Landcare NSW regional data snapshots

Impact of a supported Landcare in NSW

Landcare NSW

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Document prepared by:

Aurecon Australasia Pty Ltd
ABN 54 005 139 873
Level 5, 116 Military Road
Neutral Bay NSW 2089
PO Box 538
Neutral Bay NSW 2089
Australia

T +61 2 9465 5599
F +61 2 9465 5598
E sydney@aurecongroup.com
W aurecongroup.com

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Author signature		Approver signature	
Name	Kapil Kulkarni	Name	Victoria White
Title	Senior Consultant	Title	Technical Director

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1 Executive Summary

Landcare New South Wales (NSW) engaged Aurecon Infrastructure Advisory (Aurecon) to provide 'regional snapshots' of the value that Landcare provides to communities in NSW, and assess the contribution that Landcare NSW and the Local Landcare Coordinator Initiative make towards that value.

Landcare NSW is the peak body representing approximately 60,000 Landcare volunteers in NSW, who manage and restore Australia's natural environment, improve the sustainability of agricultural activities and build resilience in communities. Landcare volunteers self-organise into groups, which in turn are represented by regional and district 'networks'.

The support infrastructure that empowers the Landcare movement is built on investments from many organisations and entities. Investments made by the Australian Government, NSW Government, Local government, industry bodies, philanthropic organisations and individuals and by volunteers all contribute to the support infrastructure that empowers Landcarers to deliver on their goals.

The Landcare movement is also centrally supported in a number of ways by Landcare NSW. One of the primary avenues for this support provided to the district and regional networks is through the Local Landcare Coordinator Initiative, which is delivered in partnership with Local Land Services. This partnership allows for the resourcing of the LLCI to leverage and build on other support provided by investors that is delivered via Local Land Services.

Landcare NSW played a key driving role in obtaining the funding for the coordinators who are hosted by district or regional networks. The coordinators work to improve their groups' governance, facilitate communication between groups, build partnerships between groups and other stakeholders, and coordinate natural resource management (NRM) activities. Landcare NSW and Local Land Services under the LLCI, provide support to this network of coordinators and host organisations.

By operating the LLCI, in partnership with LLS, Landcare NSW plays a central role in supporting the Landcare community in NSW. This role is invaluable to the movement because Landcare NSW:

- has intimate knowledge of what is required to best support the Landcare groups across the state, and can share knowledge and best practices across the state
- as a non-government organisation (NGO) originally formed by volunteers, it has the skills and relationships to maximise the benefits from the LLCI program
- as an NGO, it is able to achieve greater buy-in from the Landcare community compared to what could be achieved by a government agency.

Aurecon obtained data on the activities of Landcarers in the Glen Innes, Coffs Harbour, Greater Sydney and Western networks, and assessed the impacts through a two-stage analysis. Firstly, Aurecon assessed the impact of a 'supported Landcare' in the selected district and regional networks, by analysing data on the economic, social and environmental outcomes achieved, and valued those outcomes in economic terms. The outcomes achieved in the selected networks that had more complete data (Glen Innes, Coffs Harbour and Greater Sydney) were extrapolated to provide an indicative value for the whole of NSW.

Secondly, Aurecon characterised the contribution the support provided under the LLCI made towards achieving the outcomes.

Aurecon's assessment of the benefit of Landcare in NSW shows that:

- the impact of a supported Landcare network is significant
- an entity like Landcare NSW plays an important if not critical role, in facilitating, value adding, and maintaining the support that underpins the work of these Landcare networks. This is supported by relevant literature.

The annual net benefit (i.e. net of costs) of a supported Landcare in Glen Innes, Coffs Harbour and *part* of Greater Sydney is estimated to be **$6.5 million**. Considering the economic, social and environmental outcomes delivered by the networks, this estimate is likely to be conservative because only some of the benefits could be quantified using available data.

As a rough indication of the value across NSW, if these benefits were extrapolated across the state using the ratio of the population of the selected regions to the population of NSW, the net benefits delivered by a supported Landcare in NSW would be **$500 million per year**.

Estimating the proportion of this value attributable to Landcare NSW, Local Land Services and the Local Coordinators under the LLCI is challenging. However, assuming 10 per cent of the benefits are due to the support provided through the LLCI, this would equate to an attributable contribution of **$50 million per year** (or equally, $50 million per year would be lost if funding for local coordinators and the central support provided by the LLCI was removed). The collation of evidence in this report suggests that the value of the support is likely to be higher.

Calculations by Landcare NSW have estimated that the funding requirement for an effectively supported Landcare movement, based on the support facilitated through the funding of the LLCI and provided by Local Land Services for Landcare support, equates to **$8 million per year** (this excludes support provided by Local Government, Industry bodies and others, and funds for on-ground works).

Based on this estimated funding requirement of approximately $8 million per year, the return on investment is more than **$6 for every $1 investment** (a BCR of greater than 6).

2 Introduction

2.1 Landcare in NSW and the LLCI

Landcare in NSW

Landcare is a community based approach to managing and restoring Australia's natural environment, improving the sustainability of agricultural activities and building resilience in communities. In New South Wales, the Landcare movement includes around 3,000 community based groups, which interact as district and regional networks.

There are about 60,000 Landcarers in NSW involved in the movement. Landcare NSW, formed in 2007 by Landcare volunteers, is the state peak body that represents them (Landcare NSW, 2018a). Landcare NSW is the representative body for district and regional Landcare groups in NSW, and acts as the state-wide conduit for support and best practice knowledge sharing that would otherwise be non-existent.

Since Landcare was established in the early 1990s, the support provided to Landcare has undergone significant change. However, feedback from the Landcare community to Landcare NSW through its biennial Landcare Musters has consistently identified that Local Landcare Coordinators are considered the most important and effective mechanism to support the work of local Landcare groups. Studies indicate that the development of district and regionally based networks of Landcare groups, supported by Landcare coordinators, whilst an unplanned outcome of the Decade of Landcare Plan, are a key factor underpinning the successful operation of Landcare at the local level (e.g. Curtis and Sample, 2010).

The Local Landcare Coordinator Initiative (LLCI)

Based on the positive feedback about the value of local coordinators, Landcare NSW secured a commitment from the NSW Government in 2015 for a four-year Landcare support program, that included funding for local coordinators. Local Land Services is a critical component of the success of this program, as are the local governments in some regions who have contributed resources for the coordinators.

This $15 million program is delivered as a partnership between Landcare NSW and Local Land Services, a NSW Government agency, and is known as the Local Landcare Coordinator Initiative (LLCI). The program is guided by a Joint Management Committee (JMC) which includes the Chairs and senior staff of both organisations.

Through this approach, the LLCI not only delivers with the resourcing of the program, but leverages and builds on other support provided by investors that is delivered via Local Land Services

LLCI provides a network of locally-based coordinators to work with local Landcare groups and networks to build capacity and connections within communities. The coordinators support a network of thousands of volunteers and groups, to deliver a variety of different economic, social and environmental outcomes across NSW.

The majority of the NSW Government funding for LLCI is used to support community based local coordinator positions, hosted within district or regional networks, which in turn support the local volunteer groups and projects in their region. The coordinators enhance the capacity of the district or regional networks – they share best practices, link the groups to technical knowledge and research, and facilitate the sharing of knowledge and innovation exchanges between groups of farmers and or the wider community. By doing these things, the coordinators facilitate the building of valuable social capital.

The LLCI also provides resourcing for Landcare NSW and Local Land Services to provide central support services to the network of Local Landcare Coordinators, their host organisations and the wider Landcare community.

The LLCI enables volunteer groups to concentrate their valuable volunteer hours on delivering projects that create lasting improvements in their environment and communities. In 2016, Landcare NSW, in conjunction with Local Land Services, worked with the Landcare community to determine the placement of the equivalent of 60 half-time (0.5 FTE) coordinators as funded by the initiative. There are currently 71 Local Coordinators supported

by the initiative (Landcare NSW, 2018b). The breadth of the Landcare coordinators network in NSW is shown below in Figure 2-1.

Figure 2-1 Local Landcare Coordinator Initiative coordinator network

Source: Local Land Services

2.2 Background to this project

The purpose of this project is to provide data and analysis on the economic, social and environmental benefits delivered through Landcare networks in NSW, and investigate the role of the LLCI in facilitating these outcomes.

The value of Landcare to the community has already been extensively investigated and summarised by others (e.g. GHD, 2013; Natural Decisions et al, 2015; Henry et al, 2016). This project adds to this work by measuring the value using economic concepts and express this in economic terms for four selected district/regional networks in NSW (i.e. provide a 'snapshot' of this value by focusing on selected networks).

Apart from providing a snapshot of triple bottom-line benefits, there are two other main objectives of this project:

1. The project aims to develop a framework (refer to section 3.3) that can be used to value the diverse range of benefits achieved by a supported Landcare in NSW.
2. The project aims to identify gaps in the data and provide recommendations on how to fill those gaps.

A more complete dataset will enable a more accurate valuation of the benefits of supported Landcare networks.

The framework aims to measure both:

- tangible benefits, such as improved land productivity
- intangible benefits, such as improved amenity, ecology, biodiversity and social benefits

The report outlines the results of applying this framework to four selected networks in NSW (refer to section 5), using indicative estimates of the value of tangible and intangible benefits. The estimates of value are derived through the literature, which uses market and 'non-market'[1] valuation techniques to allow the benefits to be expressed in aggregate economic terms.

The results of this analysis are designed to provide an indication of the return on investment (ROI) achieved by investing in the support of Landcare in NSW. The ROI is an indication, rather than a precise estimate, because the 'return' i.e. the proportion of the outcomes achieved by Landcare in NSW that is due to the contribution made by the LLCI is measured using:

- quantitative analysis using available data to measure the total economic benefits, not just the proportion attributable to Landcare NSW and the LLCI
- qualitative analysis to measure the contribution of the LLCI to those total benefits, using evidence from the networks and the literature.

Because the ROI estimate is only indicative, the report also presents a 'breakeven' analysis for the assumption that is most difficult to estimate quantitatively – Landcare NSW & LLCI's contribution to the total benefits (i.e. the proportion of the total benefits attributable to Landcare NSW and the LLCI). The break-even analysis asks the following question – *"What proportion of the total benefits would have to be attributable to Landcare NSW and LLCI for the funding provided to them to earn a positive return on investment"*.

The break-even analysis is performed by calculating the contribution required to achieve a benefit-cost ratio (BCR) of greater than 1.

2.3 Structure of this report

The report is structured as follows:

- Section 3 summarises the assessment framework.
- Section 4 provides an overview of the regions the framework was applied to.
- Section 5 outlines the results of the framework in the four selected regions.
- Section 6 concludes and provides recommendations for future work.

[1] The literature values some of the benefits using market prices (e.g. the market price of the crop affected). However, other benefits (e.g. improved amenity) don't have corresponding market prices and are therefore valued using 'non-market' valuation techniques. Non-market valuation techniques include stated preferences approaches, which involves surveying people on what they would hypothetically be willing to pay for certain outcomes, and revealed preference approaches, which involves estimating the value based on the decisions people make (e.g. the price premium people are willing to pay for a property that is closer to an environment asset).

3 Approach to the assessment

3.1 Purpose of assessment

Landcare NSW and Local Land Services through the LLCI have provided core infrastructural support that enables Landcare networks to operate. The purpose of this assessment is to demonstrate the outcomes achieved through this support using data from four selected networks (two district; two regional). This is demonstrated through a two-stage analysis.

Stage 1 – Impact of the networks

Firstly, the assessment aims to show what a 'supported Landcare' can achieve in the four regions. That is, it aims to estimate the benefit a district or regional network, which is supported through the LLCI and other assistance, provides its communities. The following benefits were considered:

- **Economic benefits:** linked to higher productivity from improved land.
- **Social benefits:** associated with enhancing the resilience and wellbeing of the communities.
- **Environmental benefits:** through protecting and repairing the natural environment, and the value that the community places on these outcomes.

Stage 2 – The contribution Landcare NSW and the LLCI make to achieve the outcomes

Secondly, the assessment explores the types of support that the LLCI has provided to the regional networks, and the significance of this support in achieving outcomes. This is done by gathering evidence from the networks that have benefited from support of a Local Coordinator provided under the LLCI, along with support provided from Landcare NSW in its role as a state peak body, and reviewing the literature on the benefit of such a coordination role in the context of NRM activities.

3.2 Inputs to the assessment

The assessment of value has been performed mostly by using data from Landcare networks located in the Glen Innes, Coffs Harbour and Greater Sydney regions. These regions were selected because they could provide data to estimate the economic value of a supported Landcare. The assessment of the data from these regions provide a 'snapshot' of the economic, social and environmental benefits of Landcare, valued in economic terms.

The assessment also includes limited analysis of a fourth region, Western Landcare NSW. While the Western Landcare NSW region was unable to provide an extensive dataset to enable a valuation compared to the other three, it was included because it was found to deliver significant social benefits to its communities.

This report uses snapshot data from the four regions on the different types of activities / projects and the outcomes generated. Examples include the number of hectares of weeds and pest management control, the number of trees planted, the number of hectares of treatment to riparian areas and the number of community educational events held. The outcomes of these activities present a variety of different economic, social and environmental outcomes to farmland, ecosystems, community and individuals.

The report also provides data on funding and number of volunteers, which are the main resources used to produce these outcomes.

3.3 Assessment framework

3.3.1 Overview of the framework

Figure 3-1 summarises the assessment framework used in this study.

Data from the regional networks on the types of projects and activities undertaken have been used to estimate the economic, social and environmental value of those outcomes (illustrated in the green boxes of the figure).

Literature and anecdotal evidence has been used to characterise the contribution by Landcare NSW and LLCI towards achieving those outcomes, the illustrated in the blue boxes of the figure. The evidence relates to how the support provided to networks from the LLCI has enhanced the capacity of the regional groups by attracting more resources, and how Landcare NSW and Local Land Services (through the LLCI) have enhanced the outcomes themselves, by partnering with the regional networks on delivery. The main sources for this evidence are:

1. Anecdotal evidence provided by the regional networks on the support that Landcare NSW has provided through the LLCI, as well as quantitative data from the networks own records.
2. Evidence from other studies that highlight the value of a coordination role in the context of NRM activities.

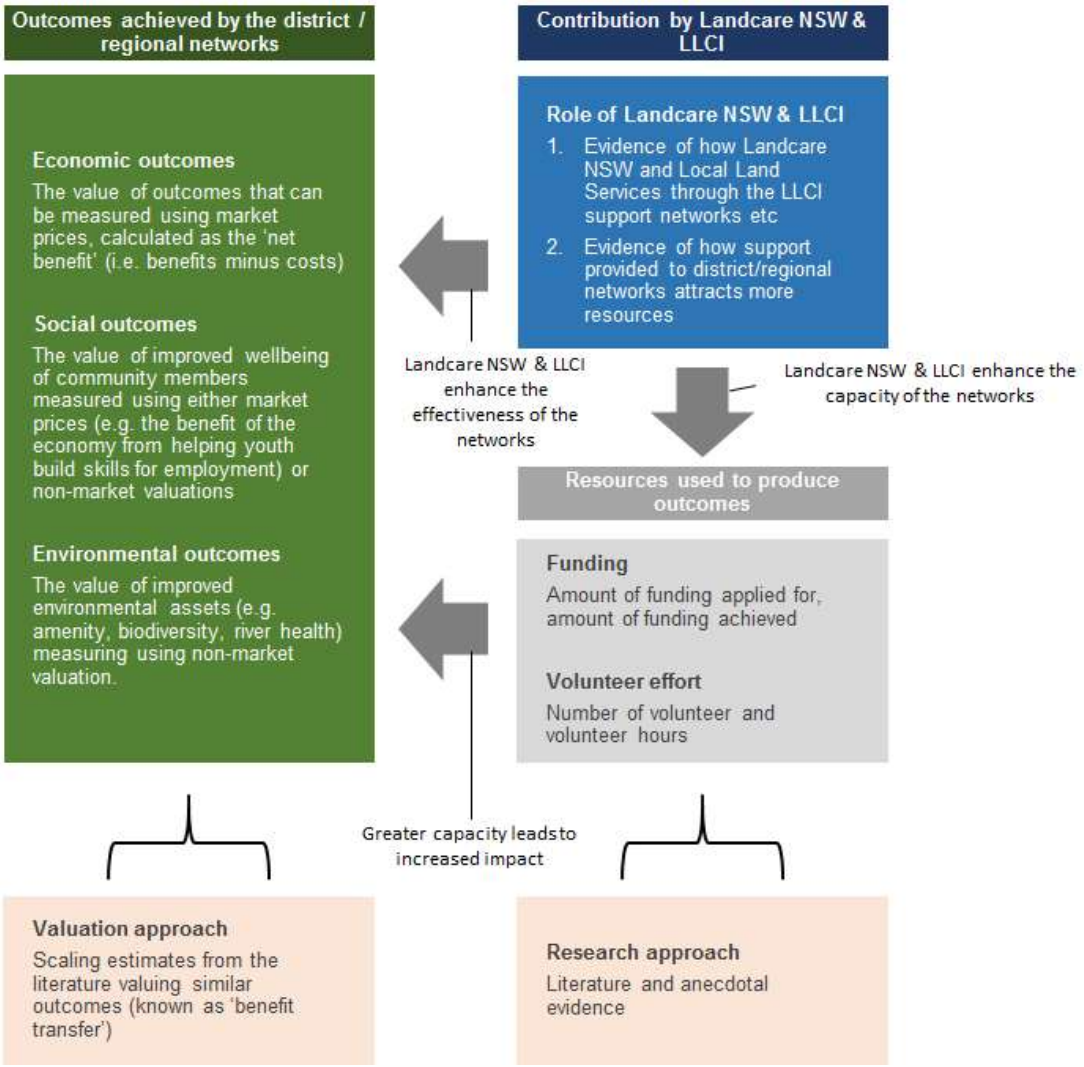


Figure 3-1 Assessment framework

Note that the estimates in this study only include those activities for which data was available and those outcomes that could be valued using data from other studies.

3.3.2 Application of the framework

The framework is applied by using quantitative analysis to measure the benefit of Landcare's outcomes in economic terms, and qualitative analysis to describe the contribution made by Landcare NSW and the LLCI towards achieving those outcomes.

Measuring the benefits of Landcare outcomes in economic terms

The following steps are used to measure the benefits of Landcare's outcomes in economic terms:

1. Identify the economic, social and environmental outcomes achieved by Landcare in a given network.
2. Gather data on the magnitude of the change for each outcome.
3. Gather evidence on the economic value of such changes estimated by others in similar contexts.
4. Adjust the estimates of value from those contexts to suit the context within the network.
5. Sum the estimates to obtain a sum value for Landcare's selected activities within the network.

The process for each one of these steps is discussed in turn. The description of the steps is provided in a way to provide guidance to others who may want to use the framework to apply the benefit of Landcare in other networks, or to refine / expand the valuation in this report to other outcomes once the necessary data becomes available.

Step 1 – Identify economic, social and environmental outcomes

The economic, social and environmental outcomes are the fundamental difference that Landcare has made to that community. Therefore, this step should focus on *what* was achieved not *how* it was achieved. For example, if an activity involved removing weeds from a national park, the outcome is that a certain area of national park has improved in quality. This outcome may have been achieved by volunteers and other resources, but this is less relevant for measuring benefits.

Step 2 – Gather data on the magnitude of the change for each outcome

To allow valuation, data is needed on the magnitude of the change achieved. Continuing with the same example, this would be an estimate of the area (e.g. hectares) of national park over which weeds were removed is required.

Step 3 – Gather evidence on the economic value of changes

For many of the outcomes, the economic value of the changes will have been estimated by economists in different contexts. For example, the value of removing weeds from a national park will have been estimated in the literature. The estimate may be for a different type of national park, in a different part of the country (or the world), and/or for a different type of weed.

The estimates are generally presented as 'total economic values' because they incorporate the value the community gets by using the asset that was improved (e.g. visiting the national park), or the satisfaction gained by community members even if they don't use the asset (e.g. the satisfaction gained by knowing the national park will be there for others or future generations to enjoy). These are known as 'use values' and 'non-use values' respectively. The relevant estimates are those of *net* economic benefits (i.e. benefits net of costs).

The purpose of obtaining this evidence is to apply it to the context within the network, after adjusting for the scale of the outcomes and other differences between contexts (e.g. exchange rates etc.). This is a valuation technique known as 'benefit transfer'. The more similar the context, the more accurate the estimate derived using benefit transfer.

An alternative to benefit transfer is to estimate the value using an original economic study. However, this type of valuation should only be undertaken by specialists with the necessary skills and can require large amounts of data, time and resources.

During this step, it may become apparent that corresponding estimates of the value are not available for some of the outcomes. These outcomes should then be discussed qualitatively. This may also require returning to step 1 to identify more outcomes that can be valued.

Step 4 – Adjust the estimates

The estimate of value from the original study needs to be adjusted to fit the context within the network. For example, if the estimate of value from the original study was for a 100-hectare area of national park but Landcare's activities covered 200 hectares, the estimate of value should be doubled. The estimates should represent the value of that change over the whole life of the asset being improved.

For example, if the weeding provides benefits for the next 10 years. The estimate should be the aggregate value over 10 years, expressed in present value (PV) terms.

A benefit transfer also requires some judgment and if possible, some input should be sought from specialists about the appropriateness of the underlying studies and the adjustments needed to apply it to the context at-hand.

Step 5 – Determine total economic value

The sum of value estimates from Step 4 for each activity can be summed to provide a sum value for the network, also expressed in PV terms (i.e. aggregate value over the years that all the activities will be providing benefits).

Contribution made by Landcare NSW and the LLCI towards achieving outcomes

This quantitative analysis provides an estimate of the sum economic value associated with outcomes, which have available data to enable valuation, that Landcare as a whole has delivered within the network. However, this does not consider the contribution made by Landcare NSW and LLCI. The contribution is investigated by gathering evidence on the types of support that Landcare NSW and the LLCI have provided to the networks.

For this study, anecdotal evidence was sought from the networks with Local Landcare Coordinators. This was supplemented with evidence from the literature on the general benefits of the role of a coordinator.

3.3.3 Robustness of the framework

The benefit transfer approach described in this section is applied in many situations where an original valuation is not practical or feasible, and an approximation is sufficiently accurate for the purposes to the study. It is a common approach used in environmental economics and when applied correctly, can provide a good estimate of the economic value of an outcome without the need to conduct extensive research. The accuracy of the approach depends mainly on the:

- similarity of the context from which the estimate is being drawn and the context in which it is being applied to
- the adjustments made to compensate for differences in the contexts.

Therefore, applying benefit transfer robustly requires technical knowledge about the similarity of outcomes (e.g. whether the weeding activities assumed in both contexts would deliver similar outcomes based on the species present in the corresponding national parks). It also requires judgment on the appropriate adjustments necessary to make the economic values more comparable.

This study considers these issues and makes adjustments for differences in the scale of impacts and some economic / demographic variables (e.g. currency exchange rate, inflation over time, population etc.). Adjustments for differences in technical variables (e.g. efficacy of weeding methods) were not possible due to limitations in the data. A more detailed exercise could take these differences into account.

4 Overview of the regions

Landcare NSW supports a variety of different district/regional Landcare networks across NSW. In securing the LLCI funding, part-time local Landcare coordinators were provided to the networks increasing the reach of Landcare across the state. The networks act as the umbrella Landcare group to facilitate volunteers and smaller groups across the region. These networks can also be supported through resources from other partners such as local councils.

This report takes a snapshot of the economic, social and environmental impacts of the following four regional groups supported by Landcare NSW and the LLCI:

- Glen Innes Landcare.
- Coffs Harbour Regional Landcare.
- Greater Sydney Landcare.
- Western NSW Landcare.

4.1 Glen Innes Landcare

The Glen Innes Natural Resources Advisory Committee (GLENRAC) initiate and coordinate action for landholders and the community in order to manage and maintain the natural resource base of the Glen Innes district. The Glen Innes farming district primarily produces wool, sheep and beef cattle.

GLENRACs objectives are to provide (GLENRAC, 2018):

> ***"Solutions for a sustainable and productive landscape"***

The vision is what they aspire to be. It is designed to inspire and represents their ideal. The vision is achieved by initiating and coordinating action for landholders and the community to manage and maintain the natural resource base of the Glen Innes region for the improvement of both the social and productive environment (GLENRAC, 2018).

Figure 4-1 below shows a GLENRAC facilitated farmer's information evening (an information event for primary producers), to encourage awareness and understanding of resource management amongst farmers and create a legacy amongst the community.

GLENRAC is a district Landcare network that has one part-time coordinator funded under the LLCI, plus an additional part-time coordinator secured from Northern Tablelands Local Land Services and project funds. The two part-time coordinators and the GLENRAC Landcare, through the work of its committee and staff achieved the following during 2017-18:

- supported 10 groups and had 611 members
- awarded eight grants from a variety of different funds, valued at $157,578.
- applied for grants to the value of $1.2 million, most pending a final decision from funding bodies (as at 1 May, 2018)

Figure 4-1 Glen Innes Pasture Update May 2017

Source: GLENRAC

4.2 Coffs Harbour Regional Landcare

Coffs Harbour Regional Landcare supports groups and volunteers working on coastal sites within the Coffs Coast Regional Park, Coffs Harbour Local Government reserves and other public land. The main area of natural resource management covers around 300 hectares of mostly coastal dune systems and national parks. The breadth of the Landcare groups is shown below in Figure 4-2.

The main aim of Coffs Harbour Regional Landcare is (Coffs Harbour Regional Landcare Inc, 2018):

"To be a respected, independent and professional community based organisation which actively promotes environmental awareness and provides leadership, support and advocacy for effective community involvement in sustainable Natural Resource Management in the Coffs Harbour region"

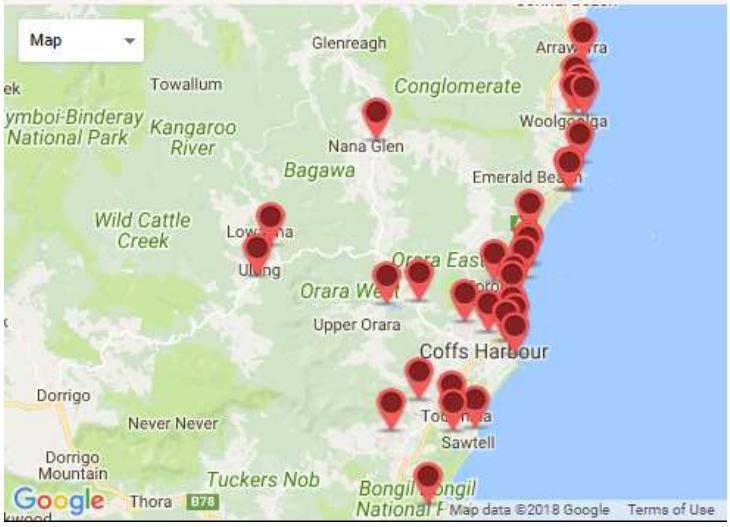


Figure 4-2 Coffs Harbour Landcare network

Source: Coffs Harbour Landcare

The Coffs Harbour Landcare is a district Landcare network and is supported by a part time coordinator (0.35 FTE) under the Local Landcare Coordinator Initiative, plus an additional part time coordinator funded by Local Land Services. The network:

- received a total grant funding of $432,225 in 2016/17 and $299,643 in 2017/18
- coordinates 269 members across 39 sites and groups who
  - in total contributed around 13,500 volunteer hours in 2016/17
  - work on 33 sites across 300 ha of land.

4.3 Landcare in Greater Sydney

Landcare in the Greater Sydney region is well supported through the partnership between Greater Sydney Landcare Network and Greater Sydney Local Land Services, which helps to support 950 groups and approximately 13,000 volunteers across the region. This is achieved through a Council and the National Parks and Wildlife Service (NPWS) Bushcare coordinator network, called the Sydney Volunteer Coordinator Network, and through the various local Landcare networks and via direct support to individual Landcare groups.

Greater Sydney Local Land Services distributed $821,000 to local Landcare / Bushcare groups in the 2016/17 financial year with a further $99,000 of grant funding awarded by the NSW Environmental Trust.

The Greater Sydney Landcare Network supports individuals and groups who are working to protect, restore and improve the natural environment of Greater Sydney. The region includes metropolitan Sydney, greater Western Sydney, the Central Coast and the Blue Mountains (Greater Sydney Landcare Network Inc, 2018a), as shown below in Figure 4-3. Members include: Council bushland managers, representatives of the Botanic Gardens, environmental event organisers, local Bushcare and Landcare volunteer groups, community organisations, regional networks, professional bush regeneration companies and individuals.

Figure 4-3 Greater Sydney Landcare network

Source: Greater Sydney Landcare Local Land Services

The Greater Sydney Landcare Network's main goals are:

- to promote and protect Landcare and Bushcare brands
- to build member capacity to tackle sustainable natural resource management

- increase opportunities for coordinated on-ground activities that achieve strategic priorities in the Greater Sydney area (Greater Sydney Landcare Network Inc., 2018b).

The Greater Sydney Landcare Network operates at the regional scale and directly hosts two of the five half time LLCI coordinators that have been placed across the Greater Sydney region. The three other half time coordinators have been placed within sub-regional locations, working directly for those organisations

This report focuses on three groups which are representative of a range of Landcare groups across the region[2]:

- Friends of the Colo – who care for the remote bush areas in the Colo River catchment adjacent to National Parks, primarily focusing on eradicating introduced pest species like Willows, Lantana and Cape Ivy.
- Cumberland Land Conservancy – who manage land for conservation and educate the community to think like land managers around the Cumberland Plains of Western Sydney.
- Red Gum Park Bushcare – Landcarers who protect public bushland reserves in Bullaburra.

4.4 Western Landcare NSW

Western Landcare NSW Inc (WLNSW) represents a diverse range of local groups across Western NSW including, but not limited to: Rangecare groups; fishing clubs; village committees; school groups; Landcare groups and pest management groups. WLNSW has three main delivery goals:

- Work with the local Landcare coordinators to build capacity and foster greater action.
- Create a community of practice; a mentoring, support and networking program to help Landcarers share, communicate and learn from each other.
- Create a sustainable Regional Landcare Network; looking at a program to build a sustainable financial footing for Landcare into the future.

The geographical vastness of the Western Region of NSW covers a landmass of approximately 31.5m ha, three quarters of which has a group membership with WLNSW (see Figure 4-4 below).

[2] Although only two of the three groups chosen are formal members of GSLN, each of these groups are representative of the types of groups in the region. The groups were chosen for this analysis because of the availabiity of data.

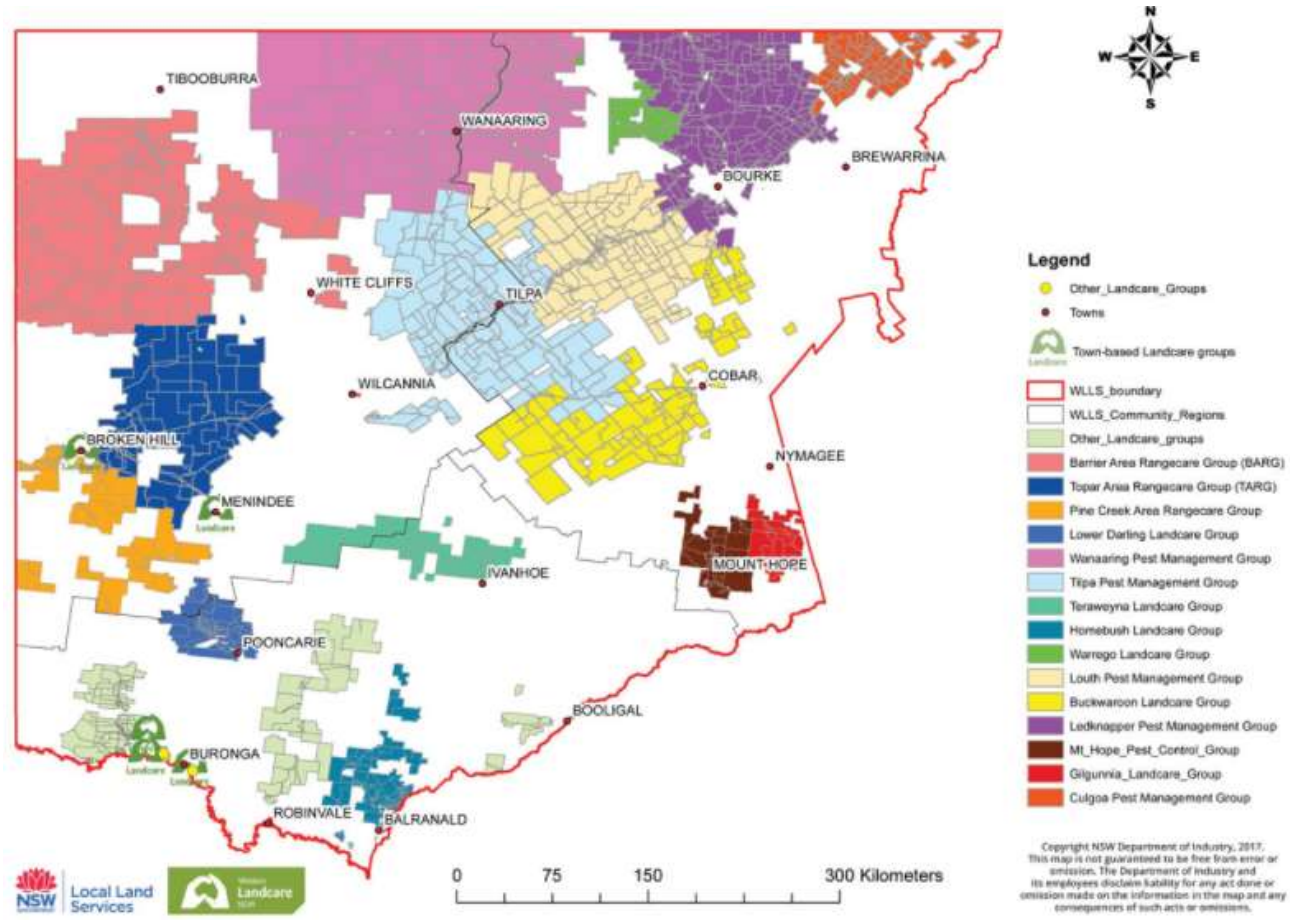


Figure 4-4 Western Landcare NSW

Source: Western Landcare NSW

WLNSW is supported by three full time local Landcare coordinators (2 FTE in total) and an Executive Officer (EO) with funds from the Local Landcare Coordinator Initiative (LLCI). These positions are based locally in Bourke, Broken Hill and Buronga with the EO working remotely from home in White Cliffs. WLNSW member groups encompass over 2,000 members across 20 million hectares in Western NSW (Western Landcare NSW, 2018).

The coordinators are housed in their respective Local Land Services offices, which is an example of the partnership between Local Land Services and Landcare at both the state and regional levels. The Coordinators and EO work for an Executive Committee as well as a WLNSW Steering Committee which is comprised of one representative from each member group. Both the Executive and steering committees meet three times per year at different venues across the region. In the 2018 financial year, WLNSW have focussed primarily on building landholder capacity for pest management in agriculture. To this end, WLNSW have:

- utilised 1,000 hours of local Landcare coordinator time
- received approximately 5,000 hours of volunteer time donated by landholders
- received $100,000 in in-kind contributions from landholders
- received a devolved grant from Western Local Land Services of $103,000.

Since the inception of the LLCI, WLNSW have received $596,200 from the State Government and have managed to match this with $518,914 of cash contributions from landholders. WLNSW estimates that since Feb 2016, the amount of in-kind contribution from both its members, Western LLS staff and the community at large equates to well over $1 million. The matching cash for WLNSW projects over this period has funded community engagement, training, strategic planning, the running expenses for the WLNSW Executive & Steering Committee and the Western Landcare Youth Network.

5 Impact of supported Landcare networks

5.1 Impact of a supported Landcare in Glen Innes

GLENRAC coordinates action for landholders and the community to manage and maintain the natural resources in the Glen Innes region. Local actions address a variety of goals including:

- Land management – managing agricultural productivity including vegetation, soils and weeds.
- Water management – controlling erosion and protecting waterways including the riparian zone.
- Biodiversity – protecting and enhancing flora and fauna habitats, and managing pests.

GLENRAC provided data on the impacts of these activities. The activities contributed to economic, social and environmental outcomes which can be valued using the framework outlined in Section 3.

5.1.1 Activities providing economic, social and environmental benefits

Table 5-1 summarises the data used to estimate part of the value of GLENRAC's activities to the NSW community.

Table 5-1 GLENRAC activities used for valuation

Scale of activity	2015-16	2016-17	Outcome
Landholdings involved in weeds projects	23	4	Reduce the impact of weeds on agricultural land
Hectares treated for soil erosion	60	77	Reduce the impact of erosion
Hectares of tree planting	30	8	Enhance biodiversity
Landholders assisted with pest animals	3	200	Reduce the impact of pests on agricultural land
Hectares of land treated along riparian areas	60	0	Protect waterways
Attendees at community events	47	214	Build stronger rural communities

5.1.2 Indicative value to the NSW community and environment

Estimate of value

The approximate net economic value of these outcomes to the NSW community and environment has been estimated using the framework described in Section 3. This estimate is based on valuation data from previous literature and studies, and provides a high-level indication of the potential value, in monetary terms. The approach is known as 'benefit transfer'. Detail on how this approach was applied is provided in Appendix A.

Table 5-2 The economic value of GLENRAC's activities

Value of activity	Average annual net benefit approx. ($)	Source used for benefit transfer
Weeds projects	87,000	Storrie (2014)
Soil erosion treatment	32,000	Walpole and Sinden (1997)
Tree planting	1,700,000	NSW OEH (2018); UNE et al (2007)
Pest animals control	750,000	Cooke et al (2013); Chudleigh et al (2011)
Treatment of riparian areas	500,000	Loomis et al (2000)
Total quantifiable benefits	**$3 million**	

Qualifications

The estimate of value in this report adjusts estimates from other studies by scaling for differences in the size of the impacts (e.g. hectares improved, trees planted, km of coastline remediated etc.). Implicitly, this approach assumes that the productivity, biodiversity and ecological improvements are similar. This is known as benefit

transfer (i.e. the assumptions about the nature of the impacts are transferred from the source study to the current research).

This simplification results in some inaccuracy because, in reality, the types of impacts will be different (e.g. previous condition of the land before it was improved, types of trees planting etc.). Therefore, the resulting estimate should be considered an approximation rather than precise estimate. A more detailed estimate would take into account the specific improvements from GLENRAC's activities in the Glen Innes region (e.g. types of farm enterprises, level of productivity improvements achieved, species of trees planted and their biodiversity value, degree of improvement to riverbank etc.). However, this type of detailed modelling was not possible because of data limitations.

Unquantified impacts

The estimates only include those activities for which data were available and those outcomes that could be valued using data from other studies. Other GLENRAC activities that have benefited the region include:

- hosting farmers information evenings, training and awareness raising events on farming practice or technology such as drones, enables the community to learn from and develop a legacy for suitable farming and environmental protection
- providing a voice for grassroots landholders at regional and state meetings to discuss local issues and share lessons learned to continually enhance the community and provide a link for the grass roots landholder.

5.2 Impact of a supported Landcare in Coffs Harbour

Coffs Harbour coordinates, facilitates and manages activities by the community members to manage and maintain the natural resources and ecosystems of coastal areas including the dune areas. Local activities address a variety of goals including:

- Land management – managing native vegetation, sustainable agricultural systems, dune structures, weed control.
- Biodiversity – protecting and enhancing flora and fauna habitats.

Coffs Harbour provided data on the impacts of these activities. The activities contributed to economic, social and environmental outcomes which can valued using the framework outlined in Section 3.

5.2.1 Activities providing economic, social and environmental benefits

Table 5-3 summarises the data used to estimate part of the value of Coffs Harbour activities to the NSW community.

Table 5-3 Coffs Harbour activities used for valuation

Scale of activity	2015-16	2016-17	Outcome
Hectares of tree planting	-	2.5	Enhance biodiversity
Hectares of coastal dune management	300	300	Enhance biodiversity of native plants and preserve sand dunes as a functioning ecosystem
Attendees at training and community events	143	117	Build stronger regional communities

5.2.2 Indicative value to the NSW community and environment

Estimate of value

The approximate net economic value of these outcomes to the NSW community and environment has been estimated using the framework described in Section 3, and is shown below in Table 5-4.

Table 5-4 The economic value of Coffs Harbour Landcare's activities

Value of activity	Average annual net benefit approx. ($)	Source used for benefit transfer
Tree planting	200,000	NSW OEH (2018)
Ecosystem dune management	1,300,000	Lehrer et al (2013)
Total quantifiable benefits	**$1.5 million**	

Qualifications

The resulting estimates above should be considered an approximation rather than precise estimate. A more detailed estimate would take into account the specific improvements from the Coffs Harbour activities in the region (e.g. species of tree planted and their biodiversity value, the degree of improvement to the dune ecosystem etc). However, this type of detailed modelling was not possible because of data limitations.

Unquantified impacts

The estimates only include those activities for which data were available and those outcomes that could be valued using data from other studies. Other Coffs Harbour activities that have benefited the region include:

- strengthening relationships with neighbouring networks, land managers and the community through working together to preserve the natural environment together
- hosting training events to volunteers and land managers and community information sessions to raise awareness of natural land management issues and sustainability, which builds on existing social capital and creates a legacy for protecting the environment.

5.3 Impact of a supported Landcare in Greater Sydney

Greater Sydney Landcare Network acts as a hub to link the actions undertaken by individual volunteers and groups which engage in protecting and caring for the natural environment. There is a strong focus on Bushcare in the Greater Sydney region, and local activities across the region address a variety of goals including:

- Land management – managing native vegetation, sustainable agricultural on small properties, weed and pest control.
- Waterways management – managing weed control along river banks, improving water quality.
- Biodiversity – protecting and enhancing flora and fauna habitats including threatened species and wildlife corridors.

The Greater Sydney Regional Landcare Facilitator provided data on the impacts of these activities across a snapshot of three groups; Friends of the Colo, Cumberland Land Conservancy and Red Gum Bushcare. The activities contributed to economic, social and environmental outcomes which can be valued using the framework outlined in Section 3.

5.3.1 Activities providing economic, social and environmental benefits

Table 5-5 summarises the data used to estimate part of the value of the three Greater Sydney Landcare groups' activities to the NSW community.

Table 5-5 Activities of three Landcare groups in Greater Sydney used for valuation

Scale of activity	2015-16	2016-17	Outcome
Hectares of bushland weed management	7	7	Protect native vegetation
Hectares of riparian improvement including weed management	-	150	Improve waterways biodiversity and soil erosion
Biodiversity and habitat protection (Cumberland)	-	49	Enhance biodiversity
Number of trees planted (Red Gum)	-	25	Enhance biodiversity
Hectares of willow trees treated and management	4.3	-	Enhance biodiversity of native plants and preserve waterways as a functioning eco-system
Number of attendees at training and community events	-	200	Build stronger communities

5.3.2 Indicative value to the NSW community and environment

Estimate of value

The approximate value of these outcomes to the NSW community and environment is estimated using the framework described in Section 3, and is shown below in Table 5-6:

Table 5-6 The economic value of three groups from the GSLN

Value of activity	Average annual net benefit approx. ($)	Source used for benefit transfer
Weeds projects native bushland	3,000	Storrie (2014); Sinden & Griffith (2007)
Tree planting – Cumberland	4,000	NSW OEH (2018); UNE et al (2007)
Tree planting – Red Gum	2,000	NSW OEH (2018); UNE et al (2007)
Treatment of riparian areas	$1.2 million	Loomis et al (2000)
Willow tree treatment	800,000	Elmqvist et al (2015)
Total quantifiable benefits	**$2 million**	

Qualifications

The Greater Sydney region has the largest number of Landcare groups, 950 in total. However, this snapshot report only analyses data from 3 of the 950 groups.

The resulting estimates above should be considered an approximation rather than precise estimate. A more detailed estimate would take into account the specific improvements from the entire Greater Sydney activities across all groups and the region (e.g. species of tree planted and their biodiversity value, the degree of improvement to the bushland and waterways etc). However, this type of detailed modelling was not possible because of data limitations.

Unquantified impacts

The estimates only include those activities for which data were available and those outcomes that could be valued using data from other studies. Other Greater Sydney activities that have benefited the region include:

- education sessions mainly focused on conservation activities including bush regeneration, tree planting and advocacy work, encompassing all different parts of the community including youth groups and local Aboriginal groups
- volunteer groups undertaking citizen science activities including bird, fauna and vegetation monitoring and Streamwatch for monitoring water quality.

5.4 Example of social benefits (Western Landcare NSW)

WLNSW has been selected to provide a snapshot of the impact on social outcomes for regional young people. Amongst other general aspects of land management and conservation, WLNSW has developed a Youth Network that is aimed at providing young people with a platform to explore a future in agriculture and the environment with access to skills training in both fields.

The scale of activity across the youth program is shown below in Table 5-7

Table 5-7 Scale of activity for Western Landcare

Scale of activity	2016-17	2017/18	Outcome
Number of youths engaged in agricultural training and mentoring programs	13	23	Upskilling youths and providing lifelong skills – both physical & technical Providing Industry and professional connections & opportunities Environmental community service project management Improving mental health and community cohesion

Upskilling of Aboriginal and Torres Strait Islander youths is a key initiative of the Australian Government, namely in achieving the aims of the Prime Minister's Closing the Gap initiative (Australian Government, 2018). Not only is Aboriginal and Torres Strait Islander youth upskilling a national priority, it has many flow on benefits to the local community and Aboriginal and Torres Strait Islander students. The following scenario has been developed to provide an indicative estimate of the potential economic benefit of upskilling local Aboriginal and Torres Strait Islander students in Western NSW, assuming:

- an average 18 students are likely to attend the upskilling classes, and of these, 20%[3] are likely to continue to become more productive members of the workforce and / or higher education (attributable to the skills they learned as part of the Youth Network)
- the productivity benefits of completing secondary school have been used as a proxy for the benefits of increasing the productivity of the members of the Youth Network[4].

Using the above assumptions, the Youth Network is estimated to provide an indicative gross productivity benefit of $1.4 million (~$75,000 per productive student)[5]. Additional to productivity are other wider social benefits of mental health and wellbeing of young people in the program. The network allows youths to connect with each other and make a different to their communities, enabling a sense of belonging and can help to reduce mental health issues and a subsequent variety of different associated effects. This includes building self-esteem, allowing youth participants to have the confidence to gain entry into the workforce or to extend their learning.

5.5 The enabling role of Landcare NSW and LLCI

The achievements of a supported Landcare at the district, regional and local scale have been highlighted in the sections above. However, history has shown this support to be variable, and subject to change. Landcare NSW and the LLCI play a valuable role in ensuring that Landcare receives the recognition and support required. Landcare NSW and the LLCI also have a critical role in establishing and building partnerships with organisations that directly interact with local district and regional Landcare groups, and through these partnerships deliver programs that meet the needs of both Landcarers and the partners organisations

[3] This could be considered a conservative estimate, considering that almost 50% of attendees in 2016 went on to have jobs related to the skills they learned (including a student that went on to attend University via a scholarship)
[4] Difference in lifetime earnings for completing year 12 compared to year 11 or below is $330,000 (2012 Australian Dollars) (NATSEM, 2012)
[5] Converted from 2012 to 2018 Australian dollars using historical CPI inflation rates. Source: https://www.rateinflation.com/consumer-price-index/australia-historical-cpi

5.5.1 Supporting networks to focus on priorities

The implementation of the LLCI by Landcare NSW and Local Land Services supports the district and regional networks by providing:

- resources (staff and information)
- governance and administrative advice
- sharing of best practices via workshops and support at regional community of practice events
- representation
- state-wide coordination.

This facilitation and coordination role frees up many more regional Landcarers who would have otherwise had to spend time and focus on governance, administration, coordination, seeking out technical knowledge and best practices from other networks – taking them away from the important tasks that deliver on-ground benefits such as obtaining funding, attracting volunteers and delivering projects. In this way, the support from a peak body helps the district and regional networks to deliver much more than they could have otherwise.

In conjunction with Local Land Services and through the Local Landcare Coordinator Initiative, Landcare NSW has been able to ensure that this role is resourced and supported, at both the state-wide and regional scale.

5.5.2 Landcare NSW – the state-level link for the 'group action' model

Landcare NSW is the representative body providing leadership, skills and resources for district and regional Landcare groups in NSW, acting as the state-wide conduit for support and best practice knowledge share that would otherwise be non-existent.

As a peak body, Landcare NSW has been able to collate a wealth of local knowledge captured across all regions of NSW. Working closely with communities, Landcare NSW works to ensure its advocacy and representative role to the grassroots movement in a reciprocal relationship that builds trust at all levels. Landcare NSW supports a community wide approach that puts the community's best interests first, and allows groups to collaborate independently and organically. Community groups are able to develop their own initiatives, and can grow sustainably with support when required.

The Landcare framework is fundamentally based on group action to deliver outcomes for the environment and communities (Henry et al, 2016). It is based on individuals and communities coming together, sharing information, and collaborating to achieve more than what they could have acting individually. Group action not only achieves more than unilateral action, but it also helps build something known as 'social capital' (Productivity Commission, 2003). Social capital is the trust and cooperation that enables groups to deliver better outcomes.

There is extensive evidence on the benefits of group action (Prior, 2012), and the benefits of building social capital, including the private (economic) and public (environmental and social) benefits (Compton and Beeton, 2012; Curtis et al, 2014). The regional networks facilitate group action and the building of social capital at regional level. Landcare NSW plays that role at a state level.

This is becoming an increasingly crucial role in light of the reduced funding for Local Land Services, reduced funding for the National Landcare Program, and a move towards a distributed Government service delivery model. The benefit of Landcare NSW's role can be measured by considering what would happen if Landcare NSW was not there. Based on the above literature review, the evidence shows that if this state level facilitation and coordination role was not there, a lot of the benefit would be lost.

Without the trust and local knowledge developed through the Landcare model, local groups would be isolated without best practice support and resources, working essentially in a vacuum, with motivation and support declining.

5.5.3 Representing Landcarers to Government

Importantly, Landcare NSW also represents Landcarers to Government and other stakeholders. This representation role is beneficial to both government and local Landcarers because (Henry et al, 2016):

- by working with Landcare NSW, government programs can achieve better outcomes for regional communities because Landcare provides a trusted link to local knowledge
- landholders and community collaborate more with a trusted organisation like Landcare than directly with Government
- the local communities feel more invested in the outcomes delivered through Landcare than they do with outcomes delivered through Government programs that directly fund contractors.

5.5.4 Building social capital

Social-political and social capital broadly relates to resources that become available as a part of social cohesion, mutual support, reciprocity and trust within a community (ABS, 2000). Although its definition is a matter of international debate, the recurring themes of 'resource' and 'benefit' are a clear indicator of the positive results brought about by an increase in social capital.

At a regional level, Landcare groups foster social cohesion and promote communities to work together (building social capital). This includes building sustainable relationships, providing new guidance or governance, building capacity and resilience, enhancing communication in local communities, empowering individuals, and the recognition of women (GHD, 2013).

These benefits are attributable to the **network** and **communication** provided by Landcare regional groups, benefits which are only amplified by the facilitation and programs brokered by Landcare NSW. Through programs such as the LLCI, Landcare NSW and Local Land Services have provided support funding to a network of groups and coordinators, allowing regions to connect and share issues, solutions, advice and ultimately social capital. Without a state level body to connect the regions together, the compounding effects of shared social capital could not be realised.

The literature presents a number of social capital benefits resulting from Landcare:

- **Partnerships and networks –** increased involvement and alignment with indigenous groups (and cohesion with non-indigenous groups), development of organic 'Landcare networks' and facilitation of groups that self-organise into higher level structures (McTernan and Scully, 2010; Sobels et al., 2001).
- **Leadership and public participation** – As a result of the increased number of networks, groups and committees is the development of new leadership and public participation roles in regional NSW. Groups like these have the potential to provide significant political influence and band together in the pursuit of mutually beneficial goals (Toyne and Farley, 2000).
- **Governance and self-regulation –** This includes the credibility and respect attributable to Landcare organisations across Australia due to the diversity in its members, geography, governance and issues. This diversity is due to the inclusiveness of Landcare which effectively engages with *"with the young and old, farmers and urban dwellers, 'brown' and 'green'"* alike (GHD, 2013).
- **Localism and empowerment** – members are attracted to Landcare as it embraces local communities and their priorities, empowerment to define their own desired outcomes and creation of a social network of support (Curtis, 2003; Catacutan et al., 2009).
- **Filling a void -** Landcare has also built social capital by filling a void that has been created through the retraction of social networks due to rural decline and a decline in government services such as agricultural extension services (Webb and Cary, 2005).
- **Other benefits:** Including personal growth (Gooch, 2004), and increasing awareness, skills and knowledge (Cary and Webb, 2001, 2000).

5.5.5 Anecdotal evidence from the regional networks

Landcarers from the regional networks reported a number of specific examples of the support provided by Landcare NSW, including the Local Landcare Coordinator Initiative Program:

- freeing up the time of staff from the Coffs Harbour network to perform value adding activities (e.g. seek funding)

- provision of oversight and guidance to GLENRAC on the grants available and assistance with applications
- support to groups to be more professional and have better governance (e.g. by taking care of insurance requirements for Coffs Harbour)
  - also, for example, in WLNSW 95 per cent of member groups are incorporated and have their own insurance and governance in place
  - this puts them in a better position for procuring funding and working on local & regional projects
- reinvigoration of existing member groups and building of capacity for communities to form more groups
  - for example, in WLNSW, membership in 2015 was eight groups and in 2018 has grown to 26 groups with the placement of new coordinators provided by the LLCI
- increased connectivity between wide-ranging regions in the Riverina as a direct result of the involvement and support of the LLCI
- flexibility that allows the local coordinator to respond to the specific needs of the community, without the hindrance of specific program-wide administrative duties (Comments from the North Coast Landcare community)
- the LLCI program acts as a way of *"telling Landcare's story"* for the Landcare initiative, compounding the positive impacts on the value local coordinators are providing to their communities (Landcare 2nd Annual Workshop identified outcome)
- communicates the importance of a strong and capable committee, meeting regularly to support their co-ordinator: groups have a greater appreciation for the important role that Landcare is playing, not just over the Parkes and Forbes Shires, but over NSW and Australia (comment from Parkes and Forbes Shires)
- coordination of upskilling needed to oversee large scale projects, teams of people, volunteers, report on projects, verbally communicate and also deliver information through the newspaper, oversee finances, coordinate Facebook, Twitter and website updates
  - the LLCI has enabled co-ordinators to refine each of these skills, with Landcare as a beneficiary.

Landcare NSW recently held the 2nd Annual State-wide LLCI Workshop (21 June 2017), focussing on key learnings and improvements across regions. A key outcome recognised during the workshop (along with the benefits of communication, governance, networking / partnerships etc. already mentioned) was the fact that the **LLCI is a catalyst for action** on the ground and has provided the ability to mobilise investment[6]. The value-add of coordinators, facilitated support, strong governance, policies and a large interconnected network are key achievements in delivering NRM on ground. The *"ability to execute action plans developed from group vision rather than funding contracts"*[6] is an exceptional outcome. This indicates maturity, capability and increased capacity while simultaneously cherishing the grassroots character of Landcare.

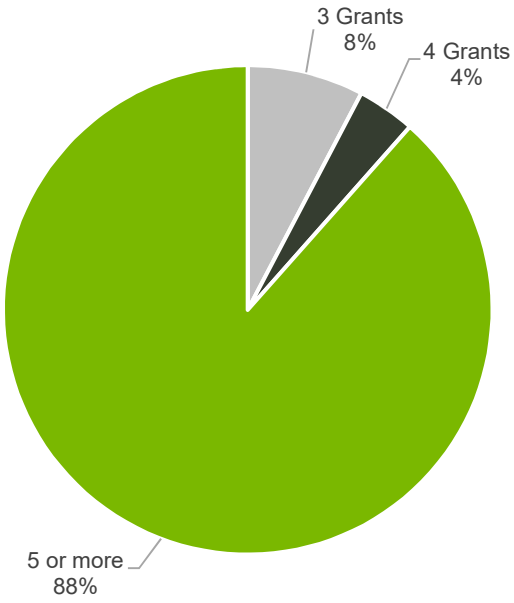
Results from a recent LLCI survey indicate the direct results of the LLCI providing support, advice and fostering partnerships[7]:

- 74% of respondents reported an increase in community group grant applications in the last year
- 96% of respondents reported an increase in community group participation in the last year
- 84% of respondents reported an increase in community group interaction / communication with Local Land Services in their region.

Of the 74% of respondents reporting increases in grant applications, at least 88% reported five or more community grant applications (or assisted grant applications) in the past year. A summary of the results is shown in Figure 5-1.

[6] Based on a summary report of the workshop prepared by Landcare NSW.
Source: Williams, S., Tkachenko, D., & Lovell, J. (2017). *NSW Local Landcare Coordinators Initiative: Report from the Evaluation Session Held as part of the 2nd State-wide LLCI Workship*. Ballina: Landcare NSW

Figure 5-1 Number of grants applied for between Jan 2016 and Mar 2017 (N: 26)[7]



There were no LLCI Coordinators who hadn't participated / assisted in at least three grants for their local groups in the last 15-month period, representing genuine value and support for the local community.

[7] Based on figures provided by Landcare NSW Survey Monkey survey completed 5 March 2017

6 Conclusions and recommendations

6.1 Assessment conclusions

Aurecon's assessment of the benefit of Landcare in NSW shows that:

- the impact provided by supported district and regional Landcare networks is significant
- evidence from the literature and from the networks highlights the importance that Landcare NSW, plays in facilitating, value adding, and maintaining the support that underpins the work of these Landcare networks.

The annual net benefit (i.e. net of costs) of a supported Landcare in Glen Innes, Coffs Harbour and *part* of Greater Sydney is estimated to be **$6.5 million**, considering the economic, social and environmental outcomes delivered by the networks. This only represents the benefits:

- for which data was available from the regional networks
- that could be quantified using data from the regional networks and the literature
- for three networks in NSW, and only for a part of one of those networks (Greater Sydney).

As a rough indication of the value across NSW, if these benefits were extrapolated across the state using the ratio of the population of the selected regions to the population of NSW, the net benefits delivered by a supported Landcare in NSW would be **$500 million per year**. To put this figure in perspective, it represents about:

- 0.1 per cent of the size of the NSW economy, which is approximately $500 billion
- $71 per person in NSW.

This suggests that the benefits are likely to be larger than estimated, whilst considering that many of the benefits provided by a supported Landcare NSW are not easily measurable.

This report summarises the literature evidence and anecdotal reports highlighting the significant contribution that Landcare NSW, through its role as a state-wide peak body and through programs such as the Local Landcare Coordinator Initiative which it jointly manages with Local Land Services, provides to help achieve these outcomes. However, it is challenging to estimate the proportion of the **$500 million** figure attributable to the network support, state-level linkage, representation and social capital benefits provided by Landcare NSW.

Assuming 10 per cent of the benefits are due to the support provided by Landcare NSW and the LLCI, this would equate to an attributable contribution of $50 million per year (or equally, $50 million per year would be lost if funding of Landcare NSW and the LLCI was removed).

Calculations by Landcare NSW have estimated that the funding requirement for an effectively supported Landcare movement, based on the support facilitated through the funding of the LLCI and provided by Local Land Services for Landcare support, equates to **$8 million per year** (this excludes support provided by Local Government, Industry bodies and others, and funds for on-ground works).

Based on this estimated funding requirement of approximately $8 million per year, the return on investment is more than **$6 for every $1 investment** (a BCR of greater than 6).

While the exact level of contribution of Landcare NSW and LLCI, and from Local Land Services toward this support is uncertain, even if only 2 per cent of that benefit were attributable to this support the investment into these initiatives would still deliver a positive economic return.

6.2 Opportunities for data collection and further work

The assessment has been limited by:

- the availability of data on outcomes
- availability of literature sources to value those outcomes.

Some of the regional networks are collecting useful statistics on the work they do. This is very important because it can be used to demonstrate the value of the groups' activities to the community, funding providers and other

stakeholders. The data collected by GLENRAC is a good example of this. The network collects data on the outcomes that provide economic, social and environmental benefits such as:

- trees planted
- area of soil treated
- area of waterways and riparian zones protected.

This is exactly the kind of data needed to enable an economic valuation of the benefits. GLENRAC's data collection practices and processes should be shared with the networks.

The benefit of this data collection could be even further improved by capturing more specific details on the outcomes (refer to Table 6-1).

Table 6-1 Recommended data collection for outcomes

Type of activity	Type of detail that would facilitate more accurate valuation of benefits
Trees planted	Species of tree(s) Whether this has provided habitats for fauna Type of land these trees were planted on (e.g. reserve or parkland, cropping land, grazing land, type of crop etc.)
Area of soil treated	Use of the land that was treated
Protection of waterways and riparian zones	Recreational uses of these areas (if any) Water quality outcomes (e.g. reduction in contaminants etc.)
Weed control	Types of weeds Type of land the reduction in weeds has benefited (e.g. reserve or parkland, cropping land, grazing land, type of crop etc.)
Pest control	Types of pests Type of land the reduction in pests has benefited (e.g. reserve or parkland, cropping land, grazing land, type of crop etc.)
Training provided to youth or disadvantaged population	Average age of the recipients of the skills Employment rate of the recipients Reports on changes in employment outcomes
Community and social events	Frequency of events Number of attendees

The contribution of Landcare NSW should also be captured by collecting data on the following:

- number and value of funding applications a local coordinator has assisted with
- instances where best practices were shared with a regional network
- instances where Landcare NSW advised on governance and administrative matters
- number of relationships between networks facilitated through Landcare NSW
- number of relationships between networks and other stakeholders (Government, private donors etc.) facilitated through Landcare NSW
- the number and types of projects local coordinators have been involved with.

The additional data collection would help further validate the estimates in this study and, since the analysis has only been able to capture a proportion of the total benefits, would provide a better estimate of the full benefits of a supported Landcare in NSW.

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Appendix A
Technical details of economic valuation

The following subsection outlines how the benefit transfer technique was used to value the economic, social and environmental outcomes achieved by the Landcare networks. Each subsection summarises the studies referred to in section 5, and shows how the estimates of net benefits by the authors were adjusted to arrive at estimates for the context of this study. The limitations of using these studies in the assessment are also discussed.

Cooke et al (2013)

Cooke, Chudleigh, Simpson and Saunders (2000) estimated the net economic benefit of biological control of rabbits in Australia. The authors estimated that controlling rabbit pests to improve agricultural production using biocontrol agents delivered a cumulative net economic benefit of $54 billion (2011 dollars) to the agricultural industry over 60 years. The benefit was estimated using the 'loss-expenditure frontier' technique, which involved estimating the loss of production avoided through pest control.

The estimate was applied to value 50 per cent of the pest control benefit in Glen Innes (assuming that 50 per cent of the pest control activities related to rabbit control) after making the following adjustments:

- calculating an annual net benefit estimate (e.g. $900 million per year)[8]
- scaling down the estimate using the ratio of the magnitude of the activity in Glen Innes (hectares) to the total area of agricultural land in Australia
- adjusting for inflation.

The approach implicitly assumes that half the pest control activities related to rabbits, and Landcare's control technique delivers similar net benefits to controlling rabbit pests using biocontrol.

Chudleigh et al (2011)

Chudleigh, Simpson and Lai (2011) estimated the benefits of the national wild dog facilitator (NWDF) program to reduce the impacts of wild dog pests on sheep and cattle farming areas. The impacts of wild dogs include predation of native wildlife and some control techniques such as baiting have an indirect impact on the environment by affecting non-target native species. Social impacts include psychological harm experienced by landholders and physical threat to humans.

The NWDF is a model that encourages cooperation between landholders using formal agreements such as Memorandums of Understanding (MOU) through a facilitator that helps broker these agreements. This encourages landholders to take a holistic approach, ignoring property boundaries, which is more effective in limiting the impact of wild dogs than a unilateral approach.

The authors use past studies and estimate the benefit as the avoided loss of livestock through the NWDF, and estimate avoided loss of sheep numbers worth $18.4 million per annum in NSW. The total investment in the program was estimated at $1.4 million.

These estimates were applied to value 50 per cent of the pest control benefit in Glen Innes (assuming that 50 per cent of the pest control activities related to wild dog control) after making the following adjustments:

- scaling down the estimate using the ratio of the magnitude of the activity in Glen Innes (hectares) to the total area of sheep and goat grazing land in NSW
- a net benefit was calculated by deducting half of the program costs from the benefits (assuming that half the costs related to the control of sheep and the half related to the control of cattle).
- adjusting for inflation.

The approach implicitly assumes that half the pest control activities related to wild dogs and Landcare's control technique delivers similar net benefits to controlling wild dogs using an NWDF approach.

[8] The cumulative value was assumed to be an undiscounted sum (not a present value)

GRDC (2014)

The Grains Research and Development Corporation (GRDC) (2014) used data from the literature to estimate a net present value (NPV) of $851 per hectare for integrated non-chemical weed control. The literature data was based on modelling studies (i.e. simulating the difference in economic value between the production that could be achieved after weed control compared to before weed control).

This estimate was applied to estimate the value the weeding activities in Glen Innes after making the following adjustments:

- scaling the estimate using the estimated hectares of farmland treated in Glen Innes
- adjusting for inflation.

The approach implicitly assumes that the weed treatments in Glen Innes deliver an NPV similar to that of IWM.

Elmqvist et al (2015)

Elmqvis, Setala, Handel et al (2016) estimated the benefits of restoring ecosystem such as rivers, lakes and woodlands in urban areas. The restoration of woodland in urban areas creates green spaces, which deliver benefits such as microclimate regulation, pollution reduction and health benefits, the provision of habitat, and cultural services. The authors valued the benefits of restoring woodland using literature that quantified the benefit in monetary terms based on a quantification in biophysical terms (e.g. amount of carbon sequestered etc.).

The authors estimated a benefit cost ratio (BCR) for woodland registration ranging from 1.21 and 6.57, from a cost of $49,000 (2015 US dollars) per hectare.

These estimates applied to estimate the value the willow tree treatment activities in Greater Sydney after making the following adjustments:

- deriving a per hectare net benefit by multiplying the cost by the estimated net benefit per unit of cost (using the average BCR from the study)
- applying this to the hectares of willow tree treated
- adjusting for inflation and the exchange rate.

The approach implicitly assumes that the type of restoration activity in Greater Sydney has similar benefits to those estimated by the authors. While the estimate relates to the value of woodland regeneration in the United States (US), it relates to the benefit in and around urban areas (e.g. Greater Sydney in the case of this work).

Lehrer et al (2013)

Lehrer, Becker and Bar (2013) used contingent valuation to estimate a mean willingness to pay (WTP) of US$8.50 and US$8.92 respectively for containment and eradication of the spread of invasive species at the Nizzanim long-term ecosystem research (NLTER) Coastal Sand Dune Nature Reserve. The benefits included dune stabilisation and improved of biodiversity as a whole.

Using these WTP estimates, the authors estimate a benefit of approximately US$570,000 for a one-time cost of between US$195,000 and US$400,000.

These estimates were applied to estimate the value the willow tree treatment activities in dune management activities in Coffs Harbour by:

- deriving a per hectare WTP estimate by dividing by the area of the NLTER
- applying this to the hectares of dune management in Coffs Harbour
- applying this WTP to the estimated number of households in NSW
- calculating a net benefit by deducting the cost per unit of benefit provided by the authors
- adjusting for inflation and the exchange rate.

The approach implicitly assumes that the type of management activity in Coffs Harbour has similar benefits to those estimated by the authors, and that the dunes of Coffs Harbour are enjoyed by NSW households (just as the households in Israel enjoy the NLTER dunes.

Loomis et al (2000)

Loomis, Kent, Strange et al (2000) used contingent valuation to estimate a household willingness to pay (WTP) of US$8.50 and US$8.92 respectively to restore five ecosystem services along a 45-mile section of the Platte river near Denver Colorado. The river systems provide water supply for municipal, industrial and agricultural users, fish habitat and recreation.

Using these WTP estimates, the authors estimate a benefit of approximately US$29 million for a cost of between US$13 million.

These estimates were applied to estimate the value the improvement due to land treated along riparian areas in Glen Innes and the selected Greater Sydney networks by:

- deriving a ratio that compares that the scale of the treatment to the scale of the restoration assumed by Loomis et al (2000)
- scaling the WTP by this ratio
- calculating a net benefit by deducting the cost per unit of benefit provided by the authors
- adjusting for inflation.

The approach implicitly assumes that the type of treatment activity in Glen Innes and Greater Sydney has similar benefits to those estimated by the authors.

NSW OEH (2018) and UNE et al (2007)

The NSW Office of Environment and Heritage maintain a register of transactions for the sale of biodiversity credits in NSW. Biodiversity credits are earned by landholders for protecting specific plant communities and species habitats in NSW. The credits can be used by develops when a development impacts on the biodiversity of land in NSW by surrendering credits of equal value to 'offset' their impacts.

Data from this register were analysed to derive a per hectare value for biodiversity in NSW. These data were used to estimate the benefit of tree planting activities in Glen Innes and Greater Sydney by:

- estimating the per hectare benefit as the average biodiversity credit value (expressed as $ per hectare) of the lowest 50 per cent (by value) of transactions on the credit register
- calculating a net benefit by applying this to the hectares of tree planting activity.

The purpose of selecting the lowest 50 per cent of transactions by value is to acknowledge that it was not possible to assess whether the Landcare activities generated biodiversity values (per hectare) are higher or lower than the average. Therefore, a conservative approach was used.

The assessment also doesn't consider the on-farm benefits of protecting biodiversity. For example, the University of New England (UNE), Southern New England Landcare and the Border Rivers-Gwydir Catchment Management Authority (2007) discuss the on-farm and off-farm benefits of protecting biodiversity. On-farm benefits include reduced wind-speed, reduced stock mortality, increased carrying capacity and increased land values.

Sinden and Griffith (2007)

Sinden and Griffith (2007) discuss the economic, social and environmental benefits of weed control, and analyse data on weed control expenditures to model the factors that affect how much the community values weed control in different areas. They note that while many studies have estimated the agricultural benefits of weed control, the environmental gains from the protection of plant communities from weed invasions have been difficult to value. The authors estimate this value by analysing control costs. The authors note that invasive plants have caused major losses to ecosystem services in Australia including soil and water conservation and protection of biodiversity.

The authors' modelling indicates that, all else equal, expenditure for the control of agricultural weeds will be approximately double the expenditure on the control of weeds in forests. This ratio has been used to value the benefit of weed projects on native bushland by the selected Greater Sydney Landcare groups. Specifically, the information is applied by:

- starting the hypothetical benefit of weed control had the activity been targeted at agricultural weeds using the data from GRDC (2014)
- scaling the estimate using the estimated hectares of bushland treated
- halving the value considering the results of Sinden and Griffith (2007)
- adjusting for inflation.

The approach makes a number of assumptions and simplifications (e.g. type of weeding, benefit of that activity, ratio between the benefits of weed control in farmland vs bushland etc.). Therefore, the results should be interpreted with caution. However, it is noted that the benefits of bushland weed control are relatively low compared to the other benefits estimated in this study and therefore do not significantly influence the key findings.

Walpole and Sinden (1997)

Walpole and Sinden (1997) undertook a benefit-cost analysis (BCA) of the treatment of sheet and rill erosion on farms in Gunnedah Shire. The BCA identified the biophysical and management factors that most influence economic outputs. The benefit of treatment of sheet and rill erosion was estimated by using data on the impact of land degradation and the effect this has on farm profitability under different conditions, and using geographical information system (GIS) data on land conditions in the Gunnedah Shire. The authors presented a net benefit for four selected farms, which averaged $280 per hectare NPV (1997 dollars).

This estimate was applied to estimate the value the weeding activities in Glen Innes after making the following adjustments:

- scaling the estimate using the estimated hectares of soil erosion treated in Glen Innes
- adjusting for inflation.

The approach implicitly assumes that the soil erosion treatments in Glen Innes deliver an NPV similar to that of the treatments assumed for the Gunnedah Shire in 1997. The drivers of profitability (e.g. value of agricultural production, costs of treatment etc.) are likely to have changed significantly since the publication of this study. Therefore the results should be interpreted with caution. However, it is noted that the benefits of soil erosion treatment are relatively low compared to the other benefits estimated by this study and therefore do not significantly influence the key findings.

Document prepared by

Aurecon Australasia Pty Ltd
ABN 54 005 139 873

Level 5, 116 Military Road
Neutral Bay NSW 2089

PO Box 538
Neutral Bay NSW 2089
Australia

T +61 2 9465 5599
F +61 2 9465 5598
E sydney@aurecongroup.com
W aurecongroup.com

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Angola, Australia, Botswana, China, Ghana, Hong Kong, Indonesia, Kenya, Lesotho, Macau, Mozambique, Namibia, New Zealand, Nigeria, Philippines, Qatar, Singapore, South Africa, Swaziland, Tanzania, Thailand, Uganda, United Arab Emirates, Vietnam.