

Melinee Leather:

Yeah, look, I disagree. Yeah, I disagree. I think the organic industry's very focused on looking after the environment, looking after soil health, all of those things. I don't think it's just a label that we talk about. I think that people are committed to doing some really good work and also happy to have that cross checked and talk about it in a transparent manner.

Andrew Bell:

Thanks, Melinee. Thanks, Nathan. Thanks, David. And earlier, thanks to Niki for that session discussing how organic fits in to this bigger, wider picture. Thanks very much for joining the FDF Science to Practice Forum. Thanks for your time.

Melinee Leather:

Thank you.

Andrew Bell:

Well, our final Hub visit has arrived as we reach the end of the first day of this event. And we're going to South Australia, Roseworthy, to be precise, which is the location of Australia's very first agricultural college. Before we cross live there, let's have a quick look at what SA has been up to and what's in store.

Dr Stephen Lee:

Hi, my name's Dr Stephen Lee and I'm the director of the South Australian Drought Resilience Adoption and Innovation Hub. My role is to work with the fabulous team we've got right across South Australia, from the Lower South East, right through to the West Coast of the state, to shape up projects around drought resilience adoption that improve on farm resilience and put in practices that are sustainable that'll help farmers next time we're in drought.

Beth Humphris:

I finished uni in 2018, straight into the industry into a drought. So I suppose when I think of drought, I think of the bare soil and the impact that has, both in the drought years but also in the recovery years. I work a lot with growers, one on one, talking about how to manage their cropping systems and how to, I suppose, ameliorate or push their soils to make sure that we're at our productive maximum.

Rebekah Allen:

I think at the moment, one thing that we talk about a lot is climate and weather. A lot of people asking, when are we going to get that break? So I think one of the factors at the moment that we face is just the unpredictability of weather events and potential climate change. Drought affects us all in different ways. Going forward, it's important to identify what actually is a drought for us and for farmers on individual properties.

Dr Stephen Lee:

South Australian farmers, I think are really adept at managing in quite a dry climate. We've been looking at a whole range of practices to have better farming systems and also better agronomic practices and better livestock management. So the focus of this Hub is really around mixed farming systems, so that's cropping and livestock, but we also have efforts into horticulture and viticulture. And our focus there is really around managing their businesses as well as on farm.

Peter Mitchell:

So, granddad was here for about 35, 40 years of his life working on this farm. He always used to talk about two droughts, they're either a water drought, or a feed drought. You never really get both of them at the same time. We've currently had probably four years of pretty bad, pretty average seasons. Most of those have been water droughts. Feed has been tight, but it's, I say it's easier to buy in feed than it is water. Resilience is probably the key to me. You've got to try and preempt it before it comes here. So, it's in the setup. If you're able to get secure water, if you're able to have your paddocks that are able to fire more feed and you can't always buy the stock in, you can always cut it for hay. There's always an opportunity there. It's a pretty paramount thing to be thinking worst case scenario and planning for the worst and being available for what comes, what happens.

Rebekah Allen:

Resilience is really important to strengthen a community. A lot of farmers that you'll speak to don't say that we're going to fix drought through a drought-tolerant crop, or an amendment that we put in the soil. Sometimes it's much more broader than that, talking about risk management and mental health and things like that to develop a community and also build a support network for growers and businesses and other individuals that might need it going through a tough time.

Dr Stephen Lee:

The Hub space is here at the Roseworthy campus of the University of Adelaide. This is a campus where we've been really fortunate to be able to take outstanding livestock research and development, helping to understand how to better manage sheep and beef cattle to realise their full potential in restricted feed environments or managing feed base in dry environments. The SA Hub has 60 partners. We're a Hub that reaches right through the farming systems groups, the landscape boards and the research, development and adoption providers in the state and agri business as well. The partners are absolutely core for us to be able to deliver our projects. We are only as strong as all our partners together.

Beth Humphris:

So, I'm actually part of the Upper North Farming Systems Group, which is partnered with the Drought Hub, and had quite a few workshops and a lot of talking through there with a lot of farmers attending those workshops.

Peter Mitchell:

It's about getting the research and development and opportunities out there to the people on the ground and getting that preparedness up, levels up, so we can have diversity and have opportunities when they arise.

Rebekah Allen:

I think the most important thing about the SA Drought Hub, particularly around Hart's involvement, is bringing together a group of industry researchers and growers, not only to work within rural and regional communities but also work together and come together to collaborate.

Dr Stephen Lee:

I hope they see the Hub as having equipped them, as an activity that help them evaluate and change practice on their farm, so that they know they're better prepared and have greater resilience in variable climates and in drought.

Andrew Bell:

What light there was in SA for the filming of that video. It seemed to be the golden hour every single minute of the day. At this hour of this day, let's cross live to Roseworthy and to the South Australia Hub Knowledge Broker, Tony Randall.

Tony Randall:

Well, thank you and thanks for the introduction. We are joining you from Kaurna country today and we pay our respects to the Elders past, present and emerging and acknowledge the deep link of attachment and relationship that other people may have with this land and the seas of the area. It's my pleasure today to be introducing Taryn Mangelsdorf, who's our next speaker. Taryn and her partner, Andrew, farm at Manoora in South Australia's Mid North in a mixed farming enterprise of cropping, sheep and a Merino stud. Taryn is the Sustainable Agricultural Officer for one of our valued Hub partners, the Northern and Yorke Landscape Board and has 20 years' experience in rural engagement and leadership development, sitting on a range of regional and state industry committees. Taryn's strength is the delivery of education and extension programs with farmers, farming families and groups with a current and specific focus on engagement and building capacity to mitigate drought. Taryn is passionate about building resilience into family farms and farming businesses.

Tony Randall:

And today, Taryn's going to present to us on the importance of addressing drought risk in climate change within our region and how the Northern and Yorke Landscape Board works collaboratively with the community and farming sector to develop meaningful projects that build resilience to drought. This will include a case study of the Future Drought Fund's supported Goyder's Line project, as well as other important local initiatives. Thanks, Taryn and over to you.

Taryn Mangelsdorf:

Thanks, Tony. So here in our Northern Yorke landscape region, 91% of our land is under agricultural production. Agriculture, forestry and fishing are the greatest employers and are highly profitable, with these industries providing economic output of more than $1.9 billion in the 1920 financial year. Our farmers are generally well educated in either agriculture or other fields and are typically fourth to seventh generational farmers. Our region is also highly varied with the types of agriculture we produce, the soil type, the degree of water security and the average annual amount of rainfall. And with these climate changes, we have two predictions for our region: less reliable rainfall during the cash crop grain season and an expected decrease in average annual rainfall along Goyder's Line, the line traditionally between grazing and cropping country. Making more of our region marginal and pastoral in nature required our agricultural industries to change and adapt.

Taryn Mangelsdorf:

A few years ago, we sat in the footy club rooms at Robertstown with over 100 farmers for a drought meeting. At that stage, they didn't have a cash crop for perhaps two years. Now, I've sat in those drought meetings as a primary producer during the Millennium Drought some 15 years ago, when my parents were irrigators in the Riverland during a time that they were given 0% water allocation for their citrus and stone fruit irrigation. Those meetings aren't pleasant or comfortable. Even walking through the door in a disaster response situation takes guts. So, while the FDF grant is for future drought mitigation and we are addressing future droughts, we are working with farmers who are experiencing dry times and drought-like conditions and we need to treat them so. So, some of our farmers now haven't had a cash crop for up to five years. So, how can we make talking about drought and disaster more comfortable? How can we make our conversations more meaningful? And how can we build that trust and respect the outcomes that we're all seeking?

Taryn Mangelsdorf:

So, the science to practice, we have two parts here. The first part is about the science to practice in drought mitigation, which we intellectually know how we can start to build resilience into the landscape. We look at the soil health, how much ground cover do we have? Do we need a change of management? How's the grazing pressure management growing, with both the livestock and if there's an overabundant native species, in our case, kangaroos? What's the crop choice like? Do we need to keep growing with annuals or do we change to perennials and a grazing property? And what's the role of native vegetation in those farms? It's finding the right mix of these ingredients, the specific recipe required at each property. But what about the science to practice and engagement? And the extension, the behaviour and practice change and then doing that in disaster mode?

Taryn Mangelsdorf:

Getting into the nitty gritty, here we start with three principles. The first is Maslow's hierarchy of needs. Our messaging sits at the top of the triangle in achieving one's full potential. If that triangle is not filled, our messaging, from an interim organisation, is just noise. In order for our message to come across, we need to make sure that our farmers' triangles are filled from the bottom up with food, warmth, safety and support from their family and friends and the feeling of accomplishment. Only then does that message come across and resonate.

Taryn Mangelsdorf:

The second part of science and engagement is a series of attitudinal change. An engagement principle is farmers, or anyone, need to be moved through a number of stages of attitudinal change before committing to land management practice change. We grab their attention to move them from ignorance to awareness. Information and data moves them to the intent stage, then they move to performing once they've made a decision and then they maintain that change. And that's how we structure our extension leading to on-ground works. And thirdly, we work with the triangle of how, the Satisfaction Triangle. In the words of Rhian Williams, she states, "If you want to get things done, you're going to have to take it seriously how people feel." The Satisfaction Triangle holds that people have three interdependent needs that must be considered and addressed. We have the emotional needs, how people feel, procedural needs, how we talk about things and how we work together and substantive needs, what are the things that we're talking about?

Taryn Mangelsdorf:

Essentially, two thirds of what makes something work is not about the end result, it's about how we get there. In changing the inner room boundaries recently here in South Australia and moving to Landscape SA, we recognised the area around Robertstown as being a gap in support and also high priority area. Typically here in the ag sector, we work with the local ag bureaus or ag groups, that's where we've got the highest engagement, participation and collaboration, with a resulting higher baseline of resilience. The issue here though, that while we have a large amount of groups across our entire area, there was a lack of groups in this specific footprint, which have resulted in a lower baseline of resilience. There was no ready audience. There was no understanding of who I was or our organisation. We had to start from scratch and build that trust and respect before we went anywhere.

Taryn Mangelsdorf:

So, getting to our actual project. In designing this project, I rang, emailed, got in contact with and ran into every farming group in our footprint, the ag bureaus, the farming systems groups, the benchmarking groups, the ag tech groups, the sheep producer groups and our statewide organisations. Now, not all of them responded, but however, we did have a high amount of response and participation in the conversations that we did have. And all of them were aware that we were planning this project and secondly, that we had won the grant. Secondly, in addition to speaking with the farming groups, we spoke with the farmers directly. We run evaluation events, like we all do. Now in this evaluation, I don't ask you if you like the catering or if you found the event suitable. I'm sure we've all answered those questions before. I can work that out through other methods. We dig deeper and ask the next layer of questions. Have you learnt something today? Typically, the answer's yes. Are you going to implement anything on your farm from what you've learnt? Typically, our answers used to be "unsure", "unlikely" and "no".

Taryn Mangelsdorf:

Okay. So, how do we address that practice change and target our work in the right direction so they will? One question we've added that I find most useful is asking farmers, what are your barriers? The answers: the bank, my parents, my brothers, the agronomist, the accountant, me, my time, priorities and insert any other answer, reason or excuse that we've all heard here in the past. Okay. So, if we're suggesting for you to adopt something like a containment area and we both acknowledge that this is something that you need and we understand the benefits of this and these are all your barriers, we need to address these barriers in addition for you to undertake that activity.

Taryn Mangelsdorf:

The second question we've added to our farmers and our farming groups is, what else do you have on your plate at the moment? What are your other issues? From here, we have a really clear strategic plan and operational direction. Usually for me, I follow that bouncing ball and address those issues and activities and barriers at our next activity. This way, we retain engagement for timely and meaningful topics. From all of this knowledge, experience and input from our farming community, who are able to design a meaningful, collaborative project to address future droughts in the Northern and Yorke landscape region that our farmers were seeking.

Taryn Mangelsdorf:

So our project, Goyder's Line: building resilience into family farms and we focus this in three different aspects, the people, the land and the business. And we had three pathways to undertake this, with your communications package, a program of extension activities and funds to enact on-ground works. Just a note here on sustainability of change, what is really important to know that in the design of this project, is that we aren't trying to fundamentally change everyone's farming practices, their businesses, or them as people. That is hard work, that is unsustainable and we usually see that approach fail.

Taryn Mangelsdorf:

We're aiming for one percenters. What are some one percenters that you can tangibly add immediately to your daily practice that is going to increase your resilience and build that buffer? For example, when we talk about sheep management, we aren't rearranging all of your internal fences with self-centred watering points. We're starting with one containment area. Learn from that one change and then in good time we know that that starts a ripple effect. These little changes or additions are far more sustainable for long-term than an unsustainable, fundamental shift that often is short-term.

Taryn Mangelsdorf:

Our communications package include a series of videos, fact sheets and podcast series that specifically featured farmers working in drought and drought response. Our extension activities were held across our entire Northern and Yorke landscape region to build resilience from drought across the board to shift up our entire resilience baseline. So while the project has had a length of about 12 months, we've maybe had about seven functional months in the farming calendar, acknowledging school holidays and the impact of COVID. During this time, we've engaged over 300 farmers at our events, with workshops, soil pit days, sit-down sessions, crop walks and farm financial literacy courses amongst other activities.

Taryn Mangelsdorf:

The on-ground works were focused along our eastern boundary, along Goyder's Line, spreading from Eden Valley in the south that sits in the rain shadow of Barossa Valley, past Robertstown and northward into pastoral country at Whyte Yarcowie. Our Project Officer, Libby Duncan, who delivered the on-ground work, summarised our farmer's response. "The biggest benefit has been providing actual money to complete the priorities listed in the property plans and the desired wishes of our farmers. All of the participants who received funding really appreciated the extra support to realise some of their wishlist. The worst thing about drought is how it robs landholders of the years of earnings that they would've put towards the properties themselves and making their properties better and more resilient. The on-ground funding has allowed farmers to feel like they're actually moving forward with their business." How good is that feedback from the project that they, as farmers, helped design.

Taryn Mangelsdorf:

With these on-ground works, we've installed at least 30 containment areas, written at least 15 drought mitigation plans, increased native vegetation through reveg in the area and undertaken significant further on-ground works. Therefore, almost 50 farming families along our eastern marginal footprint, covering an area over 100,000 hectares, have become more drought resilient with tangible on-ground activities as a direct result of this project. Our goal here in Northern and Yorke Landscape Board is to have adaptive, resilient and healthy landscapes for sustainable primary production in the generations to come. With the help of this FDF project fund, the collaborative approach from both within our own organisation and the farming systems and groups and communities that we work with, we're certainly on our way to achieve that goal for our family farm and for those around us. Thank you.

Andrew Bell:

And thank you for inspiring us. We're going to cut it off there because technology, which has been mainly kind to us today, is just interrupting your audio flow. But all the best for those convos, many of them difficult, but all of them necessary. Taryn, thank you very much for your time today. And thank you all for your time today. Hundreds of you have been watching and listening and taking part. Thank you from the team here, from the Department of Agriculture, Water and the Environment and the production team, who've been bringing this forum to you today. We'll be back tomorrow morning. 10:00 Eastern, 9:30 Central, 8:00 Western. We've got a Soils in Focus session. We've also got presentations and panels on better risk management, more resilient communities. And if you've been counting, we've had five Hub videos. Three to go. So, look out for those as well.

Andrew Bell:

And as we draw today's sessions to a close, I'm going to just refer to my notes, which I've been scribbling away at some of the things people have been saying. In no particular order, "Innovation has to drive commercial outcomes. Fewer, bigger, bolder projects. We need to look after the land. Soil health is the key to any farming system. It's all connected. Have a look over the fence. Right plants in the right areas. Making conversations more meaningful, start from scratch and build that trust. Stand and deliver doesn't always deliver. Record the past, predict the future." The only prediction that I'm going to make is that we'll all be back here tomorrow for day two of the Future Drought Fund Science to Practice Forum. Thanks to you all. Have a good evening.