



Information technologies to empower and support land managers to participate in carbon farming projects: a case study from Australia's rangelands

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Abstract

Information technologies can empower and promote active participation from land managers in carbon farming projects. As a carbon service provider, we have leveraged the capabilities of the information technology Fulcrum® to develop customised applications to support land managers undertaking Human Induced Regeneration (HIR) projects in remote rangeland environments. Through a shared platform, Fulcrum allows land managers and carbon service providers to record and share information on management interventions which promote carbon sequestration, vegetation growth and project progress. This approach can also enhance the integrity of HIR projects by using technological solutions to provide evidence of project activities and progress. In this study we look at the use of Fulcrum for the portfolio of HIR projects that we service in the southern rangelands of Western Australia (WA). We assess Key Performance Indicators (KPIs) for the database of the 'Management Activities Application' (MAA) which is the customised application that we created in Fulcrum to support these land managers. The results demonstrate the successful adoption and sustained use of Fulcrum by land managers in these locations with ongoing engagement and collaboration key contributors to this. The adoption and establishment of these ways of working provides opportunities to support land management in these areas more broadly.

Introduction

Carbon farming has become a prominent new land use in Australia's southern rangelands (Baumber et al. 2020). It presents a unique opportunity to support land managers in these areas to viably implement sustainable land management practices over the long term. Here we explore the role that information technology is playing in supporting land managers to participate in carbon farming opportunities through a case study of the portfolio of HIR projects that we service in the southern rangeland of WA. We also consider the broader opportunities to support land managers that this adoption and collaboration via information technologies presents.

A key component to the success of HIR projects, and the carbon farming industry more broadly, is capturing and sharing land management activities being undertaken as a part of a project. Land managers need to be

able to demonstrate to regulatory bodies and the broader market the work that they are doing, and the causal relationship with storing carbon in the landscape. They also need a means to record and store this information over time. This can be a challenge due to the remoteness and scale of rangeland properties, and the ways of working that the people living in these areas may be accustomed to. But it is particularly critical to methods like HIR that rely predominantly on models and remote sensing to determine changes in stored carbon over time, which needs to be supported by this information. Our case study focuses on our use of Fulcrum® to address these challenges.

Fulcrum is an information technology that enables the user to capture and store different types of information with spatial and temporal attributes. We have leveraged the Fulcrum platform to create customised applications tailored to supporting land managers to collect and record the information they need to support HIR projects. Sharing of information is streamlined through automated uploads to a shared platform, facilitating collaboration as things happen. The entries then act as a database for the project, which enables information on historic land management to be easily accessed, providing further opportunities to support management learnings over the long term. In addition, the adoption and use of an information technology like Fulcrum opens opportunities to different ways of working with and supporting land managers. Fulcrum allows the user to visualise themselves and the activities they undertake in the context of other relevant spatial and temporal information such as infrastructure, livestock, vegetation and land types, and carbon estimation areas. On a smart device, this can be done while on the ground and travelling around a property, which provides great potential to support monitoring and decision making in these areas more broadly (Robertson et al. 2019).

This case study explores the adoption of Fulcrum across the portfolio of HIR projects that we service in the southern rangelands of WA. It is intended to demonstrate the potential for the adoption of new ways of working through information technologies to support and empower land managers in Australia's rangelands to take part in carbon farming opportunities and enhance land management more broadly.

Methods

Study region

The southern rangelands of WA include the Gascoyne, Murchison, and the Goldfields-Nullarbor regions – a total area of approximately 503,120 square kilometres (DPIRD 2022). These areas border the south-west agricultural region and are characterised by semi-arid to arid climates with variable and inconsistent rainfall. They are dominated by natives shrublands which support pastoralism through the grazing of livestock, which is the dominant land use of the area. There are 284 pastoral stations across the southern rangelands with an average size of around 185,000 hectares, which are typically run by families or individual land managers. As a result, these areas have limited connectivity and are some of the most remote and sparsely populated regions in Australia. This influences ways of working for people in these locations and makes communication and collaboration challenging.

Study context

We created a Fulcrum account for 32 HIR projects that we service in the southern rangelands of WA. The land managers were given the option of using the created Fulcrum account to record and share activities associated with their HIR projects in the 'Management Activities Application' ('MAA'), which is the custom application we created for this purpose. We supported land managers with the initial installation of Fulcrum on their smart devices and the use of the MAA. The projects commenced between 2018 and 2022, but the majority commenced in 2018 (22 of the 32). Associated Fulcrum accounts were typically activated shortly after this, generally within the first 12-months of commencing the project. Therefore, land managers

in this study had access to a Fulcrum account for between three and six years, but most were in their sixth year. A second version of the MAA was developed and commissioned in 2021 to simplify the application in response to feedback. Land manager accounts were then transitioned to the new version of the MAA.

Method overview

We analysed KPIs for the database of the MAA to understand land managers' use of Fulcrum over the study period. The KPIs were assessed across the study period as a whole and on a 12-monthly basis commencing from the initial activation of each individual account. Most of the HIR projects report on an annual basis and so assessing on this timeframe generally captures the breadth of activities associated with a land manager's management system and provides the opportunity to better understand the utilisation of Fulcrum over time.

User adoption

User adoption was calculated based on whether or not a land manager commenced using the MAA to record project information. This was determined for the study period as a whole and across 12-month periods following activation of their Fulcrum account. Adoption was calculated as a binary yes/no for each land manager, with any level of use during the relevant period equating to a 'yes' outcome.

Drop-off rates

Drop-off rates were calculated based on whether land managers continued to use the MAA after initial adoption. This was calculated by determining whether land managers were actively recording activities in each subsequent 12-month period following the initial 12-month period in which they first starting using their account. Drop-off was determined as a binary yes/no for each land manager, with no use by the land manager during a 12-month period equating to a 'yes' outcome. Consecutive years of drop-off with no subsequent activity in the study period were deemed as complete drop-off.

Relative utilisation

Relative use was calculated for each 12-month period to provide greater insight into the effectiveness of Fulcrum in supporting land managers in the way it was designed to. This was calculated as the percentage of the total MAA entries that were created by land managers for each period. Where entries are not created by land managers, we as the service provider create these entries for the land managers by obtaining the information directly from them or during site visits.

Results

User adoption

Land managers for all except one of the 32 Fulcrum accounts that were activated went on to use the MAA at some stage, giving an adoption rate of 97 percent over the study period. Of these, 87 percent commenced using the MAA within the first 12-months following the activation of their account.

Drop-off rates

Of the 31 land managers that adopted the use of Fulcrum at any stage, four have dropped-off completely, giving a drop-off rate of 13 percent over the study period. Of the 27 land manager accounts that have remained active, 41 percent had a partial drop-off period of at least 12-months, and 22 percent for over 12-months. This was most consistently in the year immediately after they commenced using the MAA, with 82 percent of partial drop-offs commencing in the second year. A return to active use of the MAA occurred for 73 percent of land managers that dropped off, and this generally coincided with the transition of land managers to the updated version of the MAA.

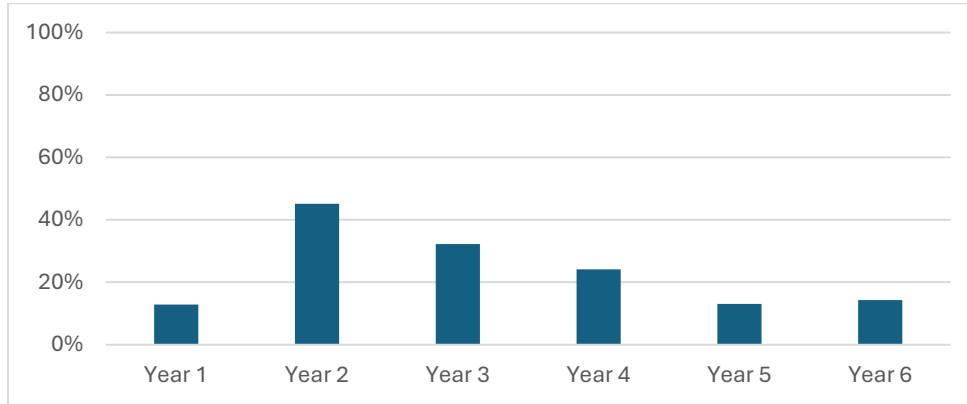


Fig.1: Percentage of land managers that dropped off for each 12-month period following account activation.

Relative utilisation

The average land manager share of MAA entries was 87 percent in the first year. It then reduced to almost half during years 2 and 3. This coincided with the peak in drop-off rates, during which we as the service provider created more entries on behalf of land managers. Between years four and six the average land manager share of entries was between 72 and 80 percent.

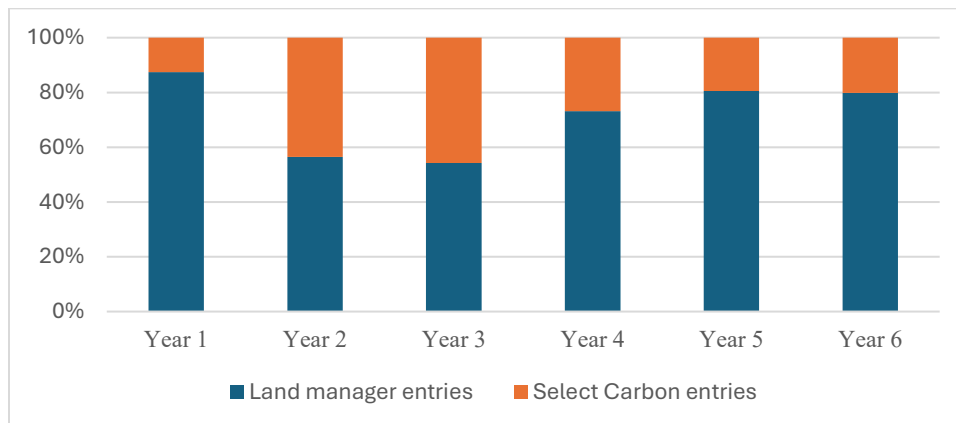


Fig.2: Average percentage MAA entries created by land managers relative to those created by us as the service provider for each 12-month period following account activation.

Discussion

The high adoption rates for Fulcrum show that land managers were receptive to trialling a new information technology to facilitate participation in a HIR project despite most not having used similar technologies in the past and having different existing processes in place to support land management. Our engagement approach was designed to streamline land managers’ access to using the MAA by supporting the initial set-up and use of Fulcrum on their smart devices. The majority of land managers then commenced using the MAA within the first year of their account being activated and with high autonomy. That most have since been retained as active users suggests the engagement process was effective in supporting land managers adopt new ways of working to support their participation in a HIR project. The continued use of the MAA also indicates that Fulcrum was a functional solution that has addressed a key challenge faced by land

managers in these locations by supporting them to record and share information required for HIR projects in more effective ways than existing approaches.

The recovery in use of the MAA by land managers aligns with the transition of the majority of land managers to a simplified version of the MAA. Simplification of the MAA was undertaken in response to feedback and to improve workability. The number of options and fields for data entry were reduced and the structure was made more consistent. The subsequent improvement in both active accounts and relative utilisation by land managers demonstrates the effective ongoing engagement and collaboration facilitated by the platform, and the importance of this in effectively establishing and maintaining new ways of working that support ongoing participation in new industries such as carbon farming.

These results demonstrate the successful adoption and ongoing use of Fulcrum by land managers in remote rangeland locations to support their active participation in carbon farming opportunities. This is a significant outcome considering the lack of prior use of similar information technologies for most of these land managers. The benefits associated with the HIR opportunity would have played a role in initial willingness to adopt the use of Fulcrum (Baumber et al. 2022), but the ongoing engagement and collaboration has been key to the sustained success of this collaborative approach. The establishment of these ways of working over the Fulcrum platform presents broader opportunities to support land management in these remote rangeland environments. Farm data platforms widely used in other sectors are largely absent from the pastoral study area. There is further scope for Fulcrum to provide wider property record keeping solutions and to act as a decision support tool through its ability in collecting and visualising data on the ground. It also opens the door for increased collaboration between land managers and a range of governmental and other private services. Further engagement and research using methods such as surveys would be beneficial in understanding how land managers in these areas can best realise these opportunities.

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